COMPETITION TRIBUNAL
TRIBUNAL DE LA CONCURRENCE

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**THE COMPETITION TRIBUNAL**

**IN THE MATTER OF** the *Competition Act*, R.S.C. 1985, c.C-34;

**AND IN THE MATTER OF** the proposed acquisition by Rogers Communications Inc. of Shaw Communications Inc.; and

**AND IN THE MATTER OF** an Application by the Commissioner of Competition for an order pursuant to section 92 of the *Competition Act*;

**AND IN THE MATTER OF** an Application by the Commissioner of Competition for an interim order pursuant to section 104 of the *Competition Act*;

**B E T W E E N:**

**COMMISSIONER OF COMPETITION**

**Applicant**

**- and -**

**ROGERS COMMUNICATIONS INC. AND SHAW COMMUNICATIONS INC.**

**Respondents**

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# NOTICE OF APPLICATION FOR INTERIM ORDER
## Volume 2

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This is **Exhibit "51"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

This is **Exhibit "52"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
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Province of Ontario
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# Rogers Communications Inc.
# Second Quarter 2019 Results
# Conference Call Transcript

**Date:** **July 23, 2019**

**Time:** **8:00 AM ET**

**Speakers:**

**Joseph Natale**
President and Chief Executive Officer

**Tony Staffieri**
Chief Financial Officer

**Paul Carpino**
Vice President, Investor Relations

**Operator:**
Welcome to the Rogers Communications Inc. Second Quarter 2019 Results Conference Call. As a reminder, all participants are in listen-only mode and the conference is being recorded. Following the presentation, we will conduct a question-and-answer session. To join the question queue, you may press star, then one on your telephone keypad. Should you need assistance during the conference call, you may signal an Operator by pressing star and zero.

I would now like to turn the conference over to Paul Carpino with Rogers Communications. Please go ahead, Mr. Carpino.

**Paul Carpino:**
Thank you, Ariel. Good morning, everyone, and thank you for joining us today. I'm here with our President and Chief Executive Officer, Joe Natale, and our Chief Financial Officer, Tony Staffieri.

Today's discussion will include estimates and other forward-looking information, from which our actual results could differ. Please review the cautionary language in today's earnings report and in our 2018 Annual Report regarding the various factors, assumptions and risks that could cause our actual results to differ.

With that, let me turn the call over to Joe.

**Joseph Natale:**
Thank you, Mr. Carpino. Good morning, everyone. Today, I'm pleased to share our results and our progress in the second quarter. Overall, it was a pivotal quarter for Rogers and the Canadian Wireless industry. We continued to deliver strong fundamentals, and it is from this position of strength that we introduced fundamental changes to our Wireless offering. We made these changes after a thorough and thoughtful analysis on where the industry is going and what matters most to our customers. Now, more than ever, customers want worry-free data. 5G is at our doorstep and we need to unlock and unleash customer demand for data. This is a bold and important step forward and I truly believe it is the right time to lean in and drive this industry direction.

We approached this change with three main objectives: number one, drive growth in data usage by delivering a worry-free proposition for customers; secondly, get ready for 5G by shifting the value proposition from capped data to focus on the quality and capability of the service, a necessary evolution and a key market construct to prepare Canada for 5G; thirdly, redefine industry economics around equipment financing and a better customer experience to drive affordability, reduce friction and reshape the subsidy model over time.

Overall, we believe a small moderation in short-term growth rates will yield sustainable, superior economics in the medium- and long-term. While it is still early days, the response has been overwhelmingly positive. Our customers and our front line team love the simple, easy pricing. Our national competitors saw the strategic merit of our move and followed our lead. Overall, this was the right move for our customers, our Company and our country.

I will share further details on our customer uptake in a few moments, but first let me turn to our overall second quarter results.

Overall, we continue to deliver strong, profitable growth. In Wireless, we saw strong growth in service revenue and Adjusted EBITDA. We attracted 77,000 postpaid net additions and we executed strong pricing discipline to attract the right customers with the best lifetime value. We grew blended ARPU by 2% and we delivered postpaid churn of 0.99% for the second consecutive quarter, reflecting our steadfast focus on the customer experience and customer base management. In Cable, we delivered solid growth in revenue, margin, Adjusted EBITDA and free cash flow, accompanied by strong Internet loading. We also continued to grow Internet penetration for the 16th consecutive quarter. On a consolidated basis, we grew revenue by 1% and Adjusted EBITDA by 9%. We returned over $300 million to shareholders through dividend payments and share repurchases in the second quarter, and we will return over $1 billion to shareholders this year.

As I said earlier, thanks to these robust fundamentals, we were able to introduce a number of strategic moves to put our customers first. We were the first national carrier to introduce unlimited data plans with no overage fees, and Canadians are responding; 365,000 subscribers are already on these new plans. When you look at our customers who migrated, roughly two-thirds upgraded their price plan, choosing to spend more, and one-third are spending less. Overall, these customers are using 50% more data. This is impressive growth in just six short weeks and it’s tracking favourably to our business case. Thanks to the simpler pricing construct and important digital investments, online transactions are up substantially and average handle time is down both in retail and care, a great reminder that customer experience and cost management do work hand-in-hand.

In addition, we were also first to introduce both 24- and 36-month device financing. We have made it instantly more affordable for Canadians to purchase the latest devices any day of the year at zero dollars and interest-free. In the first two weeks, between the two options, more than 50% are choosing the 36-month plan. It is clear customers value the longer-term payment plan, as it helps them purchase the latest devices on more affordable terms. These new financing options not only make Wireless services more affordable, but by separating the embedded subsidy, it is also more transparent. Overall, we believe this construct should improve device subsidy economics over the long term.

The team delivered these two critical customer-first initiatives flawlessly and I'm incredibly proud of their execution efforts. We're on a long-term journey to deliver the best possible experience to our customers and these were important moves, with more to come.

We also made significant headway on our 5G roadmap. We started to deploy 600 megahertz capable radio equipment and we'll start to deploy 600 megahertz spectrum later this year. As you recall, we secured 52 of 64 available licences of this precious resource in every single province and territory. This low frequency, wide area spectrum is foundational to our 5G roll-out starting next year.

Last month, we announced a partnership to open a new national centre for cybersecurity at Ryerson University. Last week, we announced the creation of a 5G innovation lab with Communitech in Waterloo. We also completed our first successful 5G test calls in Brampton, Toronto and Vancouver. 5G is unlike any other Wireless technology we have seen before, and that is why we need the right partnerships to bring the right economic use cases and the right applications to market. Working with Ericsson, a global 5G leader, we will lead and bring the very best of 5G to Canadians.

We also made strategic advances in Cable. I'm pleased to share we're making steady progress on Ignite TV. We expanded our service to Newfoundland and we will expand to New Brunswick later this summer. Over 160,000 customers, almost 10% of our base, are using the service, and we're on track to reach our subscriber target for the full year. We continue to see impressive results, including significantly improved early lifecycle churn, likelihood to recommend and average revenue per account. This innovative service has a great future roadmap for the connected home, and it rests on our leading, reliable broadband network, a network we continuously invest in and build on. Just last month, we introduced Ignite WiFi Hub to give customers more control over their WiFi experience, and we now monitor 2.5 million WiFi devices daily to ensure customers have a terrific in-home experience.

More broadly, I'm proud of our team's deep commitment to drive our customer's experience. Our multi-year program to drive improvement in channels is paying off. In the call centres, service levels are strong and first call resolution is improving at a healthy rate, and digital sales adoption is up almost 10% and online sales volume is up almost 50%. In Retail, we continue to modernize our in-store experience. Ultimately, this is all about serving our customers where and when they want.

Finally, I'm proud to share that our team achieved an employee engagement score of 85%, the highest in our Company's history, and five points above global best-in-class. We believe a high-performing culture is critical to our success and it is a sustainable competitive advantage.

In summary, our fundamentals are robust, we delivered strong growth across all the key value drivers of our business, we made significant headway in our strategic long-term plan. We have a strong Management Team and a strong front line team, along with the right strategy and the right priorities to lead and win. I'd like to thank our entire team for their incredible dedication and commitment.

With that, let me pass it over to Tony.

**Tony Staffieri:**
Thank you, Joe, and good morning, everyone. Rogers delivered solid Q2 results, reflecting strong quality loading in both Wireless and Internet subscribers, continued margin expansion, healthy service revenue gains and positive blended ARPU growth. As we have highlighted in previous quarters, our focus continues to be on balancing growth opportunities with sound economic returns to ensure we create long-term sustainable value for shareholders and customers alike.

In Wireless, we reported healthy service revenue growth of 3% and Adjusted EBITDA grew 10%. Wireless margins were 50.3%, an expansion of 380 basis points from last year, as a result of strong growth in Wireless service revenue, successful cost management and the impact of adopting IFRS 16. We continue to execute on our quality loading strategy and delivered 77,000 postpaid net subscriber additions. Contributing to the strong service revenue growth were increases in both blended ARPU and blended ABPU. Blended ARPU was up 2% and reflected our 13th consecutive quarter of year-on-year blended ARPU growth. ABPU was up 4% in the quarter.

As Joe noted, it's early days with our Rogers Infinite plans, but we are pleased with the results to date. While Infinite had minimal impact in the second quarter, we are excited with the customer benefits and cost savings opportunities that these plans are expected to generate as we move into a 5G world. In addition to the value these plans provide our customers, we anticipate an ARPU and ABPU lift over time. Already, we are seeing our monthly recurring revenue being net higher for all those customers that have switched to our Infinite plans. Of course, this is impacting overage revenues, but at a rate that is shallower and faster than we anticipated. Operationally, we are already benefiting from the simplicity of these plans, as we are seeing fewer and shorter calls to our call centres and greater adoption of digital ordering. These types of benefits should drive greater efficiency in our Wireless business going forward. Importantly, both the revenue and cost saving improvements should be accretive to margin expansion and Adjusted EBITDA growth in the future.

Enhancing Rogers Infinite plans are newly introduced 24-month and 36-month consumer-friendly device financing programs. These simpler zero down, zero interest financing options now put total control in the hands of those customers interested in acquiring new devices and builds on the savings that all customers can access through the value embedded in our no overages and unlimited data plans. We currently spend over $2 billion each year on handsets, including significant subsidies that only benefit customers wanting new handsets. With reduced subsidies going forward, combined with eventual securitization of those financing receivables, this plan is expected to expand margins, be accretive to Adjusted EBITDA and drive stronger cash flow going forward.

Turning to Cable, we grew revenue by 1% this quarter and Adjusted EBITDA by 3%. Our Internet offering continues to be a key driver for our Cable business. Internet revenue grew 7% this quarter, reflecting the movement of Internet customers to higher speed and usage tiers, some service pricing changes and a larger Internet subscriber base. We remain uniquely positioned to meet customer demand for faster speeds and higher data with our ability to offer Ignite gigabyte Internet across our entire Cable footprint.

In Q2, we reported 22,000 net Internet subscriber additions. This reflects the 16th consecutive quarter of increasing Internet penetration rates. In addition, Internet ARPU grew compared to the prior year quarter. We also expanded Cable margins by 130 basis points this quarter, due to continued focus on efficiencies and product mix shift to higher margin Internet. Importantly, we again made good strides in reducing our CapEx intensity in Cable down to 29%. Combined with our EBITDA margin expansion in the quarter, our cash margin for Cable expanded to 19% this quarter, from 11% last year, good progress towards our goal of 25% cash margin by the end of 2021.

Moving to Media, revenue was 3% lower, largely as a result of the sale of our publishing business in the second quarter and lower revenue from the Toronto Blue Jays. This was partially offset by higher subscription and advertising revenue generated by our Sportsnet properties. Media EBITDA was strong, up 20%, driven by efficiencies and lower Toronto Blue Jays salaries.

On a consolidated basis, we delivered total revenue growth of 1% and strong Adjusted EBITDA growth of 9%. We invested $742 million in CapEx for the quarter, which increased 13% year-over-year. The increases in capital expenditures in Wireless this quarter are a result of the ongoing investments being made to augment our networks as we continue to drive towards a 5G world. Capital intensity was a bit higher this quarter, driven by both the timing of our investments, as well as lower revenue in our hardware sales.

With respect to cash flow and returning capital to shareholders, we generated free cash flow of $609 million this quarter, an increase of 2%. The increase this quarter was a result of higher Adjusted EBITDA, partially offset by higher planned capital expenditures and higher cash income tax payments in the quarter. We do, however, anticipate our cash tax rate to be in the 6% range for Fiscal 2019 as a percent of Adjusted EBITDA, compared to our full year 2018 cash tax rate of 8.2%. During the quarter, we continued to demonstrate our commitment to returning cash to shareholders through dividend payments of $257 million and repurchasing $50 million in Class B non-voting shares.

Our debt leverage ratio at the end of Q2 was 3.0 times, reflecting a 50-basis-point increase, compared to the end of 2018. IFRS 16 lease accounting drove 20 basis points of the increase and the completion of 600 megahertz spectrum purchase added 30 basis points. With a healthy business and strong free cash flow, we expect to continue reducing our leverage, moving closer to 2.5 times in the future.

We had liquidity of $2.6 billion at the end of the quarter and have solid investment grade credit ratings with a stable outlook. Additionally, our balance sheet is well positioned with long-term maturities and low interest rates on our outstanding debt.

In summary, we're very pleased with our Q2 results and the long-term outlook for Rogers. We remain laser-focused on effectively managing our base business, driving greater efficiency throughout the operations, improving the customer experience, and ensuring our growth is underpinned by sound economic fundamentals.

With that, I'll ask the Operator to open the lines for questions.

**Operator:**
Thank you. We will now begin the question-and-answer session. To join the question queue, you may press star, then one on your telephone keypad. You will hear a tone acknowledging your request. If you are using a speakerphone, please pick up your handset before pressing any keys. To withdraw your question, please press star, then two.

Our first question comes from David Barden of Bank of America Merrill Lynch.

**David Barden:**
Hey, guys, thanks for taking the questions. I guess first, just if I could get a little clarification. Tony, I think you said in your—sorry, Joe, in your prepared remarks that we should expect short-term moderation in growth with respect to the Infinite plan, but then you shared some stats that roughly two-thirds of the customers who were adopting the plan thus far are spending more. I'm just trying to understand, the next couple quarters, are we expecting growth to slow down or is this actually going to help, from kind of a cadence standpoint, over the course of the next couple quarters?

Then, second, I think you highlighted that about 10% of the base has now the new Ignite TV program. I was wondering if you could kind of elaborate a little bit about kind of what the goals and the shape of that are in terms of expectations for the rest of the year and into next. Thank you.

**Joseph Natale:**

Hi, David. Thank you. Why don't I start, Tony, and then you can chip in. When you look at the two-thirds that upgraded to the plans, versus the one-third, and you do the sort of monthly service revenue math on that, we're seeing a net positive, a net positive monthly service revenue. The moderation of overage—and we said last time we've been having meetings, that overage for Rogers is less than 5%. The overage over time will diminish and, therefore, moderate our growth rates as a whole, and that's exactly what we're seeing. We're still seeing a healthy, vibrant Wireless market with penetration growth opportunities, with data growth opportunities, and we think we've picked a good price point with respect to these unlimited plans, and we think that will just serve in the medium to long term to drive sustainable growth in the business as a whole. In the short term, we'll see some moderation.

Tony, feel free to comment on that specifically, if you like.

**Tony Staffieri:**
Sure, to put a finer point on it, David. You saw in the second quarter service revenue growth of 3%, and as Joe said, the recurring MRC is coming in quite nicely on a positive basis. It's the overage piece that, as you would expect, and we expected, some of that to melt. It's not as much as we thought. More of it, in terms of subscribers, but that's in our opening remarks, we said it was shallower than we expected. That 3%, you can expect a slight moderation of that growth rate in the back half of the year on service revenue, but, again, it's only six weeks into the plan, and so, as best as we can estimate it, that's what we're seeing. For the rest of the year, we don't expect it to be a material impact to our Wireless service revenue.

**Joseph Natale:**
We think we've picked the right balancing point for the future health of the business and the ability to make the shift and pivot it with the right economics, and we're very pleased with the results so far. Early days, but very pleased so far.

On your question around Ignite TV, our goal is to migrate the entire base over the next couple of years. We're taking a thoughtful approach and doing it steadily quarter-by-quarter. We're seeing good resultant economics of customers that do move. As I said earlier, it shows up in better churn, it shows up in higher ARPU and, most importantly, it shows up in very strong likelihood to recommend the service, as a whole. One thing we're making sure is that we do it in a manner that's not stirring our base and we just do it in a manner that is thoughtful and at a pace that makes sense overall. Over the course of the next couple years, we should be completing the migration.

**David Barden:**
Thank you. Just as quick follow-up, you called out the kind of expansion of Ignite TV as kind of a contributor to the higher Cable CapEx this year. Is that going to plan? The trajectory in Cable CapEx intensity seems to be falling rather than rising. Is there anything to talk about there?

**Tony Staffieri:**
What we're seeing, David, quite frankly, is very good unit cost efficiencies that are driving that Cable capital intensity down. We are getting the migrations from legacy to Ignite that we expected. The unit costs on a per-home basis are at and, in fact, slightly better than we anticipated. We've talked about a legacy home costing us upwards of $1,100 and the new Ignite platform at under $400, and falling, and so that's coming in as expected, but on top of that, what we're seeing is efficiency improvements in our node segmentation program, as well as efficiency improvements in our truck rolls and installation rates. That's what you see coming through. We do see it as sustainable declines in our Cable capital intensity.

**David Barden:**
Great. Thanks, guys.

**Paul Carpino:**
Thanks, David. Next question, Ariel.

**Operator:**
Our next question comes from Vince Valentini of TD Securities.

**Vince Valentini:**
Thanks very much. Let's stick with that last point first. I believe in your original guidance in January you were talking about Cable CapEx intensity not really declining much from the sort of low-30s percent last year. You're now at 29% year-to-date and you're saying it's kind of sustainable. Can I read into that that Cable CapEx may be coming in a bit below what you thought originally, Tony, but on the flip side, it

looks like your Wireless CapEx, potentially on the 5G side, is ramping up, so total CapEx is still where you thought, but it's a bit of shift from Cable into Wireless?

**Tony Staffieri:**
Let me clarify a few of those points. On Cable CapEx, yes, we do think it's sustainable. As you look to the back half of the year, our expectation is it will continue to sit around 29% to 30%, so below what we originally thought. On the Wireless side, the uptick that you saw in the second quarter was really as a result of timing, and so we don't see it necessarily transcending to the back half of the year. On a total basis, our CapEx may come in slightly below or in the lower range that we provided in guidance.

**Vince Valentini:**
That's very clear, thank you. Just back on the unlimited trends, and so forth, can I clarify it a different way? The 365,000, and I'm not 100% sure on that, I think that's as of basically now or in the last couple of days, or is that as of the end of Q2?

**Tony Staffieri:**
As of, like, yesterday, Vince.

**Vince Valentini:**
Okay, and is that virtually all migrations or does that include a lot of new gross adds coming in on those plans, as well?

**Tony Staffieri:**
It's a combination of migrations and new customers.

**Vince Valentini:**
Can you characterize that at all, would it be mostly migrations or …

**Tony Staffieri:**
No, it's as expected. We're not getting into the specifics of it, but it's as expected. It's been a great attraction for new customers, and also a good opportunity for existing customers, so we're happy with that balance overall.

**Vince Valentini:**
Okay, and last on that …

**Tony Staffieri:**
The thing to bear in mind is we're really happy to see the positive ARPU that we're getting from the monthly revenue, and as we kind of wade our way through the overage, we think there's goodness on the other end. Bear in mind that, as I said earlier, overage is less than 5%, and if you were to do a full economic analysis on that small piece of revenue, on the entire business, a full economic analysis around what is the extent to which we speak to those customers, our negotiating that overage number, our dealing with it on their bill, our having follow-up conversations with them, our issuing credits, our driving a propensity to churn around it, it is, in some ways, revenue with no real economic outcome. Weaning ourselves off that revenue and driving the goodness around unlimited plans, given the positive ARPU we're seeing so far, early days, we think is the right formula for the business moving forward. You think about the fact that we have some of the lowest data growth rates globally, right? That's not sustainable. That's not an environment where we're going to head into 5G, where customers are afraid of using data. I mean, it all kind of hangs together from that perspective, Vince.

**Vince Valentini:**
I fully appreciate that, and you kind of segued my last question. In terms of those cost reductions and the benefits you see, is it fair to say, even though you may be seeing a slight moderation in service revenue growth for the back half of the year, that you can fully make up for that at the EBITDA line with various cost initiatives? Whatever your guidance was before or consensus was before, you're still comfortable with?

**Tony Staffieri:**
That's right, Vince, and I think you said it well. Notwithstanding some of the, as you would expect, forecasting an estimation that we're going through on the revenue side, what we do know with a higher degree of certainty are the cost reductions are coming in. First and foremost, the subsidy changes have been implemented, and you see that when you look at our websites and how the cost of the device is factored into the 24- and 36-month periods, as well as on the subsidized plans, you see some moderation in the subsidies there on the Fido brand. That's already started to happen. But, as Joe said, in terms of average handling time on a call, we're seeing very good reduction, and there are other pieces of it that we had talked about, customers coming in on autopay, e-bill, and, again, while it's early

days, that's coming in nicely, as well. On a net-net basis, what we do have good line of sight to is a strong impact to EBITDA and free cash flow.

**Vince Valentini:**
Thank you.

**Paul Carpino:**
Thanks, Vince. Next question, Ariel.

**Operator:**
Our next question comes from Maher Yagi of Desjardins.

**Maher Yagi:**
Thanks for taking my question. I just wanted to go maybe a little bit bigger picture on the health of the Wireless market in general. When I look at your gross adds, still down year-on-year, but half of the decline that we saw in the first quarter. Can you talk a little bit, Joe, about the overall Wireless postpaid market, how is it changing, shifting with introduction of these unlimited plans, and your competitive positioning in the market?

**Joseph Natale:**
Sure. Thanks, Maher. Overall, we're still very bullish about the growth opportunity in the Wireless market. The circumstances around that have not changed. Penetration opportunity in Canada is still very strong at 87% penetration, on the road to similar to the U.S., 120% penetration. That penetration gain is still available to us. We're seeing, and modeling in our forecast, overall subscribers growing at about 4.5% for the year, end of period to end of period. We're still seeing that kind of growth and believing it's there for the taking.
I would say to you that the first part of the year, Q1, was quiet, and we talked about it on the last call, but we saw the market wake up about halfway through Q2, and it's been active and strong ever since. Bear in mind that we're still in the early part of the year. Despite half of the calendar year having gone by, two-thirds of the volume of our industry happens in the second half of the year, between all the various Black Friday, back-to-school, etc.

We think that some of the affordability options that we've introduced will help to stimulate that growth opportunity, and that's part of the thinking behind Infinite and behind device financing. We're very pleased with what we're seeing around the 36-month plans already. Clearly, Canadians have spoken and have said, "You know what? We love the choice between 24 and 36 months. We love the affordability options." In six weeks, we've seen more than half of our customers, more than half of the 365,000 customers who have chosen the Infinite plans—or the ones who have gone on financing have chosen 36 months as a whole, right? That's an impressive start to equipment financing, and more to come.

On a macro perspective, some of our view was to unlock the future growth potential. We had to do two important things. One is take away the fear and the burden of overage. When the overage regime in Canada was such that people were paying $100 for a gig of overage or had to sign up to a number of, you know, top-up approaches that they had to manage and worry about whether their son or daughter or family member was using too much data, etc., it creates a burden on our customers and it shows up in the data growth rates, while we've seen already that with this cohort of Infinite customers, we've seen those growth rates climb substantively. Then, you take a look at affordability of handsets. Handsets are getting more expensive, not less expensive. We have, in some ways, a duty to our customers to help them figure out how to afford these handsets through choice of 24 or 36 months, etc. We think those are two very important catalysts to continue driving the growth opportunity that exists in our market, as a whole.

Wireless as a service for everyday life is becoming even more vital and important, and it's insinuated itself into every facet of life. Therefore, I think the upside continues to be very strong. The applications around 5G, I think, although early days right now, and all day right now, they all seem rather theoretical in nature. We are having a very similar conversation on the advent of 4G, and look what it's done to change the approach for consumers and to create the on-demand economy. 5G will create a new real-time economy with all kinds of use cases that we have only begun to anticipate, and I think it bodes well for both the medium- and long-term growth prospects of our sector.

**Maher Yaghi:**

Great, thank you, and just to follow-up on the second half, you mentioned it's very important, as we all know. In your planning into the launch of the unlimited plan, did you have in mind or did your market research indicate that the early adopters of these unlimited plans are mostly guys who would upgrade or downgrade, because I'm looking at your two-thirds of the new unlimited plan takers have upgraded versus downgraded. Do you believe in the second half are mostly guys who would continue to upgrade, or how do you see this taking place in the second half with the back-to-school period?

**Tony Staffieri:**

Maher, our modelling, when we had put together our outlook for the Infinite plans, our expectation was that early on the majority of customers would be downgraders and they would chase the savings quickly and the upgraders were going to take a while to understand the plan, understand the commitment they're making to a higher price point, and that always takes a bit of time. We actually had the inverse modeled in our plans, and so we were quite pleasantly surprised to see the inverse happening. Our expectation, then, is with upgraders waking up and adopting the plan sooner than we expected, I think we should expect to continue to see that. Will it be in that direct proportion, don't know, but I think it's off to a good start. As we've said, with the MRC being net positive, that's what we had hoped as the long-term outcome, and it's happening sooner than we expected. Good news on that front, but, again, six weeks into it.

**Joseph Natale:**

Bear in mind that as a portion of our entire base, the potential upgraders are vastly larger, vastly larger than the portion of downgraders. What we're seeing is the customer perception of value, the customer's value for money mindset, saying that worry-free data is worth spending a bit more for, and as a result, we're seeing more of the upgrader population move earlier on that, which is nice to see, actually.

**Maher Yagi:**

Yes, I agree, and just one last question on Cable. The net adds on Cable, on high speed, how do you—can you talk a little bit about the competitive picture in the GTA area as the competition increases on fibre-to-the-home, the pricing environment?

**Joseph Natale:**

Sure. Well, first of all, the competitive landscape and intensity has not changed in either direction, frankly. It's been roughly the same as it has been the last long while, as a whole. Bear in mind that, as I mentioned earlier, this is 16 quarters, four years of Internet penetration growth for our organization. We're now sitting at 57% penetration across our footprint of 4.4 million homes and businesses passed, and those numbers are holding up whether it's in a competitor's fibre territory or not. It's holding up in condo buildings in downtown Toronto and it's holding up in suburban parts of Canada. It's holding up in more sparsely populated parts of Canada where we have a footprint and operations, as a whole.

What we really see from customers, more than anything else, is they want Internet reliability. They want Internet and WiFi that works, and works well, and the fact that we've got a capability of a one-gig service with now managed WiFi capability across the entire base, and some more developments are coming on that front. Our new WiFi Hub is a great product and device. It allows our customers to manage to manage their WiFi in their home, but it also allows our technicians and our service operations people to look into the house and see how the WiFi is performing, and to take a look to practically manage that WiFi environment for our customers even before they call, or even before they've noticed they have a problem. We're doubling down on this notion of reliability, we think it's the number one item that matters most, and we're seeing customer response from that value proposition, as a whole.

There will continue to be competitive intensity in the market, that's not going to change, but we're very excited about the Ignite roadmap and what's coming around the corner, and as a result, there's some really interesting stuff coming. We've got a new generation of WiFi extenders that will be launched sometime very soon. We've got new capability around television viewing, new opportunities around the connected home. We'll continue to create reasons to believe in the Rogers product set and reasons to buy for people that will overcome some of the price-only competition that we've seen historically.

**Maher Yagi:**
Great, thank you very much, guys.

**Paul Carpino:**
Thanks, Maher. Next question, Ariel.

**Operator:**
Our next question comes from Drew McReynolds of RBC.

**Drew McReynolds:**
Thanks very much. Good morning. Two for me. First, Joe or Tony, on the unlimited plans that you have out there in market, you talk about wanting to stimulate data consumption. Can you—I know it's early

days, but provide us a little bit of an update in terms of what you're seeing in terms of behaviour in those unlimited plans, relative to what the behaviour was before?

Then, secondly, bigger picture, just on the regulatory outlook. In the last six months, I think if you look at all the Wireless pricing changes out there in the Canadian market, it's been pretty amazing to see and how fast it's all unfolded. Maybe, Joe, talk about whether expectations have changed from a regulatory standpoint as we look forward to the Wireless hearing. Thank you.

**Joseph Natale:**
Tony, do you want to take the first one on data and I'll pick up on regulatory?

**Tony Staffieri:**
Sure. On data, we said from the outset that one of the key success points we would look at on this is actually driving up data growth. Within our population—and it's probably not dissimilar to the rest of the industry—what we saw was data usage growth slowing to about 20% year-on-year, and so what we wanted to do is really ignite that growth rate. For customers—of the 365,000 customers that have switched to the new plans, what we saw immediately, within the six-week period, is sequentially their usage grew by 50%. When you look at it sequentially, as well as year-on-year, very healthy data usage growth, which was the behaviour we were expecting. We didn't expect it as quickly as we thought. There are some reasons for that, the biggest one being customers no longer toggling their WiFi on and WiFi off switch, and so just by leaving it off, they're comfortable using the data, which is the experience we wanted, and that's what we're seeing in the usage rates.

**Joseph Natale:**
Drew, on the regulatory front, one thing that some of the moves that we've made have done, especially around unlimited and equipment financing, it really demonstrates that we are perfectly aligned with the overall agenda for the government on the regulatory front with respect to making Wireless services more accessible and more affordable for Canadians. My simple view of it is the more we focus on what's important to the customer, the more we focus on the customer experience as a whole, the more aligned it becomes with the overall regulatory view and policy of government. We've had some very encouraging conversations around some of the moves that we've made most recently, very supportive conversations from the Minister and other members of the Cabinet, as a whole, and we think that's a good sign.

We've got a very precious resource in Canada, and that is Wireless infrastructure. Our networks are truly amongst the best in the entire world in terms of capability, in terms of reach to rural parts of the population, in terms of speed. Pick any metric and Canadian networks are amongst the best in the world. The best avenue, we believe, to drive the continuous investment of that precious resource and drive economic return from that investment in a country as sparsely populated as Canada is to make the voice of the customer be the loudest on the landscape to preserve that infrastructure for the use in the future, and for 5G and all that brings.

I'll get off my platform now, but I would just say to you that we think these are all aligned to what matters most and we're seeing good support on that front.

**Drew McReynolds:**
Okay, thank you.

**Paul Carpino:**
Thanks, Drew. Next question, Ariel.

**Operator:**
Our next question comes from Tim Casey of BMO.

**Tim Casey:**
Yes, two for me. One, Joe, could you talk a little bit about what you're seeing across brands? Given the new Infinite plans are all on the premium brand, and it looks like Chatr had a decent quarter, at least in loading terms, I'm just wondering what you're seeing, if anything, in terms of movement across brands as the new plans have been introduced.

Second point, how should we think about any regulatory discussions with respect to the three-year financing plan? You said more than half of customers so far have responded to them, but I know there is a little bit of confusion out there about how those plans will fit in with the code, just wondering how you would frame that debate. Thanks.

**Joseph Natale:**

Okay. Thanks, Tim. One of our goals in launching Infinite was to really focus the value proposition for each of our three brands in Wireless, and I'm happy to report that, through this change, Fido has done very well and kept momentum that it had, strong momentum it had, and on top of that, Chatr is performing well. We're trying to create delineation where the Rogers brand is a brand that is about customers that want worry-free unlimited data and a more-for-more value proposition.

The Fido brand is aimed at people that are looking to spend somewhere in that $40 to $60 range, want a good experience, want a good service and a good network, but have less opportunity to spend the higher amount. The Chatr brand is available, and it's a great service to anyone, with a great value proposition, and an opportunity for people that are either budget constrained or that want to manage their Wireless services in a very new approach. It's good for people that are new to Canada, we see a lot of new Canadians on the Chatr brand. It's great for students.

We're really doing a better job of sharpening the segment focus of each of the parts of the Canadian market across the three brands, the goal being that each of the three brands is attractive to those different parts of the market and drives good, strong economics in and of themselves, and we're happy with that result, as a whole.

In terms of regulatory discussion, we feel that our approach is right for consumers. We've given consumers a choice of 24 or 36 months. We've separated the equipment financing from the monthly service fee, so it's completely transparent and open. Customers, whenever they like, can pay off the balance and do whatever they want with their phone at that point. We think it's very customer-friendly, very transparent, very open. We believe it is completely aligned with the intent and the spirit of the Wireless Code and regulation, and we've been incredibly cooperative with the CRTC around providing information and insight into why these plans are right for consumers, and we await their consideration.

**Tim Casey:**

Thank you.

**Paul Carpino:**

Thanks, Tim. Next question, Ariel.

**Operator:**
Our next question comes from Jeff Fan of Scotiabank.

**Jeff Fan:**
Thanks. Good morning, and thanks for taking the questions. I've got a few, very quickly. Number one, on overage, because you launched the plans, the Infinite plans, I guess, late in the quarter, was there any impact of overage in your second quarter number? I guess we'll start to see a little bit more of that in the third quarter and second half. I just wanted to clarify that.

Then, also clarifying, I guess, the moderation in growth. I'm wondering, as you kind of go through this transition, when should investors expect to see a reacceleration of the service revenue growth as you look further out, and how you model out the impact of Infinite?

Then, I guess the last one is on network usage. It's great to see that those that have come across on Infinite are seeing an increase of 50%. As you sit back on the network capacity, what are your thoughts in terms of how this may or may not impact capacity and, therefore, Wireless CapEx, and whether usage, over time, could maybe substitute some of the broadband usage or fixed broadband usage that's in the home, and that's, I guess, more of a longer-term story? Thanks.

**Tony Staffieri:**
Hi, Jeff. I'll start with the first one, straightforward. Virtually no overage impact in the second quarter. As you said, we launched it two weeks before the end of the quarter, and so there was hardly any impact in the second quarter.

I think the second part of your question is, how do we see this sort of unpacking in terms of time. Our expectation was that the full implementation of this was going to play itself out over six to eight quarters, somewhat in line with the contracted base. It may happen a little sooner. But, what we sort of see is, on the overage side, it's happening at a more moderated pace than we expected, so that might suggest it goes on a little longer, but as we've said, it's really a moderation to the growth rates. That's probably all we can say. It's, as we've said, six weeks into it, so it's tough to predict, but we're expecting a longer impact rather than shorter.

It’s not unlike—one of the analogies we’ve been talking to some of you about is Roam Like Home. When we did that, what we saw was a very quick adoption of the value proposition and a much quicker, in terms of probably four to five quarters, adoption and impact on the revenue melt that it had. For what it’s worth, that’s somewhat of an analogy both in terms of value proposition, as well as materiality of the amount. That’s probably all we can say at this point on that one.

**Joseph Natale:**
In terms of network, we’ve modeled network consumption and impact over the long term. We feel very comfortable with the types of growth rates that we would anticipate. We’ve benchmarked them against different countries in the world and their data growth rates and their consumption. We’ve got a great spectrum position, enhanced recently by the 600 megahertz acquisition, as a whole, so we’ve got the ability to deliver the capacity.

In terms of going forward, we’re investing in 5G and adding more capability, which will deliver even more capacity at a better unit cost. As I said earlier, if 5G is inevitable, then we’ll make—as an industry, make the pivot from data as a scarce resource that is measured by just tonnage or quantity to a pivot around the quality of service or capability that customers are paying for. There are new technologies that are coming along that will even create further capacity. The migration from 3G to 4G across the entire footprint, 4x4 MIMO technology will create capacity, new spectrum of 3500 will create strong capacity. We came from a paradigm, if I can use that phrase, a paradigm of scarce data was sort of a thing that defined the 3G and 4G era. The 5G era will be defined more by the level and capability and quality of a service, and I think that’s the important thing to bear in mind. Dynamic spectrum sharing will change that opportunity in a big way. We feel very confident around that, overall, Jeff.

**Jeff Fan:**
Thanks.

**Paul Carpino:**
Thanks, Jeff. Ariel, we have time for two more questions, please.

**Operator:**
Certainly. Our next question comes from Simon Flannery of Morgan Stanley.

**Simon Flannery:**
Great, thanks very much. Good morning. Joe, you talked quite a bit in the past about surfacing value from some of your investments. How are you prioritizing that at this point?

Then, maybe just to follow-up on the video business, can you just talk about what's going on in that business in terms of cord-cutting, what are you seeing in gross adds, what are you seeing in churn, and how does the profitability split? I think you said the margins are higher in Internet, but any colour you could give us around what happens on a video loss versus an Internet add. Thank you.

**Joseph Natale:**
On surfacing value, Simon, for some of our investments, I've got nothing really new to report. We continue to look for opportunities that make sense for the business in the long term, and when we have something that is meaningful, we'd be happy to share what we're thinking.

With respect to video, what we're seeing in the video market is, really, the market is coming together in sort of two segments, as whole. The overall market roughly runs at about 50% margin, versus Internet, as you know, is largely CapEx and fixed costs and the margin is much stronger, as a whole. What we're finding is that the top end of the video market, we're doing very well. We're doing very well for customers that want lots of content, wants an abundance of choice and programming, as a whole, and we're seeing very strong ARPU growth in TV, as a whole. We're seeing 4% ARPU growth as a result of that continued growth in that part of the market, and it's driven by Ignite TV and things that we're doing.

It's the other part of the market. If you think of the market as sort of being two sets of customers, a quasi-OTT kind of appetite, and there are some service offerings in different parts of the country that require very little investment in terms of installation or set-top box, and TV services for very basic service starting at about $5 a month. We don't have a play in that part of the market yet, but something is on the horizon for us, and there our goal is to create more choice for customers, where they have a very affordable entry point and then, through the course of time, they can buy content in a much more snackable approach. They can buy a series or an episode. They can buy the Raptors playoff as a service overall. They can add on as they see fit. We would see ourselves merchandising this as an add-on to Internet.

If you take a step away back, that is goal. Internet is our primary service, broadband to the home, and we'll continue to find offerings, whether it's video, all-you-can-eat video or all-you-can-choose video, or whether it's smart home monitoring or the connected home, to add value and to add opportunity for that broadband connection. But, we're still very bullish on video, still think it's an important part of our business. It's going through the transformation that we see all around the marketplace, frankly, globally. Happy with our addressing of the video opportunity on the upper end of the market, and more to come with respect to the à la carte part of the market.

**Simon Flannery:**
Great, good colour, thank you.

**Paul Carpino:**
Great, thanks, Simon, and our last question, please, Ariel.

**Operator:**
Certainly. Our final question comes from Aravinda Galappatthige of Canaccord Genuity.

**Aravinda Galappatthige:**
Good morning. Thanks for squeezing me in. Two quick ones for me. Number one, on the Wireless side, I fully recognize the simplification of the Wireless offerings under the new sort of structure. For Joe or Tony, maybe, do you worry that that perhaps creates gaps in the market that will allow your competitors to maybe take a little bit more share? If you think about the $75 plan—in a Rogers store, obviously, there isn't anything that's generally lower than that, so you're kind of forced to go to the flanker. Do you feel that for that segment of the market that wants a $55, $60 or $65 plan, that that creates a gap that might cause some share drain there?

The second question, real quick, on Media, Tony, I was wondering if you can give us a little bit more colour on the puts and takes we should think about in the second half. I know there was a little bit of noise around the salaries and distribution from MLB, as well as the publishing sale. I was wondering if there's anything notable for the second half. Thanks.

**Joseph Natale:**

I'll take the first one and Tony can take the second one. Aravinda, we are, as I said earlier, really trying to create crisp delineation between the brands. We have done a very thorough analysis of the Rogers base and the opportunity for that base to sign up to the Infinite plans, and we're very happy with the delineation that we've created around these price points. As I said, Fido is doing very well. We're pleased with that direction, as a whole, and we'll continue to march forward. Now, at the end of the day, the market will continue to evolve, it's a dynamic market, but we're pleased with the way we're approaching it and we're confident it's the right direction.

**Tony Staffieri:**

On the second part of your question, Aravinda, yes, a couple things. I think you should expect to see good healthy top line and EBITDA growth in the second half for Media. The Jays viewership and monetization will continue to struggle, but in the back half we have the other sports franchises coming onboard, hockey and basketball, notably, and so we expect that to drive good numbers as we head into the fall, and that's underpinned by continuation of radio having a very good, solid growth trajectory into the back half. That, combined with the cost efficiencies that you've seen in the second quarter, that'll continue into the back half. I think the outlook for Media continues to be strong for us.

**Aravinda Galappatthige:**

Great, thank you.

**Paul Carpino:**

Thanks, Aravinda, and thanks to everyone for joining us on the call today. If there's any follow-up questions, please feel free to reach out to the IR Team. Thank you.

**Operator:**

This concludes today's conference call, you may disconnect your lines. Thank you for participating and have a pleasant day.

This is **Exhibit "53"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

This is **Exhibit "54"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

**SHAW COMMUNICATIONS INC.**

**In the matter of Telecom Notice of Consultation CRTC 2019-57, *Call for comments – Review of mobile wireless services***

**MAY 15, 2019**

## I. EXECUTIVE SUMMARY AND INTRODUCTION

1. The following constitutes the initial intervention of Shaw Communications Inc. ("Shaw"), on behalf of itself and its wholly owned subsidiary, Freedom Mobile Inc. ("Freedom") in connection with the Commission's Telecom Notice of Consultation CRTC 2019-57, *Review of mobile wireless services,* 28 February 2019 (the "Notice").

2. This proceeding comes at a crucial "make it or break it" moment for Canada's wireless market. Competitive disruption of the Big 3 national incumbents – Bell, Rogers and Telus – is emerging through the growing strength of Freedom and Canada's other new regional competitors. At the same time, with the advent of 5G, Canada's wireless market is poised to become even more important to the lives of Canadians and to Canada's economic development and international competitiveness. By connecting everything, 5G offers an opportunity to change everything, enabling platforms and applications that we have not yet even imagined. 5G can change the way we live, learn, work and play, and how we build and manage our resources, local communities and, indeed, our country.

3. Canada has the potential to be a global leader in 5G. In Shaw's view, we owe it to current and future generations of Canadians to deliver on this capability. However, if the Big 3 do not face strong, independent competition in the 5G era, Canada's wireless market will once again become static and overpriced, and we will fail to realize the transformative promise of a truly dynamic 5G environment that includes affordable access to innovative wireless services.

4. The Notice articulates the objective of facilitating sustainable competition that provides reasonable prices, innovative services, and continued investment in high-quality mobile wireless networks.[1] Shaw fully supports this objective. However, the Notice also expresses the preliminary view that the benefits of mandated wholesale mobile virtual network operator ("MVNO") access "are now more likely to outweigh any negative impacts that a policy of mandated wholesale MVNO access might have on wireless carriers' network investments, particularly given the extensive investments that have been made in recent years."[2] This preliminary view is fundamentally at odds with the Commission's objective in this proceeding to facilitate sustainable competition and is not supported by any evidence. Given the circumstances of Canada's wireless market today, including the imminent shift to 5G, and the significant evidence of harm to consumer welfare and competition from MVNO resale regulation tabled with this submission, Shaw respectfully submits that this preliminary view must be reversed.

[1] Telecom Notice of Consultation 2019-57, *Review of Mobile Wireless Services,* 28 February 2019 ("TNC 2019-57"), paragraph 22.
[2] TNC 2019-57, paragraph 39.

5. In order to understand what we are putting at risk with the Notice's preliminary view, it is necessary to first develop an accurate picture of where we are today in Canada's wireless market and what the Canadian consumer is currently experiencing. The Big 3 continue to dominate the market, with a collective 90% market share. There is no denying that the Big 3 continue to charge excessive prices and punitive overage fees, while failing to respond effectively to consumer needs. However, their dominance has never been more susceptible to disruption by new regional competitors like Freedom.

6. Freedom and the other new regional competitors have proven their capability to discipline the market with innovative and differentiated offerings that respond directly to these anti-consumer behaviours. Since 2016, Shaw has been responding to consumer demand and delivering on the Government's policy agenda by investing over $3.3 billion in wireless, consistent with a long-term strategy that foregoes short-term profitability for long-term opportunity for growth. We have made significant long-term investments required to transform the Freedom network from a 2G network into a competitive LTE-Advanced network in less than three years.

7. Freedom's disruptive, disciplining role in Canada's wireless market is fictionally represented in recent Freedom television advertisements, dubbed the *Monolithic Wireless* series.[3] The caricature depictions in these advertisements speak to the frustration many Canadian wireless customers feel when opening their monthly bills[4] and the relief that Freedom is providing through its innovative, affordable offerings. In late 2017, Freedom launched its "Big Gig" plans, offering unprecedented value for data: 10 GB for only $50, with no penalties for overages. In doing so, we have addressed one of the most acute pain points for Canadians: a lack of affordable and valuable options for data plans.

8. The Big Gig plans are an important example of the lower prices, better value and customer-focused innovation that Canada's new regional competitors are bringing to Canada's wireless market. The paper authored by Dr. Eric Emch (the "Emch Paper")[5] shows that Freedom is not only offering innovative, unique services at the lowest prices, we are disciplining the Big 3 and driving lower pricing and higher value throughout the market. These are the consumer outcomes called for in the proposed 2019 Policy

[3] Freedom Mobile, "Introducing Monolithic Wireless", YouTube video, 6 April 2018, available online: https://www.youtube.com/watch?time_continue=24&v=o3QW4TWBykY; and Freedom Mobile, "Monolithic Wireless – The catch," YouTube video, 6 April 2018, available online: https://www.youtube.com/watch?v=SYgvEtUQwv8

[4] Many of these pain points have already been expressed through the interventions of Canadians on the record of this proceeding: TNC 2019-57, Consumer Interventions, available online: https://services.crtc.gc.ca/pub/ListeInterventionList/Default-Defaut.aspx?en=2019-57&dt=i&lang=e&S=O&PA=t&PT=nc&PST=a

[5] Dr. Eric Emch (Bates White Economic Consulting) "The evolution of facilities-based competition in Canada: Recent gains and regulatory risks," 15 May 2019, report prepared for Shaw Communications Inc. ("Shaw") in Telecom Notice of Consultation CRTC 2019-57 ("Emch (May 2019)"), paragraphs 30 to 37.

Direction: lower prices, innovation and differentiated services.[6] This is the essence of dynamic competition. Without a network platform, it is inconceivable that MVNO resellers could have a similar impact.[7] Delivering these outcomes is not easy. It takes time and significant, ongoing investment. It does not happen overnight.

9. The lower pricing, innovative services and emerging competitive discipline provided by Freedom and the other new regional competitors are clear. However, they cannot be taken for granted. Freedom is still in the growing stage. Even though it punches well above its weight-class, Freedom continues to face undeniable barriers to growth that are unnecessarily slowing its progress in bringing the benefits of sustainable competition to Canadians.

10. To start with, Freedom's business operates with a very different financial profile than the Big 3. As Dr. Emch explains, we not only have significantly lower margins than the Big 3, we concurrently face a much higher investment burden than the Big 3, as reflected in our relatively higher capital intensity.[8] In short, we have fewer financial resources to service the higher capital investment needs associated with building a new competitive mobile wireless network. In order to overcome this challenge, we need to build scale by gaining subscriber share across all segments of the mobile wireless market.

11. However, our ability to grow and expand our market share is constrained by barriers to investment and competition. These barriers include significant, ongoing spectrum disadvantages which constrain our network coverage and capacity, passive infrastructure access challenges, poor roaming experiences for our customers, and the Big 3's targeted customer retention tactics. We respectfully submit that the Commission should be focusing its attention during this proceeding on mitigating the various barriers to investment and competition that fall within its jurisdiction, not aggravating them through unjustified resale regulation.

12. Several decades ago, the Big 3 received their low-band cellular spectrum licences for free, which provided them with an essential network building block at the beginning of their deployment efforts. In stark contrast, Freedom only recently acquired 600 MHz licences, which, following a complex, multi-year transition and deployment period, will allow us to achieve a similarly robust coverage foundation for our network. However, we need time to deploy these 600 MHz spectrum licences and to make a return on our recent

[6] *Proposed Order Issuing a Direction to the CRTC on Implementing Telecommunications Policy Objectives to Promote Competition, Affordability, Consumer Interests and Innovation,* 9 March 2019, available online: https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11484.html
[7] Bazelon et al., (The Brattle Group), *An Analysis of Broadband Services in Canada. Competition, Regulation and Investment,* 30 August 2018 (the "Brattle Broadband Study (2018)"), paragraphs 76 and 77, appended to Shaw, Initial Submission dated 31 August 2018, *Competition Bureau's Market Study Notice: Competition in Broadband Services*, May 2018.
[8] Emch (May 2019), paragraph 62 and Figure 12.

investments that can be used to fund further competitive network investments in support of 5G.

13. If Freedom were to face a resale-based competitor with significant regulatory advantages over us, the financial assumptions that support our wireless business plans, including our planned deployment of 600 MHz spectrum, would be fundamentally altered. Resale-based MVNOs will target Freedom's customers and market niches. This will redirect much-needed revenue, subscriber growth, scale and other resources away from strong, new facilities-based competitors, like Freedom, back to the Big 3 networks, re-entrenching their dominance.

14. Mandating MVNO will put resellers in a privileged position that guarantees a return and relieves them of the very significant financial burden and risks that Freedom has undertaken to build a competitive network in an extremely compressed timeframe.[9] The MVNO resellers' artificial advantages in the market will undermine Freedom's ability to gain market share and scale, thereby jeopardizing our ability to continue investing, including in next-generation technologies.[10] There is no denying the evidence of harm of MVNO resale regulation, and the significance of that harm, to Freedom and its investments.

15. MVNO resale regulation would clearly favour resale competition over facilities-based competition, which would violate the proposed 2019 Policy Direction and the objectives expressed in the Notice. This kind of intervention would also violate the 2006 Policy Direction by failing to rely on market forces to the maximum extent feasible to achieve the policy objectives. In contrast, as shown by the work of Dr. Emch,[11] regulatory intervention that addresses barriers to investment and competition will not only support facilities-based competition, it will also lead to healthier, market-driven resale competition.

16. We expect the Big 3 will also oppose MVNO regulation but for different reasons than Shaw. Shaw encourages the Commission to focus its attention on the stakeholders that

[9] In contrast, the Big 3 have had nearly 40 years to build their mobile wireless networks while facing relatively no competition.

[10] See Brattle Broadband Study (2018), paragraph 78: "Consequently, when considering investing to upgrade their infrastructure, if market participants expect to face competitive pricing that will not allow them to recover their sunk costs, they will not have the incentive to make the investments. This leads to suboptimal levels of investment, and thus dynamic inefficiency in the long run."

[11] See Dr. Eric Emch (Bates White Economic Consulting), "An assessment of wholesale roaming policy in Canada: The interaction of competition, regulation, investment and access," 8 September 2017, report prepared for Shaw in Telecom Notice of Consultation CRTC 2017-259 ("Emch (Sept 2017)"), paragraphs 44 and 50 to 53; Dr. Eric Emch (Bates White Economic Consulting), "An assessment of wholesale roaming policy in Canada: Response to initial interventions in Telecom Notice of Consultation CRTC 2017-259", 27 October 2017, report prepared for Shaw in Telecom Notice of Consultation CRTC 2017-259 ("Emch (Oct 2017)"), paragraphs 45 to 50; and Dr. Eric Emch (Bates White Economic Consulting), "An assessment of wholesale roaming policy in Canada: Response to supplemental intervention of Ice Wireless in Telecom Notice of Consultation CRTC 2017-259", 3 November 2017, report prepared for Shaw in Telecom Notice of Consultation CRTC 2017-259, paragraphs 21 to 27.

will suffer the most from a misguided mandated MVNO resale regime: Canadians. The significant benefits of dynamic competition that are beginning to change the face of Canada's wireless market will fade away, to the detriment of consumers and the development of our digital economy. By redirecting resources away from new facilities-based competitive investment, MVNO regulation will ultimately reinforce the strength of the Big 3. Scale and financial resources that would otherwise have supported a new competitive network will flow back to the Big 3's networks through their wholesale businesses. Critically, the Big 3 will also face a much weaker facilities-based competitor in the market that is less able to invest in future technologies. This will diminish the disciplining power of the new competitors, ultimately restoring the Big 3 to a joint dominance position that will then carry through to the 5G era. The result will be overpriced 5G services, which will not only lock consumers into higher prices, but also drive innovation and investment by application developers to lower-priced jurisdictions. This will waste Canada's opportunity to become a global 5G leader and destroy any hope of attaining the Government and CRTC objective of establishing sustainable wireless competition in Canada.

17. In this proceeding, beginning with this submission, Shaw will present clear empirical and expert evidence that the harms to consumers, competition and the future of 5G posed by MVNO resale regulation outweigh any benefits, which have not been established. We do not expect the proponents of this dramatic shift in Canada's wireless regulatory framework to be able to present sufficient, if any, evidence to prove otherwise. Indeed, such evidence has not surfaced in previous proceedings on this topic or in the international research that Dr. Emch conducted in authoring the Emch Paper.[12]

18. The fact that many MVNOs have not yet emerged organically in Canada is not a sign of market failure. Instead, it is a sign that sustainable facilities-based competition has not yet fully matured. MVNO regulation is uncommon internationally. Furthermore, and not surprisingly, there is no example of a regulator implementing a mandated wireless resale regime in the same timeframe that a new competitive wireless network is being built. This is clearly because such regulation would choke off the emerging facilities-based investment. Instead, what Dr. Emch observes internationally is that, where strong, facilities-based disruption is established, MVNOs emerge naturally because of the operation of market forces. MVNOs are a by-product of, not a causal factor in, the establishment of sustainable, efficient and effective competition in mobile wireless markets.

[12] Telecom Decision CRTC 2018-97, *Reconsideration of Telecom Decision 2017-56 regarding final terms and conditions for wholesale mobile wireless roaming service,* 22 March 2018 ("Telecom Decision 2018-97"); Telecom Regulatory Policy CRTC 2015-177, *Regulatory framework for wholesale mobile wireless services,* 5 May 2015 ("TRP 2015-177"); and Telecom Decision CRTC 2016-60, *The Canadian Network Operators Consortium Inc. – Application to review and vary Telecom Regulatory Policy 2015-177,* 18 February 2016.

19. Shaw respectfully asks the Commission to shift the focus of this proceeding, recognizing the significant, emergent benefits to Canadians from maturing dynamic facilities-based wireless competition. We should not be spending the bulk of this proceeding debating the undefined, radical regulatory remedy of mandated MVNO resale. Now is not the time for a regulatory u-turn. This will undermine the future of wireless affordability and innovation for Canadians. Instead, we should be designing tailored, efficient regulatory measures that target barriers to competition and investment. To this end, we have put forward our preliminary views on several proposed remedies that are designed to promote the effectiveness of mandated wholesale roaming and to address the passive infrastructure issues facing new facilities-based competitors. Our proposals will ensure that Canadians and our growing digital economy are supported by a wireless connectivity ecosystem that is affordable, dynamic, competitive and fully capable of delivering on the transformative promise of 5G.

20. The structure of Shaw's submission is as follows:

(a) First, we provide evidence of how facilities-based competitors like Shaw are driving sustainable competition against the Big 3.

(b) We then demonstrate that artificially inducing MVNO resale entry through regulation will do more harm than good for Canadians and the Canadian economy, contrary to the Commission's preliminary view.

(c) We then proceed to consider the appropriate analytical framework that the Commission must apply when deciding whether to intervene in the market.

(d) Finally, we offer our recommendations for how the existing wholesale rules could be adjusted in furtherance of sustainable competition in the market.

21. Shaw's responses to the specific questions in the Notice are provided in Appendix A.

## II. NEW FACILITIES-BASED COMPETITORS LIKE SHAW ARE DRIVING SUSTAINABLE COMPETITION AGAINST THE BIG 3, BUT CHANGE TAKES TIME

22. Even though it has been less than four years since the 2015 wholesale mobile wireless service regulatory framework was established by the Commission, and just over one year since final wholesale roaming rates were set, consumers are already experiencing the benefits of Freedom's strong competitive presence in the market. In this section, we consider those impacts, as well as the barriers that continue to hold us back from realizing the full potential of sustainable competition. Freedom and the other new regional competitors need more time in a stable policy and regulatory environment to get the job done.

## A. Shaw's Entry to the Wireless Market in 2016 Brought Sustainable Competition

23. The Notice acknowledges that "there have been positive signs with respect to investment, since facilities-based competitors, both national and regional, have continued to invest in their networks" but then goes on to equate Rogers' and Bell's acquisitions of competitors with Shaw's acquisition of WIND:

> Since 2015, RCCI has acquired Mobilicity, Shaw Communications Inc. has acquired WIND (now Freedom Mobile Inc.), and Bell Canada has acquired MTS Inc. (some assets, including some retail stores, subscribers, and spectrum, were divested to Xplornet Communications Inc.).[13]

24. This leads into the Commission's conclusion that "certain aspects of [the wireless] market are not, in fact, sufficiently competitive in their current state to properly protect the interests of users and further the policy objectives set out in Section 7 of the Act."[14] In turn, the Commission uses this interpretation of recent events in the mobile wireless market to justify its preliminary conclusion that wholesale access for MVNO resellers should be mandated.

25. Shaw is concerned with the Notice's suggestion, perhaps inadvertent, that Shaw's acquisition of WIND was an instance of market consolidation. This is clearly incorrect – Shaw's acquisition of WIND was a transaction of *market entry* not *market concentration.* Given that this is critical to a proper reading of Canada's wireless markets today, we would respectfully ask that the Commission correct this aspect of the Notice at an appropriate point in the proceeding. Prior to this acquisition, Shaw had no presence in Canada's mobile wireless market and held no mobile spectrum licences. At the same time, WIND did not have sufficient resources to compete effectively or to grow: WIND's financial struggles forced it to drop out of the 700 MHz spectrum auction at the last minute, and to forego participation in the 2500 MHz auction.[15] As explained further below, Shaw's acquisition of WIND represents an instance where a well-financed new entrant has directly contributed toward sustainable market competition in the wireless sector, representing a significant win for Canadian consumers.

## B. Freedom Disrupts *Status Quo* in the Mobile Wireless Market

26. Shaw has clearly been a disruptive force in Canadian wireless. In 2016, Shaw entered the market, in response to a clear lack of competition, reflected in the virtually identical, constrained and expensive offerings of the Big 3 in its markets. For example, prior to

[13] TNC 2019-57, footnote 13.
[14] TNC 2019-57, paragraph 26.
[15] Rita Trichur, "Wind Mobile pulls out of wireless auction," *The Globe and Mail*, 13 January 2014, available online: https://www.theglobeandmail.com/report-on-business/wind-mobile-pulls-out-of-spectrum-auction/article16313945/; Pete Evans, "2500 MHz spectrum auction raises $755M, mainly from Telus," *CBC News*, 12 May 2015, available online: https://www.cbc.ca/news/business/2500-mhz-spectrum-auction-raises-755m-mainly-from-telus-1.3070793.

Shaw's entry, no service provider offered 10GB of data for under $100,[16] and all of the Big 3 charged excessive overage fees, while tying device subsidies to service packages. This static market was not meeting consumer demands for dynamic and affordable wireless services.

27. Shaw wanted to empower Canadians with the choice of something new, differentiated and innovative. We knew that this would require substantial investments in independent network facilities. To date, Shaw has invested well over $3 billion in wireless.[17] Since our acquisition of WIND in 2016, we have significantly enhanced our network through the accelerated transition from 2G and 3G to 4G LTE, and later to LTE-Advanced, including our launch of Voice over LTE ("VoLTE") as well as extended range LTE. We have also constantly sought to improve our customer experience by expanding coverage to new areas, being the first to introduce mobile services in Toronto's subway system. We have acquired 700 MHz and 2500 MHz spectrum licences,[18] in addition to acquiring 600 MHz spectrum licences through the recent auction. Our deployment of spectrum resources has been thoughtful and innovative, recognizing the very different financial and spectral circumstances of our wireless business relative to the Big 3. For example, the timely re-farming of our AWS-1 spectrum in 2017 gave Freedom customers access to increased LTE data speeds and a much broader eco-system of devices, including the newest iPhone models.[19]

28. With each additional investment, we have been able to gradually mount a stronger competitive threat against the Big 3. This is clear from the impact of the 2017 "Big Gig" launch, which was only possible because of investments in the capacity of our network. Since their emergence, the Big Gig plans have changed the market by making significantly more data available at a significantly lower price.[20] This has brought relief to one of the most acute pain points for Canadian wireless consumers: a lack of affordable and valuable

[16] Emch (May2019), paragraph 31.
[17] Shaw Financial Reports, including 2016 Annual Report, 2017 Annual Report, 2018 Annual Report, and Q1 2019 Quarterly Report. The Reports are available online: https://www.shaw.ca/Corporate/Investor-relations/Financial-Reports/.
[18] Shaw Press Release, *Shaw Communications Inc. announces acquisition of 700 MHz and 2500 MHz wireless spectrum licences from Quebecor Media Inc.*, 13 June 2017, available online: https://newsroom.shaw.ca/materialDetail.aspx?MaterialID=6442452002.
[19] Sameer Chhabra, "Freedom Mobile has completed its refarming of AWS-1 spectrum: The company continues on rolling out 2,500MHz and 700MHz spectrum," *MobileSyrup*, 12 April 2018, available online: https://mobilesyrup.com/2018/04/12/shaw-has-completed-its-repurposing-of-10mhz-of-aws-1-for-freedom-mobile/; and Emily Jackson, "Shaw undercuts Big Three on iPhone pricing, Freedom Mobile to sell iPhone X for $0 upfront," *Financial Post*, 22 November 2017, available online: https://business.financialpost.com/telecom/shaw-diverts-from-big-three-in-iphone-pricing-freedom-mobile-to-sell-iphone-x-for-0-upfront. The iPhone was made available for $0 down (subject to conditions, including the activation of a new service and a 24-month service agreement).
[20] Our most popular wireless plan, which provides generous data and unlimited calling and texting, is approximately 50% cheaper than similar plans offered by the Big 3. In addition, we don't charge overage fees if our customers exceed their data limits and we separate the cost of the phone from the service plan, so once the phone is paid for, our customers' bills go down. Furthermore, we kept our commitment to serve the entry-level market by offering low-cost data plans that are cheaper than anything offered by the Big 3 and we have not raised prices on these entry level services. These generous data plans are only possible due to our significant investment in our network.

options for data plans.[21] Freedom's Big Gig plans include 10 GB for only $50 per month, with no financial penalties for overages, in sharp contrast to the Big 3 standard-practice. Notably, Freedom was the first wireless carrier in Canada to introduce plans with 10GB or more of data for less than $100. Moreover, the Big Gig plans were in every case the lowest-priced offering available in the market for a given data amount between 2017 and 2019.[22]

29. The affordability, innovation and differentiation that we have brought to the market are also evident in our

(a) Big Binge bonus promotion, launched in 2018, which empowers customers with an additional 100 GB of bonus data, on top of the fact that we don't charge overage penalties; and

(b) Industry-leading lower-priced offerings that promote wireless adoption and affordability – our most recent initiative offers prepaid-only plans for $9/month (unlimited global texting), $19/month (unlimited Canada-wide talk and global texting), and $24/month (1.5 GB of LTE data plus unlimited Canada-wide talk and global texting).

30. In addition to disrupting the Big 3's market dominance through innovative, affordable offers, we have multiplied the number of Canadians who benefit from our competitive presence by expanding our network to new markets, including smaller communities. Earlier this year, we launched services in several smaller communities in Eastern Ontario and Western Canada, with many more launches set to occur in the coming months. These communities include Peterborough, Cobourg, Belleville, Brockville, Cornwall and Pembroke in Ontario and Red Deer and Victoria in western Canada. We have publicly announced upcoming expansions into the cities of Prince George, Prince Rupert, Nanaimo, Lethbridge, and Medicine Hat. Freedom has added over 576,000 subscribers since 2016, representing over 50% growth in under three years.

31. Notwithstanding the barriers we continue to face (as described further in the next section), Freedom's impact is being felt in the market. Prior to our Big Gig launch, the price for monthly wireless service in Canada with 10 GB of data was over $100/month.[23] Shortly after the introduction of Freedom's $50/10GB Big Gig plan, each of the Big 3 matched

[21] See Statistics Canada, *Telecommunications service price indexes, second quarter 2018*,released 1 February, 2019, available online: https://www150.statcan.gc.ca/n1/daily-quotidien/190201/dq190201a-eng.htm (accessed 8 April 2019), as well as recent CRTC Communications Monitoring Reports, which show a decline in average revenue per 1 GB of data/month of 40% between 2015 and 2017.
[22] As explained in Emch (May2019), paragraphs 35 and 37. Dr. Emch notes that, for example, Freedom's 10 GB data plan with unlimited continental calling cost only $60, but the next cheapest plan, offered by Fido, a flanker brand of Rogers, cost $115, almost twice as much as Freedom's price.
[23] See Emch (May 2019), paragraph 33 and Figure 7.

Freedom's offering with a $60/10GB promotional plan in every province in which Freedom operates.[24] This response mirrors the experience in many jurisdictions internationally, as outlined in the Emch Paper, where new entrants act as challengers that drive existing operators to improve their offers and performance.[25] MVNO resellers, by contrast, cannot have this multi-dimensional competitive effect because they do not have an independent network with which to bring truly differentiated and innovative products to market. They will compete only on price in a "rinse and repeat" of Big 3 products, and do nothing to promote innovation, one of the core objectives of the 2019 Policy Direction.

32. The magnitude of the churn caused by the $60/10GB promotions is itself evidence of the impact of new entrants such as Freedom and other new regional competitors.[26] Furthermore, while the Big 3 continue to maintain customer-unfriendly pricing and other practices, including overage fees as high as $100/GB ($10/100MB),[27] there is no denying that Freedom's Big Gig plans have lowered the much-resented overage charges that Canadians pay to the Big 3. In 2016, data overage charges accounted for 6.0% ($1.39 billion) of total mobile retail revenues. This figure dropped to 5.0% ($1.23 billion) in 2017 after Freedom introduced the Big Gig Plans in the market in late 2017.[28] Competitive pressure from Freedom forced the Big 3 to provide their subscribers with plans with higher data caps, which lowered the data overage penalties that subscribers paid for exceeding their data limits. However, the Big 3 use every lever available to retain market share, including aggressive and targeted attempts to reduce or eliminate Freedom's competitive benefits.[29]

[24] Several industry publications have observed that these offerings were a direct response by the Big 3 to address customer switching to the new entrant. See Emily Jackson, "Will Freedom Mobile shake up the wireless market? We're about to find out, *Financial Post,* 9 January 2018, available online: https://business.financialpost.com/telecom/will-freedom-mobile-shake-up-the-wireless-market-shaws-results-thursday-may-offer-some-clue; and Gary Ng, "Rogers/Fido vs Telus/Koodo vs Bell/Virgin $60/10GB Plan: Who Did You Pick" *iPhoneinCanada*, 17 December 2017, available online: https://www.iphoneincanada.ca/carriers/rogers-fido-telus-koodo-bell-virgin-60-10gb/.

[25] As set out in the OECD Report referred to in Emch (May 2019), paragraphs 43 to 45.

[26] Scotiabank Equity Research re BCE, 8 February 2019.

[27] Other consumer unfriendly practices among the Big 3 extend to reverting to higher-priced plans after only a short promotional period; failing to reduce monthly charges when the customer's device is fully paid off after two years (or burying extra charges for new phones into the customer's data rate plans); charging customers activation fees or charging customers service fees to change their rate plans to one that better meets their needs and budget; subsequently increasing plan costs to the vast majority of customers who signed up to Big 3 promotions offered in response to more consumer friendly plans offered by Freedom.

[28] Government of Canada, *CMR 2018 – Retail Mobile Sector,* 18 December 2018, Table 6.16 – Revenues received from data overage, as a percentage of total mobile retail revenues (%).

[29] Among the most prevalent practices of the Big 3 include providing more consumer friendly plans and prices only after customers have switched to Freedom Mobile (such plans and prices are rarely available to the customer during their regular tenure with the carrier); and targeting Freedom customers directly with "instructions" on how to cancel their contracts during the "trial period" mandated under the Wireless Code of Conduct (ironically, these core protections in the Wireless Code have been "weaponized" by the Big 3 as an aggressive winback tool).

## C. Barriers to Competition Remain High

33. On top of these targeted, aggressive retention tactics, we continue to face barriers that constrain its investments and ability to compete with the Big 3, in spite of Freedom's positive momentum. This slows our progress in bringing the benefits of sustainable competition to Canadians. For instance, the Big 3 continue to enjoy a significant spectrum advantage in all spectrum ranges even after our gains in the 600 MHz auction (see Figure 1 – National Spectrum Holdings). This imbalance represents an absolute barrier by limiting the coverage and capacity that competitive networks can offer against Big 3 networks. Fortunately, Innovation, Science and Economic Development Canada ("ISED") has adopted pro-competitive spectrum policies in the past, and we will advocate strongly for further pro-competitive measures in upcoming licensing processes, including for the 3500 MHz and millimetre wave bands.

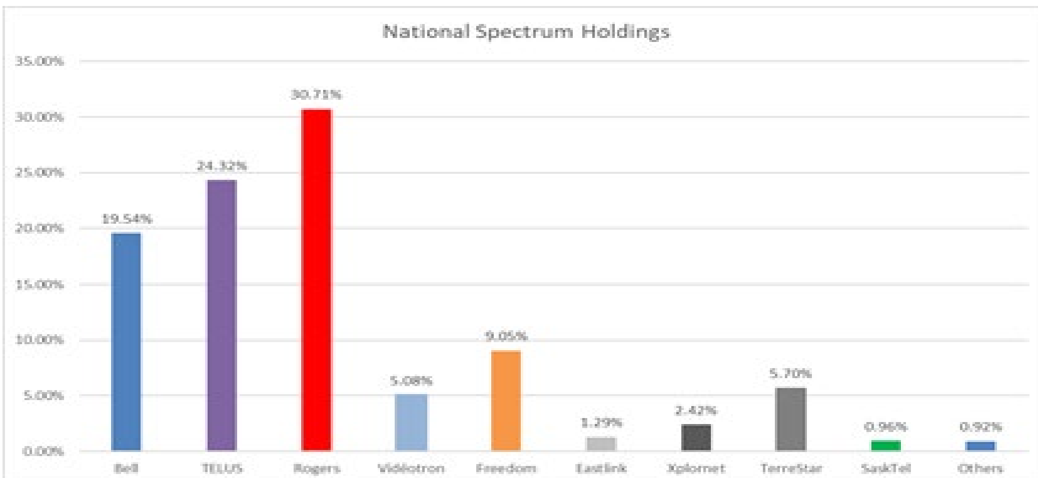


*Figure 1 – National Commercial Mobile Spectrum Holdings*[30]

34. As explained by leading economic experts, the Big 3 are incented and able to foreclose new competitors from gaining access to the spectrum they need to compete.[31] This foreclosure risk is particularly acute with respect to the key spectrum bands for 5G, including the 3500 MHz and millimetre wave spectrum bands: if the Big 3 can keep new competitors out of these bands, they will keep new competitors out of 5G,[32] effectively

[30] Weighted MHz/Pop estimate, based on ISED's, *National Holdings for Commercial Mobile Spectrum Licences,* 14 July 2016, available online: https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11210.html, updated to reflect licence transfers approved by ISED and spectrum auctions occurring after this date.
[31] The Big 3 recognize the value of preserving their dominance of the market and can do so by ensuring that strong new facilities-based competitors do not obtain additional spectrum. Peter Cramton, *The Critical Importance of the Set-aside in the Canadian 600 MHz Auction,* 2 October 2017, Appendix A to Shaw Comments dated 2 October 2017, *Consultation on a Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band,* Notice No. SLPB-005-17, 4 August 2017 ("Cramton (Oct 2017)"), pages 2 and 8.
[32] In order to compete effectively in 5G, new competitors will need access to sufficient low, mid and high band spectrum – the Big 3 know this, and they will do whatever they can to ensure that new competitors cannot access 3500 MHz and mmwave spectrum, highlighting the need for appropriate pro-competitive measures for that spectrum.

foreclosing new competitors from the market given its evolution to 5G. To mitigate this risk, it is critical that the licensing frameworks for 3500 MHz and millimetre wave spectrum include appropriate pro-competitive measures.

35. The Government's recent 600 MHz auction is one of many examples of the appropriate use of pro-competitive measures to alleviate the foreclosure risk. As Professor Peter Cramton outlined in his report filed as part of Shaw's submissions to the Government's 600 MHz licensing framework proceeding, given the opportunity, the national incumbents will act on their ability and incentive to obtain as much spectrum as possible so that new competitors cannot access it. The 600 MHz auction results were consistent with Professor Cramton's thesis – the Big 3 acquired all of the non-set aside spectrum.[33] Absent the set-aside, new competitors would have been foreclosed from accessing this critical low-spectrum band.

36. The significant costs that we have incurred for spectrum are just the beginning of our investment burden.[34] As Dr. Emch explains, the intensity of the capital outlays that new competitors must make to build out their networks (dollars per subscriber) is much higher than for the Big 3.[35] His analysis shows that on a per-subscriber basis, Shaw's investments have outstripped those of the national incumbents by a factor of two to four times in each of the past three years (2016 through 2018). To support these investments, Freedom must build its market share. However, we face a number of challenges in this regard:

(a) First, we need to create distribution channels. Unlike other telecommunications services, wireless requires a significant retail distribution presence because of the importance of devices. Through investment and tenacity, we have successfully negotiated with third party retail outlets to expand the reach of our retail distribution.[36] However, Freedom has nowhere near the retail distribution reach of the Big 3 who have extensive third party and corporate store presence.

(b) A second obstacle we face is to convince millions of Canadians to suspend their skepticism about a new entrant's network and try our innovative new offers.

[33] Government of Canada, *600 MHz Auction – Provisional Results*, 10 April 2019 ("600 MHz Auction Results"), available online: https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11499.html.
[34] Shaw acquired Wind Mobile Corp. in 2016 for $1.6 billion: See James Bradshaw, "Shaw enters wireless market with closing of Wind Mobile deal," *Globe and* Mail, 1 March 2016, available online: https://www.theglobeandmail.com/report-on-business/shaw-announces-closing-of-wind-mobile-deal/article28983065/. Shaw acquired 700 MHz and 2500 MHz wireless spectrum licences from Quebecor in July 2017 for $430 million: See Shaw 2018 Annual Report, page 23. Shaw acquired 11 paired blocks of 600 MHz spectrum for $492 million: See 600 MHz Auction Results.
[35] Emch (May 2019), Figure 12.
[36] See Shaw 2018 Annual Report, pages 15 and 53.

(c) Finally, even after new customers sign up with us, those same Canadians are bombarded with retention tactics by the Big 3 that are specifically targeted at our new subscribers.[37]

37. As we explain further in Part V, below, new competitors such as Freedom also face physical and technical barriers to competition and investment, such as discriminatory roaming practices, challenges in gaining timely access at reasonable rates to antenna tower and site sharing arrangements with the incumbents, and delays and uncertainty in securing access to support structures, including municipal rights-of-way ("ROWs") and ILEC-owned and controlled support structures. Furthermore, and consistent with the Big 3's incentives to foreclose competition from strong new competitors like Freedom, the Big 3 have shown no willingness to enter into spectrum or network sharing arrangements with us.

38. Shaw is therefore concerned with the Commission's inference that mandated MVNO is now warranted, "particularly given the extensive investments that have been made in recent years."[38] This statement may imply that we have reached a point where competitor investments are either complete or less important going forward. In Shaw's view, the opposite is true.

39. Firstly, ongoing network investment, particularly from the principal sources of competition – the new regional competitors – is now more crucial than ever as we approach the era of 5G. Without strong facilities-based wireless competition, Canada will never realize the full dynamic potential of 5G.

40. Second, in the next few years, Shaw is poised to make network investments that are critical not only to our ability to compete in 5G but the continuation of our current operations. Only a month ago Shaw secured access to the 600 MHz spectrum licences that will allow us to achieve the foundational network coverage needed to compete on quality with the Big 3. However, we cannot deploy these licences until the transition of the over-the-air broadcasters is complete, which is expected to take three years for some of our markets. Additionally, we are still in the process of deploying our other low-band, coverage-critical 700 MHz spectrum. Especially when contrasted with the incumbents, who had nearly 40 years to build out their national networks, it is clear that we are still in the early, formative stages of our network investment and development. It is therefore illogical to conclude that competitor investments to date are sufficient or that they will be less important in the coming years.

41. While Shaw remains committed to making the necessary investments to drive sustainable competition in the Canadian wireless market, the various barriers we face make it

[37] Emch (May 2019), paragraphs 38, 39 and 41.
[38] TNC 2019-57, paragraph 39.

challenging to do so. We believe these barriers can be overcome through targeted, efficient regulatory measures. In contrast, a complete reversal in the wireless regulatory environment, such as a resale-focused mandated MVNO regime, will halt competitive progress, at a moment when competitors like Shaw are just beginning to disrupt the market.

## III. REGULATED MVNO RESALE WILL DO MORE HARM THAN GOOD

42. Shaw strongly disagrees with the Commission's preliminary view that it would be appropriate to mandate that the national wireless carriers provide wholesale MVNO access. In furtherance of this view, the following section will

(a) Provide evidence that mandated MVNO access will result in market distortions that will disproportionately harm Shaw, and ultimately harm Shaw's ability to invest for the benefit of Canadians and competition;

(b) Provide evidence that organic MVNO growth is a by-product of economically efficient mobile wireless competition, not the cause; and

(c) Refute the belief that mandated MVNO access leads to increased consumer welfare.

43. Over the past five years, the Government and the Commission charted a course to enable true, sustainable competition by facilitating the build-out of, and further investment in, competitive mobile wireless infrastructure. Now is not the time for a regulatory u-turn. A mandated MVNO regime that favours resale models will fundamentally alter the regulatory environment and undo the gains that have been achieved.[39]

## A. Mandated MVNO Will Harm Nascent Competition and Consumer Welfare

44. Shaw strongly disagrees with the Commission’s preliminary view that “on balance, it is likely that the benefits that a well-developed MVNO market would deliver to Canadians are now more likely to outweigh any negative impacts that a policy of mandated wholesale MVNO access might have on wireless carriers’ network investments”.[40]

45. A mandate for broad resale-based MVNO access presents a high risk of backfiring. Perversely, such access will cause disproportionately more harm to the ability of new competitors to invest in and expand their networks and service offerings than it will to the national wireless incumbents and will serve to further entrench the latter’s dominance. It

[39] Emch (May 2019), paragraph 51.
[40] TNC 2019-57, paragraph 39.

will come primarily at the expense of the market share of new competitors who have the greatest potential to drive sustainable competition against the Big 3.

46. This reality is corroborated by economic literature: “stringent regulation on facilities-based suppliers intended to aid resellers can have significant distortions on investment incentives”.[41] If new technology is not introduced to consumers optimally, “the diminished investment incentives for both traditional facilities-based service and resellers” under hyper-regulatory regimes may lead to social welfare losses.[42] A mandated MVNO regime “will distort and bias […] technology competition, delay facilities-based broadband investment, and lower overall economic efficiency in Canadian broadband markets.”[43]

47. The Emch Paper demonstrates a number of distortive impacts that will arise due to mandating MVNO that prioritizes resale or gives privileged access to resale. For example, even at this preliminary stage, there is compelling evidence that mandated wholesale access for MVNOs and other resale models could result in a “race-to-the-bottom” that will harm current, existing competition, thereby *maintaining* and *enhancing* the market power of the Big 3, rather than mitigating it.

48. If MVNOs are given mandated access to the Big 3’s networks, they will compete most aggressively against the new competitors, not the Big 3. As the Emch Paper notes, MVNOs and smaller facilities-based carriers tend to target the same group of consumers who are price-sensitive and value established brands less.[44] Thus, competition between MVNOs and smaller facilities-based carriers is likely to be high, with the latter particularly vulnerable to subscriber losses from the former. This will ultimately redirect revenue, subscriber growth, scale and other resources away from strong, facilities-based competitors back to the Big 3, through the Big 3’s wholesale businesses.

49. MVNO resellers will be endowed through regulation with all the competitive advantages that the Big 3 currently enjoy over new entrant competitors: immediate access to national coverage that is supported by concentrations of more, and more diverse, spectrum; seamless roaming hand-off; and network sharing. However, in contrast to Shaw and the other new competitors, MVNO resellers will bear none of the enormous risks of entry, or exit, associated with high sunk-cost network investments. Freedom already faces lower

[41] Brattle Broadband Study (2018), paragraph 123.
[42] Brattle Broadband Study (2018), paragraph 123.
[43] Brattle Group concludes “We believe that unnecessary cost-based resale obligations on wireline and wireless facilities-based broadband providers will distort and bias this technology competition, delay facilities-based broadband investment, and lower overall economic efficiency in Canadian broadband markets. Broadband Study (2018), paragraph 124.
[44] Emch (May 2019), paragraphs 6, 61 and 66. The evidence demonstrates that Freedom’s monthly average billing per user is approximately 70% of that of the national incumbents and that in big-3-dominated provinces, prices of smaller facilities-based carriers are generally at the low end of the market. See Emch (May 2019), paragraph 61 and Figure 11.

margins and higher capital intensity than the Big 3.[45] With diminishing market share opportunities, Freedom's business case for investment and expansion, whether in 5G or new markets, will be substantially impaired.

## B. MVNO Growth is a By-Product of Economically Efficient Mobile Wireless Competition, Not the Cause

50. The Commission has noted that "a mix of competitors has not developed to the degree that the Commission had expected in 2015" and that "there has been virtually no MVNO activity that would provide additional competitive retail options to Canadian consumers."[46] The fact that MVNOs have not yet emerged organically in Canada is not a sign of market failure. Instead, it is a sign that sustainable competition has not yet matured.

51. Empirical evidence demonstrates that service-based competition will emerge naturally once facilities-based competition has taken hold. Moreover, the available evidence shows that the best way to incite resale-based competition is by adopting policies that strengthen facilities-based competition: "policy that promotes facilities-based competition and investment will also promote reseller access to the extent that it is valuable to consumers, while not undercutting incentives to invest in wireless networks."[47]

52. In other jurisdictions, "resellers have found traction […] not due to any regulatory intervention regarding reseller access, but as a natural outgrowth of competition among facilities-based carriers."[48] Jurisdictions that have allowed facilities-based investments to flourish have seen voluntary reseller agreements emerge organically, as a result of negotiation and the operation of market forces:

(a) In countries like the United States, the United Kingdom, and the Netherlands, reseller markets are developed as a by-product of "robust facilities-based competition" and sustained without mandated access regulation,[49] not "reseller access mandates."[50]

(b) MVNO availability in Australia is driven by market opportunity, not regulatory intervention. MVNO sector growth is due to a "highly flexible business model" and "beneficial strategic agreements between business partners".[51] These are not

[45] See Emch (May 2019), paragraph 63 and Figure 13, which shows national incumbents have reported wireless margins in the range of 40-48% in the past five years, while Freedom has reported margins ranging from 19%-22% in the past three years.
[46] TNC 2019-57, paragraph 37.
[47] Emch (Sept 2017), paragraph 86.
[48] Emch (Sept 2017), paragraph 84.
[49] Emch (Oct 2017), paragraph 55.
[50] Emch (Oct 2017), paragraph 51.
[51] Dr. Alex Richardson and Greg Shailer, *The state of competition in the Australian mobile resale market. A study of Australian MNOs and MVNOs,* January 2016 (the "Australian MNO/MVNO Study"), page 14, available online: https://accan.org.au/files/Grants/ACCAN_MVNO_final_web.pdf.

hallmarks of a regulatory scheme. Nor does the Australian evidence support mandated MVNO access.[52]

(c) Similarly, in New Zealand, the New Zealand Commerce Commission considered arguments that the appropriate approach is one of "commercially negotiated MVNO arrangements between access seekers and access providers."[53] The "regulatory backstop" which was recommended in that jurisdiction was effected in consideration of a specific market context.[54]

53. Economic theory and empirical evidence from international sources offer further proof that facilities-based competition strategies lead to higher consumer benefits, including higher quality networks and lower prices.[55] Evidence filed on the record of the CRTC's WiFi-First proceeding cited the OECD finding that a more competitive facilities-based environment provides incentives for both facilities-based carriers and resellers to improve their offers in terms of price, services offered, and quality.[56]

54. Commercially negotiated MVNO options for wholesale services have not yet developed in Canada because we do not yet have alternative network infrastructure that is comparable to the Big 3 in terms of coverage or quality. Time and a sustained effort to promote competitive network investment by removing barriers can yield a wholesale market for MVNO. The Emch Paper describes this issue as follows:

> The first argument confuses correlation with causation, as I pointed out in a submission in a previous proceeding. Countries with robust facilities based competition – I discussed the United States and the UK in particular in previous reports, but also presented an economic model to illustrate the general tendency – tend to have increased MVNO access, as facilities-based competition increases incentives for voluntary MVNO agreements. Thus, finding a correlation between MVNO access and favorable consumer outcomes is unsurprising but unrelated to the question of whether mandated MVNO access would bring about improved consumer outcomes.[57]

[52] Australian MNO/MVNO Study, pages 14, 84 and 85.
[53] Trustpower Limited, *Study of mobile telecommunications markets in New Zealand. A submission to the Commerce Commission*, October 26, 2018, paragraph 2.1.3, available online: https://comcom.govt.nz/__data/assets/pdf_file/0012/104250/Trustpower-Submission-on-the-Issues-Paper-26-October-2018.PDF.
[54] The New Zealand and Canadian market contexts are substantially distinct. See Commerce Commission New Zealand, *Study of mobile telecommunications markets in New Zealand,* Issue Paper, 31 August 2018, available online: https://comcom.govt.nz/__data/assets/pdf_file/0025/94255/Study-of-mobile-telecommunications-markets-in-New-Zealand-Issues-paper-31-August-2018.pdf
[55] See European Commission Decision, Case M.7612 (*Hutchison 3G UK/Telefonica UK*), 11 May 2016, paragraph 1226, cited in Emch (Sept 2017), paragraph 78. See also European Commission, Press Release, IP/16/1704 "Mergers: Commission prohibits Hutchinson's proposed acquisition of Telefonica UK," 11 May 2016, available online: http://europa.eu/rapid/press-release_IP-16-1704_en.htm
[56] Emch (Oct 2017), paragraph 10, citing OECD, "Wireless Market Structures and Network Sharing," OECD Digital Economy Papers, No. 243, 2015.
[57] Emch (May 2019), paragraph 68.

## C. No Evidence that Mandated MVNO Access Increases Consumer Welfare

55. Contrary to the suggestion in the Notice, there is no evidence of the benefits of mandating resale-based MVNO. This is not surprising since the evidence from other jurisdictions demonstrates that broad, resale-based MVNO access regulation is extremely rare,[58] and the evidence of the effectiveness of such a regulatory regime is non-existent.

56. In fact, countries in the European Union that adopted regulatory models in support of service-based competition have failed to create sustainable and dynamically competitive marketplaces. For example, in Spain, mandated reseller access was initially implemented to counter the dominance of three incumbent providers. However, the Spanish regulator subsequently rescinded this measure.[59] Regulatory models that support service-based competition have been shown to reduce the incentive, and financial ability, of facilities-based competitors to build alternative network infrastructure.[60]

57. MVNO resellers will be perpetually tied to the Big 3 and will depend entirely on artificial regulatory support to survive. Due to their dependence on ongoing regulatory intervention, MVNO resellers are vulnerable to technological and market change, offering little long-term consumer benefit. Consumers may end up with more competitors (at least in the short-term), but not strong competition. With resources no longer being directed toward alternative networks and the differentiated and innovative choice they produce, the prospect of strong, dynamic competition will perish.[61] The result will be to incentivize increased dependence on regulation, taking us further away from the healthy market forces that can empower consumers with the opportunity for sustainable and meaningful choice, fundamentally altering the regulatory environment and undoing the gains that have been achieved.[62]

## IV. A PROPERLY CALIBRATED ANALYTICAL FRAMEWORK IS CRITICAL

58. In the first three parts of these submissions, we have demonstrated how new competitors like Shaw have made significant contributions towards delivering high-quality, innovative services at reasonable prices in a way that disrupts the *status quo* in the mobile wireless marketplace. We have noted the absence of evidence justifying mandating MVNO and

[58] See Emch (May 2019), paragraphs 67 to 72. Emch notes in particular that MVNO access mandates were implemented due to findings of significant market power or joint dominance of a single or two dominant wireless operators, such as in Cyprus and Norway. In these countries, facilities-based competition is lacking with little prospect for direct remediation. In Germany, reseller access has been limited to the merger context, where such access has been imposed as a remedy and as a condition of merger approval. In fact, mandated access in Germany does not apply to all incumbents.
[59] Emch (Oct 2017), paragraph 54.
[60] Emch (Sept 2017), paragraphs 5, 38 and 44.
[61] Brattle Broadband Study (2018), paragraphs 123 and 124.
[62] Brattle Broadband Study (2018), paragraph 4 .

canvassed the risks of this kind of regulatory intervention to the Government's and the Commission's policy objectives for the mobile wireless market.

59. In this section, we discuss the analytical framework within which the Commission must test its preliminary view as expressed in the Notice. We consider the flaws in the analysis that led to the Commission's finding of essentiality for wholesale MVNO access in TRP 2015-177. Shaw submits that this finding must be revisited in the current proceeding. We conclude with an elaboration of the additional factors that must be incorporated into the Commission's analytical framework to assess the appropriateness of mandated wholesale MVNO access.

## A. Revisiting the Commission's Finding of Essentiality for Wholesale MVNO Access

60. In TRP 2015-177, the Commission correctly concluded that GSM-based wholesale roaming from Bell, Rogers, and Telus was "essential" for new mobile wireless carriers. The Commission mandated GSM-based wholesale roaming for mobile wireless carriers on the basis not only that the service was essential but that mandating the service would enable regional carriers to continue to invest in their networks and thereby promote innovation and effective competition in the mid- to long-term. As discussed previously, this is in fact exactly what new competitors like Shaw have done since 2015.

61. Conversely, although the Commission determined that wholesale access for MVNOs was essential, it declined to mandate wholesale MVNO access. The Commission declined to do so on the basis that MVNOs do not invest in any wireless facilities of their own,[63] paired with evidence that mandating such access would negatively affect the ability of new facilities-based competitors to bring about innovation and rivalry in the market. In effect, the Commission determined that any benefits arising from mandated MVNO access would come at the expense of achieving large efficiency gains from continued investment by new regional competitors.

62. While Shaw agrees with the Commission's ultimate conclusion in TRP 2015-177 not to mandate wholesale MVNO access, there are grounds to seriously question the Commission's finding that wholesale access for MVNOs is essential on a "concurrent" basis with its finding that wholesale roaming is essential for mobile wireless carriers.

[63] TRP 2015-177, paragraphs 109 and 120 to 125.

### *1. Wholesale market definition for MVNOs*

63. Under any process to determine whether a regulatory authority should order the provision of upstream wholesale services to competitors in the downstream retail market, it is critically important to identify the market(s) at issue.[64]

64. The Commission's Notice acknowledges that there are different types of MVNOs with varying degrees of management and control over the infrastructure and operation of a mobile wireless service. It is conceivable that each form of MVNO or each potential MVNO may require or request wholesale access services that differ by their nature and scope.

65. The variety of MVNO models and the fact that each MVNO needs something different from an underlying mobile wireless carrier suggests that there is more than one wholesale access market for MVNOs. It most certainly leads to serious doubt as to the correctness of the Commission's finding that the wholesale market for roaming is no different than the wholesale market for MVNOs and that the analysis of essentiality for these two services could, hence, happen concurrently.[65]

66. The Commission's consideration and analysis of the relevant wholesale market(s) for MVNOs must be revisited before it can properly assess the appropriateness of mandated access for MVNOs.

### *2. Essentiality test*

67. In TRP 2015-177, the flaws in the Commission's "concurrent" analysis of the market definitions, which is the starting point of the essentiality analysis, carried over to its application of the essentiality test to MVNOs.

68. The essentiality test requires that, for a facility or service to be deemed "essential" so as to justify the Commission mandating access by competitors to it, it must satisfy three components:

    (a) *Input component:* the facility[66] is required as an input by competitors to provide telecommunications services in a relevant downstream market;

    (b) *Competition component:* the facility is controlled by a firm that possesses upstream market power such that denying (or withdrawing) access to the facility would likely result in a substantial lessening or prevention of competition in the relevant downstream market; and

[64] Telecom Decision CRTC 94-19, *Review of Regulatory Framework,* 16 September 1994.
[65] TRP 2015-177, paragraph 83.
[66] Or a function, or a service, or all three, as appropriate in the context.

(c) *Duplicability component:* it is not practical or feasible for competitors to duplicate the functionality of the facility.

69. In relation to the requirement that the wholesale input be a “required input,” consideration of this element cannot be divorced from the question of what the input is required for. Wholesale roaming is clearly a required input for mobile wireless carriers, since they require broad or national coverage to offer competitive voice, text and data services. This same rationale does not necessarily exist for MVNOs, particularly given the undefined and various forms that MVNOs may take.

70. The second criterion of the essentiality test is closely related to what in competition law is known as the foreclosure risk. The foreclosure risk is particularly relevant in the market for mobile wireless carriage.[67] Wholesale roaming for mobile wireless carriers clearly meets this requirement of the test: without wholesale roaming, competitive mobile wireless carriers are effectively precluded from competing in the relevant downstream retail market, notwithstanding significant investments they have made and barriers to entry overcome to get there.

71. The same cannot be said of MVNOs with respect to this component. MVNOs who do not intend to acquire and build out their own home networks do not face the same barriers to entry as mobile wireless carriers. Given that they do not face the same barriers, the competitive foreclosure risk that mandated wholesale roaming for wireless carriers is intended to stave off cannot be said to apply.

72. The foregoing is relevant to the duplicability component as well. In Canada, at the national level, there are two mobile networks (Rogers and Bell/Telus), as well as multiple emerging networks. The entry of the regional competitors on a full facilities-basis is evidence that in the mobile market, at a regional level, the upstream inputs required have been duplicated.

73. However, what is not considered duplicable for regional new competitors, at least not in the near-term, is a national network like those of Rogers and Bell/Telus, which they have built over nearly 40 years. The mobile wireless market is characterised by frequent cyclical (or repeated) innovations and investments. New generations of technology displace the old generation. In other words, competing in mobile markets requires repeated sunk investments, where the new investment may reduce the value of previous investments. This is the environment in which facilities-based carriers operate. Mandated MVNOs would be completely immune from these market realities.

[67] Cramton (Oct 2017), pages 2 and 8.

74. The Commission must revisit the essentiality of wholesale access for MVNOs before it can properly assess the appropriateness of mandated access for MVNOs.

## B. Additional Considerations Relevant to Assessing the Appropriateness of Mandated Wholesale MVNO Access

75. From the initial stages of this proceeding, the Commission should ensure that it gathers evidence in relation to the components of the essentiality test, as discussed above, and the additional elements of an appropriate analytical framework for an assessment of mandated wholesale MVNO access, which we discuss below.

### *1. Sustainability of competition is critical*

76. The analytical framework to consider whether wholesale access for MVNOs should be granted must consider the likelihood of the emergence of sustainable and effective competition, instead of access that is perpetually dependent on regulatory fiat.

77. Mandating MVNOs (similar to mandating roaming for facilities-based providers in 2015) is akin to requiring a remedy to ensure that a party does not acquire, maintain, or enhance its market power. In its guidance on merger remedies, the Competition Bureau emphasizes that divestiture of assets should be made to suitable buyers, not any potential competitor, to ensure effective competition:

> An acceptable buyer must have both the ability and incentive to compete, so that competition will be preserved in the relevant market(s). The buyer must operate independently of the merged entity in all aspects of competition, even if various means of support (e.g. supply arrangements and other forms of technical assistance) are part of the remedy package for a transitional period of time.[68]

78. In assessing suitability, the Bureau states that it considers capabilities and resources (especially where the divestiture consists of some assets that are less than an "autonomous business").[69]

79. Given the disparity between the potential MVNO providers that could emerge in Canada,[70] the Commission should take a similar approach to reviewing mandated access and reserving it for those providers that have the potential to provide sustainable and effective competition to Bell, Rogers, and Telus. The Commission must avoid designing a remedy

[68] Competition Bureau, *Information Bulletin on Merger Remedies in Canada,* Bulletin, 22 September 2006 ("Competition Bureau Merger Remedies Information Bulletin"), paragraph 39, available online: https://www.competitionbureau.gc.ca/eic/site/cb-bc.nsf/eng/02170.html.
[69] Competition Bureau Merger Remedies Information Bulletin, paragraph 39.
[70] James Mellsop, Will Taylor, Kate Eyre, and Raul Arias (Spark New Zealand), *Competitive effects of MVNOs and assessment of regulated MVNO access*, NERA Economic Consulting, 26 October 2018, paragraph 11, available online: https://comcom.govt.nz/__data/assets/pdf_file/0019/104248/Spark-NERA-Competitive-effects-of-MVNOs-and-assessment-of-regulated-MVNO-access-Submission-on-the-Issues-Paper-26-October-2018.PDF.

around a weak business model that will be perpetually dependent on regulation. The ultimate goal must be increased reliance on market forces, and decreased reliance on regulation, over time, consistent with the *Telecommunications Act* and the 2006 Policy Direction.[71]

### *2. Regulatory measures should be aimed at enabling all forms of competition*

80. The Government's proposed 2019 policy direction states that the Commission should encourage "all forms of competition."[72] It also proposes that when relying on regulation, the Commission should be required to consider measures that "promote competition, affordability, consumer interests and innovation" and the extent to which such measures will, among other objectives, "reduce barriers to entry, barriers to competition for new and smaller telecommunications service providers".[73]

81. The fact that the proposed policy direction expressly encourages "all forms of competition" means that if enacted, facilities-based investment is no less important to the achievement of the policy objectives set out in the proposed policy direction than other forms of competition. Thus, regulatory intervention that creates MVNO competition, where the market would not necessarily gravitate to such a solution, must be assessed against the negative impact to facilities-based competition and the ongoing barriers that facilities-based competitors face. The Commission cannot adopt a course of action that would prefer one type of competitor (e.g., resale-based) to the clear detriment of another (e.g., facilities-based).

82. As discussed above, there is compelling evidence that mandated wholesale access for MVNOs and other resale models could result in a "race to the bottom" that would threaten the future of current facilities-based competitors and, ultimately, enhance the market power of the Big 3, rather than mitigating it.

83. While a mandate for broad MVNO access will prevent the establishment of strong, facilities-based competition, the absence of MVNO regulation will not prevent the emergence of MVNOs. On the contrary, targeted regulation in support of strong, facilities-based competition will lead to the development of a wholesale market for MVNOs as a result of the operation of market forces.[74]

[71] *Order Issuing a Direction to the CRTC on Implementing the Canadian Telecommunications Policy Objectives* (SOR/2006-355).
[72] We note that the proposed 2019 Policy Direction is not yet in force and that Shaw has proposed changes to the wording. See Shaw, Representations dated 8 April 2019 on *Order Issuing a Direction to the CRTC on Implementing the Canadian Telecommunications Policy Objectives to Promote Competition, Affordability, Consumer Interests and Innovation*, *Canada Gazette,* Part 1, 9 March 2019.
[73] Canada Gazette Part I, Vol. 153, No. 10, 9 March 2019, page 856.
[74] Emch (Sept 2017), paragraphs 53, 56, 84 and 86; and Emch (Oct 2017), paragraphs 46 to 48.

## V. THE 5G ERA IS UPON US, UNDERSCORING THE NEED FOR REGULATION TO ADDRESS BARRIERS RATHER THAN MANDATING MVNO RESALE

84. In this proceeding, the Commission must focus on the barriers facing regional, facilities-based competitors who have demonstrated an ability to bring sustainable competition to the wireless market. These barriers, which we have discussed in detail above, persist and threaten the potential for strong competitors to challenge the Big 3 dominance today, as well as in the 5G era.

85. In this section, we describe the steps that the Commission should take to address some of the barriers facing new competitors. In our view, the Commission must:

(a) Mandate the provision of seamless handoffs (i.e., inter-PLMN[75] handover) by the national wireless carriers to wholesale roaming customers;

(b) Clarify that mandated wholesale roaming supports the implementation of new wireless technologies and standards, such as VoLTE and 5G; and

(c) Ensure that new competitors have access to support structures and end-customer premises to efficiently deploy 5G network infrastructure.

### A. Updating and Modernizing Wholesale Roaming for Mobile Wireless Carriers

86. The availability of wholesale roaming is critical to promoting facilities-based competition, network investment and consumer access to differentiated, innovative and competitive mobile services across Canada. Wholesale roaming enables end-users of a mobile wireless carrier (i.e., the home network carrier) to automatically access the same type of voice, text and data services by using a visited wireless carrier's network (i.e., the visited network) when the end-users travel outside of their home carrier's network footprint.[76]

87. Shaw agrees with the Commission that it is not necessary or appropriate to revisit whether wholesale roaming ought to continue to be mandated.[77] However, like the Commission,[78] we recognize that the Commission's existing wholesale services regime must be updated and modernized to reflect the evolution of wireless technologies.

#### *1. Wholesale roaming must be provided on a seamless basis*

88. The existing wholesale roaming policy can be improved and modernized by mandating access to wholesale roaming on a seamless basis. Inter-PLMN handover (i.e., seamless

[75] PLMN stands for Public Land Mobile Network.
[76] TRP 2015-177, paragraph 42.
[77] TNC 2019-57, paragraph 32.
[78] TNC 2019-57, paragraph 33.

roaming) is the seamless transition of a voice call or data session with no service disruption as a subscriber moves between his or her home network and a visited network.

89. Seamless roaming is essential as Canadian consumers expect high quality wireless service without any disruptions from their wireless carriers. In fact, intermittent or inadequate quality of service is the number one complaint received by the Commission with respect to mobile services.[79] Today, when a subscriber moves between their home network and a visited network, their call will drop, even when the subscriber is on a 9-1-1 emergency call. Customers that experience network problems, such as dropped calls, have a less favourable brand image of their wireless carrier and are more likely to switch providers.[80] Accordingly, it is crucial for competitors to provide high quality service on par with the national wireless carriers.

90. When competitors like Freedom first enter a new market, coverage areas are relatively small, and subscribers often rely on roaming. As we expand into smaller communities and rural markets, like we did this past year in Peterborough, Cobourg, Belleville, Brockville, Cornwall, Pembroke, Red Deer and Victoria, the number of borders that we have to manage multiplies. Maintaining coverage at these borders requires inter-PLMN handoff. Without seamless roaming, subscribers will experience network problems, including dropped calls, which directly affect their perceptions of network quality and brand. Initial negative customer perceptions of network quality are particularly difficult to dispel and undermine a carrier's ability to effectively compete and grow in a new market.

91. The timing now is ideal for wireless carriers to enable seamless roaming on their networks. Canadian wireless carriers, including the national wireless carriers, are in the process of updating their networks to implement LTE-Advanced and 5G technologies. Adopting seamless roaming during this transition period will reduce the cost and complexity of implementing the service while ensuring that Canadians have access to next-generation services.

[79] Canadian Radio-television and Telecommunications Commission, *Communications Monitoring Report 2018*, 20 December 2018, Table 4.2.

[80] According to the J.D. Power 2019 Canada Wireless Network Quality Study, consumers with fewer network problems have a more favourable brand image of their wireless carrier and are less likely to switch providers than those experiencing more network problems. Specifically, 37% of consumers who experience fewer than 4 problems per 100 network connections plan to stick with their carrier, compared with only 18% of those who experience 12 PP100 or more. The former group also perceives their wireless provider as more innovative, reliable and of good value. See J.D. Power, *Carriers Face Challenges as Customers Keep Wireless Devices Longer, Use More Data, J.D. Power Finds,* Press Release, 10 May 2018, available online: https://canada.jdpower.com/sites/default/files/2018062_canada_wireless_network_quality.pdf.

### 2. *Wholesale roaming must support future wireless technologies*

92. The Commission's wholesale roaming policy must be technologically neutral and flexible to support the adoption of LTE-Advanced and 5G technologies as well as future advances in wireless technologies and standards.

93. We propose that the Commission expressly clarify that mandated wholesale roaming supports the implementation of new wireless technologies and standards. Specifically, the Commission should clarify that wholesale roaming provided by the national wireless carriers includes access to voice, text and data services using any wireless technology that both a national wireless carrier and its roaming customer offer their respective subscribers (excluding CDMA). This includes an obligation on the part of the national wireless carriers to make any necessary modifications to their networks to implement roaming architectures associated with new technologies.

94. Clarification is especially needed as wireless networks have transitioned from circuit-switched networks to IP-based networks and roaming architectures evolve to take advantage of the all-IP environment. The transition to VoLTE, which enables voice calls to be delivered as data packets, introduces new roaming configurations for voice calling. Unlike 3G roaming where the visited network provides call switching, routing and interconnection, VoLTE roaming – specifically S8HR – allows calls to be routed back to the home network (as an IP/data connection) where the home network can control call routing. Although there are a number of different VoLTE roaming architectures,[81] VoLTE roaming generally requires greater network integration between the home network and the host network compared to traditional voice calling.[82]

95. In this regard, there is a need to revisit some of the needlessly restrictive terms and conditions in the national wireless carriers' wholesale roaming tariffs. This includes terms that limit interconnection between a national carrier's public mobile network ("PMN") and the roaming customer's PMN[83] and that provide a national carrier with discretion to refuse to make any additions or modifications to its PMN to accommodate new technologies.[84] These and other similar provisions in the national carriers' wholesale roaming tariffs may prevent Shaw from obtaining VoLTE (S8HR) and other roaming features that are standard

[81] GSM Association, *IMS Roaming and Interworking Guidelines,* Version 18.0, 8 January 2016, available online: https://www.gsma.com/newsroom/wp-content/uploads/IR.65-v18.0.pdf.
[82] See TELUS(CRTC)17Jun16-9, Telecom Regulatory Policy CRTC 2015-177 – *Regulatory framework for wholesale mobile wireless services* – Follow-up process to finalize GSM-based wholesale roaming services proposed tariffs for the National Wireless Carriers – Requests for Information – First Round.
[83] See Rogers Communications Canada Inc., *Tariff for One-Way Domestic Wireless Roaming Service,* CRTC 21530, Part H, Item 800 ("Rogers Wholesale Roaming Tariff"), Article 4.3: "There will be no direct interconnection between the Rogers PMN and Wholesale Roaming Customer PMN."
[84] Rogers Wholesale Roaming Tariff, Article 5.3

and commonly negotiated amongst the national carriers and with their international partners.[85]

96. The Commission should ensure that the national wireless carriers support and accommodate new wireless technologies and the roaming architectures associated with these technologies as part of mandated wholesale roaming.

## B. Addressing other barriers to network investment and deployment

97. As noted above, bringing next-generation wireless connectivity to Canadians and meeting consumer demand for broadband requires substantial and aggressive investment in wireless network infrastructure, including 5G networks, by wireless carriers. Unlike 3G and 4G deployments, which primarily consisted of macro cells with large towers and antennas, the foundation of 5G services is a dense network of hundreds of thousands of small cells affixed to various structures. Wireless carriers must deploy equipment at significantly more locations than in the past.

98. At present, carriers face time-consuming and expensive regulatory barriers that risk the timely deployment of 5G networks. This includes barriers to accessing municipal rights-of-way (“ROWs”) (and other public places), ILEC-owned support structures, utility-owned support structures and multi-dwelling units (“MDUs”).

99. Below we set out recommendations to reduce barriers to wireless network infrastructure investment and to make deployment more efficient and cost-effective.

### *1. Access to municipal land and structures*

100. In our view, the regulatory process to access municipal land and structures to install wireless network infrastructure must be simplified and streamlined to ensure the timely and efficient deployment of 5G networks.

101. Municipalities are key to the deployment of small cells because they own public infrastructure that is ideally located for the placement of small cells. This infrastructure includes municipal land and buildings such as parks, libraries and transit shelters, and street-level infrastructure, such as streetlights, lampposts and bridges. However, obtaining municipal consent for access to public rights of way is often a long and complicated process, ordinarily involving the negotiation of an access agreement (which can take months or even years),[86] obtaining requisite permits (which are often subject to disparate

[85] Certain Big 3 carriers have implemented VoLTE roaming with their international partners, but not yet with domestic roaming partners, to the best of our knowledge. However, in preliminary discussions with the national incumbents, they have expressed a willingness to work towards supporting VoLTE roaming.

[86] Under the current municipal access regime found in section 43 of the *Telecommunications Act*, a wireless carrier that seeks to construct, maintain and operate its equipment within a municipal ROW must first obtain consent from the municipality to access the ROW.

processes) and paying necessary fees. Further increasing workload and costs for carriers is the lack of common rules and standards across municipalities.

102. Wireless carriers must also follow ISED's Client Procedures Circular, CPC-2-0-03 – *Radiocommunication and Broadcasting Antenna Systems* ("CPC-2-0-03") for the installation or modification of antenna systems.[87] This includes contacting the applicable land-use authority to determine local requirements regarding antenna systems and undertaking public notification and consultation. This entire process can take up to 120 days.

103. Deploying hundreds of thousands of small cells under the current access regime will place an unprecedented regulatory burden on wireless carriers and municipalities, exposing the deployment of 5G wireless network infrastructure to long and unpredictable delays. Obtaining consent for each cell site is simply impractical.[88]

104. In order to create a more efficient regulatory framework that expedites access to municipal land and structures, Shaw requests that the Commission confirm and clarify that the deployment of small cells in a municipal ROW does not require the consent of the applicable municipality where the deployment does not disturb or unduly interfere with the public use and enjoyment of the ROW. This is a balanced approach that recognizes the relatively small size of small cell sites and the minimal physical impact that the installation and presence of the equipment has on host sites and structures.

105. In addition, Shaw recommends that the Commission consult with ISED to ensure a consistent approach to regulating access to public land. In particular, the Commission should recommend that ISED amend CPC-2-0-03 to expressly exclude the deployment of small cell sites from land-use authority and public consultation requirements.

106. Finally, Shaw recommends that the Commission initiate and lead a broad-based multi-stakeholder working group comprising stakeholders from industry, interested regulatory bodies, and municipalities to work through the various issues associated with the deployment of 5G wireless network infrastructure. The purpose of the working group is to solicit different perspectives on how small cells in particular should be deployed and to reach consensus on certain standards and protocols for small cell deployment. Subcommittees could also be formed to address specific aspects of small cell network deployment. Municipalities, industry and regulators all have a vested interest in ensuring

[87] ISED, *Radiocommunication and Broadcasting Antenna Systems,* CPC-2-0-03, 15 July 2014.

[88] We note that small cell sites are distinctly different from regular macro cell sites. While macro cells typically require large antenna support structures and cover large areas, small cells are considerably smaller, have small equipment enclosures, use existing structure or small support structures, and cover shorter distances.

that the full benefits of 5G technologies are available to Canadians across Canada, in both urban and rural communities, on a timely basis.

### *2. Access to ILEC-owned support structures*

107. The inability of new competitors to access space on ILEC-owned or controlled support structures is another significant barrier to the timely deployment of wireless network infrastructure. Under the Commission's support structure regime, ILECs are required to provide access to company-owned or controlled telecommunications support structures, such as poles, strand and conduit, to competitor carriers (i.e., licensees) at tariffed rates, terms, and conditions where there is spare capacity on a support structure.[89] Despite having mandated access to these structures, competitors often encounter challenges when it comes to securing access.

108. For example, ILECs have the ability to use their construction standards to restrict small cell deployment by competitor licensees. Small cells are considered strand equipment and licensees may place equipment on an ILEC's support structure without a permit provided that the licensee meets the ILEC's construction standards.

109. This is a particular concern for Shaw because we have been engaged in discussions with Telus, which is the ILEC in many parts of our wireline serving territory, for several years about Telus' construction standards without coming to a consensus on the applicable standards. In our most recent discussions (Fall 2017 to Spring 2018), Telus included several new provisions in its construction standards that, in our view, place unreasonable restrictions and requirements on licensees. For example, Telus proposed site-specific engineering and Safety Code 6 calculations for each wireless site, including each separate small cell location. This requirement is completely unnecessary and appears to be designed to dramatically increase costs and slow the deployment of small cells.

110. We therefore recommend that the Commission clarify that ILECs cannot use their construction standards, or any other ancillary instrument, to obstruct or effectively negate a licensee's access rights under the support structure tariff.

111. Another area of concern for us is an ILEC's ability to reserve spare capacity on its support structures for its future use without clear oversight.[90] In our opinion, reservation of spare capacity without time limits and a clear rationale provides ILECs with the ability to block

[89] Telecom Decision CRTC 2015-112, *Revised support structure tariffs and proposed notification requirements for strand equipment,* 30 March 2015, paragraph 1.
[90] Unused capacity is the difference between (a) support structure capacity based on design limitations; and (b) the sum of capacity used by the company to meet current company needs, and capacity currently allocated to licensees. See Telecom Order CRTC 2000-13, *Rates set for access to telephone companies' support structures,* 18 January 2000, paragraph 30.

and delay licensees from using available capacity. This is particularly troubling as we race to deploy and rollout a large volume of small cell sites.

112. In order to facilitate timely access to ILEC-owned and controlled support structures and maximize the use of unused space on support structures, we recommend that the Commission impose clear and reasonable limits on the length of time that an ILEC may reserve space on its support structures for its future use. In our view, reasonable limits include a maximum of one month for ILEC small cells and three months for ILEC wireline attachments. These timeframes will permit ILECs to plan for their anticipated needs for capacity while ensuring that ILECs do not reserve capacity on their support structures for speculative or anti-competitive purposes.

113. In addition, we recommend that the Commission require ILECs to track reserved capacity on their support structures and document the rationale for reserving capacity, including when the capacity is anticipated or required. The proposed record-keeping obligations are reasonable measures that will keep the ILECs from reserving capacity for unreasonable purposes or lengths of time. They also provide greater certainty as both ILECs and competitors plan and decide where to place their equipment. The Commission can direct ILECs to revise their support structure tariffs to implement the proposed time limits and record-keeping obligations.

114. Shaw also notes that the requirement for make-ready work and the lack of transparency and firm timelines for its completion can cause significant delays in deploying network infrastructure on ILEC support structures. Although support structure tariffs provide timelines for processing permits, there is no oversight for the provision of make-ready work by ILECs. Furthermore, licensees and their contractors are capable of completing make-ready work themselves and should be granted the ability to undertake such work, subject to inspection of the work by the ILEC. The Commission should direct ILECs to revise their tariffs to specifically allow licensees to undertake all forms of make-ready work as needed.

115. Finally, the Commission should consider mandating joint operational coordinating committees (or similar working groups) to facilitate regular communication between ILECs and licensees and to provide the parties with a forum to address issues and solve access problems relating to the deployment network facilities on support structures, including new technologies. The current communication gap has led to miscommunication, long delays and inefficient use of resources.

### *3. Access to utility-owned support structures*

116. Access to utility-owned support structures, such as electricity transmission and distribution corridors and poles, is subject to a patchwork of rates, rate-setting methodologies, and terms of access that vary by province and, in some cases, by utility. Utilities, in some cases supported by provincial utility regulators (which have no mandate to advance

telecommunications service availability), do not view wireless attachments to utility poles as a public good, resulting in excessively high attachment charges for wireless attachments that are completely unrelated to the incremental cost of attachment.

117. Given excessive revenue in the past from macro antenna attachments, utilities have high expectations for even more revenues derived from small cell attachments. Shaw submits that central oversight is needed to ensure that wireless carriers can efficiently and cost-effectively deploy 5G network infrastructure on utility-owned support structures.

118. Consistent with our recommendations to the Legislative Review Panel, we submit that Parliament should expand subsection 43(5) of the *Telecommunications Act* to provide the Commission with the express authority to regulate access by carriers to the support structures of all support structure owners, including provincially regulated electrical utilities. This would empower the Commission to resolve disputes between telecommunications carriers and support structure owners on matters of attachment charges and other terms and conditions of access.

### *4. Access to customer premises*

119. Finally, the limited indoor propagation characteristics of high-frequency 5G spectrum means that wireless carriers will have to install in-building small cell sites to provide connectivity to their customers. Our access to commercial and residential MDUs and other buildings for deployment of small cells and associated cabling is often hindered by excessive and rising fees/rents imposed by landlords and building owners, space constraints within and outside of the buildings, fibre installation challenges, and negotiation delays.

120. Shaw submits that the Commission's established principles for the provision of telecommunications services by local exchange carriers (LECs) to end-users of MDUs should extend to wireless carriers. This includes the principles that: [91]

(d) Wireless carriers must have access to MDUs during the construction phase, in order to have service available upon occupancy, to minimize disruption, and to avoid the additional costs associated with the installation of facilities after completion of the MDU; and

(e) Wireless carriers must have the ability to access and enter into MDUs to connect and/or install their facilities, as well as repair and maintain them and do whatever

[91] See Telecom Decision CRTC 2003-45, *Provision of telecommunications services to customers in multi-dwelling units,* 30 June 2003; and Broadcasting and Telecom Decision CRTC 2015-574, *Shaw Cablesystems G.P and Shaw Telecom C.P. – Request for access to multi-dwelling units developed by Concord Pacific Developments Inc.,* 22 December 2015, paragraph 1.

else may be required to provide reliable, high-quality service to end-users in MDUs.

121. Shaw recognizes that the Commission's MDU access framework has traditionally given access to LECs providing wireline services to residents of MDUs. However, Shaw notes that wireless consumers will increasingly rely on their wireless services for Internet connectivity at home with 5G services being able to reach speeds of up to 10 gigabits per second. Wireless carriers will accordingly have to install small cell and other wireless facilities in MDUs to meet consumer demand.

122. By extending the MDU access framework to wireless carriers, the Commission will promote a technologically neutral approach to regulation that enables innovation in telecommunications services, including new technologies and differentiated service offerings.

## VI. CONCLUSION

123. The Commission should not mandate wholesale MVNO access at this critical juncture for Canadian wireless telecommunications. Thanks to the emergence and ongoing investments of the new regional competitors, the wireless market is on the cusp of achieving sustainable competition that will deliver meaningful, long-term choice to consumers. It is this sustainable competition that will drive the dynamism and innovation in connectivity that is critical to realizing the full potential of 5G in Canada, for Canadians and for our international competitiveness. Without it, the stasis that characterized Canada's wireless market for years will once again take hold and Canada will not be a leader in the era of 5G. Canadians deserve better.

124. The preliminary view in the Notice that "it is likely that the benefits that a well-developed MVNO market would deliver to Canadians are now more likely to outweigh any negative impacts that a policy of mandated wholesale MVNO access might have on wireless carriers' network investments" should be reversed in light of the evidence that Shaw has tabled with this submission. Mandated wholesale MVNO access will not result in a "well-developed" MVNO market. It will only produce regulated resale models that are inherently constrained by what the Big 3 do and offer, and that cannot innovate or pose any real threat to the dominance of the Big 3. Rather, strong facilities-based competition will create mature market forces that can create an environment for MVNOs to emerge organically. At the same time, mandated MVNO will threaten the future of the regional new competitors who are Canada's best chance at sustainable competition in the wireless market. In so doing, mandating MVNO will reduce, not increase, consumer welfare.

125. Opting to support resale-based competitors at this juncture will have devastating consequences for regional competitors, which will, in turn, hurt competition and the progress we're making on lower pricing and more innovation in the market for Canadians.

126. By contrast, opting to stay the course the Commission took in 2015, with the targeted improvements to the regulatory framework recommended by Shaw in this submission, will keep the door open for a robust wireless market that is supported by both facilities-based and resale competition. In the decision that results from this proceeding, the Commission should therefore order or otherwise stipulate the following:

(a) The incumbent national wireless carriers must provide wholesale mobile wireless roaming service to Canadian wireless carriers on a seamless basis and revise their wholesale mobile wireless roaming tariffs to include seamless roaming;

(b) Mandated wholesale mobile wireless roaming service supports new wireless technologies, including, but not limited to VoLTE roaming, and the incumbent national wireless carriers must make any necessary modifications to their networks to implement roaming architectures associated with new technologies;

(c) The deployment of small cell sites in a municipal ROW should not be subject to consent from the municipality where installation does not disturb or unduly interfere with the public use and enjoyment of the ROW;

(d) ILECs cannot use their construction standards, or any other ancillary instrument, to obstruct or effectively negate a licensee's access rights under a support structure tariff;

(e) ILECs must (i) revise their support structure tariffs to implement clear and reasonable time limits on the length of time that an ILEC may reserve space on its support structures for its future use and (ii) track reserved capacity on their support structures and document the rationale for reserving capacity;

(f) ILECs must revise their support structure tariffs to allow licensees to undertake all forms of make-ready work;

(g) Joint operational coordinating committees are required to facilitate regular communications between ILECs and licensees and to solve access problems relating to the deployment of network facilities on support structures; and

(h) The MDU access framework should be extended to wireless carriers that provide wireless service to MDU end-users.

## APPENDIX A: RESPONSES TO CONSULTATION QUESTIONS

1. At paragraph 50 of TNC-2019, the Commission invited interveners to consider several questions. The following are Shaw's brief answers to the questions. We encourage the reader to review our main submission, which provides detailed explanations, with supporting evidence, of our positions on the various issues raised in the Notice. Below, where appropriate, we have referred to sections or paragraphs of our main submission that specifically pertain to the question.

### Competition in the retail wireless service market

*Q1. Provide your views on how the Commission should define markets for the purpose of assessing the state of competition in the retail market.*

(a) *How should the relevant product market be defined for the purpose of assessing retail competition? Can the product market be segmented for this analysis and, if so, how? For example, should the Commission consider the prepaid and postpaid markets separately?*

(b) *What is the appropriate geographic market for the assessment of retail competition?*

(c) *Identify the key market indicators for the assessment of the state of retail competition in the mobile wireless service market(s). In other words, what specific evidence should the Commission gather and how can that information be used to assess competitiveness?*

2. At this early stage of the proceeding, Shaw has not finalized its view on the appropriate market definitions for the purpose of assessing the state of competition in the retail market. An assessment of competition in the retail market is relevant to this proceeding because it is well-established that a precursor to any regulatory intervention in the mobile wireless market (wholesale or retail) must be concerned about the sustainability of competition, through a finding of market power, in the retail wireless market. Both the Commission and the Competition Bureau have recognized this imperative. As the Bureau has explained, the retail market is relevant to wholesale market intervention because the sellers of wholesale mobile wireless services also compete with their wholesale customers to sell retail mobile wireless services to consumers.

3. Regardless of the precise definition for the relevant product and geographic markets for retail mobile wireless services, Shaw disputes any notion that it would be appropriate to intervene with regulation at the retail level. Regulatory intervention at the retail level will harm consumer outcomes by driving uniformity in the market and reducing differentiation and choice.[92] Furthermore, it will blunt the ability of Canada's regional new competitors,

[92] Shaw, Comments dated 9 October 2018, Telecom Notice of Consultation CRTC 2018-98, *Lower-cost data-only plans for mobile wireless services,* 22 March 2018, ("TNC 2018-98"), paragraphs 10, 32, 34 and 36; and Shaw(CRTC)20Jul2018-101 TNC 2018-98, paragraphs 44 and 45.

including Freedom, to compete in the market and differentiate themselves against the Big 3 with innovative offerings. Freedom and other regional new entrants would be disproportionately impacted by any mandated intervention in the retail mobile wireless market.[93] By inadvertently undermining the emergence of strong facilities-based wireless carriers, retail regulation would diminish the prospect of sustainable competition in the retail markets, rather than setting a path for it. The Commission should instead focus on the remaining barriers to competition and investment at the wholesale level,[94] with the ultimate goal of targeted regulation that will facilitate a transition to reliance on competitive market forces. Strong and sustainable market competition will best promote consumer welfare.

*Q2. Comment on the competitiveness of the mobile wireless service market(s). Are the mobile wireless service needs of Canadians currently being met? How have competitive conditions changed over the past five years? If the Commission's mobile wireless service regulatory framework remains unchanged, what do you expect the level of competition to be in the future?*

4. As discussed, and substantiated by evidence, in Part II of our main submission, strong, sustainable competition is beginning to gain momentum in Canada's wireless market, as evident in declining prices, innovative product offerings, and the availability of useful yet affordable data packages. This has only been made possible by the significant investments of Canada's regional new entrants, including Freedom.[95] These investments were encouraged by pro-competitive Government policies, such as spectrum set-asides and the Commission's mandated wholesale roaming framework for mobile wireless carriers. However, this nascent competition remains vulnerable to barriers to competition and foreclosure risk at the hands of the national mobile wireless incumbents and requires a stable policy environment to flourish.

5. The scale of change required in Canada's wireless market does not happen overnight. The significant and sustained investments required for Canada's regional new competitors to compete effectively with the Big 3 take time as well as a stable policy environment to take root and mature. Already Canadian consumers are seeing some of the benefits of strong and meaningful competition in the wireless market.

6. If the Commission's wholesale framework for mobile wireless services remains unchanged, but the Minister continues to adopt and implement pro-competitive measures in the assignment of spectrum resources over the next three to five years, it will position the new competitors to more effectively challenge the dominance of the Big 3 and bring dynamic choice to more Canadians across the country. The pace of improvement could, however, be greatly enhanced and accelerated if the Commission

[93] See Part III(a) of Shaw's main submission for a discussion of the disproportionate impact that mandated intervention in the retail wireless market would have on regional new entrants like Freedom.
[94] Part (II)(c) of Shaw's main submission canvasses evidence of these barriers.
[95] For greater detail and evidence on Shaw's investments in the wireless industry, see paragraphs 27, 40 and 41 of Shaw's main submission.

adopts the specific additional measures that Shaw has proposed in Part V of its main submission by way of reform to the Commission's current wholesale services regime for mobile wireless carriers and facilities-based entry more generally.

*Q3. Are there issues that require regulatory measures at the retail level (i.e. beyond current measures such as the Wireless Code and mandatory participation in the Commission for Complaints for Telecom-television Services Inc. [CCTS])? If so, what are the issues and what measures would be required? Explain why these measures are necessary.*

7. As described in our answer to Q1, above, regulatory intervention at the retail market level at this time would not be in the consumer interest.

8. While the level of competition in the mobile wireless market is still below what Canadians deserve across many measures, it is important to recognise that it is trending in the right direction as a result of focused Government policy and Commission intervention in the form of mandated wholesale roaming for mobile wireless carriers. The Commission has recognized that the policies that support facilities-based wireless competitors in Canada's mobile wireless markets are beginning to have a positive impact on the intensity of facilities-based competition across the country.[96]

9. Changing course at this sensitive juncture in the evolution of mobile wireless markets, given the intense and repeated investment cycles that characterise mobile wireless markets, could be disastrous and serve to further entrench and prolong the national wireless carriers' joint hold on the market. Now is not the time for a regulatory u-turn.

10. The best means to address these issues is by supporting sustainable and effective competition through targeted measures that remove barriers to investment. The Commission should avoid intrusive retail measures or distortive wholesale measures, such as mandated resale, that could increase foreclosure risk and negatively affect facilities-based competitors' ability to invest.

11. Nurturing facilities-based competition – not intervention in the retail market – is the solution to addressing the problem of insufficient competition in Canada's wireless market. As the Competition Bureau notes, the introduction of retail measures, such as mandated plans and price controls, is "antithetical to competition" since it replaces the key role of market forces in determining market outcomes[97] and can be as harmful to the economy as market power.[98] The Competition Bureau's assessment highlights an important distinction between policies that promote facilities-based competition and investment and those, like mandated retail measures or price controls that ultimately undermine such competition and investment.

[96] Telecom Decision 2018-97, paragraph 114.
[97] Competition Bureau, Comments dated 13 June 2018, "TNC 2018-98, paragraph 8.
[98] Competition Bureau Comments, TNC 2018-98, paragraph 9.

*Q4. Discuss how Canada's retail mobile wireless service market(s) compare(s) internationally, and provide any studies and reports you have in this regard. Which countries offer the best comparisons with Canada and why? Discuss whether international comparisons are meaningful in the context of mobile wireless service regulation.*

12. International experience is instructive when it comes to understanding the factors that contribute to the strong competition in mobile wireless markets. As discussed at length, with substantiating evidence, in Part III(b) of our main submission, international experience shows the importance of a disruptive facilities-based competitor in the market.

13. Regarding international experiences with MVNOs, before drawing any conclusions based on international comparisons, it is important to understand the conditions that led to the emergence of MVNOs (by regulatory fiat, as a merger review remedy, or as a result of competition amongst facilities-based carriers) as well as to understand the sustainability and effectiveness of MVNOs in the long-term. Without considering these factors, international comparisons in relation to the MVNO experience are practically meaningless.

*Q5. If the retail market, or a portion of it, is found to be insufficiently competitive to protect the interests of users, what regulatory measures (e.g. the application of additional conditions of service or mandating of the provision of lower-cost data-only plans), if any, ought to be applied to ensure that the policy objectives of the Act, as well as the Policy Direction, are met?*

14. In relation to potential measures at the retail level, for the reasons set out in our responses to Q1 and Q3 above, Shaw is strongly opposed. As we have explained with supporting evidence throughout our main submission, regulatory intervention at the retail level will detract from the objectives set out in the Notice. It would harm consumer outcomes by driving uniformity in the market and reducing differentiation and choice. Furthermore, it would have a disproportionate impact on Canada's regional new competitors, blunting their ability to drive sustainable competition and differentiate themselves against the Big 3 with innovative offerings.

15. As we discuss in our response to Q6, specific measures at the wholesale level would effectively promote the objectives set out in the Notice.

**Wholesale mobile wireless service regulatory framework**

*Q6. Discuss whether the current wholesale mobile wireless service regulatory framework effectively supports competition in the retail market.*

16. With the improvements we have proposed in Parts IV and V of our main submission, the Commission's wholesale mobile wireless service regime will support sustainable and effective competition in the retail market.

17. The current regime for the provision of wholesale roaming and the terms and conditions within it require that users of a wireless carrier be principally served on a home network and limit the nature of roaming services to the services that the user can obtain on its serving carrier's home network. These features serve to promote and incent continued innovation and investment by facilities-based mobile wireless carriers. In order to grow its subscriber base, the mobile wireless carrier must expand its home network footprint through investments or through network sharing arrangements.

18. However, the current wholesale mobile wireless service regulatory framework could be improved in certain targeted ways in order to enhance its effectiveness in facilitating sustainable competition that provides reasonable prices and innovative and high-quality services in the interests of users.

19. Specifically, Shaw submits that the Commission should:

(a) clarify that mandated wholesale roaming supports the implementation of new wireless technologies and standards, such as voice-over LTE ("VoLTE") and 5G, and direct the national wireless carriers to remove terms and conditions that can be used to delay or block effective roaming during technological transitions; and

(b) mandate the provision of seamless roaming by the national wireless carriers to wholesale roaming customers.

*Q7. Discuss whether there have been any developments, technological or otherwise, that would require the current wholesale roaming policy to be modified. For any proposals to modify that policy, provide rationale for why the change is necessary and how it would benefit retail competition.*

20. See Part V of Shaw's main submission and our answer to Q6 above.

*Q8. Comment on whether the Commission's preliminary view that the national wireless carriers should be required to provide wholesale MVNO access on a mandated basis is appropriate. Should this requirement apply to other wireless carriers as well and, if yes, why?*

21. The national wireless carriers should not be required to provide wholesale MVNO access on a mandated basis. Throughout Shaw's main submission, and in particular in Parts II, III, and IV, we have provided evidence that the Commission's preliminary view should be reversed.

*Q9. Comment on how a wholesale MVNO service should be structured and implemented. In particular, discuss the following:*

(a) *whether there should be a requirement for an MVNO to own a minimum amount of facilities in order to be eligible for a wholesale MVNO service. Footnote 19 If so, what should that amount be and how should evidence of facilities ownership be demonstrated by a potential MVNO seeking access?*

(b) *whether there should be other restrictions or eligibility criteria. If so, why?*

(c) *whether it would be appropriate and/or feasible to establish different regulatory requirements for wholesale MVNO service on the basis of geographic divisions. For example, should the service be mandated provincially or on another basis, as opposed to nationally?*

22. For the reasons given above, it is not appropriate to mandate wholesale MVNO services and it is premature, therefore, to discuss the form that such services should take.

*Q10. What terms or conditions should apply to regulated wholesale MVNO access?*

23. For the reasons given above, it is not appropriate to mandate wholesale MVNO access.

24. Without conceding the inappropriateness of regulated wholesale MVNO access, if this is mandated, then the terms and conditions of access should be subject to negotiation between the parties under ultimate Commission oversight. This is, in fact, the model adopted in other jurisdictions (e.g., Germany, Austria) where we have seen the imposition of mandated wholesale MVNO access.[99] This approach to setting the terms and conditions of access is required to reduce the harmful distortive and foreclosure effects that mandated MVNO access are likely to have on sustainable and effective competition in the mobile wireless market.

*Q11. Discuss whether the Commission should set a wholesale rate for MVNO access.*

(a) *If a rate is to be set, would it be appropriate to establish an interim rate as part of this proceeding and, if so, what principle(s) should be used to set that rate?*

(b) *Alternatively, should the national wireless carriers be required to make available a certain amount of capacity on their networks for MVNOs to use at commercially negotiated rates? If so, how should the amount of reserve capacity be determined? In this scenario, would it be appropriate to have a default tariffed rate to act as a backstop if negotiations fail?*

(c) *What are the advantages and disadvantages of each approach?*

25. For the reasons given above, it would not be appropriate for the Commission to set a wholesale rate for MVNO access. If any form of MVNO access is mandated, which Shaw is strongly opposed to, rates should be commercially negotiated.

*Q12. Discuss what would be an appropriate phase-out process for a mandated wholesale MVNO access service. For example, should the service be phased out on a specific, pre-determined date, be subject to a trigger that initiates a phase-out period, or be subject to another process?*

[99] It was also the model recommended for New Zealand. See in particular paragraph 52 of our main submission.

26. It is premature to discuss phase-out of a proposed mandated wholesale MVNO access service. If such services are mandated, the phase-out would necessarily depend on the nature of the MVNOs who are given access and the policy objective of giving such entities access. These are as yet undefined.

**Future of mobile wireless services in Canada**

*Q13. Provide your views on the future of retail and wholesale mobile wireless services in Canada. How do you foresee the rollout of small cells and 5G technology taking place? Over what time period do you expect this rollout to occur?*

27. Throughout our main submission, and in particular in Parts I and V, Shaw discusses the critical importance of 5G to Canadian consumers, the Canadian economy and the international competitiveness of our country. However, the full dynamic potential of 5G will not come to fruition without robust competition that can disrupt the dominance of the Big 3 over the long-term. That is precisely why the stakes in this proceeding are so high.

28. Global demand for mobile data continues to grow as subscribers increasingly consume and share video content. From 2017 to 2022, Cisco predicts that mobile data traffic in North America will increase at a CAGR of 36%, roughly doubling every two years. Consumers are also demanding faster, more reliable mobile connectivity, as mobile devices become even more capable with added processing power, higher-resolution screens, and advanced features such as gesture-based interfaces. To keep pace with this demand, mobile network operators will be required to make significant investments in densifying, expanding and upgrading their wireless network infrastructure. Therefore, it is critical that regulators create an environment that supports and encourages continued network investments by all facilities-based providers in the market.

29. With respect to 5G, the Commission has correctly observed that "the mobile wireless services market is on the verge of a major transformation, since wireless carriers are poised to begin introducing 5G wireless technology into their networks."[100] Retail and wholesale mobile services will also expand and diversify with the introduction of 5G technology, which will enable much higher data rates (up to several gigabits per second), lower latency, and higher connection density. Competing 5G networks will fuel the consumer applications known today, as well as a multitude of diverse community, commercial, data, industrial, agricultural and ecological uses that have yet to be imagined. Those that have can be grouped into four main categories: fixed wireless access (FWA), enhanced mobile broadband (eMBB), machine type communications (mTC), and ultra-reliable low latency communications (uRLLC):

(a) FWA promises to deliver multi-gigabit speeds to fixed residential and business premises and offer an alternative to traditional wired broadband services.

[100] TNC 2019-57, paragraph 18.

(b) eMBB, with its multi-gigabit per second speeds and inherent mobility, will support new immersive experiences such as virtual and augmented Reality (VR/AR), high-resolution video, and “flash download/upload” uses cases such as software updates and video downloads.

(c) mTC will require much lower throughputs but will need to support billions of devices, often with very low energy consumption requirements. mTC has numerous applications in sensor networks, smart cities, agriculture, retail, logistics, and a plethora of other use cases in a world of increasing connected things.

(d) Lastly, uRLLC encompasses mission critical real-time applications such as industrial control, remote robotics, remote surgery/health and autonomous driving.

30. With regard to the rollout of small cells and 5G wireless technology, 5G-capable handsets are expected to enter the market in 2019, with carriers making the necessary network upgrades and investments over the next few years. The rollout of 5G is expected to take place gradually, with more pronounced developments accompanying the deployment of each 5G spectrum band (i.e., 600 MHz, 3500 MHz and millimetre wave bands). It is expected that the 600 MHz band will be deployed for mobile use as soon as the band is cleared of the incumbent broadcasters. Small cells will start to play a more critical role in 5G deployments when mid- and high-band spectrum becomes available. According to ISED, spectrum auctions for the 3500 MHz and millimetre wave bands will be held in 2020 and 2021, respectively. Due to the large bandwidths available, enabling extremely high data rates and significant increases in network capacity, high-frequency spectrum (above 24 GHz) will be a key input for 5G. Given the reduced range of high-frequency spectrum, however, small cells will be crucial to realizing its full potential.

31. For our part, Shaw has been very active in preparations for 5G. In May 2018, Shaw completed its first 5G technical trials in Calgary, in partnership with Nokia, CableLabs and Rohde & Schwarz. Our acquisition of licences in the 600 MHz spectrum auction will lay the foundation for our 5G network. We have also begun to actively deploy small cells for 4G technology, including LTE-Advanced and LAA, which will eventually be upgraded to 5G as the spectrum and technology becomes available.

*Q14. What are the challenges facing carriers as they continue to deploy their networks, particularly with respect to small cells?*

32. As discussed in our main submission, in particular at Parts II(c) and V, new competitors like Freedom continue to face a multitude of challenges as we deploy, densify and expand our networks. These barriers to investment primarily fall into two categories: access to spectrum and access to passive infrastructure. As we embark on 5G, these barriers are likely to intensify, as the Big 3 seek to foreclose new competitors from key spectrum bands and small cell deployment and densification make access to passive infrastructure more urgent.

33. Small cells will play a critical role in making 5G technology seamlessly available to consumers, particularly at higher frequency bands. They will be used to fill in gaps in 5G wireless network coverage due to technological, geographical or other factors constraining macro antenna site coverage. Appropriate placement of small cells is critical because their smaller coverage footprint requires closer proximity to users. This limits the flexibility to consider alternate locations. The actual siting of small cells in myriad locations will also require either wireless or wireline backhaul network connectivity and a supply of power.

34. In this environment, passive infrastructure access will become more important than ever. The Big 3, with their extensive networks and sharing arrangements will leverage their head-start advantages as they begin to densify their networks to support 5G. On the other hand, new competitors like Freedom not only need to build new infrastructure to extend their coverage footprint, they are also faced with the challenges of densification without the extensive existing assets and relationships to leverage. On top of that, we often encounter obstacles to accessing Big 3 wireless towers and sites, in the form of excessive rental rates, inferior tower placements, and drawn out negotiation processes, without recourse to a timely dispute resolution process.

*Q15. Identify any expected changes or new technologies that are likely to be deployed in Canadian wireless networks that will have regulatory implications in the near term. How can the Commission ensure that its regulatory frameworks account for market and technological changes?*

35. 5G represents the most significant change coming to Canadian wireless networks in the near to medium future. A key regulatory implication is how to structure the regulatory framework to encourage carriers to make the required network investment in 5G, particularly in rural and remote areas, while at the same time fostering effective and sustainable competition. To achieve these goals, and to maintain the relevance and efficacy of the wholesale mobile wireless service regulatory framework in the 5G world, the framework could be improved in several targeted ways, as described in Part V of our main submission.

36. On the other hand, mandating wholesale MVNO access at this critical juncture would undermine the significant progress that has been made in recent years and choke off investment in 5G spectrum and networks by facilities-based carriers, particularly new competitors who have the most to lose under a mandated wholesale MVNO access regime. Strong inter-platform competition will drive the innovation that is required to deliver to Canadians the full benefits of 5G. A fundamental shift in the policy environment at this point in time will jeopardize the success of 5G in Canada.

*Q16. What are the issues associated with wireless carriers obtaining access to infrastructure, including towers, sites, structures, and fibre transport? Discuss whether the Commission's* *existing rules are sufficient to address these issues and what changes, if any, could be made to improve these rules under the Commission's current statutory framework.*

(a) *If there is a need for the Commission to mandate additional wholesale services to support network deployment, identify those services and demonstrate their essentiality in accordance with the Essentiality Test set out in Telecom Decision 2015-326.*

(b) *If a wholesale service that ought to be mandated is currently forborne from regulation, explain how that service no longer satisfies the conditions for forbearance under section 34 of the Act.*

37. Please refer to our answer to Q14, above, as well as our main submission at Part V. As described therein, in the decision that results from this proceeding, the Commission should therefore order or otherwise stipulate the following:

(i) The incumbent national wireless carriers must provide wholesale mobile wireless roaming service to Canadian wireless carriers on a seamless basis and revise their wholesale mobile wireless roaming tariffs to include seamless roaming;

(j) Mandated wholesale mobile wireless roaming service supports new wireless technologies, including, but not limited to VoLTE roaming, and the incumbent national wireless carriers must make any necessary modifications to their networks to implement roaming architectures associated with new technologies;

(k) The deployment of small cell sites in a municipal ROW should not be subject to consent from the municipality where installation does not disturb or unduly interfere with the public use and enjoyment of the ROW;

(l) ILECs cannot use their construction standards, or any other ancillary instrument, to obstruct or effectively negate a licensee's access rights under a support structure tariff;

(m) ILECs must (i) revise their support structure tariffs to implement clear and reasonable time limits on the length of time that an ILEC may reserve space on its support structures for its future use and; (ii) track reserved capacity on their support structures and document the rationale for reserving capacity;

(n) ILECs must revise their support structure tariffs to allow licensees to undertake all forms of make-ready work;

(o) Joint operational coordinating committees are required to facilitate regular communications between ILECs and licensees and to solve access problems relating to the deployment of network facilities on support structures; and

(p) The MDU access framework should be extended to wireless carriers that provide wireless service to MDU end-users.

**Other matters**

*Q17. Are there any other matters, issues, or proposals related to mobile wireless services, beyond those listed above, that the Commission should be aware of and potentially make determinations on as part of this proceeding? Identify and explain why those issues are relevant and include proposed regulatory solutions.*

38. Our main submission sets forth the matters, issues and proposals that Shaw considers most relevant to the Commission's determinations at this time.

***END OF DOCUMENT***

This is **Exhibit "55"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

Government of Canada Gouvernement du Canada

Canadian Radio-television and Telecommunications Commission



# Transcript, Hearing February 26, 2020

Volume: 7
Location: Gatineau, Québec
Date: February 26, 2020


▶ **Providing Content in Canada's Official Languages**

## Attendees and Location

Held at:

Outaouais Room
Conference Centre
140 Promenade du Portage
Gatineau, Québec

Attendees:

- **Chairperson: Ian Scott**
- **Vice-Chairperson, Telecommunications: Christianne Laizner**
- **Commissioners: Christopher MacDonald, Alicia Barin, Joanne T. Levy**
- **Legal Advisors: Adam Balkovec, Eric Bowles**
- **Secretary: Jade Roy**
- **Hearing Managers: Jeremy Lendvay, Marianne Blais**

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## Transcript

Gatineau, Quebec

--- Upon resuming on Wednesday, February 26, 2020 at 9:55 a.m./ L'audience reprend le mercredi 26 Février, 2020 à 9h55

9289 THE SECRETARY: À l'ordre, s'il vous plait. Good morning, everybody.

9290 We'll now begin the presentation of Rogers Communications Canada Inc. Please introduce yourself and your colleagues, and you have 20 minutes for your presentation.

**PRESENTATION / PRÉSENTATION**

9291 MR. WATT: Thank you. Mr. Chairperson and Commissioners, my name is David Watt, and I am Rogers' Senior Vice President, Regulatory. It is my pleasure to introduce our panel.

9292 To my right is Joe Natale, President and CEO of Rogers Communications. To Joe's right is Brent Johnston, President of Wireless. To Brent's right is Howard Slawner, Vice-President Regulatory Telecom. To Howard's right is Richard Feasey. Mr. Feasey has 30 years of experience in regulatory matters across 20 markets in Europe, Asia, and the Americas. He was the Director of Vodafone, then the largest wireless carrier for 10 years. Currently, Mr. Feasey is a member of the UK Competition Authority, the Competition and Markets Authority, and he wrote RPs on the international experience.

9293 To my left is Jorge Fernandes, Chief Technology Officer. To Jorge's left is Pam Dinsmore, Vice-President Regulatory Cable and Broadband; and to Pam's left is Diane Gilbert, Director, Wholesale.

9294 Behind me is Suzanne Blackwell, President of Giganomics. Suzanne authored our expert piece on sunset clauses and is well-known to the Commission.

9295 And beside Suzanne is Jeff Hunter, President of IMOBIX. Jeff is a telecom expert with 20 years experience in start-ups, deployment, operations of telecom companies, experience in roaming, MVNOs, and wholesale matters, and he authored our piece on cost structures for MVNOs and that experience.

9296 With that, I will turn it over to Joe.

9297 MR. NATALE: Thank you, David, and good morning Mr. Chairman and Commissioners. Thank you for the opportunity to speak this morning.

9298 This proceeding is absolutely critical to the future of our industry, Canada's global leadership in the digital economy and, ultimately, the prosperity of Canadians.

9299 We've been listening intently for the past week. We have found the discussion informative, but also discouraging. Clearly, there is a wide awareness gap. Rogers, and our industry as a whole, have failed to communicate to Canadians that Canada is a global leader and enjoys world-class network experience based on coverage and quality, and that we have an intensely competitive wireless market that continues to deliver more affordability and value for Canadians.

9300 I implore you to keep reminding yourselves of the importance of what is at stake here. This is about nation-building. This is about the future of wireless investment and Canada's ability to leverage it for the promise of 5G and for all Canadians.

9301 Like the railroad a century ago, it's vitally important we get this right. We have built a great industry where Canada dominates when it comes to coverage and quality, reaching 99 percent of Canadians with wireless speeds second only to South Korea.

9302 Rogers brings a unique perspective to these discussions that is founded in our entrepreneurial history. Ted Rogers was a great Canadian entrepreneur, who was a builder and a visionary. In 1960, he borrowed $85,000 to buy one FM radio station when less than 3 percent of Canadians had FM radios. He was one of the first to introduce cable TV to Canadians. Today that network reaches four-and-a-half million homes and businesses. He was the first to bring wireless to Canada in 1985, 35 years ago this Canada Day.

9303 If you'll indulge me, let's take a moment and reflect on that moment in our history.

9304 (VIDEO PRESENTATION)

9305 MR. NATALE: Today we are on the very next important doorstep - 5G.

9306 When you look back at FM radio, Cable TV, and the dawn of wireless, they all have common themes. They all required an appetite for great risk and massive capital investments, and the returns have not always been self-evident from the outset. 5G is no different.

9307 Making Canada a global leader in these areas was only possible because of two critical factors: the ability to take a long-term view of investment; and a regulatory environment that facilitated and supported investment and allowed a long-term perspective.

9308 Some people have appeared before you presenting what we think are misperceptions and mischaracterisations. Your decisions must be based on facts. You have the evidence and you have the expertise. Evidence-based decision-making may not sound flashy, but it's what delivers sound public policy and thoughtful regulation.

9309 Looking back at the last 35 years of wireless, and more specifically the last five years, I would ask you to reflect on five important principles. These are as valid today as they were when you held your last wireless review.

9310 Principle number one, it is critical that regulatory policy continue to take a long-term view. When we look to 5G and beyond, it’s clear the wireless industry in Canada has not fully matured and still needs careful nourishing. The 5G road ahead requires another generational investment, not unlike the road from 1G to 4G.

9311 For the first 25 years of wireless, Rogers did not make a single cent of return on our $15 billion investment in network and spectrum during that period. Since February 2014, only six years ago, we have invested $12 billion in our networks for equipment and spectrum, and we borrowed much of that money. Our debt has gone up by $6 billion. We now sit with more debt than ever in the company’s history, over $18 billion, and we’re not alone. Our Canadian competitors all sit with debt leverage ratios that are at or near their maximum.

9312 Principle number two, competition is alive and well in Canada. I cannot over-emphasize how competitive the market is. We have two sources of customers, new wireless subscribers and switching subscribers. Both categories of customers are extremely price sensitive. Look at churn. Every year since 2015, five to 6 million customers have switched providers. In 2019 alone, 6 million customers switched, over 17 percent of the Canadian market.

9313 The fourth-carrier policy is working. In the past five years, Videotron has almost doubled its subscribers to 1.3 million. Freedom has done the same, growing to 1.7 million customers on an LTE network that now extends to most Canadian CMAs and is being extended to smaller communities. Last year, Freedom and Videotron accounted for 33 percent of net new customer additions. This is not a market crying out for mandated MVNOs.

9314 I get up every morning knowing there are at least three formidable competitors and seven or eight brands in every market trying to eat our lunch. Simply put, wireless competition in Canada has never been this intense. Since you took your preliminary view, there have been dramatic changes in consumer offers and significant competitor successes in the wireless market. The events of the last year cannot be dismissed as inconsequential or unimportant.

9315 I listened carefully to what regional carriers told the Commission over the last six days of the Hearing. Why would you jeopardize Canada's regional carriers now?

9316 Principle number three, our ability to drive affordability and a customer-first agenda is critical. This intense competition is expanding and the range of affordable options available to Canadians is also expanding. Overall, the price per Gigabyte of data is down by 50 percent since 2015. In contrast, since 2015 the CPI has increased almost 10 percent.

9317 We are seeing massive increases in data consumption. As data usage climbs, prices per Gigabyte are coming down dramatically. This shift is significant.

9318 If you drive an extra 200 kilometres a week to get to a new job, you will spend more money on gas. If your hydro use goes up 50 percent, your hydro bill is going up 50 percent. That's not what Canadians are seeing with their wireless bills. The price of data is going down as usage goes up.

9319 Since joining Rogers almost three years ago, my number one priority has been putting customers first. This means driving affordability and customer service for Canadians, while continuing to invest in our wireless network. We are meeting the accelerating demand for data and providing leading edge wireless technologies across our vast country.

9320 We launched unlimited plans. Rogers kick-started the introduction of unlimited data plans in Canada with Rogers Infinite, a development that has dramatically changed the marketplace. These plans are not just radically cheaper than previous plans; they eliminate overage costs and provide peace of mind.

9321 Let me be clear, regulatory considerations had nothing to do with our decision. Those who suggest otherwise are spectacularly ill-informed about our business and what drives it. Our introduction of Rogers Infinite was solely motivated by the competitive need to address the customer pain point with overage charges and to increase data affordability and consumption. We have seen an immediate material improvement in customer satisfaction scores and massive adoption of the plans. The launch of Infinite was a crucial step to make Rogers 5G ready in advance of how Canadians will use wireless services in the future.

9322 We expanded lower-priced options. The range of lower cost plans in the marketplace has expanded, as has the service included in those plans. Your own list, distributed at the first day of this hearing, demonstrates the range and scope of these plans, as low as $15. Consumers can choose from a number of data-only plans, the one gap previously identified and addressed by the Commission in Canadian wireless markets.

9323 If pricing is a central issue, then surely we must consider up-to-date data and rely on sound methodology. Some presenters have relied on dated price comparisons. Our rates are comparable to the U.S. A Verizon starter unlimited plan costs slightly over $90 Canadian, versus $75 for Rogers Infinite.

9324 Introducing a wider range of plans at lower prices means more Canadians are now connected. In the last five years, Canada has added 5 million more wireless customers, increasing the penetration rate by 10 percent. And 81 percent of the Canadian population has a smartphone. This is virtually everyone in the country over the age of 10. These phones have been made available to Canadians with substantial upfront subsidies by Canadian wireless carriers.

9325 And it’s important that consumer sentiment on wireless pricing not get confused with the exploding costs of smartphones. The iPhone was introduced in 2007 and was sold for $700. The high-end iPhone today costs close to $2000.

9326 Principle number four, the industry must earn a reasonable return on investments to keep technology investments rolling out to all Canadians. I have heard various participants in this hearing quoting EBITDA margins, or various other metrics, as some indication of heightened profitability. I think it’s important to understand and respect that return on assets is the only true indicator of profitability, especially in a capital-intensive business.

9327 A partial accounting measure, such as EBITDA, that excludes key costs like capital expenditures, spectrum purchases, interest and income taxes, is not a measure of profitability. It excludes up to 50 percent of our expenditures. It isn’t economic profit.

9328 Over the last five years, our return on assets was 5.1 percent. Over the same period the Canada Pension Plan returned 10.1 percent. And this is despite heightened costs relative to other countries across the globe, specifically, we have a population density one tenth the size of the US, with a geographic area that is the second largest in the world. Tough economics for an industry where coverage matters.

9329 We pay up to seven times the amount paid for spectrum in other countries. That’s a fact. We pay a vast portion of our costs in U.S. dollars, from handsets to network equipment, and that is a 35 percent currency premium, and we pay more in taxes and fees to our government than the U.S. industry does. Despite these heightened costs, prices for our customers are comparable to U.S. levels.

9330 Principle number five, network quality and capability really matters to our future. We were one of the first countries to launch 4G, and now we cover 99 percent of Canadians with LTE, and we continuously expand capacity to address demand for data. Data growth is going up by 30 percent per year.

9331 So today, our 4G networks are twice as fast as U.S. networks, on average. Make no mistake, this is a massive and profound achievement, given the cost to serve a country the size of Canada with our challenging topography and low population density. It will come as no surprise to the Panel that we subsidize our wireless operations outside of the major cities in our country. We do this because it's right for Canada and universal access is good for Canadians. We've been able do this in smaller cities and rural communities because we have had a regulatory environment that supports infrastructure investment.

9332 MVNOs do not bridge the digital divide. They do not bring new services to underserved communities. They do not bring more rural coverage to Canadians.

9333 We began the launch of 5G this January. 5G will require a massive investment over the next five years and beyond. It will be one of the most significant civil engineering projects in generations.

9334 These five principles have served Canadian consumers well. We cannot square the success of these principles with any need to mandate MVNOs.

9335 Richard.

9336 MR. FEASY: Good morning. I was asked by Rogers to consider the evidence from the rest of the world and you have a copy of my report. In my view, that evidence leads to three key conclusions:

9337 First, very few regulators around the world ever implemented mandatory MVNO access regulation and the international trend over the past 15 years is for less, not more. Canada would be an international outlier if you were to impose MVNO regulation.

9338 There's been no new mandated wholesale regulation in the European Union since 2006. In the two markets where it was applied, it's since been withdrawn. The latest changes to the European regulatory framework are intended to make this kind of regulation less likely in future and that reflects the realization that MVNO regulation has been ineffective and that it's undermined the incentives to invest in the new mobile networks and technologies which deliver real benefits to consumers.

9339 The United States has never mandated MVNO access, nor has Australia, nor New Zealand. There's only one relevant case for your purposes today and that's in Norway, which has two facilities-based carriers, one with a 60 per cent wholesale market share of which is regulated.

9340 European competition authorities thought for a few –- a few years ago that mandated MVNOs might restore the competition lost in mergers between wireless carriers, but they've abandoned that remedy in recent cases once it became clear that it was ineffective.

9341 Second, the evidence suggests that the promises that are made by MVNOs in proceedings like this and elsewhere in the world as to their market impact are rarely kept in practice. I've seen no credible evidence that having more MVNOs in a wireless market or mandating access for those MVNOs leads to lower prices, either for consumers in general or for those on low incomes.

9342 Third, there's been little research on the impact of mandated MVNOs on wireless investment because there have been so few cases to study. What there is suggests it's negative, but more importantly, there's now strong evidence that wholesale regulation with mandated rates in the wireline market has had a significant impact –- adverse impact on wireline investment. And in my view, there's no reason to think that wholesale regulation in wireless markets would not have the same significant adverse impact on wireless investment including in 5G.

9343 Jorge.

9344 MR. FERNANDES: Unprecedented new investment in Canadian wireless networks is required.

9345 In the Notice of Consultation, the Commission has posited that given the extensive investments that made in recent years, the benefits that a well-developed MVNO market would deliver to Canadians are now more likely to outweigh any negative impacts. That is wrong. In fact, the opposite is true.

9346 While Rogers already spends $1.3 billion in capital each year just to maintain capacity while data usage grows 30 per cent a year, Rogers and the entire wireless industry are now also poised to make the most extensive telecommunication investments ever.

9347 One month ago, Rogers started to light up the first 5G network in Canada. This is a proud accomplishment for Rogers and indeed all of Canada.

9348 It is crucial that we keep pace with the rest of the world; however, while it took a considerable amount of time, capital and effort to launch 5G, this was just a small fraction of what needs to come.

9349 Why is 5G so important? Because without it, Canada's digital economy can't move to the next frontier. 5G will enable new applications for business in every sector of the economy and make faster and more innovative services available to consumers. Through a combination of ultra-low latency and high bandwidth connectivity, a combination of 5G networks will enable applications such as autonomous mining, autonomous driving and smart communities. These advances are not just important to the wireless industry; they will be the backbone of the Canadian digital economy.

9350 We know that over time investment in new technology helps drive down prices to customers. We will see a lower unit cost enabled by these investments, but to get there, 5G and the Canadian digital economy hinge on massive investments being made by wireless carriers. As you have heard before, but it bares repeating, it is estimated that between 2020 and 2026 approximately $26 billion in incremental investment by Canadian wireless carriers will be carried out to deliver 5G.

9351 People often equate wireless investment with sophisticated equipment. In fact, 70 per cent of our 5G investment costs are related to bricks and mortar, physical infrastructure we need built. This translates into well-paying jobs in communities right across our country as we work with dozens of construction suppliers to build our networks. This includes small regionally- based businesses and large companies like Ledcor and Telecon. These firms build access roads to cell sites. They build towers. They install small cells.

9352 Canadian carriers will shoulder the investment burden for Canada to compete; however, this will only happen if they have the financial ability to make the massive necessary investments. K

9353 If this money is not available from our operations, the investment level will be lower and the 5G rollout will not be as extensive as it would otherwise be. The single biggest impacts will be on rural areas outside of the major centres as they are the most costly to build and maintain and generate less revenue. Yet, these are the very areas that both the Government of Canada and the CRTC have identified as key targets for their broadband policies.

9354 Pam.

9355 MS. DINSMORE: Instead of inhibiting investment, the CRTC should be taking this opportunity to enable it. There are several measures that the Commission can take that will assist carriers to deploy new technologies and expand their footprints into unserved areas.

9356 It’s no exaggeration that hundreds of thousands of 5G small cells will need to be deployed. Traditional telephone and hydro company poles are ideal supporting structures, as is street furniture such as streetlights, bus shelters and signs, and public buildings. Timely, cost-effective, non-discriminatory access to this passive infrastructure is critical. Higher access costs translate to higher prices for consumers and delay means slower rollout to consumers and Canada falls behind.

9357 We recognize the current limitations on the Commission’s jurisdiction to address access to provincially-regulated utility poles; however, we believe the Commission can take steps to clarify the rules regarding carrier access to municipal infrastructure and ILEC support structures within the existing Canadian legal framework.

9358 The Commission should clarify now that its jurisdiction under the *Telecommunications Act* extends to wireless equipment, as well as to municipal street furniture and buildings. In doing so, the Commission must clarify that the rules established in the Ledcor decision for wireline deployment apply to wireless equipment including the core principles of no occupancy fees and reimbursement from municipal work-related relocation of our equipment. This would address a key 5G issue; that is, the annual fees municipalities seek to charge for the placement of small cell antennas on municipal infrastructure.

9359 The Commission should also convene a proceeding to review and amend the ILEC support structure tariffs to address transparency on available capacity and future use and the fees and timelines to access available capacity.

9360 Finally, the Commission should confirm that small cell antennas are captured by the existing approved ILEC tariffs.

9361 Joe?

9362 MR. NATALE: In conclusion, let me circle back to where I began. What's most important is doing the right thing for Canada and Canadians long-term.

9363 We have a massive appetite for investment. We want to continue on our path of excellence in nation- building, especially on the doorstep of 5G, but we can only make those bets when we have regulatory certainty and support in our future. Without a recognition of that investment potential and an appropriate regulatory framework, our collective costs of capital increase materially, and the investments that are required are jeopardized.

9364 You have my commitment and the commitment of Rogers to work together and strike the right balance between driving affordability and fueling investment for the future. It is that regulatory mindset that allowed Ted to be a great Canadian entrepreneur. It is that mindset that has created a leading global telecommunications industry. And more than ever, global leadership is critical for Canada.

9365 Thank you for the opportunity to participate in today's hearing. We'd be happy to answer any questions you may have.

9366 THE CHAIRPERSON: Thank you. Thank you, Mr. Natale and your colleagues. You have indeed it would appear from your opening remarks been paying attention to our proceeding and you've touched on, not surprisingly, a number of the areas that we've been discussing with interveners. I guess the good news is that you've had a chance to listen and prepare yourself. The bad news is we have lots of statements in evidence to put before you to ask you to speak to.

9367 It won't surprise you the outline of what I want to talk to you about today I think I have a couple of questions about market power and associated definitions. We'll talk a little about retail market issues. Then not surprisingly, wholesale market issues, and finish off with a few questions about the future of the mobile wireless industry. So, that's our menu for this morning.

9368 Perhaps I'll begin just with a very broad question about market definition. Back in May, in Roger's intervention -- pardon me. I'm not getting choked up by your participation.

9369 (LAUGHTER)

9370 THE CHAIRPERSON: I'm just struggling with a little bit of a cold.

9371 You submitted that the geographic market was provincial, and you submitted a document -- figure 1, sorry, of your intervention had a summary that looked at province-by-province geographic market definitions. And in that one, for example, there were six competitors in Northern Ontario for Manitoba. Now, I don't want to minimise or dispute the fact that companies like Xplornet or Tbaytel and Eastlink are not providing service in Manitoba or Northern Ontario, but certainly they're not on the same footing or basis as the three national players.

9372 So, all that to ask you, do you continue to hold the view that using province as the relevant geographic market is appropriate, and I guess I'd ask you elaborate on do you think it hides some particular market characteristics or peculiarities that might be better addressed if we took a smaller market definition such as that proposed by the Competition Bureau?

9373 MR. WATT: Yes, we would bonify our position in light of the substantial evidence and material put on the record over the last eight months. You know, we thought we put forward our position provincially. Typically, it has been provincial pricing, et cetera. However, we agree with other parties that a smaller geographic market would be more appropriate given the nature of competition that exists today and the ability for people to switch carriers.

9374 So, we would think the two options that have been most discussed is at the CMA level, which causes me to wonder -- that really doesn't define the areas outside the CMA area I think that has been picked up by people who have suggested a tier four categorisation. That comes, as you know, from ISED spectrum categorisation of geographic territories. I think that likely -- well, we would view that as more appropriate than our original provincial position. We have -- I'd say we've learned and improved our position.

9375 THE CHAIRPERSON: Thank you for that.

9376 Do you see -- you may have heard me ask the representatives from the Competition Bureau whether or not they saw any particular challenges in going forward with a sort of two-pronged approach of looking at provinces and potentially some kind of collection of CMAs. Any views on that particular challenge?

9377 MR. WATT: I guess what you're looking at there is you're saying is there a province that is -- where competition is widespread throughout the entire province, such that that province could be treated as a geographic market. I think we would still think that the better approach would be the smaller tier four approach.

9378 THE CHAIRPERSON: Okay. Thank you.

9379 Moving a little to pricing, generally speaking, in your submissions you've certainly made reference to declining mobile services rates. And, again, this morning, Mr. Natale, in your opening remarks you've touched on it.

9380 But how do you -- what would you say price declines in Canada -- well, let me rephrase that. How do recent price declines in Canada compare to price declines internationally? You no doubt have heard the discussions that say, yes, but they're going down everywhere, which is generally true, but I'd just like to give you an opportunity to speak to that particular point as it's been raised by several interveners.

9381 MR. WATT: Sure. I'll start. Maybe then I'll ask Brent to chime in as well.

9382 As we find ways to improve the efficiency of our business, as we find ways of adding capacity at better unit costs, we're more than happy to pass those savings along to consumers and therefore drive price points and affordability to a better place as a whole. I think it's kind of where the industry started.

9383 Go back to -- you know, go back to the early days of wireless and look at what it would cost for a minute of voice service, or the early days of data, they were far, far higher than prices are today. So, there's a natural technology curve. The technology curve has a slope on it based on the evolution of technology and our ability to invest in it, but that curve also has a floor based on what are the inherent costs of operating in a particular country.

9384 You know, the biggest cost drivers we have, I talked about them in my opening comments. First and foremost is population density and geographic area. I can't change that for Canada. It's just a fact that countries like ours that span 5 time zones, and have a population density that's 1/10th out of the U.S., and, you know, 1/20th or 30th that of many European countries are more expensive to cover period, especially if our goal is to leave no Canadian behind, if our goal is to extend the latest technology to 99 per cent of Canadians.

9385 The second cost factor really has to do with the price of some of out inputs. Spectrum's a very expensive input. We spent $9 billion on spectrum since the first day of wireless. As I said, you know, we pay a premium for that spectrum.

9386 If you look at -- you compare it to the U.S., we're paying in rough terms, you know, 75 per cent to 100 per cent premium on U.S. cost of spectrum. You compare it to other countries, it's two or five times the amount that some of the European countries have paid for spectrum as a whole. And then there's the topic of equipment that is all priced in U.S. currency.

9387 So, there's a natural floor to that curve. We'd like nothing more than to continue increasing affordability because it's good for Canada and it'll continue to drive adoption and data consumption. We're in some ways forecasting that we'll be able to deliver a unit cost of data more efficiently in the world of 5G; hence this move to unlimited and the ability to actually lower prices. In one fell swoop last summer, we dropped that one plan that used to cost about $100 for 10 gigabytes of data to $75, to $75 with unlimited on the plan as well. I mean, that was a big move. We though about that ---

9388 THE CHAIRPERSON: We'll talk about that in a minute.

9389 MR. WATT: We thought about that for the better part of a year before even, you know, taking that decision. So we're motivated to make those moves, but they are conditioned by the reality of investment and our ability to drive that curve.

9390 MR. JOHNSTON: I would just add, building on the 5G investments, the cost curves that ensue, and the unlimited decision in June of last year, that pricing trends and pricing developments in any market are inherently non-linear. So they -- they tend to have break points and they move in single point events in large part. And I think we'd look no further than last June to see that a catalyst like the move to unlimited, creates a breakpoint and a discontinuity in the pricing environment.

9391 And we see that as 5G rolls out, as Joe mentioned, that the ability for Canadians to use more data will drive a continued price per gigabyte downtrend in the market. And I'm sure as new technologies within 5G, and millimetre wave, et cetera, come to the market, there will be continued price compression on that price per gigabyte as we move forward.

9392 THE CHAIRPERSON: Thank you for that. That's helpful.

9393 Just back to my original question though, a number of parties -- well, for example, Telus -- suggested that the recent data in, for example, the Competition Bureau's examination is out of date. And I guess my core of my question was do you think everything you said is -- I'll accept is arguably true, but it's true elsewhere. Are our rates going down faster or slower than other countries?

9394 MR. WATT: I think you're probably referring -- there we go. I think you may be referring to the Competition Bureau chart in Bill's book about that, and others ---

9395 THE CHAIRPERSON: I am.

9396 MR. WATT: --- make the same point, that chart ended in 2018. So our prices have dramatically fallen since then. Your question is fair enough, don't dispute that. But what about other countries? Well, our view is -- because another question we've heard is, it's fabulous that you have introduced the unlimited plan, but frankly, what took you so long?

9397 THE CHAIRPERSON: That's one of my questions.

9398 MR. WATT: Yes. So I think that it's fair to say that our position -- I think it's safe to assume and you know, we tell people never to do that here, but that our prices have fallen more than others because we have, as Brent said, introduced that breakpoint now, with that very substantial change, than in some other countries came a bit before.

9399 We do think, just to make the fundamental point, and you talk about the international price comparison, to really want to look to the American situation for the most comparable match to Canada in terms of the characteristics. And so that is the one that we -- we would draw your attention to.

9400 THE CHAIRPERSON: Thank you.

9401 I'll get you to reformulate all my questions. Your statement of my question was clearer than my question.

9402 You raise -- you answered this in part in your opening remarks, Mr. Natale, with respect to the motivation behind the introduction of last June's reductions. But I'm sure, as you are referring, a number of -- a number of intervenors have questioned the timing. You've said it did not relate to the threat of regulatory intervention, but I should give you an opportunity to add to that. The point's been made, what say you?

9403 MR. NATALE: Thank you, Mr. Chair.

9404 If you were to spend time in my strategy meetings with my team, many of whom are here today, you would hear us talk about what are some of the next moves in the industry? Often informed by, what are the most important customer pain points that we see out there? We had that conversation a few years ago when the topic of discussion was roaming and how roaming is packaged or priced for Canadians, and that gave birth to the notion of roam like home.

9405 We've had this conversation around unlimited for the last, I would say year in earnest, and longer frankly. The thing that's always held us back is that the market in Canada grew up with an overage regime or an overage structure that constituted a significant part of our economics. As you heard me say last summer, five percent of our revenue is in overage. We've been quickly melting that five percent. Roughly $500 million has been quickly melting as people have adopted these plans.

9406 We did it because it's the right thing for consumers. We did it because consumers want to that peace of mind. We did it because the 5G era is around the corner. We wanted to kind of create an environment where people feel comfortable and open in using more data as a whole. When we looked at it before, it was two years ago or so, where overage was 10 percent of our revenue.

9407 So you get to a place where you say, when is the right moment we're willing to rip off the band aid and make the move? And we had a debate over a long period of time and we finally decided that we were ready to do it. We got great support from our Board. We had a Board meeting in June of last year where we talked about this topic at length and we were very open about the fact that it would lead to financial pressure. As you saw later in the year, we revised our financial guidance, not something you do lightly in a public company. But we felt it was the right thing for consumers and it's time to march on.

9408 So you can rely on us to keep looking at, you know, pain points as they come along, and other opportunities to either remove customer friction, or to create more affordable plans at all levels in the marketplace.

9409 THE CHAIRPERSON: Thank you. I omitted when we were talking about your cost curve, you made a couple of references now to spectrum costs or fees specifically, and indicated that they were in the order of seven times more than foreign jurisdictions, or the U.S. Do you have documentation, or could you undertake to provide us with details as to how that was calculated, or the source for it?

9410 MR. WATT: Yes, we can do that. The source is the GMSA Efficient Spectrum Pricing, and that's the source of the numbers that Joe was mentioning, 1.75 times the U.S. level, three and a half times higher here than in Australia, Italy, et cetera. And so, the curve is there and we'll file that with you.

**UNDERTAKING / ENGAGEMENT**

9411 THE CHAIRPERSON: I'd appreciate that. Thank you.

9412 We've heard a fair amount in the course of the proceeding relating to why there are differences, sometimes significant, sometimes not, between provinces, with respect to rates, and notably in Quebec. You are a national player, how do you explain the difference in regional pricing in Quebec, versus other regions or provinces?

9413 MR. JOHNSTON: Thank you. Well, first of all, I would mention that as we look most recently, and as the fourth carrier structure has emerged across the entirety of Canada in the last two or three years in a meaningful way, that the pricing variation across the province has actually normalized to a large degree.

9414 So we see on an everyday basis, all provinces, with the exception of Quebec, showing high levels of consistency in their pricing. I think the exhibits earlier in the submission, or in the hearings, supported that -- that observation.

9415 So as we look forward, you know, you will -- described it as, sort of, the various market dynamics and structures in the various provinces have led to various pricing outcomes. Quebec seems to be and has been in my experience in the industry, a persistent market where the pricing levels are different.

9416 And it’s a little interesting in the sense that, for example, Alberta, where the pricing and the ARPU levels are higher, but the penetration is also higher, we see Quebec with the unique outcome where the pricing is lower, ARPUs are lower, but the penetration is also lower. And so, that points to a market behaviour or consumer behaviour that places, perhaps, less value on the latest technology or the amount of data that is being provided, and has created a persistent and enhanced competitive dynamic for any particular price point because we've seen that demand for any levels of service just seem to be lower in Québec and has led to a more competitive dynamic around that.

9417 THE CHAIRPERSON: And I would take it from that response that those are generally the factors that you take into account when you determine prices for a region? It's those -- that set of considerations?

9418 MR. JOHNSTON: Well, I think it's important to note that when we determine prices, very much the market determines the prices. So we are but one player in a very competitive market.

9419 And very often I'm a price taker not a price setter in a various -- in a market, so we are responding and reacting to the moves of our competitors. And it's that dynamic, the demand levels of consumers, the behaviour of my competitors, and our responses that ultimately define and shape the pricing. And as I said, in Québec there's a unique environment that has created a unique outcome.

9420 THE CHAIRPERSON: And is that -- is the province the smallest geographic territory or market that you would look at in terms of establishing pricing, or would there be submarkets where you would adjust pricing beyond that?

9421 MR. JOHNSTON: There -- the level of pricing discrimination is like where we set -- like the prices in Québec generally have been a provincial decision, so we wouldn't have, you know, a price in Montréal that's different than a price in Québec City, and you'll even see that Ottawa prices here reflect more prices in Québec.

9422 But if you -- if you're more broadly in Ontario, you'll see a different price level. And that's been the structure of the industry to have the major players and all the players, is that the provincial boundaries have defined sort of what the prices have been in the various jurisdictions.

9423 THE CHAIRPERSON: For marketing reasons, I assume as much as anything?

9424 MR. JOHNSTON: Yes. I would say simplicity and defining, you know, where is the boundary, and in an arbitrary sense, the provincial boundary becomes the natural place to put that line.

9425 THE CHAIRPERSON: There may not be a single answer to this question, but what's the smallest region, in your view, where you might have a different price, or package?

9426 MR. JOHNSTON: That would be at a provincial level. Yeah.

9427 MR. NATALE: Let me just add one thought on this dialogue. I think it's important to understand that when we look at, you know, marketing and pricing and how it looks geographically, yes, the province is sort of the main cut, just given the expanse of Canada as a whole. But when it comes to promotional periods, when it comes to intensely hot periods like Black Friday or Boxing Week, there are often very aggressive promotions that are aimed at a particular city or a particular retail chain, or sometimes a particular shopping mall. So there's a whole promotional intensity.

9428 And bear in mind that, you know, the majority of our volume actually happens during these promotional periods. There are about 40 to 50 days a year that make up a substantive amount of our volume, in fact, a massive amount of our volume, and they would -- they're the periods you might imagine – Back To School, Black Friday, over the holiday period, through Boxing Week.

9429 And there, you'll see very targeted things that are often, as we call them, "back pocket offers". They're just happening in a channel, they're not advertised, and through our competitive intelligence - because every weekend we send people out to do mystery shopping, every weekend we send people out to look at what's happening in all banners, all stores, and come back for, you know, the Monday meeting that Brent holds and says "What did you learn this weekend?" "Well we saw that Competitor X is offering this particular bonus or offer or gift card in that particular channel", et cetera. And in fact, the people on the ground often will respond to that very quickly.

9430 But during these intense periods we have, for lack of a better descriptor, a War Room that is staffed by marketing people that are making in-the-moment pricing decisions because of the intensity of those periods. And if you look at the proportion of our customers that, you know, get something on a promotion, it's massive. It's the vast majority of customers get something on a promotion during those periods.

9431 THE CHAIRPERSON: Thank you. This question probably belongs in another part of my questions, but you just referenced looking at your competitors' offerings.

9432 We've heard a couple of times in this proceeding, from those in particular who support MVNOs, that there is little product differentiation in offers between the Big 3, as between the Big 3. Is that part of the reason for that, that you are closely examining your competitives' -- competitors' offerings and then matching or bettering it?

9433 MR. NATALE: The market is intensely competitive and highly efficient. It's not different than, you know, three gas stations on a corner. If one of them changes the price of gas, the other two quickly get up on the ladder and change the price of gas. And we have a strong pulse of market intelligence, and the reaction time is very quick in any part of the particular market.

9434 At the end of the day, there are no real structural advantages anymore. There was a time in our history when there was a structural advantage around a particular network technology, CDMA versus GSM, or the structural advantage around whether you had the iPhone and someone else didn't.

9435 Now, technology has pretty much become, you know, ubiquitous. Everybody's got every technology at their disposal; and therefore, we really do compete on a combination of customer service and price because as a service provider, we have no other structural advantage.

9436 THE CHAIRPERSON: Thank you. We'll probably come back to that theme when we talk about 5G later on.

9437 MR. WATT: I just wonder, this -- Richard, would you like to weigh on this on basically competitive markets? What is a competitive market around the world in wireless, how they structure, you know, in reference to the Chairperson's question?

9438 MR. FEASEY: Thank you. So I think the way that, at least in my experience, other regulators, and as a member of the Competition Authority I would think about it, is we're obviously trying to find another -- you know, what would a -- what is the relative competitive benchmark for the Canadian wireless market.

9439 I've heard a lot about comparisons with other countries. It's an obvious thing to do to go and look at another market that you think's competitive and say well the performance in that market gives us a benchmark against which we then compare Canada. My view, my experience is that you can attach some weight to those sorts of comparisons, but not a great deal because there are simply too many other variables involved in these cross-country comparisons to really allow you to draw very strong conclusions.

9440 In my experience, what people tend to look at much more is not historic measures of market performance, such as HHIs and market shares, that tells you something about how people have got to where they are today, but it doesn't tell you very much about what's going on today, but the standard measure that I've seen in wireless markets, certainly, is shares of net additions would be the most -- would be the measure that I would attach the greatest weight to, because that gives you an indication of the current competitive capabilities of the different parties. And I observe in Canada that in that case, the regional carriers are -- appear to be performing very strongly now in terms of their share of net additions.

9441 The other point I would make that I would also attach quite a bit of weight to is a point that Joe made in his opening remarks, which is ultimately to look the relationship between the returns -- the revenues, and the returns on assets that firms are running and their cost of capital because that takes into account pricing, quality, differences in costs, and all the other factors, and in my view, would be the sort of standard view of how you would think about is this market competitive and firms are running reasonable returns on their assets or is it a market where we see there's a problem.

9442 THE CHAIRPERSON: Thank you.

9443 Change of provinces. We talked about Québec for a moment. In reference to Manitoba, in your May intervention, you emphasized that Xplornet's entry in Manitoba ensured that there would be a continuation of a fourth carrier; and therefore, continuing levels of competition.

9444 I've seen some information in the course of the proceeding that suggests that the prices actually rose initially following the merger, but that said, since that time it seems that except for the larger plans pricing in Manitoba and Saskatchewan is now generally in line with that of other provinces.

9445 Is that a fair assessment of how you see the market? And how do you -- how would you assess Xplornet's impact on the competitive environment in Manitoba?

9446 MR. JOHNSTON: I would -- I would agree that that is a fair assessment of how the market has shaped up since that time. We've seen, you know, the intensity levels, you know, continue to increase over time more broadly across Canada, and that has led to an equilibration of pricing across those markets. And I see that actually persisting and moving forward now.

9447 THE CHAIRPERSON: Thank you.

9448 You've already made reference to this in your opening remarks, Mr. -- well, actually, Mr. Natale, but perhaps more in response to one of my questions -- when you talked about the cost curve of being a mobile provider. And you have, I think in your -- again, May intervention, talked about the declining per unit price of mobile wireless data over roughly, the last five years.

9449 But I also assume you were listening to the hearing yesterday and you may have heard Mr. Lawford's reference to magic math, effectively not -- I mean, the transcript speaks for itself. But Mr. Lawford was suggesting that cost declines can and should happen every year and therefore, increased data allowance should happen naturally. So the price decrease if -- to the extent that we're characterizing increased data as part of the increased benefit to consumer is a bit of a smoke and mirrors exercise.

9450 Would you care to respond to that?

9451 MR. NATALE: I find that highly disappointing, that characterization. You know, Jorge referenced the fact that 70 percent of our capital costs our civil engineering costs, our people that are clearing roads, building towers. Well, the price of that labour is not going down in Canada, it's going up. And in fact, almost any direct comparison with the U.S. to Canada, you find that we pay our employees and our suppliers that provide those services, far better income than in many parts of the U.S. In fact, if you compare us to the State of Florida, it's roughly half the amount per hour for a technician that is clearing a road or building a tower.

9452 We talked about spectrum already, and that analogous cost around spectrum. We talked about the fact that we buy our equipment in U.S. dollars. You know, a lot of our plans include the cost of the phone. The price of the phone is going up, not down. I talked about that in my opening remarks. So you know, we are working hard to drive unit cost as we find better technologies that make better use of spectrum. We have dynamic spectrum sharing that can give us more bang for our buck on spectrum.

9453 As we find these opportunities, as I said before, we pass them along to consumers. They're not natural. They don't just happen randomly or accidentally. They happen because of the investments that we're making every year to drive that capability and that opportunity.

9454 THE CHAIRPERSON: Thank you.

9455 A little bit of a change of subject, what about network quality, generally speaking? Is there much of a difference in network quality across the province -- across the country, rather? Do you -- if you're looking at a provincial level, are there variations in network quality from one to another? You mentioned earlier, or we discussed earlier that prices were generally lower in Quebec. Is there a differentiation in network quality between Quebec and elsewhere, for example?

9456 MR. FERNANDES: Thanks for the question.

9457 We have standard engineering policies that we apply across the country. From an engineering point of view, we don't think about the country on a province by province basis. We have central engineering teams that define quality, parameters, and standards that apply across the entire country. And then these parameters are managed and maintained by the teams on a regional basis.

9458 So at any given moment, any difference in quality that might exist is always a temporary one and would have been as a result of a particular market situation. Where, for instance, an increase in consumption of data in a particular area, particular city, might then drive up the congestion at that particular city, then obviously degrade the quality parameters. And obviously that is managed by the local teams to bring the quality of the network back up to the standard parameters that we establish. And we have those, obviously for voice and for data, to ensure that our customers experience exactly the same service across the whole country.

9459 THE CHAIRPERSON: Thank you.

9460 So by design there is no differentiation. Does it follow then that network quality is not taken into account when setting prices in various provinces?

9461 MR. FERNANDES: The quality is taken into account in as much as there is a very close alignment between the engineering and the marketing departments whenever we're thinking about a new -- a new plan, a new product. So we will consider what the impact of that new product might be, might have on the network, and if we believe that the impact is going to be significant, then we make sure that we take into account investments required to maintain that quality of service.

9462 So to give you an example, before we launched our infinite plans, we had a -- obviously, a deep discussion in terms of what the forecasting of data growth impact would be on the network across the whole country. And then based on that forecasting, we made sure that we -- we provide the investments necessary to obviously add the capacity required to maintain that quality, wherever it might be.

9463 THE CHAIRPERSON: Thank you. Mr. Watt?

9464 MR. WATT: Yes. From an economist's spin on that, I think I would say that the -- the overall level of prices is set to accommodate the costs of the network quality. But then within any particular region, as we've seen in Quebec, we then deal with demand characteristics that are unique of each of the individual markets, or where the demand is significantly different, even though the network quality is identical.

9465 To get customers on the network to drive revenue, we will -- we will have to make differences in the price plans.

9466 THE CHAIRPERSON: Understood. Thank you.

9467 And does that, I guess all of that, both from a technical and the perspective of an economist, does that hold true for the flanker brands? Is that equally true for Fido and Chatter?

9468 MR. FERNANDES: The networks that serves our customers are the same networks, and so the differentiation that we have currently is with Chatter, where the customers are on our 3G network. So we have a 2G, a 3G, a 4G, and a 5G network. Our Chatter customers use our 3G network more or less dedicated and set bans on the device that they would have. Otherwise, for other brands, whether they would attach to one or another network.

9469 THE CHAIRPERSON: And generally, you've probably heard a fair amount of discussion over the past week or so, that there is broad consumer -- we can call it confusion, or lack of information, with respect to the flanker brands, as to whether or not they are of inferior quality. And you've probably again, heard our discussion the past several intervenors, whether or not they think that hesitation to subscribe to flanker brands is driven perhaps by a sense that it is an inferior quality. You've also no doubt heard the different approaches expressed by Bell with respect to the management of its flanker brands, versus the approach identified by Telus.

9470 So that's a bunch of questions in one, but if you'd care to respond?

9471 MR NATALE: I'll start and then ask Brent to add to it. We are very proud of the network quality that our flanker brands represent. And if you were to look on the website and look at the maps that show the network, or you walk into a Fido store and speak to one of our representatives there, they would extol the virtues, and quality, and reach of that network, and tell you unequivocally that it's the same network that the Rogers' brand lives on. So, we make no bones about that, and we're very proud of that fact.

9472 Where the brands are delineated is, they speak to different parts of the market, and there's certain capabilities that live in each of the brands. So, Rogers, by definition, is a premium brand with high touch service, and, you know, a person to answer the phone and be there for every interaction. It's a brand that allows sharing and share -- plans of share constructs. It's a brand that will allow any phone whatsoever to be now financed, originally subsidized, et cetera. Whereas, the Fido brand is meant to be more of a digitally present brand that doesn't provide sharing in the construct, and certain handsets are not eligible, a lower assortment overall. So, it's meant to be tuned to a part of the market that is in a different sort of affordability strata, and, therefore, lower price points, and, therefore, lower level of support as a result. So, we try to tune these brands specifically in that manner.

9473 MR. JOHNSTON: I would also add that if you look at the mix of our gross additions and the customers coming to us, there's a very, very healthy mix of Rogers, Fido and Chatr. So, I would say that there's -- that would demonstrate a very open and transparent understanding from consumers to which choices they're making, and given the way those brands are tuned, to satisfy the needs of various customer segments. So, that'll be point number one.

9474 Point number two, when you look into a mall in Canada and look at the opportunity to make that choice transparently, you would look no further than, say, perhaps the Rideau Center here in Ottawa and discover 13 different opportunities or places to buy wireless. Some are exclusive, so they sell one brand only, some are non-exclusive, they sell multiple brands.

9475 Very, very often they are located very close to each other. So, the Fido store is very, very often very close, sometimes co-located next door to a Rogers' store, or very close to a Koodo, a Virgin, and a TELUS and a Bell store. And so, it becomes very easy for consumers to walk across and have these conversations and discover the various attributes of the service offerings and the network qualities.

9476 And then as I mentioned, you know, the vast majority of places in Canada are actually non-exclusive where all the brands are represented and the sales people there are trained by the various brands on all the, you know, pros of their particular offerings, and they can go and get that one-stop shop and be able to cross compare very, very efficiently.

9477 And thirdly, of course, is, you know, all of this information is widely and broadly available online on your mobile phone in the moment, or at home, and that makes it even more efficiently available to consumers to compare and make these decisions.

9478 So, the information is there. The mall -- the shopping environment itself actually facilitates -- very much like an auto mall -- the cross comparison of all these different attributes and makes it quite transparent.

9479 MR. NATALE: Let me just add, just to give some dimension to it, there are two-and-a-half thousand places in Canada where you can buy one of our products, one of our wireless products. About 1,500 of them are places that carry multiple -- and when I say "multiple" I mean competitor brands as well. So, the majority of those locations are places where customers can readily compare.

9480 If you walk into a BestBuy, you walk into a Walmart, or walk into a Wireless Wave ,or Telephone Booth, these are all multi-banner, multi-product locations. And given the sales representatives in those locations make their money on their ability to convince a customer to do something, whether it's their bonus or their commission, et cetera, they're very well versed in comparing and contrasting one against the other. And any time there's even a minute difference in some opportunity, whether it's price or data, et cetera, it quickly shifts the volume, which is quickly understood by the competitor and ameliorated.

9481 So, the market works very much efficiently, as I said before. And every day, in the vast majority of locations across Canada, the brands are side-by-side on a display and being talked about by the customer sales representative.

9482 THE CHAIRPERSON: Thank you.

9483 Again, changing gears a little bit, on the CAPEX front, you've already talked a little bit about the significant 5G investment requirements. Where's -- with LTEA mostly deployed, where are you right now in your investment cycle?

9484 MR. FERNANDES: We continue to invest on our current infrastructure. So, as I said before, in order to maintain the network quality across the country, we continue to invest even on LTEA as we speak. You know, in 2019 alone we deployed over 300 sites, new sites with LTEA, and we have similar plans to continue even with the event of 5G.

9485 THE CHAIRPERSON: And you've made reference, Rogers made reference to itself and its national competitors punching well above their weight, to quote your evidence. I think the numbers were $95 per subscriber in CAPEX in 2018, which you submitted was more than the per sub levels in the U.S. You may want to take this -- answer this particular question by way of undertaking, but I'll ask you in any event.

9486 Would you be able to give us that number for 2019? I don't know if that needs to be in confidence or not, and do you have any estimates of what that number will be in the coming years as associated with 5G.

9487 MR. WATT: Okay. I think it's certainly no problem providing that number for 2019. In fact, our -- we've already released our fourth quarter results, so we know we spent 1. -- roughly $1.3 billion in wireless last year up from 1 billion the year before, so we can turn that into the per capita and per sub. And I think, subject to check, I believe we gave a forecast of our CAPEX for 2020, but we'll check. If we haven't ---

9488 THE CHAIRPERSON: Okay.

9489 MR. WATT: --- we'll give it to you in an undertaking.

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9490 MR. WATT: One thing I would add though, when you look at those charts, I would encourage you to add the spectrum cost to the physical plant and equipment capital expenditure, which those charts only show now. Point being that over the last six years we've spent $6 billion in wireless, property plant and equipment, traditional CAPEX. We spent almost 6.1 billion spectrum, and spectrum is needed, and there's a trade-off there in the sense that, you know, when you have more spectrum -- Jorge can elaborate, this is by layman's explanation -- that decreases the need for additional sales to a point it's a trade-off spectrum, and then sale sites. Therefore, I think to get an accurate picture you really need to look at the sum of the two. And there we know, you know, property plant and equipment Australia looks like it's more. But I know in -- Telstra spent 1.3 Canadian over the past 6 years for spectrum. We spent 6.1 billion. And the two -- both those components of the expenditure need to be looked at in a chart of that nature.

9491 THE CHAIRPERSON: You can certainly include that analysis in your response -- undertaking response.

9492 I should give you an opportunity to respond as well to the more broad issue of if the Commission were to mandate MVNO access, how would that impact those investment numbers? You can feel free to answer that now, or you can include that in your response to the undertaking.

9493 MR. NATALE: Be happy to address that question. We can certainly follow up with more specificity if it's required.

9494 If there is mandated MVNO access that impacts our investment thresholds, then investment will be reduced, and investment will be reduced in the places where the economics of that investment no longer make sense.

9495 You asked the question, Mr. Chair, a few minutes ago around were stood with LTE advanced. You know, if you go back five years when LTE advanced, we were sitting at roughly 83 per cent of Canada covered. This year we're at 95 per cent. We'll make our way to 99 in the time ahead.

9496 I will tell you the last 5 or 10 per cent is the hardest because of population density. As you know, 48 per cent of Canadians live in the big, major cities. The 52 per cent that do not live spread across our vast landscape.

9497 And if you were to sit in one of our capital investment meetings where Jorge gets his money to build those 300 new towers and to add $1.3 billion of capacity, it is a serious discussion where we take every single request for capital, and in any given year there are far more requests than we have affordability for.

9498 We rank them one-by-one over, you know, a 20-30-page spreadsheet, and we rank them based on the expected return from that particular investment, and then we draw a line around our affordability based on the 5 percent return invested capital, and the other metrics I talked about earlier, and anything above the line gets done, anything below the line doesn't get done. So what'll happen is that line will be further up the page, and that line will impact rural Canada in the most significant way.

9499 Right now, we -- as I said earlier, we enjoy some of the best networks in the world. The fact that we're second only to South Korea, in many ways we're a global superpower when it comes to network capability and network coverage as a whole.

9500 The U.S. has speeds that on average half of Canadian speeds. If you were to draw that table, Canada would be Number 2, the U.S. would be Number 30 on that list, France would be 19, Germany would be 24. If rural Canada were a country, it would rank 14$^{th}$ on that list, far above the U.S. and the UK. That's the benefit of having a regulatory regime that supports this investment because we are fortunate in Canada not to have a very significant, and in fact, a very small digital divide when it comes to wireless.

9501 On the wireline side of our business, about 15 percent of Canadians across the industry, as you know, 15 percent of homes in Canada either have no Internet or have very poor Internet. There is a real and significant digital divide in our country that we're desperately trying to figure out ways of closing between government programs, CRTC programs, and our own efforts. We are blessed that we don't have that kind of divide on the wireless side.

9502 If we change the economic thesis of our industry, we will open up a digital divide on the wireless part of our world, which I think would be a shame. Would be a shame. 99 percent of Canadians is, I think a trophy on our mantle as a country. I want to keep it there.

9503 THE CHAIRPERSON: Thank you. Talk for a moment about barriers to entry. In your November intervention you submitted that barriers to entry in the mobile market are low. Obviously, there is some differing views.

9504 Shaw, for example, indicated last week that in addition to paying 1.6 billion for its acquisition of wind, they've undertaken billions in further investments, including 400 million per year upgrading and expanding their network. That doesn't sound like an insignificant barrier. Similarly, Mr. Bragg, when he appeared, also outlined what he described as this difficulty experienced by a privately-held company as it endeavours to build out.

9505 So I guess I'd like to ask you again, is that still your view that there are not significant barriers to entry to the mobile wireless market?

9506 MR. WATT: Okay. I don't recall that statement. It's obviously there. You can give me reference.

9507 THE CHAIRPERSON: I -- it should say paragraph 80 of 22 November intervention is what I'm referring to.

9508 MR. WATT: Okay. I'll take a look at that, but it -- for the reasons ---

9509 THE CHAIRPERSON: Hopefully, I haven't mischaracterized it.

9510 MR. WATT: No. For the reasons you outline they are clearly substantial barriers to entry for any facilities-based entrant. There is no question about that. Having said that, I'll stop, I'll go read that reference to see ---

9511 THE CHAIRPERSON: We can come ---

9512 MR. WATT: --- what we said. See what we ---

9513 THE CHAIRPERSON: --- back to it. Hopefully, I haven't misquoted you.

9514 MR. WATT: Oh, Howard, I think ---

9515 THE CHAIRPERSON: It's says it's low.

9516 MR. WATT: --- in a potential momentary minute of madness.

9517 MR. SLAWNER: No, I don't think it was a moment of madness. I don't think we were trying to say that there's a not a cost to enter the market. I think the point was that with the government's support, with set-asides, spectrum caps, mandatory roaming, the fourth carrier policy of the government has enabled entry by these players and they've been able to at a much lower price than otherwise they could've done.

9518 So the barriers are actually -- they're not insurmountable. People have been investing in wireless networks in this country over the last 10 years with the help of the government, and so it's not basically a free market (unintelligible). The barriers are actually being kind of brought down by the government.

9519 THE CHAIRPERSON: Thank you. That is helpful.

9520 So based on that, to what extent do you think its possible that we'll see a potential new entrant, regional or otherwise?

9521 MR. SLAWNER: It's always possible. I mean, with the -- if the government keeps providing assistance during auctions, there's always the opportunity for somebody to come along and take advantage of the set-aside or the cap. I think you also have an opportunity now with Xplornet, who has allotted 3500 megahertz of spectrum, who was just recently acquired by a large investment fund, so they have the potential.

9522 But I think there's a real market difference between possibility and probability. I don't think you witness a lot of market entry in a competitive market where prices are declining every single year. So even if the opportunity is there, whether or not somebody actually tries to enter it seems questionable.

9523 THE CHAIRPERSON: Fair enough. So let me say the question differently, but I think the answer will probably be the same.

9524 Do you expect, let's say in a 5-year time horizon, do you expect to see new entry in the Canadian market facilities-based entry deploying spectrum?

9525 MR. WATT: We can't be certain. We've seen Xplornet come in as a fourth in Manitoba, we actually have five, actually in the Ottawa region. As to somebody else coming in, I think -- I'm going to ask Richard maybe to comment on sort on the global perspective, four to five, four to three.

9526 But you know, in a country of 36 million people spread across this huge landmass already with four facilities-based competitors, five in some locations, and the sub brands, the spectrum that's been given out, the spectrum that remains, I think it would be difficult to see another facilities-based competitor arrive.

9527 THE CHAIRPERSON: Thank you. Oh, go ahead.

9528 MR. FEASEY: Thank you. I mean, just to add. If you look at this market from the perspective of an outside observer, Canada is a bit of an outlier in going from three to four facilities-based, four facilities-based competitors. The trend certainly in Europe, to some extent in the United States, and elsewhere in the world has been towards a greater concentration in facilities-based markets, I would say over the period over the last, certainly the last five years.

9529 Typically markets are moving down from four to three carriers elsewhere in the world. To the extent that that indicates anything about how the economics of the industry is changing then the move would not be towards additional entry.

9530 THE CHAIRPERSON: Thank you. Network sharing arrangements. You have one with Videotron. Can you talk to me a little about what your rationale or reasons were at the time for entering into that agreement?

9531 MR. NATALE: Sure. At the time, we go back in time, it is before my time so I'll ask David to fill in as appropriate. At the time, we had a re-sale arrangement with Videotron as they were looking to enter the wireless market. That re-sale arrangement turned into a network-sharing agreement. We looked at it specifically and said given the extent of the network build they want to do in Québec, given the opportunity to share infrastructure we believe there is an opportunity to share some of the capital load between two providers, maintaining, of course, our competitive distinction, delineation, but share the capital load with respect towers, and fibre, and the rest, and we embarked on that path to strike a network-sharing agreement.

9532 That network sharing agreement now is evolving. It's evolving to one where we will be sharing infrastructure, meaning we'll be sharing towers and backhaul. And so philosophically, from our perspective if there's an opportunity to strike a network-sharing agreement that makes sense for Rogers and makes sense, of course, with the other partner then we're open to the idea of the construct. We do so thoughtfully and carefully.

9533 I'll ask Jorge to comment. Network sharing agreements are very hard to orchestrate, very hard to manage over time, and in Europe the experience has been a troublesome one with agreements unravelling over time. So we do it with a very thoughtful eye.

9534 Our view generally is that sharing passive infrastructure makes sense. Sharing spectrum is more difficult, and I believe fundamentally in a 5G world even more problematic as 5G evolves into multi-dimensional applications and ideas for each of the players in the market.

9535 THE CHAIRPERSON: Before you add, maybe I can just throw in another element to the question which would be: have you been approached by any other regional MNO to enter into a similar agreement?

9536 MR. NATALE: The short answer is we have –- we have.

9537 THE CHAIRPERSON: And ---

9538 MR. NATALE: And ---

9539 THE CHAIRPERSON: --- successfully or I guess maybe you can (inaudible).

9540 MR. NATALE: Yeah, I won’t comment on the state of any particular negotiations, whether they’re old or current. I don’t think it’s fair given the confidentiality around some of those discussions, but of course, we will always address and look at opportunities as they come along.

9541 THE CHAIRPERSON: So I’ll take it as that you are prepared to negotiate with such network-sharing agreements with other carriers?

9542 MR. NATALE: Absolutely, if it's in the best interests of Rogers and our future, more than happy to do so. If it helps to deploy technology more efficiently and reach more of Canada more efficiently –- extend further into rural Canada, absolutely we're open to the idea.

9543 MR. WATT: I would just say -- and you're aware of this -- we have a network-sharing arrangement with Tbaytel and we also do in Manitoba; it was originally with MTS and then it was in –- in the BCE acquisition of MTS that was assigned over in a revised format and again, involves Xplornet et cetera to make that deal workable.

9544 In terms of any type of network-sharing agreement, you really need two partners who bring relatively equal value to the table and that is the issue in –- that either makes your network-sharing arrangement happen or makes one not happen. There has to be relative equal value brought to the situation by both parties.

9545 THE CHAIRPERSON: Thank you.

9546 MR. FERNANDES: Just to maybe add a bit of colour to the statements that have been made, the balance of interests between both sharing parties is incredibly important, and this is why we believe that if there is a balance of needs, then we are open to sharing.

9547 I think it's also important to differentiate on the kinds of sharing that exists. Again here, we believe –- and I mentioned in the opening statement that 70 per cent of the costs of building a network are down to the civil works; you know, the steel, the cement, the infrastructure, and so this is what you would call passive sharing arrangements and we are very open to passive sharing arrangements.

9548 Where it becomes more complex is when you have active sharing arrangements when you extend to the electronics, to the radios, to the frequencies that you own and especially in situations where there is an imbalance of ownership of spectrum, then it tends to become a very complex (inaudible) to have different strategies, different markets that they want to address, different needs in capacity and so on and so forth.

9549 And so this is where the discussion enters on, you know, one of the parties want to invest and the other one not wanting to make that respective investment and so that's –- that tends to complicate sharing agreements.

9550 I think it's also important to say in the Canadian context that regardless of what sharing agreements we may, you know, come to implement, I think it's fair to say that none of these sharing agreements would match the sharing arrangement that exists between Bell and TELUS where that particular sharing arrangement I think is unique in probably every circumstance, even at the global level where the –- both parties have been allowed to share spectrum and this in the Canadian context where it is incredibly expensive to apply set spectrum in what are incredibly complex auction environments where, you know, the parties are able to essentially set the price of the other. You know Bell and TELUS have the ability, more or less, to set the price of spectrum that we pay and we have, you know, very little to no chance of doing the same. And then bidding as an individual operator and then joining that spectrum is obviously something that certainly I haven't seen anywhere else in the world and does create an imbalance when it comes to sharing arrangements in this country.

9551 THE CHAIRPERSON: Thank you. That will let me move on in a one second to believe it or not, that was Part 1. Hope you're settled in.

9552 But before I leave it, I do have a short list; maybe I can save legal counsel some work later on.

9553 There are a number of reports that were used in the May intervention, and I'm not certain that they are all on the public record. Perhaps I'll read them quickly and –- for the transcript and you can see them later, but if you could undertake to file any that are not on the public record.

9554 We had the Open Signal reports; The 5G Opportunity dated February 2019, Mobile Network Experience Report Canada dated February 2019, Mobile Network Experience Report US, January 2019 and the Open Signal reports listed in footnote 11 of your May 2019 submission.

9555 There's also an Ericsson Mobility Report and a CWTA Report, the Benefits of the Wireless Telecommunications Industry to the Canadian Economy in 2017.

9556 Lastly, in your 22nd November further comments at Page 17, figure 1, there's a reference to compound annual decline in ARPU in the G-7 and Australia, 2013 to 2018. If you could please undertake to file the data used to calculate those compound annual growth rates. You can guess I did not make up that list.

9557 MR. FERNANDES:Yes, we will provide those documents and the calculation.

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9558 THE CHAIRPERSON: Thank you.

9559 All right, a few questions about the retail market.

9560 You have –- I assume, Mr. Natale, you hear it a lot in your day-to-day business; we certainly hear it: there is a view from Canadians the prices for their wireless services are not reasonable. What -– how do you explain that? We have heard a lot in this proceeding about the range of offers, the effectiveness of (inaudible), the –- you know, the -- notwithstanding the quality and coverage of the network, there is nevertheless a continuing view that prices are not reasonable. Why is that there; what's your explanation for it?

9561 MR. NATALE: I think, generally speaking, that Canadians probably have concerns about affordability period, a whole bunch of different categories in terms of affordability.

9562 We did an exhaustive survey last year and asked Canadians the question: if you could have better affordability for something, what would you like it for? And with the support of Nanos, we did a survey across Canada and wireless was ranked as seventh or eight on that list on the two different surveys that we did and in the top five were, no surprise, housing, food, electricity, gasoline and out-of-pocket Pharmacare costs.

9563 So generally speaking, I think that life is becoming more expensive as a whole, and there’s a general view that if people can get a better price or better affordability for something, they would like it.

9564 Well, frankly, we’re aligned with that mission and that view. We want nothing more than to offer Canadians more affordable options and more affordable opportunities with respect to wireless services. It’s actually in our best interest to do so because it will continue to drive demand for our product. It will continue to drive penetration rates in Canada and continue to drive the essential use of wireless services as a whole, especially on the doorstep of 5G, as we've discussed.

9565 If you look at, you know, any of the comparisons that we've drawn, we talked about the U.S. with respect to unlimited plans. The entry level unlimited plan in the U.S. on T-Mobile is $80 Canadian. On Verizon it's $92 Canadian. If you look at the MVNOs in the U.S., specifically Ting has a 1-gig plan at $29 Canadian. Republic has a 1-gig plan at $27 Canadian, while the Fido version of that is $30 and the Virgin version of that is $28.

9566 So, by, you know, a very empirical comparison, we're roughly in the same zone as the U.S.

9567 I think it's just the view that as people use more of a particular service and they like using more of that service, there is a desire to make it more affordable.

9568 I do think that, you know, the approach that the industry took to overage historically created dissonance, a lot of the customer friction that you're articulating I believe is rooted in the fact that bill shock became a major point of customer friction. And one of our goals and mandates has been to eradicate this notion of bill shock. On the Rogers' brand it's the move to unlimited. And on the Fido brand, we created something that's called worry free data protection. That is a very customer-friendly way of managing your data plan, and has been well received and lauded by our customers as a result.

9569 So, I think as we remove those friction points, you know, drive those likelihood to recommend our customer satisfaction scores, continue to drive more affordability that we'll be in a better stead with Canadians as a whole.

9570 You know, historically, we've given Canadians a lot more to think about and complain about, if -- whether it's bill shock or a customer service issue, et cetera.

9571 My personal mandate and vision and drive is to eradicate those friction points and just create a better relationship with Canadians as a whole and keep driving affordability directly.

9572 THE CHAIRPERSON: Well, we certainly wish you luck in that regard.

9573 How do you promote your lower cost plans? Are they as much a focus as the higher or larger data plans, for example, and what can you tell us about the supporting materials, training manuals, customer care, and the like that goes with that?

9574 MR. JOHNSTON: And I think I preface that with I think a constant refrain and conversation on just how vigorous the competition for subscribers are in light of the net added success of our regional players that every service rep in every store is vigorously trying to encourage and convince customers to buy with them and for the offerings that they provide. So, that creates I think a backdrop for our then desire to satisfy and deliver to those reps the materials and all of the information, both on the higher tier plans, but also on the low-cost data plans, everything that they need to be successful in that endeavour.

9575 So, there is the same treatment for the high-end plans that there is for the low-end plans, or the low-cost data plans, and similarly on our websites, they're also similarly available and available for people to see.

9576 So, there's every effort made to make them as transparent as possible, but, again, rooted in this desire to ensure that, you know, we have the right thing for the right -- for that right customer when they walk into our store.

9577 THE CHAIRPERSON: And does your promotion or advertising for some of those lower-cost plans, do they target any particular demographic market, seniors, or new Canadians, for example?

9578 MR. JOHNSTON: Certainly -- you know, the first conversation in a store from the rep is largely around discovery and understanding the unique needs of that particular customer. And it's really that conversation that opens up the door to the rep to be -- say, "Well, here's what I have that can help solve that need for you". So insofar as those conversations are happening every day across the thousands and thousands of stores across Canada, yes, there is a discern effect to ensure that the right solution is being presented to the customer given their unique needs.

9579 THE CHAIRPERSON: A bit of a -- call it a side-step, a shuffle, but you used the word "vigorous" when you described your agents or employees explaining and offering their services. Obviously, we, not so long ago, had a proceeding to look at aggressive and misleading sales practices. I'd be remiss if I didn't give you a chance to tell us how you think you're doing in light of the issues raised in that proceeding and since then.

9580 MR. JOHNSTON: Well, first of all, my vigorous comment was really around the vigorous competition and that risk.

9581 I will say that we are in a repeat business, meaning customers stay with us -- our desire is for them to stay with us as long as possible. So, the quality of the conversation at the beginning of that relationship is very, very central to the quality of the relationship that ensues.

9582 And so, reps deeply understand that when they have the right conversation, present the right solution, they are developing an ongoing relationship with the customer, and those customers often come back to the same store, talk to the same rep about their ongoing needs.

9583 We have implemented, you know -- and have had in place, you know, the structures and the training and the infrastructure to ensure that those conversations happen appropriately.

9584 I might hand it off to David or Joe to talk more specifically.

9585 MR. NATALE: First of all, we take the issue of sales practices very seriously. We've worked very hard to drive the right behaviour, the right training, and deal with any issues that come along.

9586 We have 13,000 team members that interact with customers every single day. It's a great team. They care deeply about the customer.

9587 Yes, from time to time there may be some small be it, but some behaviour that is not right, which we quickly kind of find and deal with.

9588 Eric Agius was here in that hearing last year and spoke at length around our sales practices and what we're doing about it. He's done a great job of actually driving that to a new place, a new height for us overall. In fact, Eric was just recently promoted to Chief Customer Officer for Rogers, which really means that he bears the burden of responsibility for customer advocacy at our table, reporting to me directly. And I think that'll help to enshrine not just the focus on this topic, but more broadly, the customer as a whole and having a voice at my table.

9589 THE CHAIRPERSON: Thank you. And I was going to ask you if you had -- if you could file training manuals and other documents that show how you teach your sales representatives to propose those -- or describe those low-cost plans ---

9590 MR. NATALE: Sure.

9591 THE CHAIRPERSON: --- and that relates to the earlier discussion ---

9592 MR. NATALE: Sure.

9593 THE CHAIRPERSON: --- not the discussion we just had about misleading and aggressive sales practices. I just, as you've heard from other parties, would be interested in seeing your training materials in relation to how you describe and promote those brands.

9594 MR. WATT: We will provide that information.

**UNDERTAKING / ENGAGEMENT**

9595 MR. WATT: Can I maybe do sideways shuffle back to I think two questions ago, and this was the -- sort of the threshold question of general perception the prices are too high. This is a real problem. What do you have to say in your defence? And Joe has explained our view there.

9596 This is a real conundrum because the thesis goes that if your prices are too high, and then the next statement is, quote one of the interveners, they were advocating for MVNO on the basis that the goal should be to immediately reduce excess profit taking from the Big Three. So, the connection between these high prices and excess profit.

9597 And if there's one message we'd like to get across to -- amongst many, is that, no, that happy solution of stripping a layer of big excess profits off the carriers to lower prices and still have everything continue on, that scenario isn't an accurate scenario. We've outlined in our opening statement the 5.1 per cent return on net assets, and people sometimes question that number. They say, well, your plant is mostly depreciated. No, that 5.1 percent number is calculated on the net book value of that plan, what is undepreciated so far. This, we almost -- you could go and put your money into a long government bond at 4 percent. Five point one (5.1.) percent with the risk that we -- we bear, is not evidence of excess profits. In fact, those are the profits that we need to continue to run our business.

9598 So this -- this is the conundrum. People think the high prices, big profits, therefore -- and then vice versa, and it -- you get into a mindset thinking that you can sort of, have it all. So we really need to, from our perspective, break this perception of high prices, because we understand the problem it causes for us, for you, for Canadians, and the danger that it generates for the fundamental development of the industry going forward. That's long enough.

9599 THE CHAIRPERSON: Well, thank you. You've clearly put it on the record for our consideration. So instead of talking about high prices, how about we talk about low prices for a second? There's been some discussion for example, about the success of the Connecting Canadian Families program on the broad wireline broadband side, as providing us with an example of perhaps what might be done in respect of mobile services.

9600 What are your thoughts about to what extent that would be feasible, and if it were feasible, need it be means tested? I'll give you the floor.

9601 MR. WATT: I'm going to start off again, I pretty much said what I was going to say as a framing of this particular question. Again, it is the situation of we have all these competing objectives. We want to have a high-quality network, we want to build more rural and remote locations, we want to deploy 5G broadly, and then we have the -- some of the pricing issues that work in the other direction.

9602 I'm going to pass it over to Joe. I will say that we are certainly very proud of our wireline initiatives in this area with our own initiative, Connected for Success in rent geared to income community housing, that has been out in the market for six, seven years. It's now a 25 Megabit per second service at $10 and it's -- there is an eligibility qualification around that.

9603 So certainly, in the wireline side, we've gone down this path and we are participants, willing participants in the Connecting Families program of ISED, which we really see as a compliment to our program. That one is addressed at households who receive the maximum Child Care Benefit.

9604 And Joe, over to you.

9605 MR. NATALE: I think it's a great question, and I think it's something that we're philosophically aligned with. As David mentioned, we're proud of our Connected for Success program that we launched on our own intuitive in 2015. It now supports 25,000 low income households. We'd be happy to sit down with the right people to figure out some of the complexities around it.

9606 You hit the nail on the head, one of the complexities is means testing. What is the right approach to means testing? And secondly, you know, how do we architect and structure that program in terms of price point, in terms of amount of data, et cetera. It requires some careful thought and discussion.

9607 And thirdly, how do you make sure that you direct at the people that really do deserve it and it -- it's not -- doesn't fall prey to augmentation unnecessarily that take it away from the people that deserve it? Because in the case of Connect for Success, we can connect it to the household itself. Mobility, by its definition is a mobile service and the question is, is it the individual, is the family? How do we characterize that?

9608 But, you know, suffice to say that we're more than happy to entertain that discussion, and it would be great to launch something that makes sense in Canada with the right parties at the table to discuss how we deal with the complexities.

9609 THE CHAIRPERSON: Mr. Lawford -- I mentioned means testing, which was not what was proposed by consumer groups that we've heard from. You've indicated that's one of the complexities. Mr. Lawford yesterday indicated that he thought it shouldn't be a concern given the relatively low cost of a program. You know, is there a serious risk for providers if they don't have to means test, don't have to do a credit check, with respect to post-paid? I think, setting aside devices.

9610 MR. WATT: Okay. We may have misunderstood then. We heard the discussion yesterday around line 150 of the income tax return as potentially being means of qualifying eligibility. There's a substantial difference between a program that is -- has eligibility qualifications, as opposed to a wide-open program which exacerbates greatly the concerns that Joe raised.

9611 THE CHAIRPERSON: Thank you, Mr. Watt. I misspoke.

9612 I'm referring -- I should have said with respect to credit checks, would put Mr. Lawford's comment in the appropriate context. When asked about pre-paid versus post-paid and the recommendation was for post-paid, and then with respect to post-paid, a need for a credit check. So I misspoke.

9613 MR. WATT: Terrific.

9614 THE CHAIRPERSON: But your views on that, pardon me.

9615 MR. WATT: So the -- oh, right.

9616 MR. JOHNSTON: You know the -- first of all, I would say that the distinction between pre-paid and post-paid in a world where on our Fido brand we have the data overage protection that Joe mentioned, where your data allotment stops at the end and then you decide if you want to go over. And if you use it -- on pre-paid on the other hand, if you get to the end of your purchased data, you can buy more. I would say that the concerns over credit distinct from handset, do sort of, you know, fade away in some respect.

9617 And I would say that the pre-paid option in that construct mimics almost entirely the post-paid. And so, they start to mimic one another and I think there's a lot of space between those two constructs to create a value proposition for customers, for those customers, that makes sense and that does not really create a user experience differential that would be meaningful at all.

9618 So you know, I think, subject to going into the details of that, I think there’s a lot of room to solve and not make -- I guess the concern being will credit be a barriers? I think credit needn’t be a barrier to providing and satisfying the needs that were presented yesterday.

9619 THE CHAIRPERSON: Thank you.

9620 You introduced a number of low-cost data only plans with some urging form the Commission in 2018. What could -- what did we learn from that process? I’ll stop there.

9621 MR. JOHNSTON: We’ve learned -- first of all, we have a substantial number of people on those plans, and we’ve described the process by which they are promoted in store, that there is a segment there that has adopted those plans, and that continues. At the same time, we’re also seeing that Canadians’ desire for, you know, full solutions remains intact. And there’s many, many Canadians that are looking for other alternatives.

9622 And so, we see that there’s been a healthy balance between the low-cost data only, but also the in market plans, which are, you know, very, very close to those offerings as well. So the balance of that has been, I would say, a very healthy outcome for -- for the market and for us.

9623 THE CHAIRPERSON: Just more broadly ---

9624 MR. WATT: Sorry, I think ---

9625 THE CHAIRPERSON: Sorry, go ahead.

9626 MR. WATT: Really, we were both interesting to see the attractiveness of having voice and text included with the data, even though a substantially bigger package of data, without voice and text is not as appealing. I think we had thought with low cost data only, appeal to people who would obviously use a fair bit of wi-fi, but also would use a voice app on the data. And that really hasn't proven to the be case. People -- the talk and text plans have proven to be more attractive. These are ones that we introduced in conjunction with the $30 1-gig data only plan there in March, but talk and text, very popular.

9627 THE CHAIRPERSON: Thank you.

9628 I'll maybe come back to the issue of credit checks on postpaid plans in a second, but before I do, you will have seen Commission's Exhibit 3, which provides a summary of low-cost plans that have been proposed by consumer groups. It was a range that had been proposed. You heard submissions yesterday.

9629 How feasible, in your view, would it be for you to offer a plan with similar attributes to those proposed, recognizing there is a range both in terms of price and the data allowances in the plans, at a price between 20 and $30?

9630 MR. JOHNSON: I'll start off by saying that a 40-gigabyte rate plan today with unlimited nationwide talk and text postpaid is in the very heart of the Fido value proposition as it stands today and appeals to a very wide berth of Canadians.

9631 So, the introduction of a plan in the 20 to $30 range would be sort of a 25 to $30 discount to the market price for that service above -- you know, in a available to all scenario would have a dramatic effect on the overall price in the industry. And I say that because that 40-gigabyte rate plan today is what I refer to is what -- you know, pretty much a reference plan. It's a reference value point in the market.

9632 Rogers' pricing, Fido pricing and Chatr pricing all are interconnected. The pricing is always -- everything is always connected to other pricing in the market at every time. And so, by offering -- changing the price point at that price point, it would hinge and ratchet on the pricing of all the plans in the market across Canada.

9633 So, in an above the line in market scenario, it would have a dramatic effect and get in the way of some of these -- you know, the balancing acts that we talked about between financials and the essence of the future, et cetera.

9634 With a strong eligibility criteria, as we described earlier, and the right conversation around exactly how to fine-tune that value proposition within that range, I think there is an opportunity to offer something, you know, with substantially more value for those customers in Canada in the most need.

9635 THE CHAIRPERSON: What about, for example, a two-gig plan? Same views? I ---

9636 MR. JOHNSTON: The two-gig plan clearly wouldn't be quite as -- you know, four gigs is right in the heart at $55 today. Two gigs though would -- I think is still at 45, in the 40 to $45 range, so it would have that similar effect, for sure. On Chatr right now we have a $30 1-gigabyte plan unlimited nationwide. That plan is an in-market plan. We see that plan satisfying, you know, the basic needs of Canadians looking for some data, understanding how much wi-fi is consumed amongst our customer base when they're not on wireless connectivity. So, you know, there's already that price point in place today.

9637 But getting north of into the two and the four-gigabyte range starts to really hit at the center point of the Canadian market where we looked at an average usage in Canada of two-and-a-half to three gigabytes per sub. That becomes a -- at the very heart of the Canadian wireless market today.

9638 THE CHAIRPERSON: But just bears repeating, but you did say with the -- with necessary, in your view, restrictions, then you're prepared to look at those types of plans.

9639 MR. NATALE: Yeah, if it's aimed specifically at groups of low-income Canadians or seniors with the right means testing, then I think it's a conversation we're willing to entertain, discuss how to best approach it. If it's a plan that's broadly available to everyone, it's -- it could be devastating overall.

9640 As Brent said, the average customer that we have uses about 2 1/2 gigabytes of data a month, and our average revenue per customer right now is -- sits around $55 -- 54, $55. Our break-even point, and I'm not going to repeat all the elements of our cost and our cost base, our break-even point sits in the 40s, in the 40s. So, it stands to reason that if we introduce a plan that in -- you know, would impact two-thirds of our customer base is our math in terms of how a four-gigabyte plan would actually, you know, reflect itself in the market, it would eradicate, you know, I would say the vast majority of our profits. And more importantly, it would actually stop investment in totality.

9641 So, by narrowing the size of the plan and aiming it at a specific group that is means-tested, then I think that's a great conversation to have and something we can work on. But a broad plan at four gig would -- it would eviscerate the industry economics, given the cost structure and all the things we talked about around population density.

9642 As we continue to invest in the future, as we drive the unit cost economics to a better place, of course there'll be an opportunity to offer more data at a better affordable price point, just like we have over the last five years. But to do it in sort of one key moment would make the melt from overage on unlimited plans seem immaterial in comparison to what would happen here.

9643 THE CHAIRPERSON: Thank you. I think I know the answer to the next question, but I will ask you for the record. Would you have a view on whether the Commission should mandate such a plan?

9644 MR. NATALE: Mr. Chair, you are correct. I think I've answered that question.

9645 THE CHAIRPERSON: Just touching back on the marketing or the way in which you communicate with consumers at your retail points of presence and so on, you said that the initial contact helps the sales agent or Rogers' employee to determine needs and so on. If I were a customer just asking what my best low-cost option is, I don't know if you can answer that, what would you -- where do you think your representative would begin? What kind of information would be provided? That's a bit general, I understand, but ---

9646 MR. JOHNSTON: Yeah. I can give you -- like a directional answer I think to that broad question.

9647 Many Canadians view their wireless service as a solution which includes both service plan and a hardware solution. That solution very often has -- and depends -- you know, the time of year, as Joe mentioned earlier, a promotional aspect to it. So, there will be certain plans that are discounted and certain devices that are discounted. I would say that becomes a very important point of the conversation.

9648 Customer would -- you know, would ask you what -- how much your data usage tends to be, have you gone over on your old plan? Because we know -- we want people to feel comfortable that they're in the right data plan for them. And what kind of device do you really like to use? Are you a heavy Smartphone user? Do you have an appetite towards Android or IOS? These all become very important factors. Are you a really engaged user, or are you an occasional user?

9649 For the occasional user, I'm just going to argue that a customer -- we're going to probably, you know, suggest to you a mid-range iPhone, a mid-range Android device with a plan that has somewhere around the average gigabytes for Canadians and you would give us a very -- hopefully a very specific answer around the type of user that you are, probably in the sort of two to four-gigabyte range would be the solution.

9650 Increasing, increasingly, customers are moving to used devices in Canada also. So, we're seeing -- and we're -- probably to create affordable solutions with that allow people to get into a used phone that's certified by Rogers and/or Fido to -- so they can get even more affordable outcome on the device side, because that allows them to get into a device that's more of a mid-range and perhaps a few generations old, but it's been previously used, but we've refurbished for them.

9651 THE CHAIRPERSON: Thank you. What about customers who may be more vulnerable due to their age, language barriers, and so on? How do you address those types of challenges?

9652 MR. JOHNSTON: Again, you know, this the beginning of a relationship in that conversation in the store, so there's, you know, every effort made to ensure that there's the right communication occurring.

9653 One of the more recent things we've done, is we -- on the Rogers brand we've introduced a service Pro-On-The-Go. We're expanding that nationally. This is a service where a rep will actually come to your home and offer -- you know, you buy online or over the phone through a phone conversation, have that discussion. But a rep will physically come to your home, often in the language of -- because there are multiple language opportunities -- to offer very tailored and unique assistance in the comfort of your home or in the local Starbucks around the corner.

9654 We've seen this appeal greatly to people with accessibility issues, people who find it difficult to get out to the mall, and we're quite excited about its opportunity to serve those customers which have difficulty and also to expand our addressable market, and that's been something we're rolling out as we speak. We're starting in Toronto and we're rolling it out nationally.

9655 THE CHAIRPERSON: Thank you. A little more of a focus question having regard to the concerns raised about overall about reasonableness of wireless prices, including those on behalf by vulnerable customers.

9656 Can you comment on whether you believe it would be appropriate for the Commission to deforbear from either or both of section 25 and 27.1 on that basis, and only insofar as is necessary to mandate a specific low cost occasional use plan?

9657 MR. SLAWNER: Yeah. I think it really depends on what actually you mandate. If you mandate something that's very specific, very targeted with high eligibility requirements then perhaps section 24 might work. However, if you do something that's more broad that would impact the market in the way that Joe and Brent were describing, that you set one price point and everything pivots around that would possibly lower the entire industry's prices, then I think that possibly forbearance would have to go through, or deforbearance, excuse me. I don't, however, believe that the market conditions as they are right now would dictate deforbearance.

9658 THE CHAIRPERSON: You mentioned how broad it might be and whether or not it would be suitable to impose a condition under section 24. If it were to ensure that customer service representatives are properly trained, provide prominent links, for example, on websites and kiosks, and in the stores, is that type of ---

9659 MR. SLAWNER: Yeah. I think that's probably ---

9660 THE CHAIRPERSON: --- framework suitable to mandate under section 24?

9661 MR. SLAWNER: Yes. I think those kind of ideas would probably fall under section 24, would be more suitable, yes.

9662 THE CHAIRPERSON: Thank you. Perhaps, and I'm nearing the end of my questions on retail, then we can take a short break, I think, before I do wholesale.

9663 Winback, talk about winback for a moment. Are winback tactics appropriate and fair for consumers?

9664 MR. JOHNSTON: Let me start that by saying customers switching is one of the primary means in which customers communicate with us as a carrier, and when customers switch we have a variety of what we would refer to as retention activities. We certainly don't want to see them go.

9665 And so there's two instances. One is, of course, they call us and say, you know, I'm thinking of switching. We will offer them a solution which we think better fits their needs and try to retain those customers; and/or secondly, if they go to a store and they port out and port their number to another provider, we will call within 24-hours that customer with a similar conversation to try to retain their business with us. Yeah, and it's within the 24-hours -- 24-hour period. Sometimes it takes us a little longer, depending on how quickly we're able to contact the customer.

9666 We see, you know, Joe mentioned the vigorous promotional activity that occurs in the market. There is -- all prices are bouncing very, very often. Sometimes at the store level there will be a one-day sale. Sometimes over the weekend there will be a weekend sale. And so you know, carriers are different -- moving prices at different times and the prices are moving around the market constantly.

9667 So this, again, reflects the -- hesitate to use the word "vigorous" again, but vigorous competition for subscribers, and as was mentioned earlier, the 33 percent of net additions taken by the regional carriers in the market in 2019.

9668 So this is actually an opportunity for us to provide more choice and a solution to that customer that if we didn't communicate -- if they didn't provide that communicate to us and we didn't respond they would not have available to us. So to me, it enhances choice for consumers. It creates another basis of competition, and it keeps the promotional intensity sharp in the industry because customers know, you know, every participant knows that everybody is all trying to win back each others' customers when these things are in place. So it actually -- it stimulates even more competitive dynamic around that.

9669 So I would say no, or the original question being that I would encourage winbacks to continue be seen as a valid and customer-oriented promotional and business activity in the light that I described.

9670 THE CHAIRPERSON: I think you were saying no for my next question ---

9671 MR. JOHNSTON: Okay.

9672 THE CHAIRPERSON: --- which would be would you agree with a proposal, for example, that we've heard about restricting on a time-limited basis winbacks?

9673 MR. JOHNSTON: My personal -- it's my view that that would be anti-consumer. I think the only -- the consumers would be hurt in that situation, and I don't see a basis for making that decision. It -- yeah.

9674 THE CHAIRPERSON: Do you have proactive programs or proactive measures to ensure that your long-time customers have plans tailored to their needs? You know, do you reach out proactively to go get them to sign up, give them another plan, a better plan ---

9675 MR. JOHNSTON: Sure.

9676 THE CHAIRPERSON: --- before an opportunity to leave you occurs?

9677 MR. JOHNSTON: Yeah. There's -- you know, there's always the pricing that one sees on the website, there's the offerings, and then we have, you know, a large customer base, and we have tactics and promotions and treatments that we provide to our base on an ongoing basis that are tailored for their unique needs.

9678 And we'll always be looking to figure out how we can offer our customers things that make their experience better with us. Sometimes there is treatments where maybe our network was down in a particular area and we want to apologize to that customer and you know, ensure that they continue to be happy with our services, and we take action on that, or we see them that they're on one of our older plans and they've been bumping up against their data limits and are experiencing overages, which ---

9679 THE CHAIRPERSON: M'hm.

9680 MR. JOHNSTON: --- we don't think is just a great thing. So we will reach out to them proactively and offer them an infinite plan and try to get them onto a better place. And when it's -- you know, more win-win.

9681 As I mentioned earlier, we were -- we try to be in long-term sustainable relationships with our customers. Customers can switch very easily in the Canadian market, 17 percent in a given year. It's a real fight every day to both attract and retain customers in the Canadian marketplace, so we need to always be on our front foot in terms of ensuring customers see us as having, you know, good value with the right solution.

9682 And increasingly, actually, that we're personalizing our experiences and our solutions to their unique needs. Given the state of play across, you know, a broad -- other set of industries that Canadians increasingly expect us to know more about them and how we can serve them more uniquely and in a more personalized manner.

9683 THE CHAIRPERSON: This will be my last one.

9684 MR. NATALE: Just one quick comment ---

9685 THE CHAIRPERSON: Oh, sorry.

9686 MR. NATALE: --- on that. Sorry, Mr. Chair.

9687 We have a team that we call Customer-Based Management. Brent's alluding to their activities and how they treat customers, et cetera. What they do every day is they have an ability to look into our customer base and say which customers do we think have a propensity to churn, and they have created a model, if you will, that says have we let that customer down recently because maybe the network was down or they had a billing problem that we had to make an adjustment or they tried to call us and they couldn't get through.

9688 We have a number of parameters that speak to how that customer might be thinking about leaving and we'll practically reach out to a list every single day to say hello, we notice that, you know, you've bumped up against your overage plan. If we do this, would that resolve your problem, et cetera.

9689 So it’s been a very effective approach for us, and it’s actually helped to drive churn improvement by getting ahead of it before customers decide to leave.

9690 Sometimes we know the customer loves the latest phone, we’ll call them well before they’ve paid off their phone balance and we’ll say, “Hey, the new iPhone is out, you’ve been a great customer of ours. Here’s a special promotion on the new iPhone if you want to make the change right now.”

9691 So this base management is sort of -- is a massive activity and a big investment that all the carriers have made that isn’t as visible on the Website or isn’t as visible anywhere else, but it actually fuels affordability in the industry.

9692 THE CHAIRPERSON: That’s a great segue to my last question.

9693 But you understand, appreciate the view from consumers that they don’t know what the real price is for that very reason, that it’s not necessarily what’s on the Website; that there are a wide range of promotions that the service providers are reaching out to some customers but not all customers and offering them what they might perceive as a sweetheart or special deal.

9694 So there’s a great angst among consumers that they’re not sure about the prices and the fairness of the prices.

9695 MR. JOHNSTON: Well, just having -- when we see the results of these particular programs -- which we’re always evaluating, saying is what we’re doing making a difference -- if we don’t offer an above-value plan; in other words, some solution that’s more than what they could get by going onto the Web, we don’t get the results that we need on those campaigns.

9696 So I would say that, if anything, Canadians are becoming more and more aware of the various things, and are highly aware of the various offerings. They are one click away from a Website to look at what’s available; or, actually, it’s on the device that they’re using every day.

9697 And so -- and a lot of these communications aren't -- they're not individual one-on-one conversations; they might be an MMS; like, a text message that we send to the customer. They don't have to respond right away, so they have the opportunity to shop and compare.

9698 And I would just go back to, you know, those offerings are always above what -- and attuned in a way to get customers to a new place that you wouldn't otherwise be able to get on the Website because they're offering value, given their unique circumstances, and given our understanding and the relationship we have with them.

9699 THE CHAIRPERSON: Thank you.

9700 Mr. Watt?

9701 MR. FERNANDES: I was going to say outside of what we asked Mr. Feasy -- Richard -- to do for us, but from your experience around the world, do you have any insight into this particular type of issue, the posted price versus promotional and discounted pricing?

9702 MR. FEASY: I think my experience -- I mean, it's a standard feature of certainly all the wireless markets that I've seen; and I recognize, I think, the challenge to some extent that the Chairman is characterizing, which is the appearance that active and engaged customers appear to be able to get a better deal than customers who are less engaged, either because they're vulnerable, as you talked about earlier, so that they have sort of identifiable reasons why they may struggle to engage with the market, or for other reasons which may be quite difficult, in terms of them being able to identify them.

9703 And I think, you know, regulators around the world, in my experience, are wrestling with this problem because the answer to it does not appear to be on the supply side of the market. It does not appear to be giving customers -- inactive customers more choices. It's on the demand side. It's finding ways in which customers who otherwise struggle to can engage effectively with the choices that are available to them and the opportunities that are available to them. And certainly my experience, the big insight, in a way, and the new insight that people are currently wrestling with is the solution to these kinds of challenges, is not on the supply side; it is trying to find ways on the demand side to help groups of customers engage better with the market.

9704 THE CHAIRPERSON: Thank you.

9705 Madam Secretary, let's take a 10-minute break and we'll resume at 12:27.

9706 Thank you.

9707 --- Upon recessing at 12:17 p.m.

9708 --- Upon resuming at 12:29 p.m.

9709 THE SECRETARY: Please take your seats.

9710 THE CHAIRPERSON: Welcome back.

9711 Wholesale. Let’s start, I guess, with first question, which most -- put in the most general sense, one would expect regard -- not regardless, putting aside the mandating of MVNOs that such arrangements would occur naturally in a market, and we’ve heard much about the various MVNO offers that have evolved in various markets. But we really haven’t seen that in Canada. And I know -- and we’ll put aside MVNOs focused on IOT applications or -- which I know you have taken on, or negotiated, I should say. Why not? I mean, a simple -- really simple question; why don’t we have -- why haven’t MVNO arrangements been negotiated? Why haven’t you negotiated MVNOs?

9712 MR. NATALE: Well, first of all, we have negotiated MVNOs. But let me just start more broadly and I’ll come back to that statement.

9713 As a carrier, as a provider, we look at market segments and areas of the market and say should we address those directly? Or should we do it through a wholesale arrangement? And that’s been happening since the very beginning of the telecommunications industry.

9714 As you well know, on the wireline part of the business in Canada and elsewhere, it’s -- there’s a fervent wholesale market. On the wireless market, you know, we made a decision to buy Microcel and keep the Fido brand. We made a decision to launch the Chatter brand. These were ways of addressing a part of the market. We could have easily have said, you know what; we’re to going to address the Chatter segment of the market. We’re going to do that through an MVNO post-sale relationship. And you basically make a trade-off in your mind, do I want to open stores, open a call centre, worry about marketing, building a brand, or do I just get economic rent from my network and let someone else worry about that.

9715 In Canada the market has evolved such that we have multiple brands by carrier, not just on national carriers, but increasingly the regional carriers with the launch of Fizz in Quebec, as well as the Videotron brand, as a whole. So, the markets evolve in that manner.

9716 Where there are areas of the market that we feel are being underserved, or there's an opportunity, we're very open to the idea of MVNOs. We have an MVNO relationship with a company called Star. They are provider of wireless services under the Petro-Canada brand, under the 7-Eleven brand. So, that's a part of the market where we believe it's important to have presence, but we don't want to do it directly. We -- happy to form that sort of relationship.

9717 We have -- we had a relationship with both Videotron and Eastlink in the early days of their foray into wireless where essentially they were reselling the wireless network of Rogers to get going in the marketplace. And we felt both in Quebec and Atlantic Canada it was the right economic trade-off between wholesale and retail for us as an organisation. So, we've been very open to those notions and those ideas.

9718 In areas where we may own spectrum that we're not using as much or that we can't seem to get it above that list that Jorge looks at with respect to investment, we're happy to subordinate that spectrum to really it's a wholesale relationship, but it's really an infrastructure-based provider and we've got dozens of these across the country that, you know, will address the market by wholesaling our spectrum, for lack of a better descriptor, by subordinating to them. So, we're open to the ideas.

9719 I would maybe ask Diane, if you don't mind, Diane, just talk a bit about -- Diane's our director of wholesale -- about the proposals you do see from potential MVNO candidates, how you approach and address it. Just give the panel a view into that world.

9720 THE CHAIRPERSON: Well, and a good start -- just a starting point would be helpful in terms of just how do you -- what is the starting point for negotiations? Do you propose a set of terms and conditions? How do you go about it?

9721 MS. GILBERT: Thank you. We get approached by a number of prospects year -- every year. We have conversations with each one of them. We assess the proposal, the value proposition that they want to bring to market. And then at that point, if we believe there's a way forward and there's a larger conversation to be had, we sign an NDA with them, but only 50 per cent make it to the NDA stage. Many of them drop off, for the reasons we've mentioned earlier, go into the IOT market segment because they're not quite clear on what exactly they want, so they come to me first.

9722 Some of them get -- proceed with the discussions with our competitors and sign arrangements with them. And then many of them actually tend to -- once we start to talk about what it's required, the scale and scope of running such a business, sometimes they end up speaking to our branded channels and go to the retail side because they're much more supported there, and the role that they play is at a smaller scale and scope, and they feel that that's something that they could be more successful with.

9723 So, they approach us. If they make it to the NDA stage, like I said, about 50 per cent of them do, once we get past that stage, that's for the purposes of share more details, to understand more about how they want to go to market, what level of investment they have, what market or segment they want to target, and we give -- we ask them for a business case. And when we get to that stage, then another about 70 per cent of the 50 per cent that remain drop off because they just don't have -- they don't understand what's required to get into a business like this, and they tend to lose interest.

9724 And so that's kind of the process we follow, but certainly there's been a mass shift from a Smartphone MVNO voice proposition to the machine-to-machine, as we mentioned, and I know you already said you're very well aware of that, but it's very difficult to find a niche market today that isn't already fully addressed by the many brands in the market today.

9725 THE CHAIRPERSON: In most of the proposals, for lack of a better word, that come to you, do they tend to be sort of full MVNO proposals, or do they tend to be a rebranding type offering?

9726 MS. GILBERT: They are generally and mostly full. They don't have any infrastructure. They don't own spectrum. And they are looking for -- what they believe is an easier way into the market and quicker, but when they realise that just because you're not bringing the engineering or the spectrum to the table, there's still a very large endeavour behind that.

9727 THE CHAIRPERSON: And what -- sorry, go ahead, Mr. Watt ---

9728 MR. WATT: Oh, I was just going to -- to clarify in terms of how full that we're talking about the same thing here in terms I think full is in the context of the hearing, a full MVNO is where the MVNO provides a core network, you know, switching and billing, et cetera, as opposed to more what you might call a rebrander. I think Diane is going the other way there.

9729 MS. GILBERT: You're absolutely right, David, and I apologise for that. I always knew the full MVNOs being those where they fully MVNO the business case. I apologise for that.

9730 THE CHAIRPERSON: I understood your response ---

9731 MS. GILBERT: Okay. Apologies for that.

9732 THE CHAIRPERSON: Not at all.

9733 What role does spare capacity play in your consideration? Is that a determining factor, the amount of capacity available, spare capacity in your network?

9734 MR. NATALE: Given the 30 per cent per annum data growth rates that we have, spare capacity is being very quickly used up across our network. And Jorge spoke earlier to how we manage capacity. The forward capacity in our network is often measured in months, in some cases, depending on, you know, events or major activities, it can be managed -- measured in weeks. So, Jorge has a methodology that looks on a -- as he mentioned, a 100-square meter basis it looks at capacity and is forever evolving it.

9735 It's not in our interest to have capacity lay fallow. Given our cost of capital, given the amount of debt that we take on as an organisation, given the returns at 5.1 per cent, it's not in our interest to have capital in the ground that's not earning revenue. So, we tend to try to really synchronise as much as possible the additional capacity with the ability to extract return from that capacity.

9736 The only thing that's sort of warehoused, for lack of a better word, often is spectrum, because we're waiting for spectrum to, you know, be cleared, or be available, or be deployed, but everything else is done as much as possible on a just in time basis for the reasons I described.

9737 THE CHAIRPERSON: Thank you.

9738 Some parties in the proceeding have argued that wholesale MVNO access is not an essential service in the same way that wholesale roaming was found to be in 2015-177. I'm guessing that's your position as well.

9739 MR. NATALE: Correct.

9740 THE CHAIRPERSON: So, what's the appropriate service or facility to apply the test to? Is it RAN access or is it MVNO access?

9741 MR. SLAWNER: Sorry, I think it would probably more apply to the RAN, but I don't think the RAN would actually meet the test by itself. I think there are ways -- excuse me -- for people to get entry into the market, as you already discussed. The government's been setting aside spectrum -- excuse me -- consistently for over 10 years now. I think we've seen a lot of entry into the regional markets of Canada. I again see Ray's Xplornet who has the possibility to become an additional carrier on the network. And last, but not least, I don't think there would be any substantial lessening in competition if someone did get access to these components. The market in Canada is clearly competitive. There are, you know, three or four -- excuse me -- four facilities-based carriers in each market, seven or eight brands, so I don't think it would meet the essentiality test in any event.

9742 THE CHAIRPERSON: Thank you.

9743 We talked earlier, Mr. Watt, about appropriate geographic market with respect to retail for wholesale. It was national for roaming, but some parties have argued for MVNO access it be provincial or smaller. Which of these positions do you hold?

9744 MR. WATT: I believe we would want the wholesale definition to match the retail definition.

9745 THE CHAIRPERSON: Okay. We've also seen arguments that RAN's not essential because it's been duplicated by the regional carriers. But in areas where the regional carriers -- sorry -- in areas where regional carriers have duplicated the RAN does that decrease the likelihood of further duplication? We talked about this a little bit this morning.

9746 MR. WATT: I think it does because we come the fifth carrier, they're starting up, they would have to acquire spectrum. Spectrum is not easy to acquire; a lot of spectrum is already in the hands of the existing four providers. Those four providers also need additional spectrum to grow. I think it would be difficult.

9747 THE CHAIRPERSON: In your view, do national wireless carriers have market power in the upstream wholesale market for MVNO access?

9748 MR. WATT: Well, I believe there are three sources of acquiring the supply in the current time. Now, you might say that there's four. It depends on the restrictions within the network sharing agreements as to whether there are four potential suppliers of the service to MVNOs. So that is one of the ways you could possibly promote more competition in that sector by requiring the elimination of those requirements to get approval to the extent that they exist. By that I mean you get approval from Partner A if Partner B wishes to offer an MVNO service to an MVNO potentially from agreements have restrictions or require the approval of the other partner, and by eliminating those you could increase the potential supply of that product.

9749 THE CHAIRPERSON: Assume or agree with me for a moment that there is upstream market power. Would denying wholesale access to MVNOs substantially lessen or prevent retail competition in your view?

9750 MR. WATT: No.

9751 THE CHAIRPERSON: In response to an RFI, you -- and we appreciate the effort that was put into it -- did put forward a proposed model for an MVNO access service. It contains, however, a number of conditions and qualifications. I'd like to talk about those for a second.

9752 In your model, you propose that eligibility be restricted to facilities-based cable carriers, ILECs and small ILECs, but exclude CLECs. So can you -- can we start there? Why exclude CLECs?

9753 MR. SLAWNER: Just that some CLECs don't actually put a lot of -- it's just that some types of CLECs don't actually have to invest in any kind of significant amount of facilities, so they want restrict it to those entities that actually have -- make the facilities investments that wouldn't preserve the incentive to invest.

9754 THE CHAIRPERSON: Would that include facilities-based cable carriers who are also CLECs?

9755 MR. SLAWNER: Well, at the time that we did the proposal we suggested that, but in fact since we've seen the proposal made by the Bureau, if you are going to mandate MVNOs, and we don't believe that you should, but if there was to be a mandated MVNO model it should probably be more reflective of what the Competition Bureau suggested.

9756 THE CHAIRPERSON: Okay. Thank you. Again, with regard to small ILECs and CLECs -- sorry -- ILECs and cable facilities-based cable carriers, some of them are also operating as CLECs outside their incumbent serving territories. Would their eligibility be restricted to their incumbent territories in your view?

9757 MR. SLAWNER: It should be restricted to wherever they actually have footprint for delivering service using their own facilities, and if they're not making any significant investments then they shouldn't. I'd also like to point that when we made our suggestion we had said that just investing in landline facilities is not sufficient. If they are going to do anything they have to actually invest in wireless facilities, and that would have to be their ongoing obligation. Otherwise, they're just going to continue making the investments they otherwise would've. And there's really no teeth to the small. So in our view you'd have to actually mandated investment in wireless facilities.

9758 THE CHAIRPERSON: Thank you for that. You also proposed a restriction on the reselling of MVNO access. Can you elaborate on your reasons of why it's necessary?

9759 MR. SLAWNER: It's just to keep control of who's entering the business. It's to understand how much traffic will be on the network. Anybody -- if there's a mandated regime out there, anybody can approach us directly. So it doesn't make sense, in our view, to actually have somebody who can resell resell. You need to keep some control over it.

9760 THE CHAIRPERSON: But if you had the necessary -- go ahead, Mr. Watt.

9761 MR. WATT: Well, I was just going to say, there has been some discussion earlier this week about the –- about cybersecurity issues of having resale of resale so that being able to actually track where the traffic is originating and how it is going I think is another consideration when contemplating resale of resale.

9762 THE CHAIRPERSON: But if the resale -- if the reseller reselling is subject to Commission jurisdiction and the concerns about full information or cybersecurity concerns were removed, does it still remain a problem in principle? In other words, if we got rid of the practical concerns are you still opposed to reselling?

9763 MR. WATT: Could I take an undertaking on that? Because you know, I'm thinking back several years. There have been -- there were certain clauses required of us, actually. So we were the -- the carrier was held responsible for actions of certain reselling parties. I'd like to refresh my memory on that ---

9764 THE CHAIRPERSON: You are welcome to take an undertaking.

9765 MR. WATT: --- and make a proper answer.

**UNDERTAKING / ENGAGEMENT**

9766 THE CHAIRPERSON: Another condition is restricting it to the consumer market. Again, can I ask why prohibit MVNOs from selling to IoT business or enterprise customers?

9767 MR. SLAWNER: Just because we ourselves have over 200 M2M IoT relationships out there. I think there's two distinct marketplaces between retail and business and enterprise, and clearly there is no shortage of MVNOs on the business side. I'm sure that other facilities-based carriers have similar, you know, customers on their networks, so I don't understand why we would try to create a mandated regime for something that's so obviously well-served.

9768 THE CHAIRPERSON: Thank you. You ---

9769 MR. NATALE: Mr. Chair, may I just take a second ---

9770 THE CHAIRPERSON: Yes.

9771 MR. NATALE: --- and explain these relationships now that we've talked about them?

9772 We do have about 200 different resale relationships in the IoT machine to machine world. They are everything from a service that enables your Kindle e-reader, a service that enables entertainment in your car if you subscribe to a particular service, it will enable transportation on fleet management. We even have a service that will deal with, you know, pest control.

9773 So we are open for business as it relates to entrepreneurs and Canadian small businesses that show up at our doorstep and say I've got a great idea for a machine to machine or IoT business or platform in a particular industry. We think it's part of our responsibility to actually enable these businesses.

9774 And I think in some ways it's a microcosm of what 5G is all about. 5G is all about creating these platforms that will go far beyond, you know, e-readers and transportation management that really go into enabling the business of the future and driving productivity in all sectors.

9775 THE CHAIRPERSON: Thank you. In your response you also included a condition that does not give MVNOs access to domestic or international roaming arrangements of the host carrier. Again, can you speak to why?

9776 MR. SLAWNER: Again, those are relationships that we have spent a lot of time and effort building over the years. It is perfectly possible for any MVNOs to actually build those relationships. There actually are middleman broker types out there that'll do them for them, and you can just go to one stop. So there is no requirement for them to take advantage of our roaming relationships. They are fully able to build their own.

9777 And I think the idea is to keep creating that incentive for these MVNOs to do as much as possible on their own and not rely upon on us.

9778 THE CHAIRPERSON: Okay. Thank you. You've no doubt, if you've been monitoring the hearing, heard our questions about in relation to some concerns that have been raised about entry by large, well-financed companies as MVNOs, for example, large North American tech firms. You've heard the questions; do you share the concern? Can you tell me if you share it, and if so, why and what kind of potential measures we could use, market caps, and so on if appropriate?

9779 MR. NATALE: I share the viewpoint that says large, global Webscale providers whose business value is measured, you know, at a trillion dollars or less that have massive balance sheets don't need any help or support coming into the country if that's what they chose to do.

9780 They have the financial wherewithal. They have the investment dollars to come and participate in this market and become an infrastructure-based player in this market and build network and capability that would support Canada and Canadians, so I feel the same way that they just don't deserve a handout in any way, shape or form. The market's been open to them from the very beginning and they're welcome to participate is the way I would describe it.

9781 THE CHAIRPERSON: And as to measures, subscriber limits, market caps; any suggestions for us?

9782 MR. NATALE: As an infrastructure-based player?

9783 THE CHAIRPERSON: Measures to potentially limit their ability to make –- avail themselves, pardon me, of an MVNO arrangement if mandated.

9784 MR. NATALE: I don't –- I don't think they –- first of all, we don't believe that MVNOs should be mandated and certainly ---

9785 THE CHAIRPERSON: I got that.

9786 MR. NATALE: --- should be made available to a Webscale provider. In terms of a test, I defer to my colleague to see if there's something we'd like to propose or whether we want to make it an undertaking.

9787 David.

9788 MR. WATT: I think we'd like to make it an undertaking because we think there are lots of complexities with any type of a cap or test in terms of, you know, trade considerations in a number of attributes, so can we take an undertaking?

9789 THE CHAIRPERSON: That would be fine.

9790 MR. WATT: Thank you.

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9791 THE CHAIRPERSON: Another favourite subject of yours.

9792 MR. NATALE: Can I just make one more comment, Mr. Chair, on this ---

9793 THE CHAIRPERSON: You may.

9794 MR. NATALE: --- topic? I do think that it would be absolutely devastating to the quality and capability of the networks in Canada to allow an MVNO of that scale or proportion as a whole. I do think it would just change the very nature and the future of the general economy in Canada.

9795 They've got incredibly deep pockets. Any one of them could just buy Rogers if foreign restriction on ownership weren't there as a verbal rounding (inaudible) in their balance sheet. So I just don't understand any logic by which they would even be allowed to participate on any threshold.

9796 THE CHAIRPERSON: Thank you. I do understand your position.

9797 Back to my next question, another favourite subject area: negotiated terms. What if there is to be a wholesale MVNO access arrangement and if mandated, your view is that terms and conditions and rates should be left to commercial negotiations, so couple of questions on that front.

9798 Putting aside the rate, which is not insignificant, in your view, would it be more efficient and less administratively burdened if the Commission were to endeavour to set out terms and conditions at the outset rather than –- in a tariff or decision rather than leave it all to commercial negotiations?

9799 MR. WATT: We would prefer to leave it all to commercial negotiation.

9800 THE CHAIRPERSON: And would the Commission's existing processes -- it's FOA process be appropriate for resolving disputes between prospective MVNOs and Rogers?

9801 MR. WATT: We think that would be the fallback position, yes. We think it –- really the FOA should be conducted by a third-party arbitrator. Maybe that –- and I understand this raises issues in your mind as to the delegation of authority et cetera, et cetera, but we do think that you could provide guidelines to that third-party arbitrator, and we would find that preferable to having the Commission act as the arbitrator.

9802 THE CHAIRPERSON: But whether ---

9803 MR. WATT: I just think it makes it more –- a stronger sort of commercial setting.

9804 THE CHAIRPERSON: But whether it was the Commission or a third party, if everything is left to the negotiation process, including all the terms and conditions, is it likely –- I can just envisage some very complex negotiations if parties are coming with –- starting from totally different starting points, someone looking for a full MVNO versus a lighter version or rebranding version.

9805 Absent terms and conditions, how do you see all of that being resolved, in particular, by a third-party arbitrator?

9806 MR. WATT: As we say, we think it should be resolved in a commercial negotiation. We really think that's the essence of a properly functioning MVNO market. If people come with the propositions they negotiate, ultimately, the only way it can work is when it's a win-win for both when both parties agree, and that can only be achieved when they're able to hammer out a meeting of the minds, and that really is what you should want. You should want all those matters to be sorted out by the parties, but if they are not, I would suggest it's very unlikely it's going to be a very successful MVNO experience for anybody.

9807 THE CHAIRPERSON: The record is clear that you don't support other approaches to establishing terms and conditions and rates for an MVNO if mandated, but I should give you an opportunity to put on the record your view for, first, retail minus approach to establishing a rate.

9808 MR. WATT: It won't be surprise, but ---

9809 THE CHAIRPERSON: Few things are, Mr. Watt.

9810 MR. WATT: Yeah, sorry. We're not in favour of a cost-based study to arrive at a rate. Whether it be the traditional methodology of phase II, we think –- think we have clear evidence of the difficulty of that exercise earlier this year.

9811 In terms of retail minus: retail minus, a problem that generally arises; there is what is the definition of the services and then how do you address promotions, discounts? The product has provided three months' free; is that the lowest retail price that you then discount from?

9812 There are these complexities we have mused and we know that we're coming to a proceeding on a review of costing methodology we muse and will it hold us to this when we make our submissions, but whether something such as an average retail (inaudible) ARPU for a service, it would take into account the discounts in the promotions et cetera would be a better starting point that said the listed price that takes –- it sort of ignores your problem with discounts and free months. And then arguably, it's simpler to identify the costs –- the avoidable costs than it is to do a bottom up Phase II and get into the complexities of the network which is very difficult.

9813 So –- but in general, we don't like any of those proposals. I might ask Richard to talk about the international experience on how some of these –- some rates have been set or how are they set, if that's alright, Mr. Chairman?

9814 THE CHAIRPERSON: Yes.

9815 MR. WATT: Okay, thank you.

9816 MR. FEASY: Thank you. So the first point, I suppose, is that instances of regulators determining the price are so rare as I think to be almost nonexistent.

9817 In the two cases that I referred to in my opening remarks in Europe where MVNO access has been regulated, the regulator was never asked; the firms were always able to come to a commercial conclusion with the MVNOs because the -- in those cases it's worth noting the challenge that had been identified was that there was a lack of offers of MVNOs. It wasn't there wasn't an allegation that the operators were coordinating on the terms, the commercial terms that were then supplied. So, once the operators were obliged to supply, the commercial terms appear to sort of take care of themselves.

9818 The problem, in my view, or the biggest problem, whether you're doing some kind of cost model or you're using the retail minus, but any sort of regulatory approach, is that you end up setting a single price for a very diverse set of demands.

9819 So, typically in MVNO markets, their characteristic is the MVNOs differ amongst themselves in terms of the parts of the market they're seeking to serve, the niche -- often niches, and the strategies that they're pursuing. And in a normal functioning competitive market that would lead to different commercial prices for each of those MVNOs with the host operators reflecting the different value calculations for each in particular model.

9820 So, and the difficulty with using a regulated pricing approach, it's very hard for a regulator to set all those different pricing points that would mimic the way a properly functioning competitive market was. You would just set sort of one rate, and that rate will then apply to all the MVNOs who are seeking access. And it might be appropriate for some, if you can get there, but it won't be appropriate for others.

9821 So, you're in a world where there will be permanent discontent amongst at least some of the players because the pricing is not reflecting the commercial situation.

9822 So, I think the experience is that -- and the consequence of that, recognising that is that typically regulators have adopted this approach of saying we look to the parties to find that -- a commercial price that you would expect to get in a properly functioning market, and we seem to avoid and thus far successfully in the rest of the world, ourselves intervening in terms of substituting our own view of what the rate should be.

9823 THE CHAIRPERSON: Thank you.

9824 Let's talk about the Bureau's model for a second. Let's set aside their conclusions with respect to the competitiveness of the retail market, which I understand you do not agree with. Otherwise, what's your view of their model?

9825 MR. NATALE: I know this sounds repetitive, but I need to say it. We are against the notion of mandated MVNO ---

9826 THE CHAIRPERSON: Understood.

9827 MR. NATALE: --- access in the market.

9828 You know, on the surface, when you look at the Competition Bureau proposal, it's the most similar to an infrastructure-based investment oriented regulatory approach that we've seen or that has been, you know, postulated. But -- and they, on the surface, seem like the least harmful, if I can call it that, with respect to investment, et cetera. But when you dig into the details, you realise it's very complex, extremely complex, and it really, you know, pivots on this notion of the five-year sunset. And we've debated amongst ourselves, we just can't seem to figure out how we could actually effectively manage a five-year sunset if we were to have -- given responsibility for it.

9829 Frankly, I think it does undermine the regional carriers and the investments that they've made and the success that they're having in the market. And it just punts the problem into the future with respect to managing that sunset.

9830 I don't know what would happen in year four, for example, when there are, you know, customers being served by that provider, yet they have not met their obligations with respect to building, and then we're into this very difficult circumstances that will probably start with a plea to extend the period longer, and we will, you know, really never effectively be managing to that complexity is the worry.

9831 So, I mean, I'll pause there and let others comment if they want to, but we think it's problematic.

9832 THE CHAIRPERSON: You mentioned the sunset and I appreciate you've made clear that you don't support the approach. If it were to be implemented, in your view, would it be from the day of a decision or would it be tied to when a competitor buys spectrum in the market?

9833 MR. WATT: We do think it would be from the day of the decision.

9834 THE CHAIRPERSON: Would it be ---

9835 MR. WATT: In terms of ---

9836 THE CHAIRPERSON: Pardon me.

9837 MR. WATT: Excuse me. I was going to -- I was thinking of the second part.

9838 When there's a spectrum auction probably either later this year, early next year, should a new player acquire spectrum, I think it would start for that player at the time of the spectrum acquisition. I don't think that's all that administratively complex because I don't think you're going to have really large numbers of players, new players buying spectrum. So, I don't think at least in that perspective from the start date that their proposal is overly complex.

9839 THE CHAIRPERSON: If we did adopt the Bureau's model, would it be appropriate to restrict MVNO access to regional carriers with a minimum investment, spectrum deployment or number of subscribers in order to ensure continued investment?

9840 MR. NATALE: I think it's fair to say we just don't support the proposal as a whole, and it just in its complexity feels like we're trying to land a very big airplane on a very small aircraft carrier to try to find a solution that might work with all these complexities wrapped around it. So, it's very difficult to comment on a specific element of it when we just think the models doesn't make sense in totality, Mr. Chair.

9841 THE CHAIRPERSON: Okay. Thank you.

9842 MR. WATT: Maybe one comment we would make though, we really do not understand the possibility of having a fine levied on people who availed themselves of the opportunity, and went into an area where they had previously been, and actually sold, and then started to deploy, and then found, well, it just doesn't make sense. I think, quite frankly, they've been punished quite enough having that investment and/or having had customers come to them and then being told, "Well, no, we're not going to actually provide service in that area anymore". I really don't see how that aspect of the proposal plays.

9843 THE CHAIRPERSON: And what do you think of the notion of call it a Bureau plus approach where access on an MVNO basis might be permitted for the regional players outside of their serving territories?

9844 MR. WATT: I think for the reasons that Howard mentioned earlier, we would be opposed to that. We believe it should be closely tied to facilities-based investment and facilities-based provision as possible in the wireless spectrum field.

9845 THE CHAIRPERSON: Thank you.

9846 In your submissions you've stated that if the Commission mandates the provision of wholesale MVNO access it should be limited to a period of five years. Can you clarify what you're thinking? You just mentioned some of the concerns about the Bureau's proposal to sunset after five years. Are they not similarly true for an MVNO arrangement?

9847 MR. WATT: Yes, they are. This was in our -- I'll reiterate what Joe has reiterated that we're opposed to MVNOs. So, this was in a spirit of in the alternative should that be the case, how would you, in our view, limit the damage, and in our view, you would limit the damage by a sunset clause, despite our reservations that the sunset clause would not ultimately be adhered to. But we ---

9848 THE CHAIRPERSON: Is the -- if you look at other carriers -- again, if the Commission were to mandate MVNOs, should regional carriers be mandated? And you can guess the follow-on question, SaskTel specifically, or Tbaytel.

9849 MR. WATT: Well, if you're going down that path, I think you probably would have to with respect to SaskTel and Tbaytel. They are the large provider in those territories.

9850 With respect to the three newer regionals, I would think you possibly could not place the obligation on them.

9851 I mean, quite frankly, I don't think that it resolves the concern. If you're thinking that if they are not mandated to provide the access that lightens the issue for them, I don't think so because they still will be facing -- an MVNO would be riding on the larger players' networks and competing against them in the retail market.

9852 I know Tbaytel said they actually wanted, should you go down this course, that they would have -- an MVNO would have to come to them first. And again, their presumption there is that the rate that would be struck by whatever means would be fully compensatory.

9853 They might live to regret that decision that it comes to them first if the rate were to be struck below the cost, but I think that would -- that would be our answer, Tbaytel and SaskTel as the largest players in those markets, and don't think you should have to mandate on the -- between new players.

9854 THE CHAIRPERSON: Thank you.

9855 I know you don't -- all of this is assuming something to which you stated your opposition, but I have a couple of more points in this -- in this area.

9856 Should the requirement to provide MVNO access only apply to the wireless carrier in each area with the largest network coverage -- coverage area or market share?

9857 MR. WATT: As you can tell, this is one we really haven't thought of before. Can I take an undertaking?

9858 THE CHAIRPERSON: You may.

9859 And why don't I give you two other sub-points, and maybe you can address them all together?

9860 So maybe it would bear repeating. Should the requirement to provide MVNO access only apply to the wireless carrier in each area with the largest network coverage area or market share?

9861 And perhaps we can add, you might want to comment on the benefits of requiring the provision of a wholesale MVNO service over multiple networks covering a given area and what would be the implications if we were to mandate only a subset of the national carriers to provide MVNO access and if a subset were appropriate, to whom would it apply.

9862 So if you'd care to respond to those in an undertaking, that would be fine.

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9863 MR. WATT: We will.

9864 I think Richard wants to respond from the international perspective now since we have him here.

9865 THE CHAIRPERSON: Go ahead, please.

9866 MR. FEASY: Thank you.

9867 I mean, just a quick comment about how I think in other contexts people would think about this is the scope of your intervention depends on the problem that you've identified.

9868 So if the problem you've identified is that one carrier somehow has market power and is distorting the functioning of the market, then you would focus on the problem on that carrier.

9869 My understanding is those people who are advocating intervention in this proceeding, I'm not aware that anybody is suggesting that the single carrier in and of itself has market power. As I understand it, the suggestion is that collectively some group of carriers.

9870 So at least the starting point for thinking about that question in other contexts would be that the scope of the intervention would depend on the way you characterize the problem.

9871 THE CHAIRPERSON: Thank you.

9872 In your view, does the current definition of "roaming" in your roaming tariff apply to 5G?

9873 MR. SLAWNER: No, the current wording in the roaming tariff does not cover 5G.

9874 THE CHAIRPERSON: And what would need to be changed if it was to apply to 5G?

9875 MR. SLAWNER: You'd have to redo the roaming tariff.

9876 THE CHAIRPERSON: And the supporting rates?

9877 MR. SLAWNER: And the supporting rates to roaming?

9878 THE CHAIRPERSON: Would it require re-examination of the rates -- of the -- pardon me, of the costs? Not rates.

9879 MR. SLAWNER: Possibly, yeah.

9880 MR. WATT: I'll make it a more definitive yes.

9881 THE CHAIRPERSON: I thought you might.

9882 Would such a change have an impact on 5G rollout?

9883 MR. WATT: So the question is, if roaming were required on a 5G network if the rates were redone to reflect the cost.

9884 I'm going to say likely not. To put it in perspective, roaming -- and there's been a lot of talk about roaming.

9885 You have the numbers. You know the relatively small quantum of roaming, the dollar amount. It's -- I'm not going to say it's *de minimis*, but you're looking at, say, in the one to two percent range of the costs of people so that that is not -- that change in and of itself is not going to make or break a new player.

9886 You know, in terms of, I think, for us, an absolutely new product that we're rolling out when they have exactly the same opportunity to roll it out, like I don't think it would be appropriate to require us to have to give access to 5G. It's again -- assuming that we have some type of advantage on something that hasn't even -- we're just in the very early stages of rolling something out and to be ordered to give access to it just doesn't seem to be the right way to go about it.

9887 MR. NATALE: It would only serve to slow the progression of 5G. If anything, you know, those who can avail themselves of set-aside spectrum at a lower cost, they have a bit of an advantage as relates to 5G, so I think look at it from the perspective of, you know, 5G's early days. Let's push as hard as we can to extend it as far as we can into Canada before potentially impeding it.

9888 THE CHAIRPERSON: Thank you.

9889 Just sticking with the roaming tariff for a moment, would any changes be required to limit the scope of mandated 5G roaming to service this connecting to individual consumers versus like IOT devices?

9890 Would that -- would that kind of change also be required?

9891 Using the current roaming tariff as a starting point.

9892 MR. WATT: Again, I think this is one I'd like an undertaking for, if I could. Even just listening to the question I was having trouble.

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9893 THE CHAIRPERSON: That may be the responsibility of the questioner, but ---

9894 MR. WATT: No, no. The question was fine.

9895 THE CHAIRPERSON: --- you can see it on the transcript and I'll accept the undertaking ---

9896 MR. WATT: Yeah. No, thank you.

9897 THE CHAIRPERSON: --- and not let you embarrass me.

9898 MR. WATT: No, the question was clear. My brain just couldn't connect the two pieces to think of an answer.

9899 THE CHAIRPERSON: I'm kidding.

9900 And a question we have asked a number of parties, which really is two parts. We've asked whether your current network supports full tape, but I think the most important consideration is are you on schedule for the 31st December, 2020 date mandated by the Commission for 911 real-time text?

9901 MR. SLAWNER: Yes, we are.

9902 THE CHAIRPERSON: Thank you.

9903 Seamless roaming. You have identified -- you've no doubt again heard the discussion on the record. You've identified that there are a number of changes required, billing systems, in effect, having two networks inter-operate seamlessly. Others have presented us with a different picture, suggesting that the costs are less than -- and complexity is less than has been suggested. So, for the record, could you give us your views, and I guess more important, and I'm sure this will be via undertaking, could you give us an estimate of what it would actually cost to implement seamless roaming and that will -- as I said, I will assume you will want to respond to that on -- via undertaking.

9904 MR. FERNANDES: Mr. Chairman, the implementation of seamless roaming is not only incredibly complex and costly to implement, but so compalex to maintain that it becomes effectively useless looking to qualify this statement.

9905 We have around 135,000 cells on our network. To provide seamless roaming we would have to map each and every one of these in terms of the neighbor relationships between these cells and the cell of the roaming or the handover network. And not only would this be incredibly costly, as you can imagine, I mean, it's costly as it is for our own network because, you know, we have to provide this mapping and relationship between the cells on our network, but we now have to align the ongoing management and optimization with the other network as well.

9906 And so even if such an endeavour were to be done, every time there was, you know, a change in power on the network because of an increase in demand, or there was a change on a tilt of an antenna, or a change on a fault, that work would have to be redone again.

9907 I can also state from personal experience in the UK where we had to apply this solution between two networks, one in the east of the country, the other on the west of the country, that, you know, even with the ongoing effort in what is arguably a much, you know, simple solution because it's along a well-defined boundary, even there we were never really able to successfully implement it, and so, you know, troubles continue to happen.

9908 I would end by saying that, you know, even so, you know, a seamless handover is only something that truly only really applies to voice. It's not a problem for data.

9909 THE CHAIRPERSON: Out of curiosity, how long did it take to implement that solution in the UK?

9910 MR. FERNANDES: It's still ongoing, to be honest.

9911 THE CHAIRPERSON: But the initial attempt to?

9912 MR. FERNANDES: It takes -- well, a few things. One, it takes months, and the other one, it has to be done within a part of the -- you have to essentially separate your engineering teams because this information of both networks is complexitively (sic) sensitive information. So, if you can imagine, a network that is building a new site would have to provide information of this new site to the competitor to inform that this change would have to be done.

9913 And so, in the case in the UK, we had well-defined Chinese walls between engineering teams that were part of this partnership and the ones that were not part of this partnership. And so, this was an operation that took, you know, essentially months and months.

9914 But as I said, you know, it's an ongoing effort because I think as, you know, Richard will attest, if he uses the M4, I'm sure he still has the same dropped calls that, you know, we've tried to solve for many, many, many years.

9915 THE CHAIRPERSON: Recognising, or taking into account what you've just said, would you undertake to give us a best efforts response at what would be the cost and timeframes involved ---

9916 MR. WATT: Yes, we will.

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9917 THE CHAIRPERSON: --- in facilitating it with the usual underlying calculations and assumptions?

9918 THE CHAIRPERSON: Change of subject and I'm getting near the end, you'll be glad to hear. You've heard from some parties, for example, Railway Association of Canada last week and other public utilities who are seeking mandated access for enterprise and public entities. Your view is, I take it, that such access isn't required because there are commercial solutions. Is that a fair assessment?

9919 MR. SLAWNER: Yeah, that's the case. We've actually had discussions with several utilities and railroads. We've already started to explore possible solutions for their issues. I think that we are, as a wireless carrier, the wireless connecting -- connection experts. They have clearly special issues, including security, that they need to have addressed. And I think what will happen, is that we'll work together to provide a solution that, whether it's private, or semi-private, or something, something will happen.

9920 I think you've already seen around the world with utilities or, you know, port installations or what have you, these kind of partnerships are already developed and I think that they will develop in Canada as well.

9921 THE CHAIRPERSON: Thank you for that.

9922 Do you object to their proposal to obtain mobile network codes?

9923 MR. SLAWNER: I think as long as it becomes part of the commercial arrangement, then we can figure out how best to do it. And if that's the best way, then we could consider it.

9924 THE CHAIRPERSON: Thank you.

9925 MR. NATALE: Mr. Chair, just one comment on this topic. In the world of 5G, one of the capabilities that we're working on is this notion of network slicing. And as you know, network slicing will allow us to deliver a portion of our network to a particular customer application that has very specific characteristics that meet their needs, whether it's latency, whether it's connection time, whatever that might be for that railroad, or mining operation, or utility, and actually save them the cost and effort of having to do something themselves. Where the expertise is becoming more complicated and more individualised, we think that one of the great promises of 5G, besides speed and latency, is mobile edge computing and network slicing. We haven't talked much about these things, but I think they're topics that are worth considering as you opine on the future of the industry.

9926 THE CHAIRPERSON: Thank you.

9927 Some of those parties, same parties have also raised the use of eSIMs. Is that -- do you support the use of eSIMs in your devices, in your network today?

9928 MR. NATALE: We do.

9929 THE CHAIRPERSON: You do? And would a device -- see how to put this -- would a device on your network be permitted to have another network profile on its eSIM at the same time as yours?

9930 MR. FERNANDES: Not at the same time. The device would be attached to one network at a time, if that's your question.

9931 Now, the device could detach from one network and then attach to another network. You're able to do that today on any iPad where you can select another network and attach that network through the eSIM capability.

9932 THE CHAIRPERSON: But not multiple ones at the same time?

9933 MR. FERNANDES: Not at the same time.

9934 THE CHAIRPERSON: Thank you.

9935 And is that true for machine-to-machine devices as well, the same applicability -- availability, rather, of eSIMs and those same characteristics?

9936 MR. FERNANDES: Those devices, when they do need alternative connectivity, they tend to resort to roaming to provide the alternative connectivity.

9937 THE CHAIRPERSON: Thank you.

9938 You've already answered my questions about network sharing I think when we talked earlier on the retail side. So, my last area of questions, just a couple or final ones, and that goes to support structures.

9939 So, you're unique among national carriers in that you don't have the same support structure assets that Bell and TELUS do, since you started off as a cable operator, not as an ILEC. So, in that sense you've probably got more in common with the regional competitors than with at least Bell and TELUS.

9940 Something that we've heard from both sides on this issue is that we don't seem to have a lot of hard data, and there's a lot of missing facts with respect to the magnitude of the problems faced and the resulting impacts. There's a lot of anecdotal evidence, anecdotal descriptions, not so much in the way of hard evidence.

9941 Is there anything that you can provide now or through an undertaking that, for lack of a better term, a little harder data that can give us some information on frequency of denials, length of delays, financial impacts on your business?

9942 MS. DINSMORE: We heard that question being asked the other day, and we got the wheels in motion to begin looking at a more fact-based approach that we could provide to you in an undertaking.

9943 We have many, many anecdotal stories. They are legion. The problems are real. They span from anything from the permit application process, where we're paying for inspections, we're effectively doing an audit for the ILECs. And when we finally complete that process and given the bill we are told that they don't actually have spare capacity for us, and on some occasions they end up using that very same capacity that they claim is not available for us. That's one anecdote.

9944 When we do get denials we're never really told is it because we're using the capacity or is it because we're saving that capacity for future use. So the rules under the tariff are very different than they are under the ISED protocol that we have for towers siting. That process is far more transparent.

9945 There are requirements if you are going to reserve capacity to provide that reservation to the requesting licensee. You have to provide drawings as to what the loads look like on the tower, and if you do reserve for say 18 months imminent future use and space does become available in the interim, you then have to go back to that requesting licensee and you let them know that they can get on now. We have none of that when it comes to the ILECs.

9946 So what we're doing is we are doing, for your purposes, a more extensive audit of our own -- of the problems that we're facing. We're very hopeful that that can then feed into a tariff review process where these things would be fully aired, and we would end up with a tariff that would be far more transparent and where we would have much more, again transparency in this process.

9947 THE CHAIRPERSON: Thank you. To be ---

9948 MR. NATALE: Mr. Chair, if I were to -- just a quick comment. There are three things that will impede the progress and evolution of 5G for the benefit of Canadians. One, we've talked about investment support in terms of regulation. Number 2 is access to spectrum. Access to 5G spectrum in all its frequencies; and Number 3 is this issue, access to support structures.

9949 We are woefully underprivileged on this -- in this area and we need your help and support so that Rogers can fulfill in their commitment to deliver 5G to Canadians.

9950 THE CHAIRPERSON: Thank you. To the extent that you can provide, as I said, some more specifics by the deadline date of 10th of March, that would be appreciated.

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9951 THE CHAIRPERSON: Beyond that, and you just made reference to this, you proposed that we hold a follow-up proceeding to look at the tariffs. But late last year, we did launch a proceeding looking at barriers to infrastructure deployment in rural areas. In your view, could the issues that you've raised about support structure access be addressed in that proceeding, or do you -- are you still in favour of a separate proceeding to specifically address these tariffs?

9952 MS. DINSMORE: I think we'll still need a proceeding to separately address these problems because we're talking about -- so the tariff sets out the rules of engagement between, say Rogers and Bell, Rogers and TELUS in terms of our actual access, it's very detailed. And I think we can raise these issues in that proceeding, we will raise these issues, but I think more specifically we're going to need to actually amend the tariff.

9953 THE CHAIRPERSON: You have given us an indication of the kinds of issues you want. Perhaps in that undertaking you could give us a more complete list of the issues that you would propose to see examined in that follow on proceeding?

9954 MS. DINSMORE: We'd be happy to do that. Thank you.

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9955 THE CHAIRPERSON: Thank you.

9956 Last question from me, and then I'll ask my colleagues.

9957 You've also heard our discussions that we've had with numerous parties about the desirability of establishing a 5G working group, for example, as proposed by the FCM and some others. You've said some other things should come first, for example, some clarity around jurisdictional arrangements. But are there any lessons that we can take from your prior experience in other working groups, CISC or otherwise, that would make a 5G working group effective?

9958 MS. DINSMORE: I mean, I think the problem is if we go back to the model MAA process, which I think was one of the working groups that was referenced in this context, that process took a year-and-a-half. The parties could not come to consensus on many of the major issues, most of which revolved around, you know, what are causal costs, what gets reimbursed, what doesn't, and so that process then took another year-and-a-half to get a decision.

9959 So I think the lesson learned there is that this process probably won't work. That we really do need the Commission to clarify the rules of engagement. We had proposed that frankly out of this proceeding you can do that. The record is rich in terms of discussion around these issues. You asked questions in your RFIs that specifically addressed what was in the bounds of your jurisdiction.

9960 We responded, so did many other parties, it's a legal issue, it's a legal interpretation. There really in our mind is no policy reason that would cause you to treat wireless and wireline equipment differently.

9961 Now with the onset of 5G, the time is nigh. If we have to wait for a working group which we think would just get bogged down in issues of non-consensus, especially around things like occupancy fees.

9962 I mean we -- as you know, we don't agree that we should have to pay occupancy fees to place small cells of municipal street furniture, but we have in our negotiations to date with municipalities, because we don't have the Commission's framework that we're looking for, we do end up paying occupancy fees to municipalities to place our small cells on traffic, you know, on traffic standards, light standards. That's something that is totally contrary to the Ledcor principles, but because we don't have the framework and we need the access we need to go ahead, and so we're currently signing those kinds of agreements but we don't think it's right. And if we had your oversight and we had this clarification, then we would be well on our way to resolving that problem.

9963 We're quite prepared to pay for causal costs as we do with access to rights-of-way, and we think that that same rule should extend to wireless equipment and to street furniture, and we've detailed that in our RFIs to you.

9964 THE CHAIRPERSON: Thank you. Thank you very much.

9965 Those are all my questions. Commissioner Barin?

9966 COMMISSIONER BARIN: Thank you.

9967 I have a question for you regarding the example of the Québec market. This morning, we spoke about the fact that Québec has lower prices for wireless services. Now, I want to understand your position with regards to competition from regional facilities-based carriers in other markets.

9968 So when you say that the Canadian market is currently competitive, are you saying that regional competitors in other markets are already providing effective competition and that this will drive prices down potentially if we're patient or are you saying that the Québec is an outlier or different in some fundamental way?

9969 MR. NATALE: We're saying both. First of all, we're saying that the regional carriers are doing a good job of driving competitive intensity in the markets. Look no further than last year. Last year between Videotron and Freedom and Eastlink they garnered 33 percent of the net new customers in the first three-quarters of the year. That's more than Rogers got, that's more than TELUS got.

9970 And to Richard's commentary earlier, that is probably the most visible demonstration of success in a market that new customers coming to market they're getting that proportion of. When you compare that to the size of their base it's even more stark given that they have, you know, a far smaller base of customers than we have as a whole.

9971 As it relates to the Québec market, it's as intensely competitive as the other markets. Even before the arrival of Videotron prices were lower in Québec because the appetite for whatever reason was lower in Québec. And today, even though prices are lower in Québec, the percentage of Québecers that have a cell phone is also amongst the lowest in the country. You know, it's just the nature of the market and the structure of the market.

9972 Brent talked about Alberta, where in Alberta our pool is the highest and actually penetration is amongst the highest in the country. So these are vagaries of the Canadian market as they differ from region to region.

9973 But I would say to you that when you look at the fact that wireless prices have gone down by 50 percent in the last five years; you look at the percentage of new customers garnered by the regional carriers; you look at what’s happened this last year along with respect to unlimited plans, the market is working, and the market is driving affordability while at the same time supporting investment.

9974 COMMISSIONER BARIN: Thank you. I don’t have any more questions.

9975 THE CHAIRPERSON: Pardon me.

9976 Commissioner Levy.

9977 COMMISSIONER LEVY: Good morning -- good afternoon now. Just a couple of questions.

9978 We’ve seen different assessments of the Canadian market, and you’re in the forecasting business; you do it all the time. What do you see as the capacity, the expansion and capacity of the growth in the numbers of consumer in the Canadian market over the next few years?

9979 MR. NATALE: Sure. Well, as I said earlier if you look at the number of Canadians over the age of 10, by the math alone, it’s roughly equal to, you know, complete penetration as a whole.

9980 Having said that, a couple of factors do play in; our models and forecasts look at the benefit of immigration to Canada, roughly about 2 percent growth in the population, and we're seeing that in terms of the growth in wireless subscribers in the marketplace as a whole.

9981 We're also seeing growth in penetration in the remaining portions of penetration fueled by a few factors that are more novel to Canada right now and have been fully articulated in the U.S., for example.

9982 The idea of having two phones is not as prominent in Canada. In the U.S. it's actually quite prominent. The idea of separating your personal life from your work life and having a work device and a personal device is starting to take root in Canada; we're seeing some of that. So that creates a penetration gain in opportunity as well.

9983 The opportunity for people to add a tablet or other device to their plan, you know, counts as a degree of penetration, albeit a different type of penetration but still a rich appetite in use for the technology as a whole.

9984 So we think between immigration growth, the use of dual devices; thirdly, the fact that the used phone market, as Brent has called it, will actually create more opportunity in terms of affordability and we'll seeing people give a used phone to, you know, the older person in their family that may not have a phone yet, or a child that wants a phone for whatever reason, for security, safety reasons, or entertainment reasons. So we're seeing the proliferation of used phones actually expand the market as well.

9985 Penetration rates in Canada are roughly about 85, 87 percent, and we see them marching towards, you know, 100 percent over the fullness of time based on these factors.

9986 MR. WATT: I'm just going to pick up on that last point that Joe mentioned.

9987 We do recognize a lower penetration in the lowest income quintile and it's -- so there's opportunity there to drive more penetration in what Joe has described as a pretty saturated market. And that's going to come from things like the used phones, some of the plans we're introducing and, you know, quite frankly, the potential plan that we were discussing earlier today. But there clearly is opportunity to drive more penetration in that area.

9988 COMMISSIONER LEVY: What about your forecast for Canadians' data usage? Do you have anything that you can add to your previous comments on that?

9989 MR. NATALE: Sure. I mean, right now we're seeing about a 30 percent growth into the usage. We do look to other markets to see, you know, if you will, where the puck is going. If -- you know, we talked earlier about South Korea. South Korea probably leads the world in many ways, along with Japan, in terms of overall consumption. Their data consumption sits in the 20s; 25, 25 gigabytes per month on 5G. They've got a very vigorous 5G network.

9990 Before they launched 5G in Korea, the average consumption was sitting closer to 7 or 8 gigabytes. So there really is no reason why we won't be on that progression path. It's almost a bit of a view into the future. And we spent time with our peers in different countries to understand, you know, how they're seeing data consumption.

9991 So data consumption, we believe, will, you know, march from 2.5 to 3 gig to eventually 7 or 8 and beyond in the next many years.

9992 COMMISSIONER LEVY: You mentioned that that 5.1 percent return on assets, and you suggest that that's a better way of looking at your profitability, if you like.

9993 MR. NATALE: M'hm.

9994 Commissioner LEVY: How do you think that compares to your major competitors?

9995 MR. WATT: Bell and Telus are both roughly in the same range.

9996 COMMISSIONER LEVY: Okay. And, finally, transparency has arisen several times in various parts of the conversation this morning and this afternoon. You talked about the relationship with your customers and the kinds of deals that you're prepared to offer them.

9997 We heard one of the intervenors earlier in this process suggest that Canada is still such a small market that you can't get Apple, for instance, to give you a bulk discount on devices for Canada. Is that your experience?

9998 MR. NATALE: I'll defer to Brent, who is the former leader of Apple Canada.

9999 MR. JOHNSTON: I'll be careful what I say here.

10000 So, you know, the -- I would say in the global context, Canada is relatively small, from an Apple -- in the single digits in terms of percentage of their business. But is large enough, fully, for sure, to be engaging with carriers to offer, you know, various incentives, and we work together to perform well in the market together. I'll just leave it at that.

10001 MR. NATALE: I think one comment I'll make much more broadly, not specific to Apple, but if you add up the revenue of Rogers, Bell, and Telus, and then add to it Videotron, Shaw, and Eastlink as a total in wireless, we are no more than 2 to 3 percent of the total global revenue of the wireless industry across every country.

10002 So we sometimes have a hard time punching above our weight. We sometimes have to really work hard to understand what the very large players are doing, the Vodafones, the Verizons, the SK Tels of the world because they actually make the market and drive the technology direction.

10003 We often find ourselves draughting in their wake and making sure that we avail ourselves of some of the ideas that are out there. And we all do it; all the players do it, industry does it. It's part of being in Canada and being small on a global scale.

10004 COMMISSIONER LEVY: So are you prepared to make any kinds of discounts and so forth readily apparent to your customers when you're negotiating with them? You know, if I have come to the end of my plan and I'm trying to decide am I going to have more muscle in the market as I come to my new plan if I bring my own device, if I buy it myself, but if you can get it for me at a discount and over the course of a term it will be less, does that -- can you break that out for a customer so that they can make those kinds of decisions?

10005 MR. JOHNSTON: Yeah, I'll say a couple of things. We've moved now across all of our brands that provide devices to a financing world where the service -- the cost of service and the cost of the phone are delineated and very, very transparently separated. So people know exactly what they're paying for the phone and they know exactly what they're paying for the service. And then at the end of the contract when you're done paying for the -- payment for the device falls off and you're left with just paying for the rate plan.

10006 So I think that takes us a giant leap forward versus a day when subsidy was -- in some ways the rate and the hardware repayment were baked into the same cake and it was hard to disaggregate, sometimes, which was which. So that's been a major step forward I would say, first of all.

10007 Second, when you look at a customer and you're deciding at the end of their contract what type of promotion, or what type of offer you might want to provide to them, I'd say two things, one Joe mentioned that the vast majority of our volume, a large proportion of the volume that happens in the market happens at these peak moments, Black Friday, Boxing Week, and back to school.

10008 When you dig into that volume, you'll find that the majority of that is actually renewal activity. Those are people that are coming back to you and resigning a contract and extending their relationship. And those happen disproportionately as well in those sale moments.

10009 So that's when customers are getting a deal. And those deals are very much set across the entire industry, given the level of competition, so that everybody is offering deals at the same time.

10010 And then in the case where perhaps we're talking to a customer one on one, given financing and given the opportunity to also understand that customer's unique needs, and their loyalty to us over time, and how long they've been a customer, and the quality of that relationship, we will reward that and offer, you know, specific promotions and incentives to continue to be a customer with us. And those are very clearly laid out.

10011 And of course, we want them to say yes to that, so we'll always be referencing the in-market price at the time and the discount that's being offered.

10012 So that would be the nature of those interactions.

10013 COMMISSIONER LEVY: Thank you.

10014 THE CHAIRPERSON: Commissioner Laizner?

10015 MR. NATALE: If you look at our desire, our number one priority as a company is to put customer's first.

10016 Right in that language and that manifest to the Roger's team is to be clear and simple with our customers.

10017 So it's part of our wiring to focus on all of these areas where we could improve clarity.

10018 MR. WATT: Commissioner Levy, if I could, just very quickly, I very confidently said that Bell and Telus' return on assets was similar to Rogers, 5.1.

10019 I said that on the basis of having looked at that number for 2018.

10020 It's dawned on me the 5.1 number we provided, in order to take out gyrations or any jumps up and down in one year, is a five-year average.

10021 Can I undertake to do the precise same five-year average for Bell and Telus just to make absolutely certain that what I said, that's very comparable, is true? I don't want to mislead you.

**UNDERTAKING / ENGAGEMENT**

10022 THE CHAIRPERSON: Thank you. Sorry, I interrupted you, Mr. Natale.

10023 Commissioner Laizner?

10024 THE VICE-CHAIRPERSON: Good afternoon.

10025 You've argued that the current definition of roaming in your tariff does not include 5G.

10026 There are other parties that have argued, based on the way the roaming service is defined in the tariffs, that is incidental access to GSM based voice, text, and data services, that 5G would automatically be included, unless the definition were to be changed.

10027 And I understand that that is the kind of wording that you used in Rogers Access Services Tariff.

10028 So how do you respond to that argument?

10029 MR. SLAWNER: I just think that 5G is a big revolutionary step from the current existing technology. I'm not sure that the current tariff has phrases specifically directed at GSM type technologies covers 5G.

10030 So I do think that some changes would be needed to reflect that change.

10031 THE VICE-CHAIRPERSON: Okay. I had another question on spectrum.

10032 You mentioned that you have subordinated spectrum to a number of other providers. Would you undertake to provide us with a list of the specific spectrum and providers?

10033 MR. WATT: Yes, we will.

**UNDERTAKING / ENAGEMENT**

10034 THE VICE-CHAIRPERSON: Okay. And then my last couple of questions.

10035 We heard yesterday from the Coalition for Cheaper Wireless Service that -- and specifically I'm thinking of the representative from ACORN, that a one gig plan just doesn't meet needs.

10036 I think she gave the example of currently there's a lot of disruption in the educational system in Ontario, and the only way she gets her information about whether the schools have will be closed for her children is through data.

10037 You've indicated that you have a one gigabyte plan which you feel is very reasonably priced. I think you mentioned around $27.

10038 So what's the overage charge on that plan?

10039 MR. JOHNSTON: The one I mentioned was a Chatr prepaid plan for $30. That, by its definition, doesn't have overage.

10040 THE VICE-CHAIRPERSON: Okay.

10041 MR. JOHNSTON: So prepaid, you pay in advance, and then when you use up your allotment, then you're prompted to pay more if you'd like to continue to use it.

10042 It allows you to very efficiently begin and end service. It really appeals to people who don't always know that they're able to, you know, continue on with service also.

10043 So that's -- it's sort of inherent to that plan that it doesn't have overage.

10044 MR. NATALE: Broadly speaking, the biggest consumer of data is video.

10045 If you were to see a pie chart or a sort of unpacking of how data gets consumed, video, and especially high-definition video, is the biggest consumptive factor.

10046 And it's happening in all media that people are watching more and more video, for entertainment, or information, or other purposes.

10047 And that's the challenge that we face in trying to structure these plans, at the same build a network that can, you know, transmit and broadcast more and more video time.

10048 THE VICE-CHAIRPERSON: Although, I mean, we have seen that two gigabytes are available in Quebec for $35 amongst virtually all the providers. It just seems to be that outside that province, consumers are out of luck at that price point.

10049 MR. NATALE: As we said before, there are variations in plans across the country.

10050 As opportunities come along, we will look to create more value in low end plans.

10051 We hear the comments of Canadians loudly and clearly.

10052 As the economics of the business improve and evolve, much like when we went from 250 meg, to 500 meg, to a gig, at roughly that price point, we'll continue to see more low-end price points over time.

10053 THE VICE-CHAIRPERSON: Thank you.

10054 THE CHAIRPERSON: I believe Commission counsel has a short snapper. Hint.

10055 MR. BOWLES: Given the time, I'll endeavour to make this short.

10056 I just wanted to make it perfectly clear -- or sorry, to get your position on the matter perfectly clear.

10057 When you were discussing the issue of the current roaming tariff and 5G, is your position that the current tariff ought not to cover 5G, because changes should be made to the tariff, or that it technically does not apply to 5G?

10058 MR. SLAWNER: Technically it does not. It does not contemplate 5G.

10059 MR. BOWLES: Okay. Last question.

10060 MR. SLAWNER: Just a -- yeah, no, that's right. That's fine. Sorry.

10061 MR. BOWLES: So it's how the terms are defined in the tariff do not ---

10062 MR. SLAWNER: The tariffs, as currently written, do not cover 5G.

10063 MR. BOWLES: So then your position on that would be that Videotron's interpretation of the tariff language is incorrect?

10064 MR. SLAWNER: Exactly.

10065 MR. BOWLES: Last area that I wanted to ask a question on has to do with the discussion that was going on earlier about the mechanism for establishing rates, terms, and conditions in a hypothetical environment where there was a mandated MVNO.

10066 I believe, Mr. Watt, you were saying that in that hypothetical environment, it should be left to negotiations backed up by some third-party arbitration process, which would see, to the best as I understood it, no Commission involvement.

10067 Now, I believe you spoke a little bit to the question of delegation and why you thought this would not constitute impermissible delegation, but I just wanted you to expand a little bit on that.

10068 MR. WATT: I'll have to turn to one of my lawyers to expand on the delegation authority.

10069 I'm not sure if we're prepared to speak to that today or give you an undertaking on that.

10070 I know it was an issue that you raised with other parties.

10071 We've addressed it. We're still coming to the conclusion on it.

10072 I'm not sure if that's helpful or not.

10073 MR. BOWLES: If you'd like to take that away as an undertaking, ---

10074 MR. WATT: We will.

10075 MR. BOWLES: --- that would be fine. Thank you.

**UNDERTAKING / ENGAGEMENT**

10076 MR. BOWLES: Then that's all. Thank you.

10077 MR. SLAWNER: Sorry, could I just clarify? Because before you asked whether it technically covered 5G or ought to cover 5G.

10078 So technically I don’t think it covers 5G.

10079 And why I got a little confused is our position is very clear that it should not include 5G. If there is a mandated MVNO regime, 5G should not be a part of the regime.

10080 So I just wanted to make sure that position is quite clear. Thank you.

10081 THE CHAIRPERSON: That concludes the presentation from Rogers.

10082 Mr. Natale?

10083 MR. NATALE: Mr. Chairperson, thank you for the time and the considered thoughtful questions and commentary. We appreciate the opportunity to state our views and thoughts.

10084 Before we go, I think it would be remiss to not recognize a particular individual.

10085 It was 38 years ago this year that a young David Watt first sat at a CRTC hearing.

10086 And this year we will celebrate the contribution of Mr. Watt to the Rogers organization, as we celebrate his retirement and he takes the next chapter forward.

10087 I would ask for the record to recognize Mr. Watt.

10088 THE CHAIRPERSON: Thank you for that. I wasn’t sure that Mr. Watt would ever actually retire.

10089 (Laughter / Rires)

10090 MR. NATALE: We tried to convince them otherwise. We were unsuccessful.

10091 THE CHAIRPERSON: And I'm not entirely persuaded that that's the case.

10092 We may leave a seat somewhere in the back with a name plate on it in the event that he just starts to hang out at future proceedings. But I would -- I, too, would like to acknowledge Mr. Watt.

10093 He has always been a collegial and responsive participant in our proceedings -- see, I'm getting choked up now -- in our proceedings and has no doubt made significant contributions to building a public record on many proceedings over many years.

10094 Mr. Watt, I wish you well in your retirement.

10095 MR. WATT: Thank you very much. Thank you very much for the kind words, and it has been a great honour for me to appear before the Commission.

10096 THE CHAIRPERSON: Thank you.

10097 We will adjourn, returning at 3 o'clock.

--- Upon recessing at 2:03 p.m.

--- Upon resuming at 3:00 p.m.

10098 THE SECRETARY: Good afternoon. Before we begin, we would just like to announce that due to the weather forecast for tomorrow and to allow everyone extra time to arrive, the hearing will start at 9:30.

10099 And now we'll hear the presentation of the Canadian Wireless Telecommunications Association.

10100 Please introduce yourselves, and you may begin.

**PRESENTATION / PRÉSENTATION**

10101 MR. GHIZ: Thank you. Merci beaucoup.

10102 Good afternoon, Chairperson Scott, Vice-Chair Laizner, Commissioners, Commission staff and counsel. My name is Robert Ghiz, and I am the President and CEO of the Canadian Wireless Telecommunications Association.

10103 To my right is Eric Smith, Senior Vice-President of the CWTA, and to my left is Katherine Winchester, CWTA's Vice-President of Operations.

10104 CWTA is the recognized authority on wireless issues, developments and trends in Canada. In addition to promoting the importance and benefits of wireless connectivity in Canada, CWTA also facilitates a number of industry councils and committees as well as consumer-facing programs such as Mobile Giving Foundation Canada, Wirelessaccessibility.ca, DeviceCheck Canada, and Recycle My Cell.

10105 We appreciate having the opportunity to participate in this important proceeding and to appear before you today.

10106 Dans son avis d'audience, le Conseil a déclaré que le principal objectif de l'audience était de

10107 « s'assurer que son cadre réglementaire favorise une concurrence durable qui donnera lieu à des tarifs raisonnables et à des services novateurs, ainsi que des investissements continus dans des réseaux sans fil mobiles de haute qualité dans toutes les régions du pays ».

10108 Le Conseil demande aux intervenants de déterminer s'ils « répondent aux besoins des Canadiens et atteignent les objectifs stratégiques énoncés dans la

10109 Loi. »

10110 Autrement dit, il convient d'examiner la santé globale de la concurrence dans le marché de détail en tenant compte de sa capacité à produire des résultats attendus, plutôt qu'en tenant compte de résultats statistiques, comme le nombre ou le type de concurrents.

10111 Le gouvernement fédéral a clairement défini les besoins des Canadiens en matière de services sans fil mobiles dans le document intitulé Perspectives du spectre de 2018 à 2022. Reconnaissant que le Canada dispose d'une « infrastructure de télécommunications de classe mondiale », le gouvernement déclare qu'il veillera à ce que « les consommateurs, les entreprises et les établissements publics canadiens continuent de bénéficier les applications et des services avancés de télécommunications sans fil ».

10112 Pour parvenir à ce résultat, le gouvernement a cerné trois principaux objectifs : qualité, couverture et prix abordables.

10113 MR. SMITH: These objectives of quality, coverage, and affordable prices are not controversial. They reflect the policy objectives in the *Telecommunications Act*, are consistent with the Commission's stated focus, and are shared by CWTA and its members. The question is, what is the right path to achieving these goals.

10114 To quote the Competition Bureau from its appearance before you last week, facilities-based competition should be the "guiding principle" for the path forward. Why? Because facilities-based competition is working.

10115 Facilities-based competition is widely recognized as the market structure best capable of delivering sustainable competition and encouraging the level of investment in network infrastructure that is necessary to achieve desired outcomes for Canadians. It is driving more intense competition, growth in wireless adoption, increased data consumption, declining prices and more choices for consumers.

10116 Equally important, continuing innovation and investment by Canada's facilities-based carriers is providing Canada with some of the fastest and highest-quality networks in the world, as well as expanding network coverage.

10117 Despite this success, in the Notice of Consultation the Commission expressed its concern that an appropriate mix of facilities-based competitors and MVNOs has not developed and that it might be appropriate to mandate wholesale MVNO access.

10118 We strongly disagree. A low number of MVNOs is not an indication of a competition problem. In fact, as expert witness in this proceeding attests, the number of MVNOs in any particular country is largely irrelevant when it comes to assessing competitive intensity and positive consumer outcomes.

10119 The Commission's preliminary view on mandating wholesale MVNO access comes at a critical time in the evolution of the wireless market in Canada. The Commission and the federal government have placed the expansion of both wired and wireless coverage near the top of their agendas.

10120 They have also stressed the importance of investing in next-generation 5G wireless technologies. Yet a mandated wholesale MVNO access regime would undermine both of these objectives with little, if any, corresponding benefits.

10121 First, the reduction in capacity to invest brought on by mandated MVNO wholesale access would be disproportionately borne by Canadians in rural and remote areas where the economics of network deployment are already challenging. By way of example, existing wholesale internet access regimes have already forced national and regional providers to suspend certain planned investments into smaller communities where the wholesale regime would impede them from obtaining a reasonable return on investment.

10122 It is notable that if facilities-based carriers no longer have the capital to expand and upgrade networks in less populated markets, residents of those areas will not receive any of the alleged benefits that come with mandating of wholesale MVNO access.

10123 MS. WINCHESTER: With respect to 5G, the Commission has correctly stated that, with the introduction of 5G wireless technology, the wireless market is -- and I quote -- "on the verge of a major transformation" and that "wireless carriers will be required to make significant investments in network infrastructure".

10124 5G will bring more than improved and faster wireless communications. 5G will expand the capabilities of wireless communications through the use of different bands of spectrum, new technologies, and a more intelligent and dynamic wireless network. The impact of 5G extends well beyond the wireless industry. It will be an indispensable platform for innovation, increased economic prosperity, and improved quality of life, and countries that do not recognize the importance of 5G will fall behind their international counterparts.

10125 The deployment of 5G in Canada will add an estimated $40 billion in GDP to the economy by 2026 and create close to 250,000 new permanent fulltime jobs in that same time frame. Beyond these macroeconomic factors, 5G will provide benefits to cities and rural communities and improve the quality-of-life of Canadians, including helping to fight climate change and extending network connectivity to underserved rural communities.

10126 However, deploying 5G will require massive investments by facilities-based wireless providers. According to Accenture, this level of necessary investment is estimated to be 26 billion by 2026. This does not include the several billions more that is likely to be spent by facilities-based wireless providers from 2020 to 2022 in the upcoming 3500MHz, mmWave, and 3800MHz spectrum auctions.

10127 MR. GHIZ: Mandating wholesale MVNO access will reduce facilities-based carriers' capacity to invest in 5G infrastructure and spectrum, threatening Canada's leadership role in wireless telecommunications, and hampering Canadians' access to the latest mobile innovations which are vital to increasing productivity, growing the economy, creating jobs, and improving Canadians' quality of life.

10128 Finally, while mandating MVNO access to facilities-based carriers' networks would negatively impact investment by all facilities-based carriers, regional providers will be particularly harmed. In CRTC 2015-177, which set out the current wholesale wireless roaming framework, the Commission acknowledged the important role that the regional providers are playing in bringing sustainable competition to the wireless retail market. Mandating MVNO wholesale access would effectively "pull the rug out" from under the regional providers, threatening their capacity to contribute to sustainable competition as independent network operators. It would instead favour economically inefficient MVNOs whose business model is dependent on gaining regulated access to the national carrier networks.

10129 As we have discussed in our written interventions, mandating MNVO access will not improve consumer outcomes, nor, as the Competition Bureau has testified, can MVNOs substitute for the positive impact that regional providers have had in increasing sustainable competition, investment, and declining prices.

10130 Justifying regulatory intervention requires compelling evidence that the benefits of such intervention clearly outweigh any negative consequences. The benefits of mandating MVNO wholesale access are purely speculative, and if they exist at all, are minimal and short term. In contrast, the negative effects of mandated wholesale MVNO access on sustainable competition and investment are well-established by the record of this proceeding and will have long-term negative impacts affecting all Canadians.

10131 These negative impacts have also been recognized time and time again by the Commission, which has concluded in past proceedings that the costs of mandated MVNO wireless access outweigh any potential benefits. Since those decisions, the benefits of facilities-based competition are even more evident, and the need for massive ongoing investment in innovation, infrastructure and spectrum has only increased. The evidence on the record does not support mandating wholesale MVNO access.

10132 Thank you, and we'd be happy to take your questions.

10133 THE CHAIRPERSON: Thank you for your presentation.

10134 Commissioner MacDonald?

10135 COMMISSIONER MacDONALD: Good afternoon and welcome. Your comments today and your submissions throughout this process have largely been consistent with statements that we've heard from the large facilities-based carriers across the country that are also members of your organization. So, I'm not going to cover all of the same ground perhaps we have with other -- with facilities-based providers, but if there are particular points where you potentially take a different view from that of some of your members, perhaps you might just want to outline that as we go through.

10136 I guess the first question I would have is one of the criticisms that has been levied against MVNOs is the fact that they don't invest in any infrastructure, but other parties have said, "Well, yes, they actually do. They invest in core network. They invest in billing systems. They hire people".

10137 Why are you of the view that such investments are not significant enough to warrant some merit in this proceeding?

10138 MR. GHIZ: Well, I'll start off with that. Just to address your first point where you asked if we have any different views than our members to let you know when those issues come up, we're not going to have any different views than our members today.

10139 COMMISSIONER MacDONALD: I was expecting that response. Thank you.

10140 MR. GHIZ: Or I'd be in a lot of trouble.

10141 With regards to investment, when we talk investment, we talk about investment in building the world-class networks that Canadians have enjoyed. Where we've got 99 per cent of Canadians that have access to LTE networks, where we have, you know, some of the fastest networks in the world, second only behind South Korea, those are the investments we're talking about. And where we see that investments that, from a particular point of view that I have, that where they will definitely not invest is for those Canadians that still do not have access to wireless networks.

10142 So, if you're a Canadian out there today and you happen to be watching this at home, and you do not have access to wireless networks, or you're still waiting for upgrades to your wireless networks, it's very important to know that mandating MVNO access, allowing MVNOs to have access to the incumbent networks is going to do absolutely nothing, nothing to build out into those rural and remote communities where Canadians are still waiting to be able to be connected. And that's probably the biggest -- one of the biggest issues that I have.

10143 They also don't do anything in terms of upgrading our networks where we're on the verge of 5G, which, as we've heard, is going to be transformational. And perhaps I'll talk a little bit about it later, but even with 5G, with those upgrades, we're going to go into fixed wireless, which is even going to make it even more easier to be able to connect those Canadians that don't need it.

10144 So, where my concern comes from is people out there that don't have access, MVNOs -- mandating MVNOs is going to do absolutely nothing to help.

10145 COMMISSIONER MacDONALD: Sorry, go ahead.

10146 MR. SMITH: Yeah, if I could just add. I, you know, definitely agree with Rob. I think also, you know, you heard this morning from Rogers where they talk about like 70 per cent of their investments are in things like building roads, building towers, building that physical infrastructure. So, certainly, depending on, you know, the model, an MVNO will have to make some investments, but those are sort of more in some operational things that they will need, that any business needs, but they're not contributing, as Rob mentioned, to actually building the physical infrastructure that's necessary to provide world-class service to Canadians.

10147 COMMISSIONER MacDONALD: Thank you for that.

10148 So, given your viewpoints that investments should be focused on building networks, not necessarily investing in internal systems or a new core network for a potential MVNO, are there certain proposals from different parties that cause you more or less concern when talking about a mandated MVNO? Because if I'm looking at the range of possibilities, at one end of the spectrum we have what the Bureau has proposed, and then at the other end of the spectrum we have what perhaps a provider wishing to be a full MVNO would like to see as a result of this proceeding. So, which ones give you more concern?

10149 MR. SMITH: Well, obviously we're -- we've stated quite clearly, as has our members, we're against any MVNO model.

10150 And I think, you know, some have commented that maybe the Bureau model is less harmful.

10151 But I think what's key is that any type of intervention along that will still have potential negative impact.

10152 And the key is, you know, the Bureau has created that model as part of this proceeding.

10153 But the focus of their report is really that facilities-based competition is working, the regional providers have provided additional competitive intensity, and basically they're saying, "Commission, whatever you do, don't do anything to hurt the regional providers."

10154 Even with that proposal, the regional providers aren't asking for that proposal. They're not asking for that.

10155 So, you know, could it potentially, in theory, be less harmful than the others? Yes.

10156 But also, as we heard, there's many complexities to it, unanswered questions.

10157 Even the Bureau themselves indicated that, in response to some of your questions, well, you know, that they weren't sure what the answers were, there maybe would need to be another proceeding, et cetera.

10158 So it's a theoretical model that even they said -- they didn't say in the report it would work, they said it may work.

10159 So we're really against all the models, because we don't think we need any of them and facilities-based competition is working and it's producing positive outcomes.

10160 COMMISSIONER MacDONALD: Thank you. One of the things that you -- or one of the points that you tried to drive home in your submissions was around the negative financial impact that mandating MVNOs would have, particularly in the context of the rollout for 5G.

10161 So on that topic, I'm just wondering, in your original submission, you note the many benefits of 5G to transportation, mobility solutions, precision agriculture, energy management, rural connectivity.

10162 Those would seem to be excellent lines of business that a 5G provider could leverage to offset any potential harm that MVNOs might create.

10163 Could you perhaps comment on that?

10164 Mr. GHIZ: I'll start off. Well just allow me to put things into context.

10165 For us to even get to where we want to be so that we can take advantage of 5G, it's going to take a $26 billion investment.

10166 We know that that is a massive investment that needs to be made by facilities-based providers.

10167 For us to -- and then there's a lot of other steps along the way as well.

10168 But when we do get to that step, I think that the benefits that are going to come are going to be delivered to society.

10169 I did talk about, and in our open remarks, about how 5G will actually help with climate change.

10170 We see from some of the examples that you just used, whether or not it is smart grids, smart energy, less traffic on highways, reducing down our carbon footprint, there's a lot of things for us to get there.

10171 But when it comes to, again I go back to MVNOs, they will do nothing to help us get there.

10172 Are there going to be other avenues to be able to gain, perhaps, revenue? It's unpredictable what's exactly going to happen with 5G. We know what some of the use cases are.

10173 But in terms of exactly how that's all going to work, I think it's going to be an evolution, kind of like how we didn't predict a lot of the things that were going to come about when 4G arrived.

10174 So it's going to be an evolution before we start to see what some of those results could be.

10175 COMMISSIONER MacDONALD: Thank you. A couple of days ago, I was asking questions of a panel of former telecom executives, and I'm going to paraphrase, but the statement was made, "The investments are going to happen. No provider would not invest in 5G."

10176 And that could very well be true, but I think the example that I used at the time was there will always be a business case to build in the GTA, there will always be a business case to build in Montreal, but there's an awful lot of Canada outside of the larger centers.

10177 Could you perhaps give your thoughts on where the negative financial impact will most be felt from a network deployment standpoint?

10178 MR. GHIZ: Very good point. And I agree with your assessment that I think where the bigger components are going to be felt, and I addressed this a little bit earlier, is going to be on those Canadians that do not have access to networks, first of all, that are still waiting for 4G and LTE, that are still waiting on the hope of what fixed wireless and 5G could bring to those communities.

10179 It's also going to hinder the buildouts in rural areas.

10180 You heard from just Rogers this morning, they're going to look for areas where they can get a return on their dollars.

10181 But to go back to -- and I watched the testimony of those three former telecom executives, and they're partially right.

10182 And I think you've heard this from all the members.

10183 There's still going to be buildouts that are going to happen, they're just not going to happen as fast as they could have, which then leads to some major issues for Canada as a nation.

10184 Because you heard from Joe Natale this morning talking about we should be proud of our networks and how this is about nation building.

10185 And there is a race to 5G. And those countries that get there first are going to have the new jobs, the new apps, the new technologies.

10186 I don't want rural Atlantic Canada missing out on that, or the prairies missing out on that, or the north missing out on that.

10187 And so while buildouts may still happen, they will happen at a much slower pace.

10188 And if they happen at a much slower pace, then there's incremental costs that will happen because we're losing out on that growth that could deliver that.

10189 And I have just some quotes here from -- and we've referenced it in our submissions, and you mention it, from our 5G report from Accenture, and it just has to do with rural connectivity, just to put things in perspective, and those that may not have broadband today, or may not have wireless, and what 5G and the potential of fixed wireless is able to do.

10190 And it says here:

10191 "studies have shown that a 10 percent increase in broadband penetration can achieve a 0.9 percent to 1.5 percent increase in GDP growth…"

10192 Applying these figures to Canadian rural regions showed significant economic benefits.

10193 In Saskatchewan, a province with 296 rural municipalities and 33 percent of the population live in rural regions, only 75 percent of households have access to broadband services.

10194 In a scenario where the province achieves the Canadian Government target of 95 percent broadband service availably, Saskatchewan can expect a potential increase in GDP of up to 1.2 billion.

10195 Similarly, the same marks in Nova Scotia and in Newfoundland and Labrador are 520 million and 430 million, respectively.

10196 Rural connectivity will become easier with 5G through fixed wireless.

10197 Slowing down those investments will mean that they'll get those investments years later down the road.

10198 And the incremental cost to that is something that concerns me, from someone who comes from a small jurisdiction in this country, that we cannot afford to be left behind. We need to be able to get there together. We need to be able to make sure that Canada is competitive all over the world and that no matter where you live in our country, you have every possible opportunity to compete with anywhere else in the world, let along with Canadians regardless of where they live.

10199 COMMISSIONER MacDONALD: So still on the topic of 5G and making sure that Canada is at the forefront, some parties have indicated that we're already lagging behind.

10200 And one of the suggestions that's been put forward in this proceeding was the possibility of a working group being established to sort through some of the many complexities that are going to be involved in the rollout.

10201 I believe, and I may use the wrong term, but you also have a 5G collaborative group who share thoughts within your organization.

10202 But pretty much universally, all of the service providers have said that the working group won't provide any benefits and may, in some cases, actually slow down progress.

10203 So what are your thoughts on a 5G working group?

10204 MR. SMITH: Yeah, as you mentioned, there's divergence of opinion among carriers.

10205 I think the majority of our members have indicated that they're not in favour of some type of mandated working group and they have concerns with it and whether it's things like potential sharing of confidential information, or just even the feasibility or workability of it. And others have indicated it may have some merit.

10206 I mean, definitely collaboration itself is important in our industry, and it goes on every day, and we know the that carriers work with municipalities on issues, et cetera. But you know, in terms of whether that should be a mandated working group, I mean we'll let the comments of our members that are on the record stand. We don't, you know, as we said, there's a divergence of opinion, so we don't have anything to add to that.

10207 MR. GHIZ: If I can -- sorry.

10208 COMMISSIONER MacDONALD: Go ahead.

10209 MR. GHIZ: If I can just add to that, because you talked about where are with 5G and are we behind other jurisdictions in the world.

10210 I like to point out, I was -- I remember I was at a conference in the U.S. and I was listening to a panel, and this was when I first started my job, and we like to talk about how great our LTE networks are and how we're world leaders, and there was a panel on and there was -- they were talking about 5G. And they were talking about how they were the first to get there to 4G. And I said to my staff is that true. And they said yeah it's it true. You know, the U.S. was the first country to get to 4G.

10211 And here we are a number of years later, and Canada's networks are twice as fast as the United States. We reach more on a percentage-wise of Canadians.

10212 And then there's a great quote from OpenSignal that I like to use where they say

10213 "There is no question, Canada is a global 4G superpower today. That likely means there are few other countries better prepared than Canada to deploy the 5G networks of the future." (As read)

10214 There's a caveat to that, and that caveat is that if we do not have a regulatory environment that supports facilities-based competition, then we cannot help deliver on that to help make sure that maybe we will be a little bit behind in terms of 5G, that -- but that in 5-years time OpenSignal will say isn't it great that Canada is a 5G superpower today. And I think that's what we should try to strive for when we look at our regulatory framework.

10215 COMMISSIONER MacDONALD: I have a question on building networks in just a second, but before I go there, do you have specific thoughts around if a working group were established who should be at that table. Obviously, the carriers, I would assume municipalities, ISED. Are there other parties that you think should be around that table, if indeed they are invited to that table?

10216 MR. SMITH: No, I mean, I think you've hit the main ones. But I think, as Rogers mentioned this morning, part of the issue is that there is uncertainty regarding the sort of regulation of certain things like access to municipal infrastructure, passive infrastructure, access to electrical utility poles, et cetera. And so it's probably -- you know, the concerns I know that Rogers expressed anyway, and I think some others have was that it's more difficult to have that kind of discussion without those rules and those frameworks being worked out.

10217 COMMISSIONER MacDONALD: I have some experience with working groups, and one of the challenges can be, well one, not having the right people at the table; but two, having too many people at the table to actually get everything accomplished. Is that a concern when we're talking about the number of municipalities that will be involved in a 5G rollout? They all may have different priorities, very different circumstances. Can you comment on that?

10218 MR. SMITH: Yeah. I mean, you know, we have roughly, I guess, the same number of municipalities as when rolling out 4G, but the issues are probably more complex now because of, you know, small cell ---

10219 COMMISSIONER MacDONALD: M'hm.

10220 MR. SMITH: --- architectures, et cetera.

10221 You know, we know that our carriers have good relationships with municipalities, obviously some relationships better than others. Our hope is that as, you know, we're still very much in the infancy of 5G in a lot of these, you know, sort of best practices and things like that are still being worked out, and we hope as deployments begin those best practices will be identified, will be shared across municipalities, et cetera, and that it will make the process more streamlined and work better.

10222 But you're right. I mean, it's always a challenge because every municipality has, you know, different concerns from their citizens, has different priorities, has different economies of scale. So they may -- you know, one -- a large city may have a department dedicated to it, whereas a smaller municipality may have somebody who it's, you know, part of their job. So those challenges are very real.

10223 COMMISSIONER MacDONALD: On the topic of building a 5G network for Canada, I would assume it's cheaper, faster, and easier if one network were built as opposed to multiple networks serving the needs of each individual carrier. So I'm wondering, could I get your thoughts on a potential mandate for all carriers to build a 5G network to serve Canadians' needs and where the challenges might be with such a proposal? Other countries have gone down that road, which is why I ask the question.

10224 MR. SMITH: Right. What was the last part, sorry, that you just said?

10225 COMMISSIONER MacDONALD: I was just going to say, what might the challenges be with a mandate for all the carriers to work together ---

10226 MR. SMITH: Right.

10227 COMMISSIONER MacDONALD: -- and build one 5G network ---

10228 MR. SMITH: Yeah.

10229 COMMISSIONER MacDONALD: --- as opposed to building one individually for each of them.

10230 MR. SMITH: Right. And I think, though, you said something about others ---

10231 COMMISSIONER MacDONALD: Oh, other countries, particularly South Korea and Germany, have received a mandate that all carriers will build a single network.

10232 MR. SMITH: Yeah. I did hear that earlier in the proceeding, and I was looking into it for –- your information, obviously may be better than mine. I'm not sure in Germany that it's an actual mandate. I thought it was basically cooperation among three of the carriers who are, in one case I think they've entered into a letter, a memorandum of understanding, another one they're exploring discussions, and I think TELUS's expert talked a little bit about that in terms of sharing some of the building to address white spots areas of the country that are not receiving coverage. But obviously I stand to be corrected if I'm not accurate there.

10233 And I think part of that was actually -- arose out of concerns with some of the recent happenings in the German market, where with the spectrum auctions, the recent spectrum auctions were incredibly inflated in terms of the costs for the 5G spectrum. And basically, the comments that came out of the CEOs of the carriers were essentially, you know, our whole investment model is broken, we don't have money to invest in infrastructure, with this money we could've built out in these areas, areas, and areas. And so it was really a solution they came to, not because they felt it was the best thing to do or the best thing for the German people, or to provide the best networks, it was really driven out of a necessity.

10234 South Korea as well, I don't know too much about that situation other than I would say that, you know, South Korea is a much different country. Almost half the population lives in the Greater Seoul Area. Their population density is roughly around 16,000 people per square kilometre, whereas if you look at the GTA area it's like 800. And so they have some very real issues in terms of building the type of small cell architecture in a relatively small area to serve that many people, and so again, I think it's more of a -- come out of a necessity, rather than something seen as it will drive the, you know, the best network experience.

10235 One of the strengths of Canada is having multiple networks that allow facilities-based carriers to compete based on network performance differentiation, and I think in 5G that'll be even more key. Because we're not talking just about providing connectivity. We've heard earlier speakers talk about the diverse set of capabilities that 5G will deliver, and that will enable carriers to differentiate themselves from others even more.

10236 So you know, I don't think a mandated network is really something that's in the benefits of Canada.

10237 COMMISSIONER MacDONALD: Okay. Thank you. Regardless of whether we're living in a 4G or a 5G world, I think everyone could agree it's important for Canadians, particularly, perhaps more vulnerable Canadians, to have access to the communication services they need.

10238 And we've talked a lot about the potential to mandate a particular plan that would be available to low income Canadians. We've talked about low cost plan that would be available to all Canadians. We've talked about, and others, and myself included have referred to it as the ISED model, but it includes the partnership with, I think last count 13 different service providers have come together in the Connecting Families initiative. If we were looking as a way –- looking for a way to potentially solve that gap in the market if indeed it does exist, what’s the best vehicle to do that with?

10239 MR. SMITH: Yeah, no, certainly, I mean, you know, our view and our members, view is right now that the market is serving Canadians in terms of providing a broad range of plans at different price points, plans attributes, as well, but we certainly heard the discussion of different interveners and some of the questioning from the Commission about, well, isn’t there still potentially a segment of Canada who simply, you know, just does not find wireless affordable and you reference to the Connecting Canadian Families program on the wireline side.

10240 And I think, as Rogers mentioned this morning, I mean our industry is always open to have conversations about ways that that can be addressed. But I think the need for a mandate is not there. I think that, you know, some of the plans that have been proposed as part of this proceeding, as other members of ours have mentioned, are really not economically feasible and don’t reflect, you know, the true cost of delivering a service.

10241 But in terms of having an engagement with industry to look at whether something could be put together, I think is fair. I don’t think you can simply map the Connecting Families program to wireless because there’s different economies; it’s a different, you know, it’s a –- on one side, it’s connectivity to a family or household versus connectivity to individuals.

10242 COMMISSIONER MacDONALD: M’hm.

10243 MR. SMITH: There’s device costs, so there’s a lot of, you know, issues and complexities that would be –- had to be worked out. But I think that’s –- that would be the way to do it.

10244 And again, you know, along the lines that it would have to be, you know, strictly means tested et cetera because you don’t want to distort the whole market. You don’t want to totally destroy the economics of the market and impact investment et cetera, but you do want to, you know, look for ways if there's a manageable way to address the needs of Canadians.

10245 MR. GHIZ: And I totally agree and those are great points and, you know, as Eric mentioned, you know, we don't believe there's a need to mandate. Industry is open to conversations. You hear –- you know, our members are always looking for better ways to find new customers, but for those that perhaps need help in our society, you know, I think that yes, you know, obviously you've heard from some of our members saying that they are open.

10246 There is another avenue, and I think I heard you asking some questions about this the other day. And with my background, I can say that, you know, provinces do receive a transfer payment from the Federal Government specifically designed for provinces themselves to decide on whether or not the needs of their citizens are being met to help them in areas where they may not be able to afford things. It was the health and social transfer; that was divvied up I think in 2004-2005. Now, it's the Canada Social Transfer, and within the provinces, there's different names for social assistance programs all across the provinces, but that could be another area that to help make sure that those Canadians that need the help are able to get it.

10247 COMMISSIONER MacDONALD: Thank you for that. If we did decide to mandate a low-income plan, do you think that should also come with a requirement that it would be promoted in the same way –- sorry, a low-cost plan -- that that low-cost plan should be promoted in a similar way as carriers would promote other plans in their market: visual displays at kiosks, same size font on their website, that sort of thing?

10248 MR. GHIZ: Well, first of all, I think that there are inherent dangers in mandating a plan that is below cost and that could distort the entire market. You know, obviously, I'm somewhat paraphrasing Mr. Natale from this morning, but also, at the same time, if you remember Lee Bragg who represents a smaller private company said that they had a program at one point and that there was very little uptake on it, so they got rid of it.

10249 I think that I go to our two ways that I've described, but I think that if you want to sit down with industry and perhaps have some discussions or the second avenue would be to ensure that provinces do have the mechanisms in place to help bridge those gaps that exist within our society.

10250 COMMISSIONER MacDONALD: Thank you. Just one final question and then my colleagues may have questions of their own, and it's a bit unfair to ask you, but I'm going to anyway.

10251 Just because you have a large number of members who compete with each other, who steal –- steal –- who attract customers away from each other with enticing offers, -- we have talked a lot in this proceeding about win back activity, especially what could be described as somewhat aggressive behaviour of a service provider calling one of their soon to be former clients upon receiving the (inaudible) request while the customer is still in the store -- do you think that there should be any guidelines put around that activity to: 1) allow the customer to still take advantage of the advantageous offers that may be put in front of them, but protect the service provider who has just unwrapped the $2,000 iPhone?

10252 MR. SMITH: Yeah. Yes, we heard the discussion about win backs. I mean, again, I'll just say, you know, one of the concerns was brought by one of our members and it was, I guess, opposed by other members of ours, so, you know, we don't have a view as an association on that issue. It's not something we talk about at the CWTA, so we don't have anything to add to the record on that.

10253 COMMISSIONER MacDONALD: Fair enough. Thank you. Those are my questions.

10254 THE CHAIRPERSON: Commissioner Barin. Pardon me.

10255 COMMISSIONER BARIN: I thank you. Thank you for the responses to the questions. I have a couple more.

10256 I heard you say that Canadian networks are twice as fast, and we've heard in the course of this proceeding that Canadians consume less data generally than international benchmarks, so that the networks are possibly less congested which makes it so that the speeds are better. We've –- so I'd like your comments on that.

10257 And also, we've heard from some of your members that they refer to the Canadian networks as higher quality, so I want to just ask you what is meant by the term higher quality; is it the equipment that's different? What accounts for Canadian networks being of higher quality?

10258 MR. SMITH: Yeah, I mean on the issue of congestion or capacity –- I think we've heard those comments as well, but we also heard from facilities -- facility-based providers is they essentially build to the demand and the anticipated demand. So this notion that there's a whole bunch of excess capacity just sitting there that they happened to spend millions of dollars in building, but nobody's using it, I think that's a fallacy.

10259 In terms of what quality means, quality is more than just speed; it's reliability. There was a reference –- I think it was this morning – to one of the Open Signal reports they did on the performance of networks in rural Canada, and they looked at things, not just speeds compared to other nations, but they looked in terms of availability, the –- so essentially the expansion of the network or how broad it is and also its reliability.

10260 So those are some of the elements that go into quality, but it's everything that makes up the consumer's experience, so, you know, whether it's the reception on a call, whether it's how quickly your device connects to the network; it's how many devices can connect to a network, so there's a lot of elements that go into quality.

10261 MR. GHIZ: And then the other part of your question, I'll paraphrase, I guess, some of my members in terms of data usage and that is that, you know, you are starting to see today incredible growth and you just heard with the unlimited plans that are taking place now.

10262 We also have a higher rate than some. I heard a comparison between Canada and Norway, you know, in terms of Wi-Fi availability and Wi-Fi availability makes a big difference there too. So, I don't think there's any one direct answer to why our data usage is lower. I think there's a whole lot, but I think you're going to see -- and you've heard this from our members -- is an incredible amount of growth, and we've seen an incredible amount of growth over the last number of years, but I would say if we're here in another couple of years, it won't be an average of 2.5, that average will be much higher.

10263 MR. SMITH: And just -- just to add to just that is I don't think Rogers mentioned this morning, but I think it was one of their submissions that with -- or actually, it may have been as part of their financial earnings conference calls, that, you know, on their -- they're seeing on their unlimited plans a usage of those subscribers going up to average like seven or eight gigabits. And obviously, as Mr. Natale said this morning as well, they're getting ready and anticipating much higher growth because of the capability that 5G will bring.

10264 COMMISSIONER BARIN: Thank you.

10265 For my second question, you talked about the dangers of mandating low-cost plans that are below cost. Yesterday we spoke with Québecor that operates the Videotron service, and they mentioned that there are $35 2-gig plans that are widely available in the Quebec market, and these are not plans that are targeted at low-income groups, so they're widely available.

10266 So, and we asked Québecor about the costs of operating a network in Quebec. Their response was that they were similar to the costs of operating networks elsewhere in Canada.

10267 So, my question to you is, is it fair to say that that price point of $35 for a 2-gig plan is not below cost?

10268 MR. GHIZ: I'll let Eric fill in if I don't go into anything too technical here, but just basically from the testimonies that have taken place, and I love to support my members, and I believe that if you heard -- the reason why the rates are lower in Quebec is, according to Mr. Péladeau, is because Québecor's offering that competition, and they've been in the market a little bit longer. And it's the facilities-based competition with the fourth player that is allowing those rates to go lower.

10269 My argument would be allow that -- those new entrants to have the opportunity to continuing to grow, the Shaws, the Eastlinks, the Xplornets, so that all the other jurisdictions can get to the same level and start to drive down prices after they've been in the market a little bit longer. That's one of the arguments that you hear.

10270 In terms of prices, you know, I take it from what our -- all our members say is that, you know, they're knowing their best to find those low-cost plans. We know that in Quebec the rates are a little lower. I would say that you heard from these proceedings that the rates in Saskatchewan were a little bit lower a few years ago. And then now it's becoming more of an equilibrium across the country.

10271 I think that if we allow facilities-based competition to continue and encourage the new entrants to continue to grow by not mandating MVNOs, that we'll see more of an equilibrium as well.

10272 COMMISSIONER BARIN: Okay. So, I understand that it's really a competitive issue to get the price lower, but that in terms of the costs, that costing a low-cost plan at that level would not be below cost.

10273 MR. SMITH: Yeah, I mean, I think that obviously we don't have a lot of discussions with our members about pricing, et cetera, for obvious reasons. You know, they're competitors and so we don't talk about those things. And we don't have a lot of visibility into different cost structures that companies have.

10274 I'll note that that offer though, you know, is from Fizz, their flanker brand, which is a purely sort of a digital light -- I'd say light touch with the consumer. So, I mean, that has a lower cost structure.

10275 And I think every carrier is a little bit different. I mean, Eastlink said it would not -- they couldn't offer them because they would -- at least so an so were opposed because they would be -- it's cost prohibitive.

10276 And also, you know, I even have to note that when you ask some of the interveners who, you know, are advocating for MVNO access or aspiring to be MVNOs, when they were asking would you make these plans available, and to paraphrase, you know, the response was, well, not if they're below our cost, and those are the people that are holding themselves out as, you know, people who will serve those markets better than the facilities-based carriers.

10277 At the end of the day, costs, you know -- you can't look at price without looking at cost, but we can't really answer about one particular member and what their structure is.

10278 COMMISSIONER BARIN: Fair enough. Thank you.

10279 THE CHAIRPERSON: Thank you. Thank you for your submissions and for taking the time to appear and answer our questions.

10280 I bid you a good afternoon and turn it, Madame secrétaire.

10281 THE SECRETARY: Merci. I will now ask the Halton Regional Police Service to come to presentation table.

10282 THE CHAIRPERSON: Hopefully no guns at the table.

10283 CHIEF DURAIAPPAH: We barely found our pens.

10284 THE SECRETARY: Please introduce yourself when you are ready, for the record, and you have 10 minutes for your presentation.

**PRESENTATION / PRÉSENTATION**

10285 CHIEF DURAIAPPAH: Thank you. Merci beaucoup.

10286 Good afternoon Commissioners. My name is Nishan Duraiappah, and I'm the Chief of Police for Peel Regional Police Service in Ontario, and the former Deputy Chief for Halton Regional Police Service. I'm pleased to be here today with my co-panelists to present on the CRTC's review of mobile services.

10287 We'll be focussing our submission today on the growing importance of and the role of reliable mobile data communications in the context of daily 9-1-1 emergency services across tri-services, first responders, municipalities, and critical infrastructure entities across Canada.

10288 It's my pleasure to introduce my co-presenters, who consist of leaders from a cross-section of Public Safety agencies, associations, critical infrastructure and communities, which you will see outlined on the slide. In the interest of time, I won't go through each -- everybody's name.

10289 Public safety communication needs have seen a rapid evolution in operational revolution in the past decade and significant increases in the reliance on broadband data as part of emergency services and day-to-day operations.

10290 In our collective experience providing emergency services, we can confidently state that data has become as important to emergency services as voice communications. From text messages and data files to video and photos, through new applications that provide for better frontline efficiency and coordination in life-saving missions to society.

10291 Emergency responders require reliable access to data during the minutes and seconds that can make a difference between life and death.

10292 We need telecom services that resiliently survive all manner of disasters, both human and natural, and the ability for communications to survive in the face of new, modern issues, such as cyber security.

10293 Unfortunately, commercial broadband services around the world have been shown to provide a level of resiliency and reliability below the threshold required by first responders and critical infrastructure entities during our times of needs.

10294 We, therefore, suggest that enabling a pro-MVNO telecom policy in Canada will provide emergency services with an added technology tool that permits first responders to seamlessly collaborate and coordinate in disasters and during surges of traffic seen during large public events.

10295 Our interest and vision is that the CRTC Mobile Wireless Review pertains to a series of transformative policy and infrastructure decisions happening this year. And that's related to a Canadian public safety broadband network, or PSBN, and key generational decisions related to setting up a reliable, resilient and cyber secure framework for emergency responders communication over the next several decades.

10296 ISED has allocated 20 megahertz of spectrum in the band class 14 or the 700-megahertz spectrum for the experimental and future operational use by Public Safety. This valuable spectrum was reserved for Public Safety in light of the tragic deaths of hundreds of first responders during the September 11, 2001 attacks in New York City, where access to reliable data could have saved hundreds of lives of first responders and civilians during the evacuation of the towers during that disaster.

10297 Key decisions on the technology and business model for the Canadian PSBN and the future course and effectiveness of first responder communications in Canada are going to be made in 2020.

10298 We submit that permitting a small and specialized class of public safety MVNOs is a key enabling technology tool to ensure always available data, communications for emergency responders.

10299 SUPT. ODOARDI: Thank you, Chief.

10300 My name is Anthony Odoardi. I'm a Superintendent with the Halton Regional Police.

10301 Reliability, resilient cyber security, cost effectiveness and interoperability are the theme of what we're here talking today.

10302 The revolution in data needs for first responders are going to grow. In fact, they're upon us with near-term enhancements to next-generation 911 in the next couple years.

10303 In fact, here today, we're seeing changes, also including enabling Voice Over IP-based services and an exponential growth in data sources that are fast approaching first responders today.

10304 If we're to accept, then, that next-generation 911 and all these -- and the growth of digital sources are essential for community safety and well-being and that the upstream path of that data from civilians requires resiliency so the data can reach our call takers, then the same is true for the downstream path of those sources to reliably reach our first responders, our front-line people out working.

10305 Without broadband connectivity that reliability gets 911 data to front-line emergency personnel, effectiveness and reliability of coordinated 911 services are diminished and at jeopardy.

10306 So given the generational explosive growth in data use for first responders and issues related to commercial grade telecom reliability, our vision for public safety communication stems from a desire to ensure, and these are key for us, public safety agency oversight and collaboration on strategic direction, initiatives and operations surrounding a shared public safety LTE core.

10307 Canada's emergency services, although small, representing a small portion of the commercial telecom system, represent a critical facet of overall telecommunication users in our country and an important arena to CRTC policy reviews and the parallel legislative reviews of the *Broadcasting and Telecommunication Act* which can help address important issues to assist mission-critical efforts on behalf of all first responders.

10308 As part of our commitment and concern for reliable communications, a rapidly-growing not-for-profit association of first responder agencies, municipalities, like-minded commercial and non-governmental partners has been established -- we will talk about that in a moment -- to advocate for reliable communication policy, focused changes to the *Telecommunications and Radio Communications Act* that take into account the specific needs of public safety, what our citizens have come to expect and demand.

10309 Our rapidly-growing not-for-profit association, named the PSBN Innovation Alliance, encompasses lead responder agencies and critical infrastructure entities that cover over three million of Canadians, and growing daily, which I am the Executive Director of.

10310 Our members support telecommunications policy, business models and technology innovations that help establish a level of communication, reliability, need for 911 response.

10311 You will hear that we are also firm advocates for policies that help bridge the rural and remote broadband digital divide in Canada, business models and partnerships that bring new capital to bear on this critical issue.

10312 MR. CRNKO: Thank you, Commissioners. My name is Phil Crnko. I am President of Black Castle Networks and Engineering Consultants Inc.

10313 In our collective view, there are several key areas we need to focus on improving in a holistic network approach that would provide 4G and 5G service resiliency for first responders, including a focus on rural and remote broadband enablement, reliability for first responders, resiliency, high-cost service rates, cyber security from a holistic systems view.

10314 Public safety MVNOs or PS-MVNOs can be a key innovative enabler for better reliability of communications for emergency responders. PS-MVNOs effectively create a digital right-of-way to help 911 life-saving services in times of need.

10315 As noted in our written submission and also in the submissions of the Canadian Electricity Association and the Rail Association of Canada, MVNOs offer technical architecture that is better able to withstand outages of individual MNOs.

10316 Put simply, MVNOs permit stacking the reliabilities and availabilities of several carriers, one on top of the other, to get a net better level of signal strength and system reliability than any individual MNO.

10317 The PS-MVNO model is an effective concept that has been proven and implemented in other jurisdictions in the world. Indeed, in a recent study on MVNO performance in the United States market, a report by Tutela has confirmed that the concept of stacked reliability where reported in their October 2019 state of the MVNO paper that MVNO performance measured across all 50 states have shown an ability to be as good and even better than Tier 1 MNOs.

10318 This superior performance stems from an ability of MVNO users with multiple roaming agreements to effectively jump to the best signal level and the best network in any given location, thereby always maintaining the best level performance for their users.

10319 This MVNO concept of providing first responder access to the best signal in any given location effectively amounts to a digital right-of-way in a similar manner that an emergency responder's vehicle sirens and lights provide a right-of-way in the real world on our highways and roads.

10320 Besides the performance advantages that a PS-MVNO policy has for first responders, the relatively high cost of telecom in Canada shown over years of international studies also impacts the operational budgets of first responders.

10321 Chronic high costs due to competitive skew in the Canadian telecom marketplace in turn draws valuable operational budget dollars away from critically-needed 911 field resources, staff and equipment.

10322 MR. PAYNE: Thank you, Phil.

10323 Good afternoon, Commissioners. My name is Bill Payne. I'm the Director of Information Technology for the Halton Regional Police Service.

10324 The advantages of PS-MVNOs run across both operational and financial considerations. Our financial modelling has shown that a pro market-driven approach to a PSBN in Canada, which includes enabling PS-MVNO services, can result in operational cost savings of between two and four billion dollars in the sample case of the Province of Ontario over a 20-year operational period.

10325 These projected savings are considered to be a conservative view given the growing use of data anticipated for first responders due to next-generation 911 services and represent funds that will go back into the budgets of first responder agencies to buy essential equipment, apparatus or vehicles for emergency response and to hire more front-line staff for 911 life-saving response.

10326 Our proposed hybrid PSBN model consists of a network of networks approach with an ability to roam via PS-MVNO services on multiple, if not all, MNOs in Canada through roaming agreements with CRTC-established fair market rates for specialized PS-MVNO service with an ability to connect to 4G and 5G networks and traditional land mobile radio networks.

10327 Recent successful testing conducted between both Halton Regional Police Service PSBN and Land Mobile Radio networks and the Telesat Low-Earth-Orbit satellite network, a technical first in Canada, has demonstrated the effectiveness of our network-of-networks approach.

10328 A network-of-networks model provides resilient communications and extends the reach of first responders by giving municipalities and their first responder agencies the flexibility to license and monetize Band Class 14 spectrum in PSBNs in the manner best suited to their diverse regional needs. With PS-MVNOs as an architectural tool for reliability and cost savings, we can assure that valuable spectrum resources are flexibly deployed in a manner that best meets the diverse needs of Canadian communities.

10329 Our PSBN model consists of a two-tiered choice for municipalities and provinces to select the spectrum deployment model that is most effective. The model includes a place for MNOs and yet with a strong competitive framework between MNOs and PS-MVNO service providers, it's about choice in how Band Class 14 is deployed and monetized in a given community.

10330 In turn, to maximize competitive forces flexibility in choice for first responder agencies, we propose a second optional MNO oriented licensing and PSBN service approach that provides municipalities the market-driven option to obtain PSBN services from MNOs also.

10331 MR. SLACK: Thanks, Bill.

10332 I'm Shawn Slack. I'm the Chief Information Officer for the City of Mississauga.

10333 From an IT municipal services stance, a pro-public safety MVNO policy enacted by the CRTC gives regional municipalities more market choice and competitive options in our current marketplace.

10334 This choice helps drive down costs and serves to align Canada with other G7 countries and the majority of G20 nations around the world that have had strong MVNO markets for the past several decades, providing both facility and virtualized competitive services.

10335 Canada remains one of the very few industrialized countries on earth without an MVNO model.

10336 On the balance of analysis, a pro-public safety MVNO policy can help solve the problems we noted earlier in our presentation, namely rural broadband.

10337 Our policy proposals leverage Band Class 14 spectrum, which has been made available to first responders and municipalities to permit deploying the public safety use case in rural areas where it makes sense for community safety needs.

10338 Coupled with new sources of P3 capital investment, our model creates new facilities-based competition via the 700-megahertz spectrum.

10339 Municipalities can partner with both critical infrastructure, for example, rail, and transit, and utilities, and public safety, as part of an existing smart city or smart rural programs to gain a trifecta win that solves both the need for reliable public safety access, provides municipalities with new tools through spectrum, along with a PS-MVNO business model that provides cost savings on municipal broadband.

10340 This approach also enables rural and urban broadband infrastructure in areas where MNOs decline to invest today, and achieves a better net service resiliency than a single carrier.

10341 On reliability, as noted earlier, the PS-MVNO concept permits stacking multiple MNOs where existing commercial service providers exist, or to layer Band Class 14 PSBN networks on top of incumbent MNO services, or in partnership with incumbent MNOs in a given region.

10342 This helps build a more robust layer of survivable infrastructure.

10343 Resiliency. A strategy for the first responders that built a skeleton of highly ruggedized Band Class 14 sites, coupled with PS-MVNO services to permit first responders to jump to the best available single strength, enables the digital right-of-way concept for data that we’ve described, the better survivability for public safety than relying on a single MNO today.

10344 High cost. The chronic problem can be alleviated by permitting new sources of competition.

10345 Canada's telecom market continues to exhibit constrained competition with the three main incumbent MNOs commanding market power, with a significant majority of the national mobile wireless market.

10346 Where this power dynamic constrains competition, in our view, requires ongoing regulatory review by the CRTC to ensure market forces are viable for the long-term.

10347 And lastly, cyber security. With the growing risk of cyber attacks, it is incumbent for Canada to build a secure and survivable telecom network for times of crisis and disaster response, where reliable and secure communications help in the minutes and seconds that count in emergencies.

10348 MR. MITCHELL: Good afternoon. Chris Mitchell. I'm the Associate Director of Airport Operations for the Greater Toronto Airport Authority, the Operator of Toronto Pearson.

10349 We are pleased to note that our recommendations for PSBN Band Class 14 and PS-MVNO policy are aligned with the views of the Canadian Electrical Association, the Ontario Association of Chiefs of Police, the Rail Association of Canada, and the Ontario Professional Firefighters Association, as well as the membership of the PSBN Innovation Alliance.

10350 We also, in turn, firmly endorse and support the RAC and the CEA proposals for PVNO services in Canada.

10351 Critical infrastructure entities also often bring significant telecom assets in rural and remote regions, such as fibre backhaul links in Northern Ontario, where no commercial cell service exists today.

10352 In partnering, we can share PSBN costs and leverage fibre assets across critical infrastructure organizations.

10353 It would also reduce the burden on government and taxpayers in building a secure 5G PSBN asset for Canada, and yet obtain the required level of reliability in critical communications where lives are on the line.

10354 At the Greater Toronto Airport's Authority, we are firm believers in the risk mitigation benefits that a sound public safety MVNO and public safety broadband policy can provide.

10355 As a mission critical entity, the GTAA understands first hand the impact of communications breakdowns and how failures in communications can lead to catastrophic results to society.

10356 As a personal anecdote which highlights the critical importance of coordinated and reliable communications, the GTAA experienced major communications failures on cellular services during the Air France flight 358 disaster at the airport in 2005 due to a surge in network traffic.

10357 During the crisis, cellular service ground to a halt with very significant impacts on operational effectiveness during the event.

10358 MS. PAYNE: Good afternoon. My name is Susan Payne. I work for Peel Regional Police and I am the Manager of VCOM and Support Services.

10359 Our proposed PS-MVNO concept combines the strategic use of Band Class 14 and hybrid PS-MNO approach, which can help in many emergency scenarios ranging from special events and high-density gatherings.

10360 And as an example of cases where combined PS-MVNO and Band Class 14 could have helped include the very recent Raptors' Victory Parade where broadband communications experienced serious access issues.

10361 Also, in cases of ad hoc evacuations where networks experiences surges of users on limited RF site capacity, including school and high rise building evacuations, where large numbers of civilians can congregate and overwhelm limited commercial sites, crisis events where commercial telecom infrastructure is damaged, or where power outages exceed the relatively short levels of battery backup at commercial sites, or where infrastructure is down due to a lack of resiliency and poor architectures or links to cores.

10362 Additionally, special events and emergencies where seamless coordination and data sharing across tri-services and secondary responders is essential to saving lives, where minutes and seconds can mean the different between life and death.

10363 In order to help address these risks and challenges to public safety communications, Halton and Peel Police have embarked on an innovative path for first responder communications with the first multi-regional public safety broadband network in Canada, providing coverage and resilient first responder communications in a region that covers over two million Canadians.

10364 We are also pleased to note our work with the Canadian Electricity Association in a series of ongoing inter-PSBN core tests with public safety and utilities innovating and collaborating together between our PSBN in Ontario and the Powertech-hosted PSBN in British Columbia, with the multicore PSBN tests showcasing security, resiliency and reliability in communications.

10365 CHIEF LAZENBY: Good afternoon. I'm Dave Lazenby, Fire Chief for the Burlington Fire Department.

10366 From a tri-services stance, reliable broadband communications has never been more important to saving lives on a daily basis in Canada.

10367 We're please to note that our fast-growing coalition within the PSBN Innovation Alliance includes a significant support of a number of public safety associations and agencies, including the Ontario Association of Chiefs of Police and the Ontario Professional Firefighters Association.

10368 Reliable communications saves lives and makes sense from a CRTC policy stance.

10369 Our proposed hybrid model PSBN would provide Canadians with many advantages, including improved reliability, resiliency, and cyber security for first responder communications, support to help bridge the rural broadband divide, support to critical infrastructure entities in municipalities such as healthcare, transit, rail, utilities, airports, and public works, a maximum market-driven choice for municipalities, a maximum fostering of market innovation and technology innovation, and maximum optimization of costs by permitting innovative market solutions.

10370 CHIEF DURAIAPPAH: We'd like to conclude our presentation with the following four key recommendations for the CRTC to consider in the development of a telecom policy that can help save lives and help emergency responders.

10371 First, to permit a PS public safety MVNO model for public safety focused on the niche emergency responder community.

10372 Number two, establish competitive wholesale PS-MVNO rates for emergency responders as a specialized CRTC MVNO rate at or below commercial rates, given our life-saving mission with CRTC involvement in rate establishment, negotiations with carriers as well.

10373 Number three, further consider our additional detailed legislative recommendations, which we've submitted, for the *Radiocommunications and Telecommunications Acts*, including the perspective of emergency responder needs within the Acts.

10374 Number four, to mandate and facilitate a special case for public safety roaming, given our public safety life-saving mission, and permit the following key technical elements: MNC allocation and intersystem roaming; seamless roaming; special cooperation with public safety; potentially network sharing; access to MNO VoLTE services; access to MNO 4G and 5G networks.

10375 We'd like to sincerely thank the Commissioners and the CRTC staff for their time today and we remain available for questions.

10376 Thank you.

10377 THE CHAIRPERSON: Thank you. Thank you for your presentation.

10378 Where to begin? I might just make a note with respect to your summary of proposed CRTC and government policy actions, that obviously the CRTC does not have a direct role in amendments to the *Radiocom Telecommunications Act*. That is the work of parliamentarians and the Minister for Industry.

10379 So we'll leave that on the side. I appreciate the suggestions that you've made and I know you made them to the expert panel as well. So we'll just note that. I'd like to start by just having you give me a little more of an explanation of what a non-profit public safety MVNO would look like. I'm assuming this is fairly comparable to the FirstNet Services in the U.S.?

10380 SUPT. ODOARDI: Good afternoon, again, Anthony Odoardi, and I'll be directing the questions to our subject matter experts on the panel so that we save some time for you folks in comment. Phil, I'll turn that over to you.

10381 MR. CRNKO: Certainly, thank you Anthony. And so quite simply, you're correct in that it's an analogy to the FirstNet system which is in the United States. However, our proposal is that Canada has different needs, given the different population density and diverse geographic needs across Canada.

10382 And so as a result, we propose a flexible framework that at its core has a shared core model for municipalities and provinces, so that they can essentially share on costs similar to a co-op model at a very broad and high level. And it allows municipalities to share those central costs for connectivity into the cores and allow them, in turn, to plug in RANs that they can, for example, monetize in the fashion that is most appropriate for their needs. And also, to solicit and procure equipment with P3 partners, public private partnerships.

10383 And for example, we have had interest from several venture capital institutions and institutional investors that would certainly provide billions of dollars for the build out of these networks that would be again, constructed to a higher level resiliency, reliability and cybersecurity than we currently have with the MNO networks.

10384 So the twist is that it is a model that is actually analogous to the approach that land mobile radio networks take in municipalities today. So municipalities in many of our jurisdictions have oversight and deploy these land mobile radio networks independent from mobile network operators.

10385 THE CHAIRPERSON: But they've built those networks for themselves, they're not using the networks of other providers, right?

10386 MR. CRNKO: There's inter operability and certainly coordination with network providers that do also have land mobile radio networks as well.

10387 THE CHAIRPERSON: But take a step back. Just what are the differences between your approach and FirstNet in the U.S.

10388 MR. CRNKO: So our approach provides the oversight into the hands of public safety communications.

10389 THE CHAIRPERSON: As opposed to the network operator?

10390 MR. CRNKO: Correct. Yeah, so it's the control which we feel is so important. Again, in times of need we've seen countless examples where, left to their own devices, commercial operators will build based on the motivation of profit, and not necessarily providing the overbuild required to handle those corner cases, where you have surges of traffic that overwhelm the networks.

10391 And so, we have countless examples of where we -- there is a different level of construction and engineering, for example. We could cite recent examples, such as hurricane Dorian, where networks were down for days, certainly, and we contrast that with the build of land mobile radio networks, which survived far better than the carrier networks in those particular examples. And there are many other examples that have occurred in recent history as well.

10392 THE CHAIRPERSON: You may have answered this question in part. But if the Commission were to go forward and mandate full MVNO access, under one of the other models that have been proposed to us, why is that not sufficient to meet your needs?

10393 MR. CRNKO: So again, it stems from the commercial motivations. We think that public safety needs to have a direct hand and involvement in establishing the criterion and standards, similar to how they have been directly involved in that land mobile radio networks. And we feel it's that oversight that has allowed land mobile radio networks in large part to survive better in these crisis situations, in these surge conditions that occur.

10394 THE CHAIRPERSON: Is emergent -- the carriers work together through Emergency Preparedness Canada and do have a number of activities to coordinate among themselves in the case of emergencies. Why doesn't that respond to the public safety component of this?

10395 MR. CRNKO: So Anthony, if you wanted to ---

10396 SUPT. ODOARDI: As Phil has indicated, despite sitting on these committees and participating in these organizations, we've cited several examples throughout the presentation where the reliability factor just hasn't been there. And so, to leave it solely in the hands of the carriers in the greatest times in need, and we don't want to overstate that this is just about critical incidents and disasters.

10397 But this is about everyday, day to day uses or surges, and the reliability the network needs to come through. We don't feel right leaving that solely in the hands of the carriers. Our participation in making those rules and regulations, and standards, and policies, we think is critical and essential to delivering on our mission critical needs.

10398 MR. SLACK: If I may add as well, from a public safety communication standards point of view, we design our sites very differently from how a carrier would. For instance, so they're hardened sites with generators, they're monitored. We have multiple diverse routes, and service levels that we contract to for those sorts of things. And it's those disciplines that really make a very large difference in reliability and predictability of networks.

10399 THE CHAIRPERSON: And in your view, it's not possible to contract with commercial providers to obtain higher and necessary standard of service? I assume carriers have contractual arraignments with the Department of National Defense and other customers who demand particularly onerous conditions of service.

10400 MR. SLACK: In our experience it's been best effort, sort of the commercial approach to that sort of coverage. And it's very difficult to predict when and where an incident will happen, as you know, we've talked about in our presentation. It's the day to day use case, as well as the emergency, sort of disaster. And so, designing a network from the ground up that has that sort of resilience built in is, you know, not -- it's not an option not to do that in a public safety, sort of approach.

10401 THE CHAIRPERSON: And if you had such PVNO access, would you use the service to deploy handsets to personnel in the field?

10402 MR. SLACK: Yes, we would. In our initial tests -- sorry -- our initial tests today are on a mobile designed network, which is performing quite well. And it would be our plan to have a -- areas of coverage where it makes sense under band 14, under a private network, and then be able to use the PS-MVNO relationships to be able to ensure coverage in those worst case scenarios, where we either need to leave an area, or where there are other disasters affecting other pieces of infrastructure.

10403 THE CHAIRPERSON: And would this connect with and communicate with conventional smart devices?

10404 MR. SLACK: It would. It would, absolutely.

10405 THE CHAIRPERSON: And then I guess, the logical question is, if you're deploying handsets, would you be willing and able to comply with all of the typical obligations imposed by government and the Commission on carriers?

10406 MR. SLACK: Yes, we would. And certainly, elements such as next generation 9-1-1, which are new standards coming for -- for facilitating digital engagement with civilians during crisis situations. So new data, or digital driven elements, such as SMS text, video calls, and data file transmissions first responders in the course of 9-1-1 calls. So absolutely.

10407 THE CHAIRPERSON: Is the ---

10408 SUPT. ODOARDI: If I could -- sorry, sir. If I could ---

10409 THE CHAIRPERSON: Go ahead.

10410 SUPT. ODOARDI: --- also top up, and Mr. Shawn Slack could weigh in on this, we speak about this at length in our innovation alliance meetings as to audit standards in terms of regulations.

10411 MR. SLACK: Thank you, Anthony. And so, I think what we talked about was really the -- the requirements to be able to have a multi agency response with the inter operability for the everyday. So when you've got fire, EMS, transit, utilities, and traffic, all responding as a multi agency response to an incident, that's the everyday use case that drives the ROI for this type of solution. And I think that's really why you want to have the public safety aspect to have a hand on the implementation and operations of this MVNO model.

10412 THE CHAIRPERSON: Thank you. I'm struggling a little bit. Essentially what you've told me is that commercial networks provide reasonable reliability for everyday services, but not for the exceptional circumstances. But your proposal still relies on the very same networks.

10413 I'm just not adding two and two together to reach five.

10414 MR. CRNKO: So let me help you get to four. So essentially ---

10415 THE CHAIRPERSON: That would be a good start.

10416 MR. CRNKO: So essentially, it's the stacked reliability concept. So where the individual reliability of a single MNO may not be sufficient, when you have the ability to stack one on top of the other, so if –- let's say, for example, during the Ottawa tornado disaster that happened recently here in this region, individual MNOs might be impacted in a given jurisdiction with one, let's say, having an issue in terms of an outage. But another tower site nearby with a second MNO would provide coverage in that circumstance.

10417 So it's the overlapping coverages from the three MNOs, the major MNOs, and the additional regional incumbents that when you stack together provide the ability to bounce effectively to the best signal strength and the best network throughput given the circumstance. So it's the staked reliabilities, when you add them all together, provide a superior net reliability.

10418 THE CHAIRPERSON: But my understanding is the carriers do work together through the Emergency Preparedness System to do just that.

10419 MR. CRNKO: So similar -- in a similar vein to how the Rail Association noted, you know, the stacked reliability concept provides the advantage, you know, for net superior reliability, and I believe the Canadian Electricity Association when they are before you later this week will also refer to this concept. You essentially, you do obtain a superior reliability when you combine the net availabilities of those individual networks.

10420 THE CHAIRPERSON: So a number of the parties that have appeared before us are certainly supportive of the public safety objectives and have indicated that some of these objectives are indeed being entertained at the moment, both with public safety and in some negotiations with the providers themselves. The suggestion is that it's premature and the Commission should wait until the PSBN model is agreed upon and adopted before we should be acting.

10421 Can you give me some comments on that view, please?

10422 SUPT. ODOARDI: Certainly and thank you. And just to address the first comment about the MNOs, perhaps, or the carriers working in that space with public safety. To date, there hasn't really been any dialogue in that. We have approached and we have asked to speak about this.

10423 THE CHAIRPERSON: Sorry. Dialogue with the service providers, or dialogue with public safety?

10424 SUPT. ODOARDI: Dialogue with service providers.

10425 THE CHAIRPERSON: Thank you.

10426 SUPT. ODOARDI: And so working in that space has been difficult and challenging to date, and I'm -- I won't say that there has been zero, but they have not been substantial or productive. Yet, we continue to see those very instances of which we've mentioned here today of outages, or the lack of reliability affecting our operations, and again, not just in crisis but on a day-to-day basis.

10427 So the urgency for us is now. It's to move now and to speak about this, and this is why we're here today is to really help solve that issue and hope that part of what comes out of -- from these hearings is a greater collaboration with those providers.

10428 THE CHAIRPERSON: Now, when -- oh. Go ahead.

10429 MR. CRNKO: Just one additional point is that in terms of the timing. The timing is actually right in that the decisions surrounding the spectrum, and again, which would permit us to act, in effect, as a facilities-based MVNO, which some of the suggestions have been related to the HMNO and other models, those decisions are happening in 2020. And so the timing is essentially aligned with the timing of the decisions surrounding the MVNOs subject with the CRTC.

10430 THE CHAIRPERSON: Thank you. When Bell was in front of us, however, they expressed a concern, and I'd like to hear your view about it, that it wasn't entirely clear to them that there was internal alignment, I believe was the term they used. That whether -- and they didn't speak specifically to whether it was law enforcement agencies or electrical utilities, but they indicated that their experience was that sometimes the broader proposals were not consistent with the proposals or demands of individual members or subcomponents of the group.

10431 Could you comment on that?

10432 SUPT. ODOARDI: We have two comments. And first, I'll turn it over to the Executive Director of the Ontario Association of Chiefs of Police, and he will comment on that, and then I will top him up.

10433 THE CHAIRPERSON: Thank you.

10434 MR. McGUIRE: Thank you, Commissioner. My name's Jeff McGuire, and as Anthony indicated I'm the Executive Director of the OACP, and we have come onboard. We represent the police services across the province as a professional and leadership entity, and also advocacy to government issues on all public safety matters that impact all police services across the province.

10435 That said, we have 46 municipal police services in Ontario, 9 First Nations policing services, and the Ontario Provincial Police. All of those are members of our organization.

10436 We've been involved in presentations from the group before you here today over the past year, and a motion was put forward two years ago at our annual general meeting to support this issue, which was brought forward by then Deputy Chief Nishan Duraiappah, and then following that, the motion was adopted in September of last year by our executive board to sign on as an advisor group to this very alliance that is here before you.

10437 So (unintelligible), you may be correct that there would be times out of the 56 police services where there may be one or two that don't always have the exact agreement, but I can tell you that we do represent the totality of those police services, and that agency, that's why we are supporting this group moving forward.

10438 THE CHAIRPERSON: Thank you for that.

10439 SUPT. ODOARDI: Just to top up, I'd like to say that the information provided by Bell, perhaps, on that specific item, we would characterize as inaccurate. The PSBN invasion alliance grows by the day. Although at this point we cover 3 million Ontarians and Canadians, we know from even recently, Chief Duraiappah and I attended a conference in Vancouver just yesterday and spoke to hundreds of delegates and were approached afterwards in terms of those who are willing to sign our document, our memorandum of understanding to join the alliance from East Coast to West Coast.

10440 So to say that in fact that there is support is the truth and is more accurate than there is a -- there is not. We are a fast and very speedy, growing coalition of interested first responders who want to collaborate in this space.

10441 THE CHAIRPERSON: Thank you.

10442 SUPT. ODOARDI: Secondly, I also noted, sir, that Mr. Bibic, and I'll paraphrase here, also said that "If they come forward with a particular customer segment in a particular area of the country that could tackle better than we can, we're all ears". Well, we need to follow up on that. We are a particular segment in all areas of the country with particular needs, so we will be looking forward to talking to Bell, Mr. Bibic, further about what our needs are, and I think he clearly stated that before the Commission, and we look forward to doing so.

10443 THE CHAIRPERSON: And I encourage you to do so.

10444 I'll get into maybe a slightly more technical area in a second, but before I leave this, a little -- just back to the larger picture. You suggested that your model also would help bridging the urban rural divide through the use of the hybrid MVNO model for a PSBN. Can you tell me how that works? How -- again, how is that the case? Is it because, again, the over -- the stacking of the various providers? I'm just trying to figure out how you better serve rural areas if the rural area is underserved with facilities.

10445 SUPT. ODOARDI: Thank you. And I'm going to turn it over to our technical experts.

10446 Before we do that, we believe there is several fundamental tenets of that model, one of which we -- some exciting news that we just released yesterday was some work with Telesat, which we know will revolutionize the way we're able to use a PSBN and the spectrum to bridge that rural and remote, remote broadband divide. Because right now, we feel that where there are not people, where people are not in clusters, where there are not urban centres they are not greatly represented in terms of emergency response efforts via data, via our ability to use data and respond to them.

10447 And so that is where we partner with critical infrastructure agencies like rail, electricity, where they have existing infrastructures to run through those routes and add on to them and pave the way for other investment opportunities by MNOs.

10448 And I will admit a little deficiency in that, so I will turn that over to Mr. Crnko to explain. However, we feel that we've established a good model far superior to what has been put out there to date perhaps, which is not a lot in terms of public safety, in terms of our niche in public safety.

10449 MR. CRNKO: Thank you, Anthony.

10450 And, Commissioner, certainly in terms of areas where there is a lack of MNO investment today, that exists because the MNOs are motivated by commercial profit reasons and margins, and hence, they have not invested in those regions today.

10451 Nevertheless, notwithstanding that the infrastructure's not there, our members, our first responders, emergency responders still need to respond to 911 calls. There are being inquests in scenarios in, for example, Northern Ontario, I believe in Sudbury area, where lack of MNO access has resulted in deaths. And there are other examples we could cite historically.

10452 And so in those regions where the MNOs have simply refused to invest because of commercial motivations, we would suggest that our partnership, which brings, for example, the Canadian Electricity Association assets from their members -- we had one of our charts that indicated the fibre assets in Northern Ontario as an example, and there are similar cases in the other provinces, where those fibre assets would be a significant baseline of investment that already exists that we could leverage to lower the cost of bringing access to those rural and remote regions.

10453 And in turn, with our public/private partnerships, and as noted, we have received indications of significant interest in terms of investment, we would bring those partnerships to bear, to pave the way, to bring down the commercial cost, and in turn, allow MNOs to collocate on our infrastructure that we would build in these remote locations.

10454 And in terms of that trifecta benefit that my colleague, the CIO of Mississauga, Shawn Slack, noted, it also brings besides public safety access in those areas for 911 response, it also brings the resiliency that members of the Canadian Electricity Association need for their purposes, the Rail Association members need for their particular needs, as well as provides a potential mutual host infrastructure, or a method of monetisation with, for example, First Nations' communities, who can also coinvest and reap the benefits for their communities, which would, in effect, provide a lower cost of entry for commercial entrants to come and collocate and collaborate.

10455 So, it's that P3 angle. It's the public/private partnership that brings those multiple sources to reduce the net cost that's inhibiting the carriers for deploying today.

10456 THE CHAIRPERSON: And to perhaps more of a question for the electrical distribution representatives, but if they have fibre extending into rural areas and there's a lack of service by the existing MNOs, I just wonder why there isn't a win/win available there and why perhaps they're not working together to build out facilities that are mutually beneficial. But I don't expect you to answer that. We can raise that with the representatives of the CEA.

10457 So, your proposal also seems to suggest that the Commission should set a different and preferential rate for Public Safety MVNOs than any other general rate it might set. Others have, not surprisingly, suggested otherwise.

10458 Could you comment on that, and then perhaps we'll talk a little bit about how a rate would be reached?

10459 SUPT. ODOARDI: I won't speak to how a rate would be reached perhaps, and then I'll turn that over to my colleagues.

10460 And it's tough for me as an executive in the police department to sit before you and always lean on the fact that Public Safety agencies should come first and foremost in terms of not only financial and economics when it comes to data, but just really in all courses of response to emergencies. And, again, this isn't just about emergencies. It's about day-to-day use.

10461 But that is a reality. And the demands from the community to meet expectations on public safety suggests that we have to use all the tools and resources available to us. And we've talked about in the near future what those resources are, and it will be, as my friend, Mr. Crnko alludes to it, is a tsunami of data available to Public Service and Public Safety agencies to utilise in life-saving, mission-critical response.

10462 And so, the consumption of that data is a burden on not only police, fire and EMS, but also agencies that assist us, critical infrastructure agencies. And to provide that level of service to the community in a cost-effective way that minimises the impacts to budgets, we feel that it is important to negotiate rates specifically for public safety to protect all of us.

10463 And I know it's a motherhood and apple pie statement, but, in fact, that is exactly why we're here today.

10464 THE CHAIRPERSON: We share in some of those motherhood and apple pie objectives. I mean, we serve the public interest as well, so I appreciate it, and I'll let your colleagues answer the other part of the question. But before we leave that, but if the Commission sets different rates for different types of entities, you've made the case for why Public Safety should qualify. What do we do about the others who will make a similar case, medical services, hospitals? I mean, we can go and make a list of entities or sectors that contribute importantly to society and to the general wealth, health and safety of Canadians. And, you know, to use a tired expression, is this not a slippery slope?

10465 SUPT. ODOARDI: Thank you, sir, and I do agree with you it is a slippery slope in some instances, and I -- ultimately, I don't have the answer for you in terms of some of those other organisations or facets of society that require the same critical usage of data as emergency responders.

10466 However, in our model, we do indicate that not only critical infrastructures, but our partners in health are also -- have been provided by legislation access to the spectrum through Public Safety agencies. And so, we feel that there would be a benefit to them with our endorsement of a PS MVNO and they can capitalise on that.

10467 THE CHAIRPERSON: Thank you.

10468 And the other part of the question?

10469 MR. CRNKO: Certainly, Commissioner, and we would be certainly accepting of whatever the CRTC felt was fair in light of the societal life-saving role of tri-services emergencies responders and also secondary and tertiary responders, such as rails, transits, utilities. And so, we don't necessarily ask for more than that, which is going to be granted, if it were granted, to any other particular MVNO. So, first of all, we would be accepting of an equal standing with other MVNOs.

10470 We are simply suggesting as an option for the CRTC to further consider that perhaps an additional discount, given the societal life-saving role and the fact that all of us do benefit as Canadians from those 911 emergency services. So, for that reason, we would suggest that a further reduction could be considered, but it's certainly not necessary and is not a requirement in our recommendation.

10471 THE CHAIRPERSON: Thank you.

10472 Do you have any views, and I know it's not your traditional area of expertise, but we'd be interested in hearing any advice you might share, on, for example, with commercial negotiation, backstop by a binding arbitration process, in your view, would that be the best approach, or a preferred approach to reaching a rate, or do you see an alternative approach you -- if you've been following the hearing, you might have heard discussion about either doing a retail minus approach or relying on our traditional bottom-up costing approach. Do you have any views on that?

10473 MR. CRNKO: Certainly. First of all, we would -- we'd certainly prefer to have the CRTC backstopping those negotiations because of the market power position of the carriers. And as was noted I believe by representatives of Rogers and the other carriers, you know, they certainly don't have an interest, as they've clearly stated many times, in enabling MVNOs. It's not their current position.

10474 So, from a stance of negotiation, you have to have parties that have equal motivations to come to an agreement. And when one party is clearly indicating on public record that they have no interest, it's difficult to have those fair negotiations. And for that reason, we'd suggest it would be preferred that the CRTC act as that mutual intermediary and provide fair rates.

10475 Furthermore, the CRTC has visibility and confidentiality with respect to costing and true cost, EBIDTA and other numbers, and so we think the CRTC would be best positioned to backstop those negotiations.

10476 And I think furthermore, with respect to the model, our MVNO model really works because we do have access to Bank Class 14 spectrum as part of what is sort of the intention of Public Safety Canada and ISED in terms of providing access to that spectrum in one way or another, ultimately, to Public Safety.

10477 So it’s our hope that that spectrum be provided to the hands of Public Safety to deploy as they see best for their particular municipal and provincial needs.

10478 And so we would be able to work along the full spectrum of, essentially, all thus far the MVNO scenarios that have been presented to the CRTC. So just noting the flexibility of that as well.

10479 THE CHAIRPERSON: In the same vein, in your view should any of the regional carriers be required to provide wholesale MVNO access?

10480 MR. CRNKO: So one of the options, again, it’s because of the stack reliability. The ability to have a digital right-of-way, so sirens and lights for data; the ability to get access in those times of crisis where minutes and seconds count to save lives.

10481 We would rely upon the CRTC for perhaps a staggered or a prorated -- just as one idea, a prorated rate that could be differentiated between major incumbents and regional players to allow, you know, perhaps a further facility for the regional players so that we don’t overburden them.

10482 So we would defer to the CRTC for ---

10483 THE CHAIRPERSON: There you're talking about a rate. I'm talking -- I guess my initial question is; should they be obligated? So we've discussed -- most of the discussion in this proceeding has been about requiring the three national players to provide MVNO access. My question is, under your proposal, would it be necessary to obligate the regional players to provide MVNO access?

10484 MR. CRNKO: We would propose to negotiate with them, in terms of a fair market value. And, again, backstopped by the CRTC.

10485 THE CHAIRPERSON: Sorry; I don't know if we're -- we're just at cross-purposes.

10486 MR. CRNKO: Okay.

10487 THE CHAIRPERSON: You're talking about rate; I'm talking about an obligation.

10488 MR. CRNKO: Right. Well, certainly I think that is part and parcel with, I guess, a secondary question which is are the regional operators going to be granted, by the CRTC, some sort of special status; a five-year period -- grace period, and so forth?

10489 It depends on the model -- the particular MVNO model that is ultimately selected, if it in fact is selected.

10490 THE CHAIRPERSON: Let me give you a more concrete example. In SaskTel territory in Saskatchewan both Telus and Bell ride on the network of SaskTel. If the Commission were not -- were to oblige Bell and Telus to do something but not SaskTel, does this hold up for your model in other parts of Canada?

10491 MR. CRNKO: Again, we are flexible in terms of our model, in, you know, the spectrum of MVNO scenarios. We would ideally ask to have access on all networks because, again, emergencies have no -- you know, they don't have no distinction as to where they occur. So they could occur on a regional player's territory.

10492 But, again, the rate could be prorated by the CRTC to provide an appropriate rate for the regional players.

10493 THE CHAIRPERSON: Thank you.

10494 So I have one last question, it's kind of a -- it's a very broad one, and you probably won't like it but I'll ask it anyways.

10495 The Industry Department set aside spectrum in the last auction for Public Safety. We have a department, a Ministry of Public Safety, that is focused on these issues. One way of characterizing your request is you want to leverage all of these assets of a variety -- you want us to oblige or mandate a number of providers to give you, if you will, pieces of a network that would then allow you to assemble a higher quality, more robust, reliable network for your purposes. And there is no suggestion that that is not an appropriate and laudable objective. But could I ask you if you don't think, then, that it's the role for other parts of government to assign to you or make available to you the necessary spectrum and for you to work with your proposed partners, whether they be hydro utilities or railways, and put together that network for public safety purposes for yourselves?

10496 MR. CRNKO: No, we certainly are all about a collaboration, both with our secondary and tertiary responders as well as the MNOs. We feel, in light of the lifesaving service that Public Safety, paramedics, medical professionals, firefighters, and policing, and again, those secondary and tertiaries provide, it's all about collaboration with the MNOs. So we would want to leverage their participation in a collaborative, cooperative fashion.

10497 So, again, we're all about a win/win. We certainly want fair rates and we would look to the CRTC to establish those rates.

10498 In terms of Public Safety Canada's involvement, perhaps if you just clarify that part of the question.

10499 THE CHAIRPERSON: I'm just saying is it -- to put it in the most basic terms; is this a problem for the CRTC to solve, or should you be out there building a network, getting the necessary spectrum, working with your partners, and building the network you desperately need and deserve?

10500 CHIEF DuraiappaH: Thank you, Commissioner.

10501 I think just to preface it, we have been, for the last year or two, concurrently working with Public Safety Canada and ISED in direct collaborations. We're regularly here and across the bridge in Ottawa with Public Safety Canada and we have proposed to them a very collaborative hybrid model of utilities, everybody.

10502 So we see that as a concurrent activity to, you know, this discussion with you. I think the totality of our model that we're proposing, the outcomes of whatever the CRTC decides, along with the work we've done with Public Safety Canada to date on a PSBN model will be the most fulsome, reliable backbone for emergency services in Canada.

10503 So I think we haven't had the opportunity to give you full line of sight of what we've been doing to date with PSE and other elements of the Federal government, but I can assure you that there are concurrent, really fulsome activities that are occurring.

10504 I'll just turn to my colleagues if they want to elaborate.

10505 SUPT. ODOARDI: Our presence here before the CRTC is in fact to espouse one fundamental tenet of those concurrent working relationships that we have had with ISED and PSE, just in particular those two government agencies.

10506 There are other pillars, I won't call them silos because they, in fact, are pillars of the model, but this is one key pillar of the model and it speaks to the resiliency and reliability of -- not to mention the cost-effectiveness, absolutely, of what we aim to achieve.

10507 THE CHAIRPERSON: Thank you.

10508 MR. SLACK: If I could just add ---

10509 THE CHAIRPERSON: Oh, yes.

10510 MR. SLACK: --- to participation with PSBN.

10511 So I had the opportunity to participate as a Federation of Canadian Municipalities representative on the consultation around the principles and use case for PSBN, and I can tell you the alignment in here, as far as reliability and resilience as being principles for PSBN, is very strong in this model here as well. And we continue to work with and collaborate with all of the agencies that have been involved in that consultation, so the alignment is quite strong.

10512 SUPT. ODOARDI: One more thing and I probably should turn it over to Mr. Crnko who has written the academic papers, and a total of seven so far that are peer-reviewed and looking to be published, is that this isn’t something where we’ve decided to appear here before you today to ask for a discount. And if it came across that way, that’s absolutely not our intent.

10513 Our intent is to put forth, really, the fact that PSMVNOs provide us a level, sir, of resiliency and reliability; certainly we think so. And that the cost-effectiveness would be a benefit. In collaboration with Public Safety Canada and ISED and the Temporary National Coordinating Office, a group of 30 people who made up across Canada, we anticipate their final recommendations. In fact, that was supposed to happen last week and may have a little delay. We anticipate their final recommendations on the use of the spectrum.

10514 In anticipation of that, we’re here before you today looking for that support.

10515 THE CHAIRPERSON: Thank you.

10516 MR. CRNKO: And the last part of your question with respect to dialogue with ISED, in terms of spectrum licensing; we are strong proponents of building those facilities and infrastructure. And, again, it’s two sides to the coin in terms of the model. One piece is that resilient, ruggedized infrastructure that can withstand those example cases such as Hurricane Dorian, providing, again, those skeletons of coverage that will be resilient, for example, when the big quake hits Vancouver, again, wildfires that we saw in Alberta where we had cell outages, and the cases go on and on. And so, for that reason, we'd want to work collaboratively with the MNOs, have fair rates, deploy our spectrum, to build facilities and infrastructure that also, again, win for the municipalities that could be monetized in a mutual host infrastructure manner, provides also facilities-based infrastructure that helps foster competition, which is one of the aspects of this committee here.

10517 And the other aspect, the other side of the coin is the MVNO piece, which is all about the reliability and resiliency angle, more so than the cost. The cost is a benefit, again, to society, because it liberates resources for infrastructure and equipment such as fire trucks and frontline staff, but we're not really focussed on the cost aspect as much as the reliability and resiliency piece.

10518 So, there's two sides of the coin. We're firm believers in building facilities-based infrastructure. And, again, the MVNO piece is the other side, which allows some of those advantages on reliability and resiliency.

10519 THE CHAIRPERSON: Well, thank you. We have a much better understanding of your proposal.

10520 Commissioner Levy?

10521 COMMISSIONER LEVY: Good afternoon. Just a couple of questions to follow up on the discussions that you have -- that you've already had.

10522 You just talked a little bit about, you know, this isn't about the savings, although they -- there are going to be savings. Can you give us any kind of sense of what kind of savings you are looking at in this kind of proposal?

10523 MR. CRNKO: So, certainly, Commissioner. We've undertaken studies, again, that we feel conservatively estimate, just as an example, for the Province of Ontario over a 20-year operational period, something on the order of between 2 and $4 billion, which we've included in our submission to you, the original submission. We feel ---

10524 COMMISSIONER LEVY: Is that the one that's over 20 years?

10525 MR. CRNKO: Correct, yes. And we feel those numbers are actually conservative in terms of all the parameters that we used in the model. We always took -- gave the benefit of the doubt to carriers. And also, it depends on the exponential growth that is anticipated in terms of Internet of things and the societal use of data.

10526 As noted, there's some significant changes in how the public will be engaging with Public Safety. To date, we're essentially limited to land -- or, well, there was a period where we were limited to landline phones, but now we are entering into a digital age where you'll be able to share video messages, you'll be able to share data files, SMS texts, and that's fast approaching over the next three years.

10527 In terms of that explosion, as 5G grows, societal use of data in turn increases the amount of data that Public Safety will need to manage and deal with. In terms of that load of data, it would be anticipated it will be so significant that certainly there'll be additional amounts of data heading downstream to field based first responders that are actually out there in the real world, as opposed to just at dispatching facilities. So, we think that there is significant upside to those savings, again, depending on which side of the spectrum of growth that you anticipate for 5G use.

10528 COMMISSIONER LEVY: And my second question has to do with you've talked from time-to-time about this being monetised and giving municipalities new tools and things like that. Could you give me some sense of what that might look like?

10529 MR. CRNKO: Certainly, I'll give you a few, and perhaps Shawn, Mr. Slack from the City of Mississauga can also elaborate.

10530 In terms of the monetisation for municipalities, there's a concept, a mutual host infrastructure, which I think was alluded to earlier in one of the proceedings today, in terms of building a single set of 5G infrastructure to municipality. Again, for cost savings, but also because of the space constraints on the municipal infrastructure in terms of mounting on lampposts, on other municipal-held infrastructure. So, building one set of 5G infrastructure that's perhaps held by the municipality, provides them this mutual host infrastructure approach that could be monetised by reselling access to the MNOs. And so, in that regard -- and we're talking about fostering competition. We're talking about building infrastructure. And so, there's an opportunity for the municipalities to benefit from that as well.

10531 And I'll let Mr. Slack comment further.

10532 MR. SLACK: Thanks, Phil. And so, 5G is probably the example I would have used where we see a lot of downward pressure on the built environment, the right-of-way as it is today, the infrastructure that's going to support 5G. And we think there's a real opportunity to collaborate with the proponents around the placement of 5G, looking at different infrastructure to facilitate the radio equipment, electrical requirements, the backhaul, smart pole-type technology.

10533 Because the challenge with the right-of-way is the amount of radio equipment that will be placed along the poles and the site lines within the city, so beautification is actually a factor. So, we want to make sure that we're able to look at an infrastructure, and smart pole technology, and the right power, and the right backhaul that could support a resilient infrastructure, but also create opportunity by having a shared infrastructure within the right-of-ways in cities.

10534 But I can give you a specific example of savings. So, with in the Region of Peel, and actually, many of the partners at the table here, we have built out over the last 20 years the public sector network, which is a fibre infrastructure, which supports fire, police, the Region of Peel, the three municipalities within the Region, we connect the hospitals and post-secondary. And the annual savings -- this is annual from within the Region of Peel is $10 billion a year -- 10 million in operating costs. So, over the life of the last 20 years of building a fibre infrastructure we save over a hundred million dollars in operating.

10535 So, these types of models can work. And so, that's a shared infrastructure model, and it really does demonstrate, you know, building a resilient infrastructure and collaborating with partners can save money.

10536 COMMISSIONER LEVY: Thank you.

10537 THE CHAIRPERSON: Commissioner Laizner?

10538 THE VICE-CHAIRPERSON: Good afternoon. And may I start by thanking you for the excellent work you do in keeping our communities safe.

10539 When we had CN Rail before us earlier this week, they mentioned that one of their concerns was the inability to get service level agreements with the MNOs, that they were only operating service level objectives. And I think I heard you talk about in discussions with MNOs, just getting agreement on a best efforts level in terms of agreements with them.

10540 Is that an accurate assessment?

10541 SUPT. ODOARDI: No, go on.

10542 MR. PAYNE: I think that's an accurate assessment, and so to compare that paradigm to how we operate our other critical communications infrastructure, such as our land/mobile radio system, and including our test-bed PSBN, which is throughout our region, we're contracted for, like, five nines above time basically, which is unheard of in the commercial world of commercial broadband.

10543 THE VICE-CHAIRPERSON: So, why is it that you can't get service level agreements with the national carriers? What is the reason that they give you?

10544 MR. PAYNE: My understanding that it comes down to designing networks to meet certain coverage and loading and backhaul demands. And there are differences in doing that, so you might design a network to meet a certain purpose of reaching into an area, but not necessarily for peaks and things like that, or investing in generators and that sort of infrastructure.

10545 The way that we look at it within the Halton Region is -- and we use our voice radio system as a parallel to that is that we enjoy 99.96 per cent coverage outside anywhere within Halton Region on a portable on the hip of our police officers and firefighters. And that sort of coverage, combined with that reliability, is -- we have not had the ability to contract that with a commercial carrier.

10546 MR. SLACK: Oh, sorry, I just want to add one more example with the Region of Peel. Caledon is a partner in our fibre infrastructure. You only have to drive two minutes south of Caledon to get no coverage, zero coverage, so that's within the GTA, within a, you know, fairly large urban centre, and it's because there's no commercial incentive to put that kind of coverage there.

10547 So, these are the types of issues. If you are first responder, no coverage is not good enough.

10548 MR. CRNKO: And, sorry, one last thing, Commissioner, it really boils down to the design principles, the engineering principles that are used. And certainly, the MNOs are motivated by commercial interests and want to deploy where, as was noted by Rogers this morning and other -- the other carriers equally, they desire to build where they can maximise profits.

10549 We, however, have to operate wherever emergencies occur, and they can occur in areas where infrastructure is not overbuilt. There are areas of Canada where the MNOS have overbuilt capacity, but as they noted today as well, they rapidly exhaust those resources, so they rapidly fill them up. And when those resources are either filled up or they're inadequately provisioned in areas, because it simply doesn't make economic sense to overbuild everywhere, it's in those circumstances that we have surge conditions.

10550 So if you think about it, for example, on the TransCanada Highway, you'll have a set of infrastructure, but you won't necessarily have sufficient capacity to handle the surges that could occur when there's a multi-car, a hundred car, you know, pile-up of vehicles in let's say a winter crash where those individuals then are trying to access a single cell site that could be in a remote location.

10551 So in our case, in those examples, which also exist in urban areas, so again, as noted by Mr. Slack, there are areas even surprisingly in Southern Ontario in the densest area of Canada for population where we do not have sufficient coverage in terms of signal strength or where emergencies can rapidly provide surges in terms of commercial use that overwhelm the capacity of those sites. So we need the ability to deploy an overlay of ultra resilient reliable capacity that we have the ability to access in those places.

10552 And again, we are not motivated by profit but rather by being able to deploy where we need access in those societal lifesaving moments. So that's the difference in engineering design philosophy.

10553 THE VICE-CHAIRPERSON: Thank you.

10554 THE CHAIRPERSON: Thank you.

10555 I believe those are all our questions. I will -- I was going to thank you for taking the time and for sharing with us. We certainly share your public service objective and understand it. You'll need to leave the rest to us, but there is no doubt about what your objectives are.

10556 I appreciate it, and as the Vice-Chair indicated, we also appreciate what you do for Canadians every day. Thank you for taking the time.

10557 And with that, we'll adjourn. As the Hearing Secretary mentioned, we will start 30 minutes later, 9:30 tomorrow, given the weather circumstances.

10558 THE SECRETARY: Exactly. Thank you very much, Mr. Chairman.

10559 THE CHAIRPERSON: Thank you.

--- Upon adjourning at 5:08 p.m.

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**Court Reporters**

Sean Prouse

Dale Waterman

Mathieu Philippe

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Lyne Charbonneau

Anne Michaud

Renée Vaive

Julie Lussier

Jocelyne Lacroix

Suzanne Jobb

Nancy Ewing

Patricia Cantle

Jackie Clark

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**Date modified:**

2020-02-26

This is **Exhibit "56"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

This is **Exhibit “57”** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

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**Notice No. SLPB-002-19**

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# *Consultation on a Policy and Licensing Framework for Spectrum in the 3500 MHz Band,* Notice No. SLPB-002-19

## Reply Comments

## of

## SHAW COMMUNICATIONS INC.

**September 20, 2019**

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## I. INTRODUCTION AND EXECUTIVE SUMMARY

1. The following constitute the reply comments of Shaw Communications Inc. ("Shaw"), on behalf of itself and Freedom Mobile Inc. ("Freedom" or "Freedom Mobile"), to Innovation, Science and Economic Development Canada (the "Department" or "ISED") in connection with the proceeding initiated by *Consultation on a Policy and Licensing Framework for Spectrum in the 3500 MHz Band,* Notice No. SLPB-002-19 (the "Consultation" or "Consultation Document").

***A Critical Policy Moment***

2. In the context of this consultation, the Department is presented with a critical moment in Canada's mobile wireless market. Competition is intensifying, and consumers are seeing unprecedented price decreases and service rivalry. The Big 3 national wireless incumbents – Bell, Telus and Rogers – are facing intensifying market discipline from strengthening regional competitors like Freedom. As a result of Freedom's leadership on data affordability in Canada with its Big Gig plans, in the weeks surrounding this consultation's launch, each of the Big 3 was forced to follow our lead and offer its own version of "unlimited" data, permanently changing the face of Canadian wireless competition. Canadians now have access to more data, more affordable plans, and more diversity of offerings than ever before.

3. At the same time, there are fundamental risks that threaten the momentum of dynamic wireless competition in Canada and the regional new competitors that are driving it. The assumptions underlying competitive facilities-based wireless businesses are being challenged through an ongoing policy proceeding at the CRTC, which is considering the regulation of resale-based wholesale access to wireless networks.[1] Of more direct relevance to this consultation, new regional competitors like Freedom could face foreclosure by the Big 3 from critical 5G spectrum bands, including the 3500 MHz spectrum, unless ISED intervenes with a pro-competitive and pro-investment set-aside.

[1] See Telecom Notice of Consultation CRTC 2019-57, *Review of mobile wireless services,* 15 May 2019 ("TNC 2019-57"), which provides a "preliminary view" that mobile virtual network operators (MVNO) should have regulated access to Big 3 incumbent networks.

4. This confluence of events emerges just as the world's mobile wireless ecosystems are embarking on the transition to 5G – a complex evolutionary shift that entails massive investments and access to extensive spectrum and infrastructure resources. The impact and importance of 5G have been well canvassed throughout this and other Department consultations.[2] It is clear that the full promise of 5G can only be realized if there is robust competition among facilities-based operators. The success of 5G depends on an innovative wireless connectivity market that provides choice and affordability to consumers, application developers, and the broad and changing range of participants in our digital economy, culture and society. None of that is possible without robust competitive pressure from a strong player that can contend with the Big 3.

5. The Department needs to maintain its focus on well-designed pro-competitive spectrum policies so that today's momentum can be carried through to achieve a competitive 5G environment. Reflecting the voices of many and diverse Canadians, fifteen municipal governments or associations from across Canada have submitted comments to this consultation expressing clear support for a pro-competitive set-aside of 3500 MHz spectrum.[3]

6. As discussed throughout our submissions below, in order to mitigate the risk of Big 3 foreclosure of regional competitors, Shaw has proposed a carefully crafted set-aside that would see up to 50 MHz of spectrum available for exclusive bidding by eligible new competitors, with a reduced amount in certain areas where less spectrum is available.[4] We have supplemented our set-aside proposal with an additional in-band cap of 50 MHz, in order to address distinct spectrum concentration concerns. At the same time, we have proposed suitable set-aside eligibility requirements, deployment conditions and opening bid prices that will reinforce the Department's objectives of promoting competition, network expansion and timely deployment.

[2] Shaw, Initial Comments dated 2 August 2019, paragraph 11.
[3] Burlington*, Cambridge*, Edmonton, Leduc*, Lethbridge*, Association of Manitoba Municipalities, Moose Jaw*, Prince George*, Michael Thompson (Deputy Mayor and Councillor, Scarborough Centre)*, Selkirk, Stonewall*, Strathcona*, Victoria* and Winnipeg. Asterisked bodies explicitly called for a set-aside or a set-aside plus cap.
[4] As discussed below, this would be 40 MHz in those areas listed in Annex G of the Consultation Document where less than 80 MHz of 3500 MHz spectrum would be available in the auction, or 50% of the available spectrum in those areas not listed in Annex G of the Consultation Document where less than 80 MHz of 3500 MHz spectrum would be available in the auction.

***Freedom and Other New Regional Competitors Are Changing Canada's Wireless Market***

7. Freedom's belief that Canadians deserve more wireless competition is reflected in the risks we have taken. Since 2016, Freedom has invested over $3.4 billion to establish itself as a facilities-based competitor, with spectrum and network investments having transformed our 2G network into a competitive LTE-Advanced network in less than three years. In 2019, we significantly expanded the coverage of our competitive network to include millions of additional Canadians that live in a range of different communities, including larger centres, smaller towns and more remote areas.[5] Freedom has proven its ability to efficiently and rapidly deploy spectrum, when we have access to it, consistent with the Department's objectives.

8. Also consistent with the Department's objectives, Freedom's investments have translated directly into heightened market competition. Whether it's our Big Gig plans[6] or our "Absolute Zero" promotion[7], Freedom has changed the Canadian wireless market by driving the Big 3 (and their sub-brands) to provide more talk, text and high-speed data at lower prices across all market segments.[8]

9. According to the CRTC's most recent *Communications Monitoring Report*, prices for mobile packages dropped significantly from 2016 to 2018. 2018 prices for mobile services offering 150 to 450 minutes of voice service and up to 1GB of data decreased by approximately 22 per cent when compared to 2016, while prices for mobile services offering 2GB of data or more decreased by approximately 32 per cent compared to 2016.[9] The most significant drop was observed for services offering 5 gigabytes (GB) of data or more (the average monthly price for a mobile service with unlimited voice, text

[5] Victoria, Red Deer, Brockville, Belleville, Coburg, Pembroke, Cornwall, Medicine Hat, Nanaimo, Kelowna, Prince Rupert, Prince George, Kamloops, Courtenay, Campbell River, Cranbrook, Vernon and Lethbridge.
[6] Big Gig offers include unlimited LTE data starting at only $50 per month with no financial penalties or overage charges, and numerous entry-level talk, text and data plans starting at only $15 per month.
[7] "Absolute Zero" provides customers with a smartphone, such as Apple's iPhone XR or Samsung's Galaxy S10e, for free ($0 upfront, $0 extra each month and $0 extra at the end of our standard two-year commitment) when paired with our Big Gig Unlimited plans.
[8] Dr. Eric Emch (Bates White Economic Consulting) "The evolution of facilities-based competition in Canada: Recent gains and regulatory risks," 15 May 2019, report prepared for Shaw Communications Inc. ("Shaw") in Telecom Notice of Consultation CRTC 2019-57 ("Emch (May 2019)"), paragraphs 30 to 37. Also See Shaw(CRTC)5July2019- 203, Table 1, in the proceeding initiated by TNC 2019-57.
[9] CRTC, *Communications Monitoring Report 2019* at 47 and 50, Figure 2.2 – Average prices ($/month) for mobile services (urban and rural) 2016-2018.

messaging and 5 GB of data fell by as much as 35 per cent in 2018, from $78.36 in 2016 to $51.05.[10]

10. More recent data show that, in the period between November 2017, when Freedom first launched its Big Gig offerings, and July 2019, the Big 3's plans have dropped in price by almost half:[11]

    (a) The cheapest plan with at least 10 GB of data was $105 per month before Freedom introduced its Big Gig plans in November 2017. In July 2019, the Big 3 offered 10 GB plans for $75 per month. Freedom continues to offer the cheapest plan at $60 per month for 13 GB of data per month.

    (b) Prior to November 2017, plans with at least 20 GB of data were priced at $175 per month. In July 2019, each of the Big 3 offered 20 GB plans for $95 per month. Freedom continues to offer the cheapest plan at $90 per month for 28 GB of data per month.

11. This is reinforced by the Competition Bureau's review of the state of competition in the Canadian wireless industry between 2017 and 2019, which concluded that where there was a strong regional competitor, not only were prices per GB of data much lower, data usage was substantially greater.[12]

12. As a result of ISED's pro-competitive spectrum policies and the investment and relentless pressure from Freedom and other new facilities-based competitors, Canada's wireless market is finally breaking free from the static, uniform and consumer unfriendly services that have traditionally been offered by the Big 3.

13. To sum up the circumstances in Freedom's markets, as reported by one industry journalist:

> Freedom Mobile has been busy. The Shaw-owned wireless carrier has expanded its network reach in Ontario and several parts in British Columbia. Freedom is known for low-cost plans that include large amounts of data, which Canadians are pining for. Recently, Freedom's main competitors, Rogers, Bell, and Telus, have offered plans to their customers that feature "unlimited" or an "infinite" amount of data for roughly $75 CAD per month. This has spurred a level of

10 *Ibid.*
11 See Shaw(CRTC)5July2019-211 in the proceeding initiated by TNC 2019-57; and Emch (May 2019).
12 Competition Bureau, Initial Comments dated May 15, 2019 in the proceeding initiated by TNC 2019-57, paragraphs 27-34 and paragraphs 12-26.

wireless competition in Canada that hasn't been seen since 2008 when all the new carriers were granted a license to operate.[13]

***A Set-Aside is Essential for Sustainable Competition in 5G***

14. Despite the momentum and progress in Canada's mobile wireless market outlined above, the state of competition is fragile and beset by challenges. The Big 3 continue to dominate the market with 90 percent subscriber share and 92 percent revenue share (CRTC 2018). As noted by the Competition Bureau, this heightens their ability to coordinate behaviour in a way that reinforces their dominance.[14]

15. In contrast to the Big 3, the competitive regional operators are vulnerable at this stage of substantial new investment in 5G. Competitive investment is inherently riskier for new competitors. Freedom operates at half the margin and at over twice the CAPEX intensity as the Big 3.[15] Freedom is still busy trying to extend its network and has only recently secured access to sufficient low-frequency spectrum in order to do so.

16. With spectrum being an essential input for facilities-based wireless competitors, the spectrum advantages of the Big 3 translate directly into competitive market advantages. Our Initial Comments,[16] showed that the Big 3 hold or control 84 per cent of mid-band spectrum. This dominance of mid-band spectrum will only be further exacerbated pursuant to the Department's Reclamation Decision, which will enable fixed wireless licensees to convert up to 60 MHz of spectrum per serving area, case depending, for flexible use.

17. As Professor Peter Cramton observed in the White Paper submitted with our Initial Comments, "[e]ach step in technology – 2G, 3G, 4G, and 5G – requires new investment and new equipment. The steps are evolutionary, not revolutionary. With each step, users rely on the prior technologies whenever the latest technology is unavailable. Incumbent operators leverage their existing spectrum, network, and customers to

[13] Ian Hardy, "Head of Freedom Mobile says a sizable number of customers left Rogers for Freedom over the weekend," Mobilesyrup, available at https://mobilesyrup.com/2019/08/27/freedom-mobile-rogers-promo-numbers/.

[14] Competition Bureau, Initial Comments dated May 15, 2019 in the proceeding initiated by TNC 2019-57, paragraphs 13-14.

[15] Eric Emch, PhD (Bates White Economic Consulting), ""The evolution of facilities-based competition in Canada – Recent gains and regulatory risks", 15 May 2019, report prepared for Shaw Communications Inc. in the proceeding initiated by Telecom Notice of Consultation CRTC 2019-57, paragraphs 62-63.

[16] Shaw, Initial Comments dated 2 August 2019 at 12-13/paragraphs 33 to 38.

develop a business plan for 5G."[17] Amongst other persistently high barriers to competitive investment – such as lack of access to antenna sites – the Big 3's dominance of spectrum holdings looms large. This is particularly acute in the case of the mid-band range of which 3500 MHz spectrum forms part.

18. The totality of spectrum, antenna site, retail distribution, incumbency, and other advantages enjoyed by the Big 3, coupled with the barriers that new competitors face on these same factors, coalesce to provide very strong incentives for the Big 3 to protect and extend their advantages in the 5G environment. In his Reply White Paper appended with these comments, Professor Cramton observes that this is "the market failure that set-asides mitigate by preventing foreclosure and limiting the competitive advantage of dominant incumbents. The result is enhanced competition and innovation."[18]

19. The Big 3 are alone in arguing that the Canadian market is sufficiently competitive so that pro-competitive measures like a set-aside are no longer needed. A set-aside is necessary as it is the only pro-competitive measure that addresses both the significant risk of foreclosure of the new mobile wireless competitors at the hands of the Big 3 and the significant spectrum asymmetries observed between the Big 3 and the regional mobile wireless competitors.

20. Spectrum caps may address spectrum imbalances and are useful when the primary concern is to prevent excessive concentration of spectrum holdings. However, this does not address the significant risk of new competitor foreclosure in Canada today. As with Canada's 600 MHz auction, foreclosure by dominant incumbents in the 3500 MHz auction remains the chief concern and so a set-aside is essential.[19] As evidence of the competitive and consumer-welfare enhancing benefits of the set-aside, Freedom has commissioned the attached Reply White paper by Professor Peter Cramton.

21. We note that the Big 3 have attempted to discredit set asides by mischaracterizing their impact and role in the 600 MHz spectrum auction. As we explain in detail below, the Big

[17] Cramton (July 2019) at 10.
[18] Cramton (July 2019) at 10.
[19] Cramton (September 2019), page 2.

3 should not blame flawed auction strategies on Departmental policy. The set-aside in Canada's 600 MHz auction did not have a distortive impact on outcomes or pricing, and this is supported with the publicly available bidding data[20] and with the attached paper prepared by Economists Incorporated.

22. In the remainder of these Reply Comments, Shaw summarises its positions and provides its comments in reply on each of the questions posed by the Department in the Consultation Document.

23. Shaw's silence on any point or argument raised by other parties to this Consultation should not be taken as acquiescence on Shaw's part where to do so would be contrary to Shaw's interests.

## II. PRO-COMPETITIVE MEASURES (Q1)

**Q1A—ISED is seeking comments on its proposal to implement pro-competitive measures in the 3500 MHz auction.**

**Q1B—ISED is seeking comments on the use of a set-aside, an in-band spectrum cap, or a combination of both, including the amount of spectrum that should be applied for the use of a set-aside, and/or the amount of spectrum that should be subject to an in-band spectrum cap. Provide supporting rationale for your responses.**

24. As explained in our initial comments,[21] the Department should implement pro-competitive measures in the 3500 MHz auction in order to produce a more competitive market structure in the Canadian mobile wireless market. Pro-competitive measures are needed in this auction to:

(a) First, to prevent foreclosure of the new mobile wireless operators by the Big 3;

[20] See Government of Canada, *Auction of Spectrum Licences in the 600 MHz Band,* Bidding Information, online: https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/h_sf11331.html
[21] Shaw Initial Comments, dated 2 August 2019, at Section II paragraphs 22-62.

(b) Second, to correct the stark imbalance in spectrum holdings, and mid-band spectrum in particular, between the Big 3 and the new mobile wireless competitors; and

(c) Third, to ensure that none of the Big 3, singly or jointly, enjoy a head-start advantage.

25. In particular, Shaw proposes that the Department apply a spectrum set-aside of up to 50 MHz, depending on the amount of 3500 MHz spectrum available, as follows:

(a) In all areas where at least 80 MHz of spectrum is available, the Department must adopt a 50 MHz set-aside;

(b) In the areas that are listed in Annex G of the Consultation Document as large population centers where less than 80 MHz of spectrum is available, the Department must adopt a 40 MHz set-aside; and

(c) In the areas that are not listed in Annex G of the Consultation Document where less than 80 MHz of spectrum is available, the Department must set-aside 50 per cent of the available spectrum.

26. The set-aside spectrum should consist of spectrum blocks that are not encumbered by existing sub-divided or grid cell licences. Only where there are insufficient unencumbered blocks should encumbered blocks be assigned to the set-aside, and in those cases, the least encumbered blocks should go toward the set-aside.

## A. Critical Need for Set-Aside (Q1A and Q1B)

27. Many different parties in this proceeding support the adoption of a spectrum set-aside in the 3500 MHz auction.[22] Additionally, as noted above, 15 municipalities or associations representing municipal interests submitted comments in response to the Consultation

[22] Eastlink Initial Comments dated 2 August 2019 paragraphs 14 and 16; SaskTel Initial Comments dated 2 August 2019 paragraphs 8 and 12; Ecotel Initial Comments dated 2 August 2019 paragraphs 15 and 17; Iristel Initial Comments dated 2 August 2019, paragraphs 8 and 9; Teksavvy Initial Comments dated 2 August 2019, paragraph 22; Shaw , Initial Comments dated 2 August 2019, paragraph 16. See also submissions by Cambridge, Leduc, Lethbridge, Moose Jaw, Prince George, Toronto, Stonewall, Strathcona and Victoria.

and these public sector bodies uniformly support the adoption of a pro-competitive set-aside or a cap in addition to a set-aside.

28. Like Shaw, proponents argue that a set-aside is needed to allow competitors to access valuable 3500 MHz spectrum for 5G services[23] and to address the concentration of spectrum "in the hands of a few players."[24] In particular, they note that there will only be a limited amount of 3500 MHz spectrum available in most service areas in the auction because incumbents, such as Inukshuk (Bell and Rogers) and Xplornet, will already hold a significant amount of the spectrum in the band.[25] .

29. In contrast, the Big 3 incumbents oppose a spectrum set-aside. The incumbents argue, among other things, that a set-aside is no longer necessary because there is a fourth competitor in each region that has the financial means to compete for spectrum in an open auction.[26] In the following sections we explain why pro-competitive measures, and in particular a set-aside, remain necessary in the 3500 MHz band and in the current Canadian context.

30. Many parties, such as SaskTel and Eastlink, share Shaw's concern that without a set-aside, the Big 3 incumbents have the ability and incentive to foreclose competitors from acquiring 3500 MHz spectrum and thereby perpetuate their market power in the 5G era.[27] A set-aside is required as it is the only means that can simultaneously address both the mid-band spectrum imbalance suffered by new facilities-based competitors and the highly elevated risk of foreclosure at the hands of the Big 3.

### *1. Risk of Foreclosure*

31. Without a spectrum set-aside, there is a risk that the incumbents will foreclose competitors from acquiring 3500 MHz spectrum in the auction. This risk of foreclosure

[23] Eastlink, Initial Comments dated 2 August 2019, paragraph 12; SaskTel, Initial Comments dated 2 August 2019, paragraphs 9, 11 and 53; Ecotel, paragraph 12.
[24] Ecotel, Initial Comments dated 2 August 2019, paragraph 12.
[25] SaskTel, Initial Comments dated 2 August 2019, paragraph 53; Ecotel, Initial Comments dated 2 August 2019, paragraph 13.
[26] Bell, Initial Comments dated 2 August 2019, paragraphs 3 and 5; and Rogers, Initial Comments dated 2 August 2019, paragraphs 13 and 63
[27] See Shaw, Initial Comments dated 2 August 2019, paragraphs 48 to 62; SaskTel, Initial Comments dated 2 August 2019, paragraphs 5, 6, 54 and 55; Quebecor, Initial Comments dated 2 August 2019, paragraphs 2 and 16; Eastlink, Initial Comments dated 2 August 2019, paragraph 10.

arises from a combination of factors: the incumbents' dominant position, the persistently high barriers to competition in mobile wireless markets, the high capital intensity required of new facilities-based competitors,[28] and the importance and unique characteristics of 3500 MHz spectrum for 5G deployment. These factors combined provide the Big 3 with the means and incentive to foreclose competition in 5G by limiting the 3500 MHz spectrum that competitors can win in the auction.[29]

32. The incumbents' arguments that the foreclosure risk is misplaced and that the regional providers can compete for spectrum in an open auction are not credible.[30] In the Canadian context, the Big 3 have demonstrated their powerful incentives to try to shut down competition through the spectrum auction, going back to the 2008 AWS-1 auction where the new entrants won only seven (7) of the (rather insignificant) open blocks despite actively bidding to acquire the non-set aside spectrum.[31]

33. As Eastlink recounts, regional service providers have consistently attempted to acquire open blocks in successive spectrum auctions but have typically only been able to acquire the set-aside or spectrum cap protected licences.[32]

34. This experience is supported by Quebecor's insight that in the recent 600 MHz auction, all of the open blocks were acquired by the national incumbents.[33] The foregoing is consistent with the Department's view that the wireless incumbents, "likely have the means and the incentive to prevent other service providers from acquiring spectrum licences in an open auction."[34]

35. The foreclosure risk has also been explained by Professor Peter Cramton, a world-renowned expert on spectrum auctions and their dynamics. In his July 2019 report and in its September 2019 reply report prepared for Shaw in this proceeding, Professor

28 Emch (May 2019), paragraph 62 and Figure 12.
29 Cramton (July 2019), pages 1, 3 and 4: The concern is that the dominant incumbents would inflate bids for 3500 MHz spectrum to exclude competitors.
30 Bell, Initial Comments dated 2 August 2019, paragraphs 5 and 8; and Rogers, Initial Comments dated 2 August 2019, paragraphs 13 and 63.
31 Shaw, Initial Comments dated 2 August 2019, paragraph 51; and Quebec, Initial Comments dated 2 August 2019, paragraph 14.
32 Eastlink, Initial Comments dated 2 August 2019, paragraph 11.
33 Quebecor, Initial Comments dated 2 August 2019, paragraph 14.]
34 SLPB-002-19, paragraph 28.

Cramton confirms that the foreclosure risk in Canada is real[35] and, therefore, "preventing foreclosure is the main challenge in Canada's 3500 MHz auction."[36]

### *2. Mid-Band Spectrum Concentration is a Significant Barrier to Wireless Competition*

36. As noted by Professor Cramton[37] and by many parties in this Consultation, 5G networks in Canada require a mix of low-band, mid-band and high-band spectrum to deliver 5G services to Canadians. Mid-band spectrum with its large channel bandwidths, low latency, reliability and favourable wide-area propagation characteristics is considered the "sweet spot" for 5G services. 3500 MHz spectrum is considered the "beachfront property" of 5G and is one of the best bands to deploy 5G technologies.[38] It provides an optimal balance of capacity, latency, quality and coverage needed for 5G. This balance is especially important as service providers build out their 5G networks because it enables faster, more efficient and more extensive 5G deployment.

37. Mid-band spectrum in Canada is highly concentrated in the hands of the wireless incumbents. There are significant spectrum asymmetries that provide these incumbents with a dominant position and head-start in the deployment of 5G compared to competitors and risk creating permanent competitive distortions in the market, absent a set-aside.[39]

38. The Big 3 incumbents collectively possess 84 per cent of mid-band spectrum in Canada (MHz/Pop).[40] This concentration of spectrum in the hands of the Big 3 is further exacerbated by first, the Department's Reclamation Decision and second, the Bell/Telus reciprocal network access agreement, which gives each party access to the other's HSPA and LTE networks. Bell and Telus' pattern of spectrum sharing was evident in the AWS-3, 700 MHz and 600 MHz spectrum auctions.[41] Bell and Rogers will be eligible for flexible use licences in 157 of the 172 proposed Tier 4 services areas through their

35 Cramton (July 2019), pages 3-5.
36 Cramton (September 2019), page 2.
37 Cramton (July 2019), page 4.
38 Cramton (July 2019), pages 2 and 4.
39 Cramton (September 2019), page 4.
40 Shaw, Initial Comments dated 2 August 2019, paragraph 37 and Figure 3.
41 Shaw, Initial Comments dated 2 August 2019, paragraphs 40 to 42; Rogers, Initial Comments dated 2 August 2019, paragraph 82.

interest in Inukshuk Wireless Partnership ("Inukshuk").[42] They will each have an additional 25 MHz or 30 MHz of spectrum (out of 200 MHz) as a starting point in the 3500 MHz band in the majority of service areas, including 30 MHz in all major urban areas before the auction even commences.[43]

39. There is only a limited amount of 3500 MHz spectrum available in each service area (between 30 MHz and 200 MHz). A set-aside is needed to counteract the incumbents' dominance in mid-band spectrum holdings and the commanding lead that this will give them, particularly in the early stages of 5G deployment. Notably, the Big 3 have already indicated that they plan to commence "full-fledged" 5G commercial deployment starting in 2020.[44] This spectrum advantage, if further augmented in the upcoming 3500 MHz auction, will, in turn, translate into a head start advantage in the race to 5G.

### *3. A Spectrum Cap Does Not address the Foreclosure Risk*

40. In their initial comments, the Big 3 make proposals aimed at foreclosing competition and should be rejected. Telus and Rogers argue that set-asides are no longer the norm internationally[45] and that a well-designed spectrum cap creates an "effective set-aside"[46] that will ensure that sufficient spectrum is available for regional players.[47] Both Rogers and Telus further argue that a set-aside is unnecessary in the 3500 MHz auction because there will already be a "set aside" and "guaranteed" fourth player (i.e., Xplornet) in most service areas as a result of the Reclamation Decision.[48] In particular, Rogers argues that Xplornet's retained holdings should count towards the Department's objective of promoting regional competitors.[49] Telus, meanwhile, argues that another reason to prefer a cap over a set-aside is that it is in the same boat as the new facilities-based competitors in the 3500 MHz band and that a cap is the only way to guarantee

42 Shaw, Initial Comments dated 2 August 2019, paragraph 73.
43 Shaw, Initial Comments dated 2 August 2019, paragraph 73. Quebecor, paragraph 16.
44 For example: Michael Lewis, "Rogers says U.S. Huawei ban won't slow down rollout of 5G network," *21 May 2019*, online: https://www.thestar.com/business/technology/2019/05/21/rogers-says-us-huawei-ban-wont-slow-it-down.html
45 Rogers, paragraph 70 and Telus, paragraph 57.
46 Telus, Initial Comments dated 2 August 2019, paragraphs 69 and 70
47 Rogers, Initial Comments dated 2 August 2019, paragraph 14; Telus, Initial Comments dated 2 August 2019, paragraph 31.
48 Telus, Initial Comments dated 2 August 2019, paragraph 81; and Rogers, Initial Comments dated 2 August 2019, paragraphs 30 and 97.
49 Rogers, Initial Comments dated 2 August 2019, paragraphs 30 and 97; and Telus, Initial Comments dated 2 August 2019, paragraph 81.

that it will have access to 3500 MHz spectrum in all areas. In reply and for the reasons discussed below, these arguments must be dismissed.

*(a) Cap does not serve same purpose as a set-aside*

41. As expected, the Big 3 deny that there is foreclosure risk and are motivated to argue that a spectrum cap would work just as well as a set-aside. As noted by Professor Cramton, this argument fundamentally confuses the different purposes of caps versus set-asides:

> Spectrum caps are the preferred instrument when the purpose is to prevent excessive concentration of spectrum holdings.
>
> Set-asides are preferred when the market failure is the risk of foreclosure of smaller operators by dominant incumbents.[50]

42. Assuming that only a 50 MHz cap is adopted for the 3500 MHz auction, the mobile wireless competitors, such as Freedom, Eastlink and Quebecor, will be left with insufficient 3500 MHz spectrum to provide 5G in some areas and may be completely shut out of acquiring spectrum in many other areas.

43. In particular, we note that Xplornet and other WISPs that primarily provide FWA services are eligible to retain between 20 MHz and 60 MHz of 3500 MHz of spectrum in almost all service areas as a result of the Reclamation Decision. In many areas where existing FWA licensees, such as Xplornet, retain at least 50 MHz of spectrum, the wireless competitors could be foreclosed from acquiring any spectrum if each of the Big 3 incumbents acquired spectrum up to their spectrum cap. These areas, such as Edmonton, Ottawa, Kamloops, Brockville, Kingston, Guelph/Kitchener, Peterborough, London, Brandon, Regina, Saskatoon, Red Deer, Camrose, Kelowna, Prince George, Sherbrooke, Pembroke and Fredericton, deserve strong and sustainable wireless competition. In a best case scenario, wireless competitors would be able to acquire only 30 MHz of spectrum in these areas.

44. Consistent with the foregoing, the Department must dismiss Rogers' argument that Xplornet's retained holdings should count toward ISED's objective of promoting regional

50 Cramton (September 2019), page 2.

players. Xplornet uses fixed wireless infrastructure to provide Internet access services in rural areas. The intention of the Reclamation Decision was to allow fixed wireless providers to continue to utilize the retained spectrum to provide fixed wireless services. In contrast, the intention of a set-aside is to allow new competitors in the wireless industry to gain access to the set-aside spectrum to providing mobile wireless services that compete effectively against the Big 3. Accordingly, the set-aside in a service area should not be reduced by Xplornet's holdings.

45. Telus and Rogers' spectrum-cap only proposal does not ensure that sufficient 3500 MHz spectrum will be available for the wireless competitors in the auction. Rather, their proposal is clearly designed to *effectively foreclose* wireless competitors from accessing 3500 MHz spectrum and competing in the 5G era.

*(b) Telus' situation is nothing like the new facilities-based carriers*

46. Telus attempts to cast itself in the same light as new wireless competitors. These attempts are misleading and inaccurate. Telus is part of the jointly dominant Big 3 in the mobile wireless market and already holds a significant portion of mid-band spectrum even after the reclamation.[51] As shown in our initial comments, Telus will hold 26.2% of wireless mid-band spectrum after the reclamation, at least 30 MHz of which was originally gifted PCS spectrum given to Clearnet, which Telus subsequently acquired. Telus also recently gained access to more mid-band spectrum via a subordination arrangement with TerreStar.[52]

47. Additionally, as noted, Telus has an extensive network sharing arrangement with Bell that allows Telus to access Bell's share of Inukshuk's 3500 MHz spectrum. Even in the handful of service areas where Telus will allegedly be foreclosed from acquiring spectrum because of a set-aside, it will still have access to Bell's spectrum. The fact that there will be competition in some markets for non-set-aside spectrum is no reason to ignore the even greater risks faced by the new wireless competitors. Shaw has

51 See Shaw, Initial Comments dated 2 August 2019, Figure 3.
52 ISED, *Subordination of Licences Held by TerreStar to Telus,* July 2019 <online: http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11533.html >

proposed a balanced, equitable solution, while Telus is trying to monopolize the available spectrum for itself by opposing set-asides outright.

48. There is no comparison between Telus' situation and that of the new wireless competitors. Moreover, given Telus' substantial position in the market, as noted by Professor Cramton, "it is hard to believe that Bell and Rogers would think that they could drive Telus out at a profitable price."[53]

49. Also, Telus' claim that with a spectrum set-aside, incumbents will not be able to serve Canadians beyond large population centres is clearly false. Under Shaw's set-aside proposal, all of the incumbents (including Telus) would be able to bid on between 30 MHz and 150 MHz of spectrum in each service area with a 50 MHz set-aside (i.e., in service areas where at least 80 MHz is available for auction). This includes 150 MHz in Victoria, 90 MHz in Toronto, Vancouver, Montreal, Quebec and Halifax, 70 MHz in Calgary and 40 MHz in Winnipeg, Ottawa, London and Guelph/Kitchener (subject to the proposed in-band spectrum cap).[54]

50. In the service areas without large population centers that have severe supply limitations (e.g., less than 80 MHz of spectrum available), Telus will, at a minimum, be able to bid on 50 per cent of the available spectrum in these areas. This is the same amount as the proposed set-aside.

51. The Big 3 have not raised any arguments or evidence that would alleviate both the real risk of foreclosure in the 3500 MHz band and the mid-band spectrum imbalance. A significant set-aside is needed in the 3500 MHz auction to help level the playing field between the regional operators and the Big 3, stimulating investment and innovation in 5G for the benefit of all Canadians.[55] Canada cannot wait until the release of 3800 MHz spectrum or other future bands to level the playing field in relation to spectrum holdings. If we are shut out of the initial deployment of 5G, we will lose irreparable ground to the wireless incumbents. This outcome would be a significant step back for facilities-based

53 Cramton (September 2019), page 3.
54 See Shaw, Initial Comments dated 2 August 2019, paragraph 74.
55 Cramton (September 2019), page 6.

competition, innovation and affordability in the wireless market just as Canada enters the 5G era.

## B. Incumbents Fail to Counter Compelling Arguments For a Set-aside

52. The Big 3 incumbents are opposed to a set-aside in the 3500 MHz auction that would promote greater competition for 5G services. The incumbents claim, among other things, that: (i) set-asides will delay 5G deployment; (ii) set-asides distort the auction process and harm consumers. As discussed in the preceding section, the incumbents' real motive for opposing set-asides is to foreclose the prospect of strong, self-sustaining, facilities-based competition in the mobile wireless sector, and in particular, to foreclose competition in the coming era of 5G. We nevertheless respond to their arguments below.

### *1. A Set-aside in 3500 MHz Will Not delay 5G Deployment*

53. In their submissions, the Big 3 incumbents and Bell and Telus in particular, falsely claim that a set-aside will delay the deployment of 5G networks and deprive Canadians of access to good quality 5G services[56] and that they should be given the spectrum advantage in 5G because they know how to use the spectrum.

54. These arguments should be seen for what they are – an argument for the *status quo,* for an auction that merely tracks current market share and an argument to extend their dominance for the next 40 years. Professor Cramton rejects these arguments as false:

> The Big 3 argue that spectrum holdings should track current market shares. This argument is false. First, it presumes that the market is mature, and shares of the smaller operators should remain small, rather than increase to produce a more competitive market structure. Second, the argument ignores the reality that small facilities-based operators require at least some minimum of low-band (e.g., 600 MHz) and mid-band (e.g., 3500 MHz) spectrum to provide coverage and capacity to support 5G services. This is true of all operators, but the Big 3 easily satisfy these minimums. The Big 3, with high market shares, can more economically expand capacity with cell density, rather than incremental spectrum. For regional operators, greater cell density is not an economic option until market shares increase. Thus, we should expect

[56] Bell, Initial Comments dated 2 August 2019, paragraph 10; and Rogers, Initial Comments dated 2 August 2019, paragraph 16.

> smaller operators to require a larger share of low- and mid-band spectrum relative to their market shares than the dominant incumbents.[57]

### *2. Consumers and the Digital Economy will be the Principal Beneficiaries of the Set-Aside*

55. The incumbents allege that spectrum set-asides drive up spectrum costs by reducing the supply of spectrum,[58] particularly for ineligible bidders, thereby distorting prices paid by the latter[59] and ultimately, harming consumers.[60]

56. By way of reply, Shaw notes that the Big 3's arguments have no basis in theory or in fact. Professor Cramton states that "the causal connection between higher spectrum prices and higher consumer prices is at best difficult to establish" and "the set-aside encourages competition from regional operators and this enhanced competition reduces prices…".[61] In other words, the real driver of consumer prices is the degree of competition in the market for mobile communications.

57. In addition, the incumbents' claims that set-aside eligible bidders raise costs for set-aside ineligible bidders are incorrect. Indeed, as explained in the White Paper[62] prepared by Economists Incorporated that we have filed with these reply comments, the Big 3 have mischaracterized the results of the 600 MHz auction in a number of ways.

58. For example, an analysis of the 600 MHz auction shows that the allocation phase winnings of Rogers (more than 86 percent) and Telus (nearly 95 percent) were due to counterfactual bids from other incumbents and ISED. The price that Rogers and Telus paid was determined entirely by the other incumbents and ISED rather than the set-aside eligible bidders.[63]

[57] Cramton (September 2019), page 4.
[58] Bell, Initial Comments dated 2 August 2019, paragraph 20; Rogers, Initial Comments dated 2 August 2019, paragraphs 56, 58 and 61; and Telus, Initial Comments dated 2 August 2019, paragraphs 35 and 52.
[59] Bell, Initial Comments dated 2 August 2019, paragraph 19; Rogers, Initial Comments dated 2 August 2019, paragraphs 67 and 68; and Telus, Initial Comments dated 2 August 2019, paragraph 52.
[60] Bell, Initial Comments dated 2 August 2019, paragraphs ES7 and 19; and Rogers, Initial Comments dated 2 August 2019, paragraphs 56, 61 and 68.
[61] Cramton, September 2019, page 2.
[62] Economists Incorporated, "Canada 3.5 GHz Auction: Responses to Comments on the Effects of the Set-Aside on Pricing in the 600 MHz Auction", September 20, 2019 ("Economists Incorporated (September 2019)").
[63] Economists Incorporated (September 2019), pages 3 to 5.

59. Moreover, to the extent that a set-aside eligible bidder did price Rogers or Telus, the set-aside eligible bidder also priced other set-aside eligible bidders. For example, Novus bid $60,304,000 for a single block of spectrum in British Columbia. This bid shows up in counterfactuals for Shaw (Freedom) and Rogers. Similarly, the only significant amount of pricing power conveyed by set-aside eligible bidders to Telus (above the reserve price) was $49.8 million from Shaw and Videotron combined. This pricing came from bids for 3 blocks in Manitoba (Shaw) and 2 blocks in Eastern Ontario (Videotron). Notably, this same Shaw bid appears in the price calculation for Xplornet, and the Videotron bid appears in Shaw's pricing calculation.[64]

60. Insofar as incumbents' claims refer to set-aside eligible bidders driving up clock prices rather than final prices paid, they ignore the fact that many of these clocks would have increased solely due to bids from incumbents, even without any bids from set-aside eligible bidders. Furthermore, the only way in which higher clock prices in a CCA impact the final price paid is through the ability of bidders to submit bids that show up in each others' counterfactuals (via the GARP rule). However, as established above, the incumbents largely drove up each other's prices.[65]

61. The incumbents also claim that set-asides are taxpayer-funded subsidies.[66] Bell alleges that new entrants have been given more than $5 billion in "spectrum subsidies" through spectrum set-asides since the AWS-1 auction, including $2.7 billion in the AWS-3 auction and $1 billion in the 600 MHz auction.[67] Rogers alleges that regional carriers received between $560.6 million and $2.51 billion in total subsidies in the AWS-3 auction because of the set-aside.[68]

62. While mischaracterizing a spectrum set-aside as a subsidy may be politically expedient, it is economically invalid. Measuring auction revenue under the counterfactual of no set-aside rule would require both demand schedule and bidding strategy information for all bidders. However, the impossibility of performing a correct analysis does not stop

64 Economists Incorporated (September 2019), pages 4 and 5.
65 Economists Incorporated (September 2019), page 5.
66 Telus, Initial Comments dated 2 August 2019, paragraphs 24 and 48; Bell, Initial Comments dated 2 August 2019, paragraphs ES10, 12, 24, 25 and 33; and Rogers, Initial Comments dated 2 August 2019, paragraphs 63 and 66.
67 Bell, Initial Comments dated 2 August 2019, paragraphs 22 to 24.
68 Rogers, Initial Comments dated 2 August 2019, paragraph 66 and Table 4.

Rogers and Bell from engaging in the fraught exercise of using the price paid by open bidders in the 600 MHz auction to calculate the "subsidy" for set-aside bidders.[69] This is entirely invalid because all prices would be different without the set-aside rule. Therefore, it is not surprising that Rogers and Bell have calculated different "subsidy" amounts.

63. The incumbents continue to ignore the purpose and intent of a set-aside, which is to promote competition in the wireless market.[70] Set-asides are adopted to ensure that there is strong competition and sufficient choice in the wireless marketplace by addressing the risk of foreclosure. The incumbents' claims about set-asides do not take into account the economic and consumer benefits of stronger competition in the market facilitated by set-asides. In particular, Professor Cramton notes that strong competition from set-aside spectrum winners can further generate downward price pressure.[71]

64. The capital-intensive investments made by new facilities-based competitors like Shaw are beginning to drive real and durable change in the Canadian mobile marketplace. The course set by the Government in the AWS-1, AWS-3 and 600 MHz auctions is unquestionably correct. Including a set-aside as part of the 3500 MHz spectrum auction will result in a highly competitive auction process for valuable mid-band spectrum for 5G that is in high demand. This will provide Canadians with significant benefits in the form of better prices for more valuable services.

## C. Amount of Set-Aside Must Ensure Sustainable Competition

65. The objective of the set-aside in the 3500 MHz auction is to correct the current mid-band spectrum imbalance of the new facilities-based competitors relative to the Big 3 and to enable new facilities-based competitors to drive competitive market outcomes from the inception of 5G in Canada.

66. In order to be effective in achieving these two objectives, the set-aside must be meaningful. Even though the incumbents will continue to hold a significant advantage in

[69] See Rogers par. 13: Rogers claims "a $634M subsidy as a result of the set-aside in the 600 MHz auction." See also Bell par. ES10: Bell claims "a subsidy of over $1 billion dollars to set-aside eligible bidders."

[70] See Bell, Initial Comments dated 2 August 2019, paragraph 25 and Telus, Initial Comments dated 2 August 2019, paragraphs 52 and 88.

[71] Cramton (September 2019), page 2.

mid-band spectrum holdings after the 3500 MHz auction, it offers the wireless competitors an opportunity to acquire valuable mid-band spectrum for 5G. The amount of the set-aside must ensure that competitors have the mid-band spectrum they need to make competitive 5G network deployment.

67. Our proposal for up to 50 MHz set-aside (where available), while considerably smaller than the set-aside in the 2008 AWS-1 auction (40 per cent), the 2015 AWS-3 auction (65 per cent) and the recent 600 MHz auction (43 per cent),[72] is supported by many different parties[73] and will provide wireless competitors with the mid-band spectrum they need so that they do not fall behind in the race to 5G.

68. The parties also proposed various different ways to address the uneven amount of spectrum available for auction in each service area as a result of the Reclamation Decision. Generally, in areas where there is less spectrum available for auction than the set-aside amount, Quebecor, Eastlink and Cogeco recommend that the set-aside equal the amount of spectrum available.[74] For example, in areas where there is only 40 MHz of spectrum available, the entire 40 MHz would be set-aside spectrum. We would support this approach.

### *1. Proposals to Weaken Competition Must be Dismissed*

69. Cogeco, and in a similar vein, Ecotel[75] and Iristel,[76] propose to impose a 30 MHz set-aside cap to limit the amount of spectrum that a set-aside eligible bidder can acquire within the set-aside[77] or to otherwise limit the amount of the set-aside to a percentage of the available spectrum in all service areas. By way of reply, these proposals should be dismissed as they would be ineffective in supporting true and sustainable facilities-based competition.

72 See Quebecor, Initial Comments dated 2 August 2019, paragraph 25; and Shaw, Initial Comments dated 2 August 2019, paragraph 71.
73 Quebecor, Initial Comments dated 2 August 2019, paragraph 24; SaskTel, Initial Comments dated 2 August 2019, paragraph 12. Cogeco and Eastlink propose even higher amounts - 60 MHz and 100 MHz respectively. See Cogeco, Initial Comments dated 2 August 2019, paragraph 68 and Eastlink, Initial Comments dated 2 August 2019, paragraph 14.
74 Cogeco, Initial Comments dated 2 August 2019, paragraph 68; Quebecor, Initial Comments dated 2 August 2019, paragraph 24; and Eastlink, Initial Comments dated 2 August 2019, paragraph 14.
75 Ecotel, Initial Comments dated 2 August 2019, paragraph 17.
76 Iristel, Initial Comments dated 2 August 2019, paragraph 9.
77 Cogeco, Initial Comments dated 2 August 2019, paragraphs 80 and 82.

70. Under these proposals, the set-aside amount would be insufficient to build-out a competitive 5G network and compete effectively in 5G with the wireless incumbents. The set-aside must, to the extent possible, provide competitors with sufficient mid-band spectrum to deploy 5G services, which in Shaw's submission is 50 MHz in each service area. 30 MHz or 40 MHz is insufficient to sustainably compete in 5G with the wireless incumbents, which enjoy a considerable spectrum advantage. If the proposals of Cogeco Ecotel and Iristel are adopted, the Big 3 will face weak competition from wireless competitors, undermining the purpose of a set-aside. In the words of Professor Cramton, "this makes no sense":

> Competition is apt to be best served in many markets with a strong regional operator to discipline the Big 3. In markets that can support multiple regional operators, then the clock auction allows and encourages multiple winners of the set-aside spectrum. Given the limited quantity of 3500 MHz spectrum, mandatory splitting of the set-aside would fragment the mid-band spectrum too much. The important distinction is that the Big 3 are dominant in the wireless market. None of the regional operators are dominant in the wireless market.[78]

71. Given that the 3500 MHz auction will be assigned on a Tier 4 basis and juxtaposed against Cogeco's submissions before the Canadian Radio-television and Telecommunications Commission advocating for mandated MVNO access, it is clear that Cogeco is less interested in building out competitive mobile wireless infrastructure and more interested in resale-based competition. The policy and licensing framework determinations of the spectrum regulator, whose mandate is to maximise the benefits that Canadians derive from the spectrum resource, should not be guided by parties who are only marginally interested in deploying network infrastructure using the resource. Cogeco's proposals are, at root, inconsistent with the Department's objectives for commercial mobile wireless spectrum – maximum promotion of innovation and investment, competition and deployment, and must, therefore, be rejected.

[78] Cramton (September 2019), page 5.

### *2. Proposal to encumber set-aside blocks must be dismissed*

72. Finally, Shaw continues to support the Department's intention that the set-aside spectrum consist of spectrum blocks that are not encumbered by existing sub-divided or grid cell licences.[79] Only where there are insufficient unencumbered blocks should encumbered blocks be assigned to the set-aside, and in those cases, the least encumbered blocks should go toward the set-aside.[80]

73. We note that Telus opposes this proposal and argues that unencumbered spectrum should not be dedicated first to the set-aside because regional providers will likely delay deploying the unencumbered spectrum in areas outside of large population centers (Calgary, Ottawa and Quebec City).[81] Telus also claims that if the incumbents are forced to buy encumbered blocks, they would never be able to serve Canadians in areas beyond the large population centers (because the encumbrances are located outside of the urban core).[82]

74. Telus' opposition rests on an incorrect presumption about competitors' deployment intentions and should be dismissed. Shaw has demonstrated and delivered on its commitment to expand coverage in areas outside of urban centers even while simultaneously facing major transformative investments from 2G to LTE-Advanced. As noted previously, in early 2019 we launched services in Victoria, Prince George, Cranbrook, Kelowna, Lethbridge, Red Deer, Brockville, Belleville, Cobourg, Pembroke, Cornwall, Medicine Hat and Nanaimo, and in the Summer we further expanded our network footprint in Alberta and British Columbia by launching service in non-urban areas such as Kamloops, Prince Rupert, Vernon, Penticton, Courtenay-Comox and Campbell River.

## D. Spectrum Cap to Protect Against Spectrum Concentration

75. In addition to the spectrum set-aside, Shaw proposes that the Department apply an in-band spectrum cap of 50 MHz in all Tier 4 service areas.[83] As observed by Professor

[79] SLPB-002-19, Annex C, paragraph 4.
[80] Shaw, Initial Comments dated 2 August 2019, paragraph 66.
[81] Telus, Initial Comments dated 2 August 2019, paragraph 136.
[82] Telus, Initial Comments dated 2 August 2019, paragraph 137.
[83] See section III (pages 19-25/paragraphs 63-106) of Shaw's Initial Comments in this Consultation.

Cramton, in contrast with a cap within the set-aside, a "spectrum cap for the entire 3500 MHz spectrum is pro-competitive as it limits excessive concentration of the 3500 MHz spectrum into the hands of dominant incumbents."[84]

76. Almost all industry participants in the proceeding, with the exception of Bell and Xplornet, also support the adoption of spectrum caps, in part to address the risk of foreclosure. Our proposed 50 MHz cap is consistent with the amounts recommended by the proponents of a spectrum cap, including Ecotel (40 MHz),[85] SaskTel (50 MHz)[86], Teksavvy (50 MHz)[87] and Cogeco (50 -60 MHz)[88]. With a 50 MHz cap, the Big 3 incumbents will still be able to acquire 3500 MHz spectrum. According to Cogeco, Rogers and Bell would only be restricted from bidding in 5 Tier 4 service areas out of 172 and Telus only in Edmonton. These are areas where the incumbents already possess a minimum of 50 MHz of spectrum.[89]

77. A 50 MHz cap balances the need for licensees to have sufficient capacity to provide high bandwidth services to subscribers and the need to avoid undue spectrum concentration.[90] This is particularly important considering that there are incumbent licensees in 3500 MHz band like Bell and Rogers and that the Reclamation Decision allows all incumbent FWA licensees to reclaim large amounts of spectrum for flexible use.

### *1. Assessment of Cap for FWA Incumbents Must take into Account their FWA Spectrum*

78. In this regard, Shaw submits that the auction framework must be clear in relation to the assessment of the cap in the case of the spectrum held by fixed wireless incumbents:

84 Cramton (September 2019), page 5.
85 Ecotel, Initial Comments dated 2 August 2019, paragraph 14.
86 SaskTel, Initial Comments dated 2 August 2019, paragraph 9.
87 Teksavvy, Initial Comments dated 2 August 2019, paragraph 22.
88 Cogeco, Initial Comments dated 2 August 2019, paragraph 66.
89 Cogeco, Initial Comments dated 2 August 2019, paragraph 62.
90 SaskTel, Initial Comments dated 2 August 2019, paragraph 9.

(a) As a general matter, any 3500 MHz in-band spectrum cap must take into account any spectrum reclaimed and converted to flexible use licences. This rule should be expressly spelled out; and

(b) Bell and Rogers should not be allowed to acquire or have access to 3500 MHz spectrum in excess of any applicable spectrum cap.

79. In relation to Bell and Rogers, it has been pointed out that a potential gap arises from the fact that under the rules as proposed,[91] subordinate licences do not count towards a spectrum cap. This means that if an existing fixed wireless provider exercises the option to convert its fixed wireless holdings to flexible use licences, it could subordinate some or all of these licences post-auction, in which case under the rules as proposed, none of the subordinated spectrum would count for spectrum cap purposes.[92]

80. While the Department appears to have assumed that Bell and Rogers, through Inukshuk Partnership, would exercise the option of dividing up and transferring individual fixed wireless licences as between the partners (as per the precedent in the 2500 MHz band), Shaw is concerned about the ramifications should Bell and Rogers decide to allow Inukshuk to continue to hold and convert the fixed wireless licences to flexible use in Inukshuk's hands, in which case, Inukshuk could subordinate the flexible use licences to Bell and Rogers.

81. Shaw submits that Bell and Rogers should not be allowed to acquire or have access to 3500 MHz spectrum in excess of any applicable spectrum cap. To address this situation, Shaw submits that the proposal at paragraph 158 of SLPB-002-19 should not apply to 3500 MHz spectrum licences held by Inukshuk and subordinated to Bell and Rogers.

### *2. Special cap for Bell and Telus*

82. The persistent coordination between two of the Big 3 dominant providers, Bell and Telus, through their comprehensive reciprocal access agreement, further underscores the need

[91] SLPB-002-19, paragraph 158.
[92] Cogeco, paragraph 224.

for pro-competitive measures. Shaw was not alone[93] in pointing out that Bell and Telus will likely pool any 3500 MHz spectrum following the auction and that absent a spectrum cap, these two incumbents will have an insurmountable spectrum advantage. In particular, they could potentially have double the amount of 3500 MHz spectrum as the next largest network, with a speed and capacity advantage that no other operator could match.[94]

83. Shaw is therefore supportive of the suggestion that Bell and Telus should be limited to a total of 80 MHz of 3500 MHz spectrum as between them in any given geographic area for at least 10 years following the issuance of flexible use licences.[95]

## E. Eligibility for Set-Aside (Q1C AND Q1E)

**If a set-aside is to be applied:**

**Q1C—ISED is seeking comments on its proposal to limit the eligibility criteria to bid on set-aside spectrum licences to those registered with the CRTC as facilities-based providers* that are not National Mobile Service Providers, and that are actively providing commercial telecommunication services to the general public in the relevant Tier 2 service area of interest, effective as of the date of application to participate in the 3500 MHz auction.**

**Q1E—ISED is seeking proposals for other eligibility criteria along with supporting rationale.**

### *1. Eligibility for Set-Aside Should Advance Department's Deployment Objectives*

84. As noted above, 3500 MHz spectrum is critical mid-band spectrum for 5G services. The set-aside eligibility rules must be designed to promote the efficient use of 3500 MHz

93 Rogers, Initial Comments dated 2 August 2019, paragraphs 184-85.
94 Rogers, Initial Comments dated 2 August 2019, paragraph 21.
95 Rogers, Initial Comments dated 2 August 2019, paragraph 187. Ecotel, Initial Comments dated 2 August 2019, paragraph 56: Ecotel pointed out that given that Inukshuk owns about 75 per cent MHZ/pop of the 3500 MHz band, any in-band spectrum cap must take the Inukshuk spectrum reclaimed by Bell and Rogers into account.

spectrum by carriers that are committed to investing in competitive wireless facilities while preventing speculative bidding and non-viable new entry.

85. Consistent with section IV (pages 25-28/paragraphs 87-95) of Shaw's Initial Comments, Shaw supports limiting the eligibility to bid on set-aside spectrum to licensees of commercial mobile terrestrial spectrum that are:

(a) Not a national mobile service provider ("NMSP") (*i.e.*, any entity with more than 10 per cent of national wireless subscriber market share);

(b) Registered with the CRTC as a facilities-based carrier;

(c) Actively providing commercial telecommunications service to the public in the relevant Tier 2 licence, using access facilities that the person or entity, or its affiliates, owns and operates; and

(d) Actively providing commercial wireless services to the public somewhere in Canada using RAN facilities that are owned and operated by the entity in question.

86. The last criterion is being proposed by Shaw in addition to the three other criteria in order to ensure that entities that have already demonstrated their capacity and commitment to competitive mobile wireless deployment and are therefore best positioned to challenge the dominance of the Big 3, gain access to the spectrum.

87. Shaw's proposed set-aside eligibility criteria will ensure that:

(a) wireless carriers that are bidding on set-aside spectrum in a region have demonstrated a capacity and commitment to making the intensive capital outlays required to compete effectively against the Big 3;

(b) set-aside spectrum in the 3500 MHz band is used to provide more capacity for mobile broadband services and support the deployment of 5G networks; and

(c) there is sufficient competition for the set-aside spectrum.

***2. Proposals to unduly narrow set-aside eligibility should be rejected***

88. Some other parties in this proceeding have recommended that the Department narrow its eligibility criteria for the set-aside.[96] However, Shaw believes that a number of these proposals should be rejected.

89. Teksavvy proposes that the Department prevent existing regional mobile wireless competitors, like Videotron, Eastlink and Freedom, from being eligible to bid on set-aside spectrum.[97] Teksavvy's proposal will prevent these regional mobile wireless competitors, who are driving real, sustainable competition, from bidding on the set-aside spectrum in favour of those that have not shown the same commitment to investing in wireless and competing with the Big 3 incumbents.

90. With respect, they demonstrate a lack of understanding of what it takes to compete, now and into the future, in mobile wireless markets. Apart from the entirely self-serving nature of these submissions and the fact that they appear to be driven by purely private interests, these proposals are fundamentally misguided. They fail to acknowledge the fact that spectrum is a public resource that must be assigned to maximise the benefits that Canadians derive from the resource and ignore the purpose of a 3500 MHz set-aside – namely, to ensure that Canadians can look forward to a competitive market structure in the era of 5G. We have demonstrated our ability to compete with the incumbents and inject much-needed competition in the markets in which we operate. Teksavvy's proposal will not promote a more competitive marketplace and should therefore be rejected.

91. In addition, both Cogeco and Bell submit that set-aside eligible bidders must be actively providing commercial telecommunications service in the Tier 4 areas in which the entity wishes to bid as a set-aside eligible entity, not the Tier 2 service area.[98] In our opinion, this proposal will restrict competition for set-aside spectrum in the auction. It would also prevent mobile wireless competitors that are expanding their networks from acquiring the

96 Eastlink, Initial Comments dated 2 August 2019, paragraph XX; Bell, Initial Comments dated 2 August 2019, paragraphs 35 and 38; Cogeco, Initial Comments dated 2 August 2019, paragraph 99; Teksavvy, Initial Comments dated 2 August 2019, paragraph 26; Xplornet, Initial Comments dated 2 August 2019, paragraphs 80 and 81.

97 Teksavvy, Initial Comments dated 2 August 2019, paragraph 26.

98 Cogeco, Initial Comments dated 2 August 2019, paragraph 99; and Bell, Initial Comments dated 2 August 2019, paragraph 38.

mid-band spectrum they need to enter new markets and bring competition to more communities.

### *3. It Makes No Sense to Expand Set-Aside Eligibility to Include the Big 3*

92. Shaw does not support the various proposals to unreasonably broaden the eligibility criteria. In particular, we do not support Telus' opposition to the blanket restriction on NMSPs.[99] Removing this criteria would defeat the purpose of the set-aside.

93. Shaw supports the Department's proposal that the eligibility of affiliated entities, partnerships[100] or of bidders participating jointly[101] will be determined jointly. This means that the eligibility of the venture, partnership or affiliation is based on the shared qualifications of its members. However, should any of the members be a national mobile wireless service provider, then the venture, partnership or affiliation as a whole will be disqualified. As discussed in our response to Q10 and Q11 below, we disagree with Cogeco's suggestion[102] that the Department should "revisit" these rules as they relate to the assessment of set-aside eligibility.

## F. Non-Transferability of Set-Aside Licences (Q1D)

**If a set-aside is to be applied:**

**Q1D—ISED is seeking comments on its proposal that any set-aside licences acquired by set-aside-eligible bidders would not be transferable to set-aside-ineligible entities for the first five years of the licence term.**

99 Telus, Initial Comments dated 2 August 2019, paragraph 105.

100 SLPB-002-19, paragraph 40: A bidder may be eligible to qualify as a set-aside-eligible bidder based on the eligibility of its affiliated entities or on the eligibility of the partners who control the bidder where the bidder is a partnership.

101 SLPB-002-19, paragraph 117: In the case of a bidding consortium, "the eligibility rules would apply jointly in each licence area. For example, if a set-aside is applied, in the cases where any of the entities participating jointly would not qualify as a set-aside-eligible bidder, the bidding consortium would not be eligible to bid on set-aside spectrum."

102 Cogeco, Initial Comments dated 2 August 2019, paragraph 243.

94. As outlined in our initial comments, Shaw agrees with the limits on transferability of set-aside spectrum for the first five years.

95. Shaw does not agree with the proposal from Cogeco that if ISED does not permit switch or “all-or-nothing” bid option, then the restrictions on post-auction licence transfer and divisibility (SLPB-002-19, para. 167) on set-aside spectrum should be relaxed.[103]

96. This and any other suggestions for the relaxation of the prohibition of transfers of set-aside licences must be rejected. One of the main purposes of these transfer rules is to prevent speculative bidding to ensure that scarce spectrum resources are put to use in a way that maximizes the benefit to Canadians. Read together with its submissions in the CRTC’s Wireless Review proceeding, it is clear that Cogeco’s proposals are driven by speculation. Cogeco is seeking a cheap win with minimal investment and without having to face the challenges that new competitors face. Moreover, Cogeco fails to explain how its self-serving proposals would deliver any benefit to Canadians.

## G. Grid-Cell and Sub-Divided Licences Are Counted Towards Spectrum Cap (Q1F)

**If a spectrum cap is to be applied:**

**Q1F—ISED is seeking comments on the inclusion of grid-cell and sub-divided licences towards the spectrum cap, and the proposal to allow the return of these licences in order to increase a licensee’s eligibility to bid on additional spectrum within the related licence area.**

97. For the reasons set out in our initial comments, Shaw proposes that encumbered blocks should count toward the spectrum cap if it is at least 90 per cent clear. Our proposal is consistent with many of the other industry participants in the proceeding. This includes Quebecor, which states that if a cap is used, any ‘lightly encumbered blocks’ should be

[103] Cogeco, paragraphs 183-85.

included in the cap. This also includes Cogeco,[104] Eastlink,[105] Ecotel,[106] Teksavvy,[107] Telus,[108] and Rogers.[109]

**Q2—ISED is seeking comments on its proposal to use Tier 4 service areas for the 3500 MHz licensing process.**

## H. Tier 4 Licence Areas Are the Smallest Tiers that Should Be Used (Q2)

98. Consistent with the view of a majority of the parties in this Consultation, Shaw submits that the Department should use, at a minimum, Tier 4 licences areas.

99. While a small minority of parties advocated for the use of Tier 5 licence areas, these parties diverged considerably in their proposals.[110] These proposals are driven by their proponents' individual business plans and therefore lack policy justification and should be rejected. Tier 5 licensing would exponentially increase the complexity of a clock auction.

## I. Inclusion of Encumbered and Partial Tiers (Q3A to Q3D)

**Q3A—ISED is seeking comments on its proposal to include all remaining spectrum (including partially encumbered Tier 4 areas) as part of the auction.**

**Q3B—ISED is seeking comments on its proposal to consider all spectrum acquired through the auction and only Tier 4 licences that will be issued through the transition process, simultaneously in the assignment round of the auction, in order to determine the specific frequency assignments of all licences in the 3500 MHz band.**

**Q3C—ISED is seeking comments on the proposal that licensees who acquire multiple flexible use Tier 4 licences in a given area, either as a result of the auction or as a result of the transition process, be assigned contiguous spectrum, and that this also apply to partial area licences acquired through the auction.**

104 Cogeco, paragraph 58.
105 Eastlink, paragraph 22.
106 Ecotel, paragraph 28.
107 Teksavvy, paragraph 29.
108 Telus, paragraph 111.
109 Rogers, paragraph 110.
110 For example, Cogeco insisted on the use of Tier 5 licensing in the three largest urban centres: Cogeco, paragraph 211; See also Ecotel, Initial Comments dated 2 August 2019, paragraph XX; BCBA, Initial Comments dated 2 August 2019, paragraph 32

**Q3D—ISED is seeking comments on the proposal to classify all partial tier licences as encumbered blocks.**

100. As stated in our initial comments, Shaw supports the proposals in Q3A to Q3D.

## J. Bundling of Encumbered Blocks (Q3E and Q3F)

**Q3E—ISED is seeking comments on the proposal to bundle the remaining portions of the encumbered areas offered in the auction as a combined encumbered block of 20, 30, 40 MHz or more, depending on the number of 10 MHz blocks being bundled. […] Comments on the proposed list of encumbered service areas where multiple blocks may be combined for the purpose of the auction are also sought.**

**If a spectrum cap is applied:**

**Q3F—ISED is seeking comments on the proposal that the bundled encumbered blocks would not count towards the spectrum cap during the auction, but that any transfers of the licences post-auction would be subject to the spectrum cap and the conditions of licence as described in section 11.2.**

101. Shaw understands that Q3E and Q3F relate solely to encumbered areas in Napanee, Estevan, Weyburn, Swift Current, Yorkton, Watrous, Lloydminster, Squamish/Whistler, and Nunavut, as per paragraph 58 of the Consultation Document.

102. In its Initial Comments, Shaw sought clarification of the number of blocks to be bundled in each of the identified service areas.[111] Shaw further submits that bundling should be subject to the following rules:

(a) Any decision to bundle encumbered blocks into units larger than 10 MHz should depend on the quantity of unencumbered spectrum in the area in question. If unencumbered spectrum is scarce in a particular service area, bundling encumbered spectrum into blocks that are too large could harm competition;

(b) Bundling should not override the goal of contiguous spectrum assignments. ISED should ensure that blocks purchased at auction are assigned in a manner that maximises contiguous blocks. It is not clear from the Consultation Document how

[111] Shaw, Initial Comments dated 2 August 2019, paragraph 141.

bundling would affect the contiguity of auctioned blocks. This should be clarified to ensure that bundling does not negatively affect the contiguity of auction allocations.

103. Regarding Q3F, Shaw does not agree that the bundled encumbered blocks should not count toward the spectrum cap. There are areas with encumbered spectrum (*e.g.* Kamloops, Calgary), where the spectrum is largely unencumbered. Shaw proposes that encumbered blocks should count toward the spectrum cap if it is at least 90 per cent clear.

## III. PRODUCT AND BIDDING RULES (Q4-Q5)

**Q4A—ISED is seeking comments on its proposal to use generic licences.**

**If a set-aside is applied (with or without a spectrum cap):**

**Q4B—ISED is seeking comments on its proposal to categorize all blocks won by set-aside-eligible bidders as set-aside blocks.**

**Q4C—ISED is seeking comments on its proposal to create separate categories for encumbered and unencumbered blocks, as well as open and set-aside blocks.**

**If only a spectrum cap is applied:**

**Q4D—ISED is seeking comments on its proposal to create separate categories for unencumbered and for various encumbered block in a service area.**

### A. Generic Licences (Q4A)

104. Regarding Q4A, Shaw generally supports the approach of using generic licences, subject to clarification of the following:

(a) How ISED proposes to define “significantly different levels of encumbrance”;

(b) Whether there could be more than one block supplied for a given level of encumbrance in a given service area.

### B. Categorisation of Blocks Won by Set-Aside Eligible Bidders as Set-Aside Blocks (Q4B)

105. Regarding Q4B, Shaw agrees with the Department’s proposal to categorise blocks won by set-aside eligible bidders as set-aside blocks. This is consistent with ISED’s successful implementation of set-asides in the AWS-1 and 600 MHz auctions.

## C. Separate Categories for Encumbered and Unencumbered Blocks (Q4C and Q4D)

106. Regarding Q4C, Shaw agrees with the proposal to create separate categories for encumbered and unencumbered blocks, as well as open and set-aside blocks. Consistent with Shaw's submissions in relation to the set-aside, the set-aside spectrum should, to the extent feasible, consist of spectrum blocks that are not encumbered by existing sub-divided or grid cell licences and only where there is insufficient unencumbered blocks should encumbered blocks be assigned to the set-aside. In the latter instance, the least encumbered blocks should be categorised as set-aside.

107. Regarding Q4D, Shaw agrees that there should be separate categories for unencumbered and encumbered blocks.

## D. Use of Anonymous Bidding Is Appropriate (Q5)

| **Q5—ISED is seeking comments on the use anonymous bidding during the auction.** |
|---|

108. Shaw supports the use of anonymous bidding and the Department's original proposal to provide only the combined open and set-aside aggregate demand information.

109. Shaw notes that Rogers expressed concern about aggregation risk and proposed to mitigate this risk by incorporating a requirement that ISED "provide aggregate demand information for each product (open and set-aside), as well as aggregate information for the entire service area."[112] The risk of providing more detailed information is that bidders could use this information for anti-competitive means. Incumbents could use it to "divide up" the auction supply without competing as vigorously as they would otherwise, thereby suppressing auction revenue. Alternatively, incumbents could use additional aggregate demand information to determine when set-aside bidders are bidding in excess of the set-aside in a particular geography and decide to bid more aggressively for the sole purpose of keeping set-aside bidders from getting more spectrum. To this point, ISED must understand that set-aside eligible bidders have essentially been unable to compete with the three large incumbents, which inevitably win everything that is not protected by

[112] Rogers, Initial Comments dated 2 August 2019, paragraph 134.

pro-competitive measures. Therefore, Rogers' proposal for aggregate information per service area should be rejected.

## IV. AUCTION FORMAT

**Q6—ISED is seeking comments on its proposal to use a clock auction format for the 3500 MHz spectrum auction.**

110. As set out in our initial comments, Shaw supports the use of a uniform price clock auction format. While a vast majority of parties also support the auction format, some parties proposed modifications, which we respond to below. Our responses below focus primarily on responding to other parties' unnecessary and complex proposed changes.

### A. Proposed Modifications to Activity Rule Should Not Be Adopted

111. Among those parties that supported the use of a clock auction format, certain parties recommended changes to the methodology for calculating eligibility within each clock round. For example, Bell proposed that a bidder's eligibility in a given round be calculated using the larger of its processed activity level in the previous round and its requested activity level in the previous round.[113]

112. Bell's proposal is misguided. An intelligent bidder would use this rule to undermine auction competition and price discovery. Specifically, under such a rule, a bidder could submit add requests that it knew with certainty could not be processed and that would allow it to avoid eligibility point reductions. This would allow the bidder to violate the activity rule in proportion to its initial eligibility in the auction. Therefore, large nationwide bidders could avoid bidding on some large to mid-sized markets until very late in the auction when competition has all but subsided. This would give larger bidders an unfair advantage and would harm competition and price discovery in the auction. Therefore, Shaw strongly recommends that ISED reject this proposal.

113 Bell, Initial Comments dated 2 August 2019, paragraphs 67-68. For example Bell states that: *"Bidder's activity should be set equal to eligibility points associated with its processed demand or eligibility points associated with its requested demand, whichever is larger"*

113. Cogeco proposed that the activity rule should gradually increase, starting at 70% and increased to 100% by the end of the auction.[114] Shaw notes that a 70-80 per cent activity rule is more appropriate for an SMRA format, because provisionally winning bids of the SMRA result in less flexibility than generic clock auction bid processing. Activity rules that are too permissive hinder price discovery and increase the likelihood of strategic bidding. The 95 per cent activity rule proposed by ISED has worked well in other countries and is the standard for the uniform price clock auction format with separate product categories and/or geographic licensing. Shaw recommends ISED reject this proposal to use a 70 to 80 percent activity rule to start the auction.

114. Cogeco also proposed that bidders be allowed to sit out up to three rounds of the auction without losing eligibility. Shaw notes that activity rule waivers are generally not used in uniform price clock auctions like the one ISED proposed because they unnecessarily undermine price discovery. Cogeco provides the following example: "a bidder places a bid in Round 10 to reduce demand, which is not fully processed. By using a waiver in Round 11, the bidder's Round 10 bid stays in place but the bidder would not lose eligibility if the bid is fully processed in Round 11." Such a waiver would clearly allow a bidder to place a major drop that it knew could not be fully processed but that would confuse the market as to whether a major bidder was exiting the auction or simply applying a waiver. Furthermore, given the characteristics of the 3500 MHz band and the tier 4 service areas, the strong geographic synergies that could justify Cogeco's proposed waivers are not present. And where there are strong geographic synergies, a CCA with package bidding or a uniform price clock auction with larger geographic licenses would be a superior way to accommodate the expression of these synergies. As it stands, the potential synergies in this auction are only those associated with getting a sufficient number of blocks in a given service area. Protecting those synergies, if deemed absolutely necessary to auction efficiency, would be more appropriately served by relaxing the "no excess supply" constraint to allow for very limited amounts of excess supply. Therefore, Shaw strongly recommends that ISED reject this proposal to allow waivers.

[114] Cogeco, Initial Comments dated 2 August 2019, paragraph 187,

**B. Withdrawal Proposal Should Not Be Adopted**

115. Cogeco asked that bidders have the option to withdraw in up to three rounds of the auction, provided that the withdrawals do not have the effect of stopping the entire auction. A penalty representing the difference between the price at which it withdrew and the price of the actual final clock round (if lower) would be paid by the withdrawing bidder.[115]

116. Shaw does not support an SMRA-like withdrawal option, as Cogeco proposes. Shaw believes that bidders will not need as much flexibility as Cogeco's proposed withdrawals provide, because if there are synergies in this auction, they are limited to avoiding insufficient spectrum quantities in a given service area. Therefore, ISED may consider a more limited "withdrawal" rule, targeted at alleviating the risk that partially processed drop requests could leave bidders with insufficient spectrum quantities. To this end, the rule could allow a reduction of demand to be processed such that a small amount of excess supply—say, 10 MHz—is allowable. ISED, however, has already stated that it believes that the minimum optimal block size in this band is 10 MHz. Therefore, unless there is convincing evidence that 10 MHz is too small, such a rule would unnecessarily complicate the auction for both ISED and participants.

**C. Permission to Place Switch Bids, All-or-Nothing Bids Should Not Be Adopted**

117. Bell proposed that bidders have the option of designating individual bids for a given product in a given round as well as overall bids for multiple products in multiple areas at a given price point as "all-or-nothing."[116] Cogeco also proposed that the Department allow bidders to designate bids as all-or-nothing[117] and that parties be permitted to tie two bids together – a bid to increase demand on one product in a given area is contingent on being able to reduce demand on another product in the same area.[118]

118. Shaw notes that the all-or-nothing bid type was allowed in the FCC's 600 MHz Incentive Auction. However, it was not used to any significant degree, even though the smallest block size, 2x5 MHz, was considered suboptimal for LTE. As a result, the FCC decided

115 Cogeco, Initial Comments dated 2 August 2019, paragraphs 195-200
116 Bell, Initial Comments dated 2 August 2019, paragraphs 69-74.
117 Cogeco, Initial Comments dated 2 August 2019, paragraphs 172-180.
118 Cogeco, Initial Comments dated 2 August 2019, paragraphs 168-171.

to drop these types of bids from the recent uniform price clock auction in the 24 GHz band.

119. Shaw further submits that switch bids would only be possible between products in the same service area. This would mean that a bidder could switch between unencumbered blocks and any encumbered blocks that appeared as a separate product category. However, under ISED's proposed rules, encumbered blocks will not have the same number of eligibility points as unencumbered blocks. In this regard, Cogeco's proposal for switch bids is incomplete, because it does not specify how eligibility-point differences would be handled. Even assuming that this question could be resolved in a way that does not provide opportunity for gaming, it is still Shaw's opinion that switch bids are unnecessary.

120. Furthermore, Cogeco asked that "if there is no all-or-nothing bid option, ISED should relax the conditions of licence on transferability and divisibility proposed at par. 167 of the Consultation Document for a set-aside eligible licensee in areas where it ended the auction with only one block. In these cases – i.e. ending the auction with a single set-aside block in a licence area – the conditions of licence for the set-aside eligible bidder would be the same as for an open block."[119] As set out in our response to Q1D, one of the main purposes of these transfer rules is to prevent speculative bidding to ensure that scarce spectrum resources are put to use in a way that maximizes the benefit to Canadians. Relaxing the transferability and divisibility conditions will encourage speculation and would run contrary to the objective of maximizing the benefits derived from spectrum and the intent of the auction rules aimed at discouraging speculation.

121. Bell also proposed that the Department allow optional overall "all-or-nothing" bids. Shaw submits that this proposal is unnecessary and is more consistent with the spirit of a CCA auction rather than the simpler uniform price clock auction design proposed by ISED. Furthermore, Bell fails to clarify how bid processing would take place in the event that multiple bidders submitted such bids. With only two bidders, A and B submitting such overall all-or-nothing bids, it is unclear what a bid queue would look like. If the price point on A's bid were lower than the price point on B's bid, and both cannot be processed

[119] Cogeco, Initial Comments dated 2 August 2019, paragraphs 183-85.

together, does ISED then attempt to process B's bid with A's hold bid? This clearly becomes exponentially more complicated with more than two bidders. Shaw strongly recommends that ISED reject this proposal. Given ISED's decision to use tier 4 licensing, this proposal from Bell could not reasonably be incorporated into ISED's proposed clock auction design.

### D. Shaw's Comments Regarding the Proposal to Adopt an Extended Round

122. Cogeco proposed that the clock auction format include an "Extended Round, which would be one round after the clock rounds end."[120] Shaw notes that the primary utility of this proposal is to address the possibility that Cogeco's other proposals, a spectrum cap of 30 MHz within the set-aside and the withdrawal rule, could create excess supply. As discussed above, Shaw rejects the idea of a spectrum cap within the set-aside. Without that particular spectrum cap, something like an extended round could still be useful to clean up excess supply in the event that ISED either adopts a limited withdrawal rule or relaxes the "no excess supply" rule. However, ISED should only consider a withdrawal rule if the extended round prohibits bidders from acquiring blocks from which they previously withdrew. Without this prohibition, withdrawals could potentially be used to signal, which is counter to auction efficiency. Moreover, any such extended round should occur prior to the assignment round so that all spectrum acquired can be assigned contiguously.

## V. STRUCTURE OF THE CLOCK STAGE AND CALCULATION OF PROCESSED DEMANDS AND POSTED PRICES (Q7)

**Q7—ISED is seeking comments on the proposed structure of the clock stage and on the proposed methodology for calculating processed demands and posted prices after each clock round, as described in annex C.**

123. Shaw supports the Department's proposals concerning the proposed structure of the clock stage and the proposed methodology for calculating processed demands and posted prices after each clock round, as described in Annex C of the Consultation Document.

[120] Cogeco, Initial Comments dated 2 August 2019, paragraphs 201-206

124. Shaw notes that some parties have proposed to eliminate intra-round bidding. Shaw has reviewed these submissions and for the reasons set out below, submits that there is no cause to revise the clock stage rules in Annex C.

## A. Proposal to Eliminate Intra-Round Bidding Should Not Be Adopted

125. Iristel[121] and Teksavvy[122] asked that the Department eliminate intra-round bidding because this greatly complicates the auction and "disproportionately disadvantages smaller organizations who do not necessarily have a team of economists and game theory specialists at their disposal." This proposal should be rejected. Intra-round bidding is a crucial element of the uniform-price clock auction design. It allows bidders to accurately express their demand while also allowing the auction to progress at a reasonable pace. It presents no significant complexity burden, as bidders are always free to bid at the clock prices themselves if they choose.

126. Telus stated that while it believed that the use of intra-round bidding could support an efficient auction outcome, it was concerned about the fact that ISED linked intra-round bidding with the use of large bid increments. Telus opposed the use of large bid increments and elaborated on this concern in its response to Q.8. Shaw supports the Department's proposed increments. They encourage a reasonable auction pace while still allowing for full bid expression through intra-round bidding.

## VI. BID INCREMENTS (Q8)

| |
|---|
| **Q8—ISED is seeking comments on the proposed range of percentage increments.** |

127. Shaw generally agrees with the Department's proposed approach, with one modification to reduce the potential distortive effect of large bid increments on smaller licences as described below.

128. Rogers proposed a price increment rounding rule depending on population levels to reduce bid inflation in the case of smaller licences.[123] By rounding new clock prices to the

[121] Iristel, Initial Comments dated 2 August 2019, paragraph 30.
[122] Teksavvy, Initial Comments dated 2 August 2019, paragraphs 59-71.
[123] Rogers, Initial Comments dated 2 August 2019, paragraphs 148-156.

nearest $1,000, inexpensive licences, *e.g.*, 4-163 Golden ($3,000 opening bid price), will experience disproportionate increases through the early rounds of the auction. To reduce such distortions, Rogers proposes rounding to the nearest $100. Shaw agrees with Rogers's proposed rule change.

129. Shaw agrees with Telus' comment that in using its discretion to determine price increments, ISED should strike a balance between auction progress and price discovery.[124] For this, increments in the range of 5-10% are the norm, both within Canada and internationally. In particular, increments greater than 10% are very seldom used in the uniform-price clock auction or any other spectrum auction design.

## VII. ASSIGNMENT STAGE (Q9)

**Q9A—ISED is seeking comments on the proposed structure of the assignment stage, including the order of the assignment rounds, treatment of existing holdings, the combination of service areas into a single assignment area and parallel bidding.**

### A. Eliminate Proposal to Present "Fake" Bid Options to Bidders during Assignment Rounds

130. The Consultation Document proposes to:

(a) conduct a separate assignment round for each of the eight (8) most populated service areas sequentially, in descending order of population.

(b) wherever possible, create assignment areas that consist of a combination of two or more continuous service areas.

(c) create assignment sessions for six areas at one time after the completion of the first eight assignment rounds.

131. While Shaw generally agrees with the Department's proposed approach, as noted in our Initial Comments[125] and like several other parties, Shaw disagrees with the presentation of assignment bid options that do not represent feasible assignments. As such, Shaw

124 Telus, Initial Comments dated 2 August 2019, paragraphs 162-165.
125 Shaw, Initial Comments dated 2 August 2019, paragraph 152.

proposes that the Department eliminate the proposal to present bidders with infeasible bid options.

## B. No Priority Access to Desirable Higher Frequencies Should Be Given

132. Rogers correctly recognizes that there may be a premium on assignments adjacent to the 3800 MHz band. It would indeed be valuable for bidders to combine their 3500 MHz winnings with whatever they might win in a future auction of the 3800 MHz band. However, Rogers' proposal to deal with this situation is flawed.

133. Rogers proposed that individual bidders and joint networks that acquire no more than 60 MHz be given higher priority to the desirable higher frequencies in the assignment stage in order to "make it easier for them to catch up with networks with access to larger combined holdings, who have less need to aggregate spectrum later."[126] Rogers further submitted that in the event that the Department does not adopt Rogers' proposal to adopt a joint network spectrum cap, then network sharers should be prohibited from access to large amounts of spectrum from the top of the 3500 MHz band. The way to deal with this problem, according to Rogers, was to simply require that national operators give an undertaking prior to the auction not to combine spectrum subsequent to the auction.[127]

134. Teksavvy submitted that open bidders should not be included with set aside bidders in the assignment round, particularly in the event that ISED does not accept Teksavvy's proposal to create separate products for unencumbered blocks overlapping LTE band 42 and LTE band 43 as per its answer to Q4.A.[128] In this case, Teksavvy proposed that the Department give priority to small regional operators in the upper portion of the 3500 MHz band.

135. By way of reply, Shaw submits that ISED should not engage in picking toehold positions for some bidders over others. Instead, the Department should commit to a complete defragmentation of both bands after the 3800 MHz auction, ensuring that all licensees

126 Rogers, Initial Comments dated 2 August 2019, paragraph 40
127 Rogers, Initial Comments dated 2 August 2019, paragraphs 157-178.
128 Teksavvy, Initial Comments dated 2 August 2019, paragraphs 75-76.

have contiguous holdings across both bands. This is the simplest and most efficient way to address the 3800 MHz option value.[129]

## C. Parties' Other Proposals Should Be Rejected

136. Shaw notes that several other parties proposed a number of modifications to the Department's Q9A proposals:

(a) Bell and Videotron opposed the Department's proposal to create assignment sessions for six areas at one time after the completion of the first eight assignment rounds:

(i) Bell proposed that the Department conduct a separate assignment round for each service area (subject to the creation of assignment areas) and that the rounds proceed sequentially in descending order of population.[130]

(ii) Videotron asked for the elimination of the simultaneous assignment round until the 20 most populous areas have been assigned. Videotron cited the inherently distortive effects of a bidder's preference for a package in one territory being susceptible to being blocked by a bidder's preference for a package in a different territory.[131]

(b) Cogeco proposed that the first three assignment rounds be reserved to the assignment of the largest Tier 5 service area in Toronto, Montreal, and Vancouver first.[132]

(c) Cogeco further proposed that in each of these first three assignment rounds, if there are adjacent Tier 5 service areas that are contiguous with and within the same Tier 4 service area and satisfy the other constraints of the assignment phase as set out in paragraph 5 of Annex E of SLPB-002-19, then these additional Tier 5 service areas would be added to the assignment area in question. Telus similarly

[129] Indeed, Rogers mentions a defragmentation in a brief parenthetical after making the other proposal: see Rogers, Initial Comments dated 2 August 2019, paragraph 40.
[130] Bell, Initial Comments dated 2 August 2019, paragraph 77.
[131] Quebecor, Initial Comments dated 2 August 2019, paragraph 64.
[132] Cogeco, Initial Comments dated 2 August 2019, paragraph 211.

proposed that ISED take geographic self-contiguity into consideration in the assignment round on the principle that variation in frequency assignments across service areas should be minimised using an unbiased optimisation algorithm.[133]

(d) Cogeco proposed a detailed sequencing of the remaining assignment rounds on a Tier 4 basis.[134]

137. Shaw submits that these additional proposals are unnecessary. They would add additional complexity to the auction without enhancing auction integrity, fairness or efficiency.

## D. Nearest Vickrey Appropriate for Determining Assignment Prices.

**Q9B—ISED is seeking comments on the proposal to apply bidder optimal core prices and to use the "nearest Vickrey" approach in determining the assignment prices.**

138. As noted in our initial comments, Shaw endorses the use of the "nearest Vickrey" approach in determining assignment prices.

## VIII. BIDDER PARTICIPATION RULES: AFFILIATED AND ASSOCIATED ENTITIES (Q10-Q11)

**Q10—ISED is seeking comments on the proposed affiliated and associated entities rules that would apply to bidders in the 3500 MHz auction.**

**Q11—ISED is seeking comments on the proposed rules prohibiting collusion and other communication rules, which would apply to bidders in the upcoming 3500 MHz auction.**

1. Shaw believes that the bidder participation rules are critically important to ensure the integrity of the auction. We do not oppose the clarifications to the rules set out in the Consultation Document. However, we reiterate our position set out in our initial comments that it remains unclear as to whether the auction rules are complete in ensuring the integrity of the set-aside. Specifically, Shaw is concerned about the possibility of an incumbent using set-aside eligible entities as vehicles to gain access to

[133] Telus, Initial Comments dated 2 August 2019, paragraphs 168-181.
[134] Cogeco, Initial Comments dated 2 August 2019, paragraphs 213-214.

set-aside spectrum and influence the outcome of the auction by preventing Shaw and other strong new competitors from gaining access to this spectrum.

2. With respect to other parties' comments on the proposed 3500 MHz bidder participation rules,[135] we note that the Bell-Rogers Inukshuk partnership was the main focus. In addition, Cogeco suggested, without being specific, that the Department should revisit its approach to the anti-collusion rules, implying that they should be relaxed. Shaw addresses the parties' submission in relation to these two items below.

**A. Any Arrangements relating to 3500 MHz Spectrum Should Trigger Departmental Review**

3. Rogers argued that fixed use licensees who do not apply to bid in the auction should not be considered a bidder or potential bidder in the auction on grounds that included that Rogers and Bell, through Inukshuk Partnership, should not have to publicly divulge who holds or will hold flexible licences at the time of the auction.[136]

4. Rogers' position and arguments are antithetical to transparency and auction integrity. Not only should they be completely rejected, they highlight the need to further tighten the rules so that Rogers and Bell cannot indirectly undermine the transparency and fairness of the auction.

5. The proposed definition of an association is limited to arrangements pertaining to "the spectrum licences being auctioned in this process."[137] The definition of an association should be modified to specify that an association arises where parties have entered into any arrangement pertaining to "any spectrum in the 3500 MHz band." The rules should be modified to require that any and all arrangements relating to the 3500 MHz band (including arrangements or agreements pertaining to post-auction transfers, subordination or transactions of any kind) would have to be disclosed and reviewed by the Department in advance of the auction.

[135] See Cogeco, Ecotel, Iristel, and Rogers, Initial Comments dated 2 August 2019, respectively.
[136] Rogers, Initial Comments dated 2 August 2019, paragraph 183.
[137] Cogeco, Initial Comments dated 2 August 2019, paragraph 222.

## B. Anti-Collusion Rules Should be Maintained

6. Cogeco requests that the Department “revisit its approach” of restricting discussions towards a potential association prior to the auction without being specific as to exactly how it wanted the rules to be modified.[138]

7. Shaw fundamentally disagrees with the intent behind Cogeco’s submissions. In Shaw’s view, the anti-collusion and communication rules are essential to preserving auction integrity and should be maintained. Parties should not be free to discuss prohibited topics with impunity as this would irretrievably damage the transparency and fairness of the auction process.

## IX. CONDITIONS OF LICENCE FOR NEW FLEXIBLE USE SPECTRUM LICENCES IN THE 3500 MHZ BAND (Q12-Q15)

## A. 20-Year Licence Terms (Q12)

**Q12—ISED is seeking comments on its proposal to issue new flexible use spectrum licences in the 3500 MHz band with a 20-year licence term and the proposed wording of the condition of licence above. Licence terms for all flexible use licences, regardless of when they are converted from fixed to flexible use, will terminate on the same date as licences issued through the auction process.**

8. Shaw supports the Department’s proposals in relation to Q12.

## B. Transferability and Divisibility of Licences (Q13)

**Q13—ISED is seeking comments on the proposals on the condition of licence related to transferability and divisibility, and the proposed wording above.**

9. Shaw supports the Department’s proposals in relation to Q13.

## C. Deployment Conditions (Q14)

**Q14—ISED is seeking comments on the proposed deployment condition of licence as stated above as well as on the proposed levels of deployment.**

[138] Cogeco, Initial Comments dated 2 August 2019, paragraphs 236-243.

10. Shaw supports the proposed general deployment obligations set out in Annex F of the Consultation Document.

### *1. Additional deployment conditions for LTE Operators not appropriate*

11. Consistent with Shaw's initial comments,[139] there is widespread opposition to the Department's proposal to adopt additional requirements for licensees that currently operate a mobile LTE network.[140] For example, Rogers[141], Quebecor[142] and SaskTel[143] note that current LTE networks have been deployed using low-band spectrum, which has more favourable propagation characteristics. Meeting the same coverage with 3500 MHz spectrum would result in massive costs and delay the roll-out of 5G, particularly in rural areas.

12. The additional requirements will especially harm new competitors like Shaw who are in the process of investing billions of dollars to expand and build network infrastructure. The new requirements will upend our investment strategy and put us at a significant disadvantage in meeting the deployment requirements compared to the Big 3, who have had a decades-long start in building-out their networks in rural areas. The costs of meeting the additional deployment obligations would be so prohibitive for Quebecor that it has indicated that it may have to refrain from purchasing spectrum in the 3500 MHz in certain service areas.[144] As Professor Cramton explains, the wireless competitors currently have a much higher intensity of capital investment relative to revenues than the Big 3, which would need to increase to even more significant levels to meet the additional deployment requirements.[145]

13. We recognize that the intent behind the Department's proposal is to promote timely rural deployment. However, licensees already have an incentive to deploy 5G as fast as possible. We agree with Eastlink that the factors that would likely delay the timely

139 Shaw, Initial Comments dated 2 August 2019, Section V.
140 See Bell, Initial Comments dated 2 August 2019, paragraph 89; Rogers, Initial Comments dated 2 August 2019, paragraph 200; Quebecor, Initial Comments dated 2 August 2019, paragraph 71; Eastlink, Initial Comments dated 2 August 2019, paragraph 40; SaskTel, Initial Comments dated 2 August 2019, paragraph 34.
141 Rogers, Initial Comments dated 2 August 2019, paragraph 202;
142 Quebecor, Initial Comments dated 2 August 2019, paragraphs 71 and 73.
143 SaskTel, Initial Comments dated 2 August 2019, paragraph 34.
144 Quebecor, Initial Comments dated 2 August 2019, paragraph 76.
145 Cramton (July 2019), page 9.

deployment of 5G would be outside of our control (e.g., equipment ecosystem or inability to access infrastructure on time). It would therefore be unduly punitive for the Department to burden licensees with the additional deployment requirements.

14. For similar reasons, we do not support Telus' proposal that the Department require licensees to meet the Year 20 target in Year 12 and add 25 per cent to the new Year 12 target.[146] Telus' various proposals to accelerate deployment requirements are aimed at putting disproportionate pressure on competitors that are still in the process of building out their networks.

***2. No incumbent head start***

15. Shaw reiterates that in order to ensure a competitive 5G environment, existing licensees should not be given a head-start advantage in any form. In keeping with the submissions found at Section VII of our Initial Comments in this Consultation, Shaw reiterates that in large urban population centres,

(a) The protection period cannot be longer than six months in urban areas from the date of issuance of flexible use licences to either an existing licensee or a new licensee.

(b) As soon as flexible use licences have been issued to either the existing licensee or to the competitor, the protection period for that existing licensee must begin to run.

(c) In the alternative, where the existing licensees cannot demonstrate continued service to subscribers that it had on June 8, 2018, the existing licensees should not be entitled to protection and notification periods. Just as existing licensees are required to transition only when its continued operations in a specific area would constrain deployment by a new licensee, new licensees should be required to notify and protect only where its new operations would constrain an existing licensee.

[146] Telus, Initial Comments dated 2 August 2019, paragraphs 193 to 195.

### *3. Deployment deadlines should be based on expiration of protection periods*

16. In its Initial Comments (page 36/paragraphs 127-130), Shaw submitted that regardless of the level of deployment obligations adopted in the licensing framework, where the entry of a competitive new licensee has been delayed due to the application of notification and protection measures, the deployment timelines should be extended to take account of the delayed implementation and in-service dates arising from the transition process.

17. We agree with Bell and SaskTel that the timeframe for all deployment requirements should be based on the expiration of the protection periods for Tier 4 service areas and not based on the initial licence issuance. Like Shaw, SaskTel notes that operators cannot begin to deploy in most Tier 4 service areas until two or three years after licence issuance because of the protection period for incumbent licensees.

18. Shaw urges the Department to adopt Shaw's proposal to extend the deadlines for meeting the deployment obligations as a function of actual in-service dates.

### *4. Payment obligations should also flow from when the spectrum is usable*

19. Bell proposed that final payments of 80 per cent of winning bids not be due until 30 days after the spectrum is put in service. While the wording of Bell's proposal was not restricted to situations in which a protection period in the transition plan applied, Bell justified this proposal on such grounds. At a minimum, Bell proposed that final payment of 80 per cent of winning bids not be due until 31 January 2021 or 30 business days following the announcement of provisional licence winners.

20. Shaw agrees that given the particularities of 3500 MHz spectrum, the final payments representing 80 per cent of the winning bid amounts should not be due until 30 days after the spectrum is put in service.

## D. Annex H Conditions of Licence (Q15)

**Q15—ISED is seeking comments on the proposed conditions of licence outlined in annex H that would apply to flexible use licences.**

### *1. R&D condition should be removed*

21. In our Initial Comments, Shaw recommended that the Department remove the proposed Research and Development (R&D) condition of licence in Annex H of the Consultation Document and all other mobile wireless spectrum licences.

22. Both Bell and Rogers also propose removing the R&D requirement.[147] However, we do not support Bell's alternative proposal to significantly lower the threshold for the R&D expenditure requirement (Licensees with less than $1 billion in annual gross operating revenues from wireless services in Canada, averaged over the term of the licence, are exempt from the R&D expenditure requirement).[148] Bell's proposal is designed to harm emerging competitors and competition. The Department expressly increased the revenue threshold in 2014 to $1 billion because the department recognized that the R&D condition placed an administrative and financial burden on small and medium-sized licensees.[149]

### *2. Mandatory roaming remains essential*

23. We disagree with Bell and Telus' proposals to remove and/or revise the mandatory roaming condition of licence, including Telus' proposal to eliminate the requirement to provide in-footprint roaming. We share Rogers' view that mandatory roaming remains essential.[150] The mandatory roaming condition of licence is an important part of the Department's policy of promoting facilities-based competition. Facilities-based competitors like Shaw require roaming as we expand and build-out our networks.

24. In particular, we do not support Bell and Telus' proposal to limit mandatory roaming to existing network technologies and not future 5G networks.[151] There is no legitimate basis to distinguish between different wireless technologies and carve-out 5G from the mandatory roaming condition. Their proposal is designed to give them a competitive

[147] Bell, Initial Comments dated 2 August 2019, paragraph ES32; and Rogers, Initial Comments dated 2 August 2019, paragraph 207.
[148] Bell, Initial Comments dated 2 August 2019, paragraph 100.
[149] The Department, *Decisions on Conditions of Licence Regarding Research and Development and Learning Plans,* 19 February 2014, paragraphs 14, 17 and 19.
[150] Rogers, Initial Comments dated 2 August 2019, paragraph 213.
[151] Bell, Initial Comments dated 2 August 2019, paragraph 115; and Telus, Initial Comments dated 2 August 2019, paragraphs 210 and 211.

edge in 5G and limit competition, which is precisely the type of behaviour that the mandatory roaming condition protects against.

## X. AMENDING THE CONDITIONS OF LICENCE FOR ALL CURRENT FIXED WIRELESS ACCESS LICENCES (Q16)

**Q16A—ISED is seeking comments on its proposal to amend all FWA conditions of licence based on the proposed conditions of licence in annex I.**

**Q16B—ISED is seeking comments on its proposal to apply this amendment on June 5, 2019, plus one year—June 5, 2020.**

25. Shaw supports the Department's proposals in relation to Q16.

## XI. OPENING BIDS AND ELIGIBILITY POINTS (Q17-Q18)

**Q17— ISED is seeking comments on the proposed opening bids as presented in annex D.**

### A. Opening Bid Amounts Should be Reduced (Q17)

26. In our Initial Comments,[152] we demonstrated how the proposed national average opening bid price for all unencumbered blocks in all Tier 4 service areas ($0.147/MHz-pop) is higher than the final prices paid in many international jurisdictions that have recently auctioned mid-band 5G spectrum. In a similar vein, Quebecor and Telus pointed out that the Department's proposed opening bid prices exceed nearly all global comparators (national average opening bid and end prices for 5G 3 GHz spectrum) since 2017.[153]

27. Unreasonably high spectrum costs add to the financial and other risks involved in deploying a 5G network. The more we expend on critical 3500 mid-band spectrum resources due to high prices leaves us with less capital to fund 5G network deployment.

28. Accordingly and consistent with the views of several interested parties in this Consultation, the Department should reduce its proposed opening bid price of $0.232 per MHz-pop in service areas with populations over $2 million to the range of $0.17.

[152] See section VI (pages 31-32/paragraphs 107-113) of our Initial Comments in this Consultation.
[153] Telus, Initial Comments dated 2 August 2019, paragraph 229; and Quebecor, Initial Comments dated 2 August 2019, paragraph 86.

This is similar to Quebecor's proposal to reduce the opening bid price and is in line with the opening bid prices in mid-band 2500 MHz spectrum and with the prices paid globally.[154]

## B. Eligibility Points Should Be Smoothed in 18 Most Populated Markets (Q18)

**Q18—ISED is seeking comments on the proposed eligibility points for spectrum licences in the 3500 MHz as outlined in annex D, and pre-auction deposits as outlined above.**

29. As set out in our initial comments, the eligibility point structure that ISED has proposed is too dramatically weighted toward just three licence areas. The consequence of this eligibility point structure is that even if ISED implements a high initial activity rule (between 90 and 95 percent, for example), bidders will have an incentive to park insincere demand in the top markets for the added flexibility it affords. This will likely result in a highly sequential auction, harming price discovery and efficiency.

30. To reduce the degree of sequential bidding, we reiterate the proposal set out in our initial comments[155] that ISED smooth eligibility points by population within the 18 most populated markets (the first decile of market areas). ISED's proposal allocates 8,190 eligibility points to the 18 most populated markets. That is, in markets that comprise a total of 69.3 percent of the population of Canada, ISED is assigning 87.8 percent of the eligibility points, which is entirely appropriate. Therefore, Shaw suggests that ISED simply smooth these 8,190 bid points based on population within the 18 most populated markets. The resulting eligibility point structure would be as follows:

154 Quebecor, Initial Comments dated 2 August 2019, paragraph 89.
155 Shaw, Initial Comments dated 2 August 2019, pages 48-49/paragraphs 171-174.

**Table – Proposed Eligibility Points Within 18 Most Populated Markets**

| Area Rank | *Name* | *ISED Bid Points* | *Proposed Points* |
|---|---|---|---|
| 1 | Toronto | 3,260 | 2,370 |
| 2 | Montréal | 2,020 | 1,470 |
| 3 | Vancouver | 1,270 | 920 |
| 4 | Ottawa/Outaouais | 290 | 490 |
| 5 | Calgary | 280 | 480 |
| 6 | Edmonton | 270 | 450 |
| 7 | Québec | 120 | 310 |
| 8 | Winnipeg | 110 | 280 |
| 9 | Guelph/Kitchener | 90 | 240 |
| 10 | London/Woodstock/St.Thomas | 90 | 230 |
| 11 | Victoria | 60 | 160 |
| 12 | Halifax | 60 | 150 |
| 13 | Windsor/Leamington | 50 | 140 |
| 14 | Kelowna | 50 | 130 |
| 15 | Barrie | 50 | 120 |
| 16 | Niagara-St.Catharines | 50 | 110 |
| 17 | Saskatoon | 40 | 90 |
| 18 | Trois-Rivières | 30 | 50 |

## XII. LICENCE RENEWAL PROCESS (Q19)

**Q19—ISED is seeking comments on the proposed renewal process for spectrum licences in the 3500 MHz band.**

31. Shaw supports the Department's renewal process as proposed at Q19.

*** End of document ***

This is **Exhibit "58"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

This is **Exhibit "59"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

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Commissioner of Oaths etc.
Province of Ontario
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This is **Exhibit “60”** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

This is **Exhibit "61"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
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Province of Ontario
LSO P15816.

This is **Exhibit "62"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

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LSO P15816.

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Commissioner of Oaths etc.
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Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

[redacted]

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Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

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Commissioner of Oaths etc.

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Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

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Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

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# Get more with Freedom WiFi.

With Freedom WiFi, customers get exclusive access to over 450,000 WiFi hotspots across Western Canada.

# How To: Connect to Shaw Go WiFi as a Shaw Mobile Customer



## Contents



## Overview

All Shaw Mobile plans include access to over 450,000 Shaw Go WiFi hotspots across Western Canada. Your Shaw Mobile device is designed to automatically connect and authenticate when you have WiFi turned on and are in-range of the ShawPasspoint or ShawMobileHotspot network names.

This is **Exhibit "71"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

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Raha Mohammad

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Province of Ontario
LSO P15816.

Shaw)

# Shaw Mobile Has Arrived — Fast LTE and Shaw's Fibre+ Network Combine to Give Customers an Innovative Wireless Experience With Unprecedented Savings

July 30, 2020 06:00 ET | Source: Shaw Communications Inc.

- Shaw Internet customers in B.C. and Alberta can now add wireless to their Shaw Fibre+ Internet to get as many as six lines of unlimited nationwide talk and text for $0 monthly.
- Since everyone uses their smartphones and their wireless data differently, Shaw Mobile also offers an Unlimited Data plan starting at $45 a month with $10 a month US and Mexico roaming options.
- Shaw Mobile customers leverage the power of Shaw's Fast LTE, Shaw's in-home WiFi service and Canada's largest network of WiFi hotspots, powered by Shaw's Fibre+ network.
- Shaw Mobile is available across B.C. and Alberta in 19 Shaw retail stores, including 12 new stores opening in the coming weeks, and over 120 locations of Shaw's largest national retail partners across these two provinces.
- Building on the strength of its Fibre+ network, Shaw introduces the 'Brighter Together' advertising campaign focusing on the powerful combination of Shaw Mobile and Shaw's position as the new leader in gig speed internet in Western Canada.

CALGARY, Alberta, July 30, 2020 (GLOBE NEWSWIRE) -- Shaw Communications Inc. today announced the launch of Shaw Mobile — a new wireless service in Canada that leverages Shaw's Fast LTE and Fibre+ network to provide Shaw Internet customers with an innovative wireless experience that can virtually eliminate their monthly wireless data bill.

Beginning today, Shaw Mobile is available to all Shaw Internet customers who can easily add up to six wireless lines of unlimited nationwide talk and text for $0 a month on the most popular handsets.

Communications. "We are pleased to deliver what Canadians have wanted from their wireless carriers for years — innovation and technology that helps them save money without sacrificing connectivity."

Shaw Mobile customers can leverage the best WiFi experience both at home, with their Shaw Fibre+ Internet, and while on the go, by automatically connecting to any of Shaw's thousands of WiFi hotspots across Western Canada powered by Shaw's Fibre+ network. When customers aren't on WiFi, they can pay only for the data they need and connect to Shaw's Fast LTE network or to any of Shaw's roaming partners nationwide.

Shaw Mobile is designed around the fact that Canadians have been increasingly choosing to reduce their monthly wireless costs by using their smartphones on WiFi rather than cellular data. This long- term trend has been driven by the dramatic growth in the number of WiFi hotspots, the number of devices capable of connecting to WiFi, and more recently, the movement toward working from home.

As the new leader in gig speed internet service in Western Canada, Shaw's gigabit download speeds are available to over a million more homes and businesses than its closest competitor. Shaw's Fibre+ network, including in-home and public WiFi hotspots, provides great speed and coverage both within and outside the home to allow customers to spend more time on WiFi and less time on cellular.

"By leveraging WiFi powered by Shaw's Fibre+ network rather than LTE data, many Shaw Mobile customers can realistically eliminate much of their monthly wireless data expense," Mr. Shaw said. "It's 2020 and Canadians expect to be connected all the time wherever they are. With Shaw Mobile, that doesn't have to mean large wireless data charges.

"To our existing Shaw Internet customers, we're pleased to provide you with unlimited Canada-wide talk and text at no charge as a way of thanking you for your unwavering support and loyalty to our company," Mr. Shaw said. "For B.C. and Alberta residents who don't yet have their internet with Shaw, we invite you to take advantage of our Fibre+ Gig speeds available to more than 99 per cent of our market, and bundle it with a mobile service that will give you unprecedented savings exclusively available for Shaw customers."

experience by deploying new spectrum, expanding its lineup of premium devices, and building out a robust retail distribution network. Shaw has invested nearly $30 billion since fiscal 2013 to build, upgrade, and expand its Fast LTE and Fibre+ networks and services. Shaw's Freedom Mobile, recognized as an industry innovator and champion of wireless affordability, continues to serve almost 1.8 million Canadians.

**Shaw Mobile puts customers firmly in control of their mobile data**

Because everyone uses their phones and their data differently, in addition to being able to connect to Shaw's WiFi network, Shaw Mobile gives people the ability to customize their mobile data allotment with two rate plans — By The Gig and Unlimited Data — that can be mixed and matched to meet the needs of as many as six household members.

Customers who use only a modest amount of LTE data or who are mostly connected to WiFi can choose a By The Gig option and pay only for additional wireless data they need, starting at $10 per GB for use on the Shaw or Nationwide networks. By The Gig customers also get the benefit of unused data automatically rolling over for up to 90 days.

For those customers who need more data, Shaw Mobile's Unlimited Data plan option includes 25GB of our Fast LTE network data for only $45 per month — an abundance of wireless data at a price that's more than 40 per cent less than similar plans offered by other competitors. Beyond this, customers can choose to top their data up one gig at a time or have access to unlimited data at reduced speeds.

Shaw Mobile's launch comes at a time when Canadians are searching for better value and more features from their wireless provider.

"The launch of Shaw Mobile is the best example yet of how facilities-based providers can compete and innovate to deliver true wireless affordability," said Paul McAleese, President, Shaw Communications. "We are the only provider offering $0 talk and text to internet customers in Canada and our data plans empower them to find an option that fits their unique needs."

"Since the onset of the COVID-19 pandemic, telecom service providers such as Shaw, and its employees, have been working hard to provide high quality telecommunications services to Canadians in these trying times," said Navdeep Bains, Canada's Minister of Innovation, Science and Industry. "Now more than ever, Canadians rely on these services for work, school, finances and further reduce prices. We applaud Shaw for offering innovative options to help Canadians stay connected."

"Expanding our wireless infrastructure will enable economic development, spur job creation, and help get Albertans back to work," said Tanya Fir, Alberta Minister of Economic Development, Trade and Tourism. "Part of our economic recovery plan includes developing plans to support the fastest, most secure use of technology and data by Albertans, and today's announcement is a great step in that direction."

"Affordable wireless services ensure people can stay productive at work, connect with friends and family and unwind after a long day without worrying about unexpected and costly charges at the end of the month," said B.C. Minister of Citizens' Services Anne Kang. "The Province is a vocal advocate for the affordability and availability of mobility services for people in British Columbia. I want to thank Shaw for taking steps to reduce wireless bills for B.C. families."

More information about Shaw Mobile's innovative new plans can be found at www.shawmobile.ca/plans.

**Customers can choose Shaw Mobile plans on Canada's most popular handsets**

Shaw Mobile will feature premium and popular handsets from the world's top providers, including Apple, Samsung, Google, LG, and Motorola. When a customer switches to Shaw Mobile, they can bring their own device or purchase a new device using Shaw's MyTab program.

More information on compatible handsets is available at shawmobile.ca/devices

Shaw Mobile customers pay no data overage charges in Canada when using the Shaw and Nationwide networks and can leverage WiFi calling features on compatible devices to make calls from any WiFi network anywhere in the world.

While the biggest savings come from bundling Shaw's wireless and internet services, Shaw Mobile is also available as a standalone product at market rate.

locations across Alberta and B.C., including 12 new and enhanced stores in high-traffic shopping centres to be opened by the end of the summer. Shaw Mobile will also be available at over 120 locations of our largest national retail partners across B.C. and Alberta, beginning today, Thursday, July 30.

Shaw stores have been redesigned to provide customers with an immersive destination where they can explore, learn, and interact directly with the latest Shaw products and services, including Shaw's suite of in-home technology. All stores are designed with physical distancing in mind and will continue to adhere to applicable health and safety protocols to keep customers and employees safe.

Building on the strength of its Fibre+ network, the new stores reflect Shaw's "Brighter Together" advertising campaign and new visual identity. Shaw's new creative was produced in collaboration with Shaw's marketing agency of record, Rethink.

Brighter Together is a call to action suggesting that there is a brighter future for Canadians with Shaw. By bringing Shaw's total offering together, consumers get the two-fold benefit of constant high-speed connectivity and the reassuring feeling that they've made the brightest choice. The new visual identity expands the Shaw colour palette and uses fibre imagery as a symbol of connectivity and brightness.

"The language of our industry has changed, with more and more Western Canadians understanding that our value lies in the strength and capacity of our network. Our new refreshed visual identity puts Shaw's Fibre+ network at the forefront and reinforces the technology available to customers through our exciting products," Mr. McAleese said. "This new identity will serve as the foundation for all our new advertising and merchandising in the foreseeable future."

The new imagery will be extended across Shaw-branded business units, expressing a consistent experience across all customer touchpoints, including advertising and digital properties such as shaw.ca and social media accounts.

More information, including a complete list of retail locations, can be found at shaw.ca.

**MEDIA LINKS:**

High-resolution images related to Shaw Mobile are available at: https://bit.ly/2PdceoR, https://bit.ly/3gbPBNF, https://bit.ly/3gdIAM7, https://bit.ly/2DgNw4w, https://bit.ly/39KLupl

B-roll new Shaw retail locations is available at: https://youtu.be/QTwCPNR7hho

High-resolution images related to Shaw's new retail space are available at: https://bit.ly/2EwWDP8, https://bit.ly/33kcriH, https://bit.ly/2CQN2Cn, https://bit.ly/2P4jK5H

**About Shaw**

Shaw Communications Inc. is a leading Canadian connectivity company. The Wireline division consists of Consumer and Business services. Consumer serves residential customers with broadband Internet, Shaw Go WiFi, video and digital phone. Business provides business customers with Internet, data, WiFi, digital phone and video services. The Wireless division provides wireless voice and LTE data services through an expanding and improving mobile wireless network infrastructure.

Shaw is traded on the Toronto and New York stock exchanges and is included in the S&P/TSX 60 Index (Symbol: TSX - SJR.B, SJR.PR.A, SJR.PR.B, NYSE – SJR, and TSXV – SJR.A). For more information, please visit www.shaw.ca

**Caution Regarding Forward Looking Statements**

Statements included in this news release that are not historic constitute forward looking statements within the meaning of applicable securities laws. Such statements include, but are not limited to, statements concerning the availability of handsets and the opening and timing of opening of new retail locations in B.C. and Alberta. These statements are based on assumptions made by Shaw that it believes are appropriate and reasonable in the circumstances, including without limitation, the availability of equipment and devices and the forbearance of governments in implementing any emergency measures or changes in laws or regulations that may impact Shaw Mobile, including retail store closures in response to the ongoing COVID-19 pandemic. Undue reliance should not be placed on any forward-looking statement. Many factors, including those not within Shaw's control, may cause actual results to be materially different reasonable terms, changes in the general economic, market and business conditions; emergency measures implemented by any government; changes in laws, regulations and decisions by regulators that affect Shaw Mobile or the markets in which it operates; and other factors described in Shaw's 2019 Annual Report under the heading "Known events, trends, risks and uncertainties" and in its Management's Discussion and Analysis for the period ended May 31, 2020. The foregoing is not an exhaustive list of all possible factors. Should one or more of these risks materialize, or should assumptions underlying the forward-looking statements prove incorrect, actual results may vary materially from those described herein. Any forward-looking statements contained herein speak only as of the date of this news release. Except as required by law, Shaw disclaims any obligation to update any forward-looking statement.

**For media inquiries, please contact:**

Shaw Communications Inc.

Chethan Lakshman, VP, External Affairs

(403) 930-8448

chethan.lakshman@sjrb.ca

### Tags

Shaw Mobile | Fibre+ Network | Shaw Communications | Fibre+ Gig

## Recommended Reading

April 13, 2022 08:00 ET

Source: Shaw Communications Inc.

**Shaw Announces Second Quarter and Year-to-Date Fiscal 2022 Results**

Second quarter consolidated financial results include adjusted EBITDA1 of $632 million along with free cash flow1 of $217 million The Company continues to focus on balancing growth and profitability...

April 05, 2022 17:00 ET

Source: Shaw Communications Inc.

**Shaw Communications Inc. Second Quarter Fiscal 2022 Results**

CALGARY, Alberta, April 05, 2022 (GLOBE NEWSWIRE) -- Shaw Communications Inc. ("Shaw") will be releasing its consolidated results for the second quarter (ending February 28, 2022) on Wednesday,...

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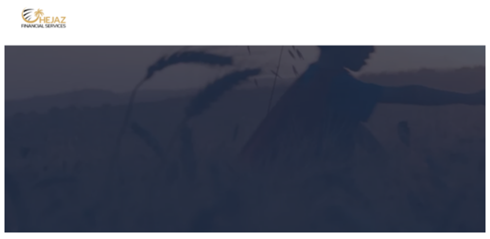
[UPDATE Secretary Hillary Clinton and Thought Leade...]

May 02, 2022 18:04 ET



[Hejaz Financial Services Discusses the Economic Im...]

May 02, 2022 18:00 ET

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This is **Exhibit "73"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

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Raha Araz Mohammad
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Province of Ontario
LSO P15816.

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**SUBMISSION OF SHAW COMMUNICATIONS INC.**
**TO THE HOUSE OF COMMONS STANDING COMMITTEE ON INDUSTRY, SCIENCE AND TECHNOLOGY**

**STUDY ON THE PROPOSED ACQUISITION OF SHAW BY ROGERS**

***Introduction – Canada must keep its eye on the future***

1. Shaw and Rogers were founded by entrepreneurs inspired to delight and exceed the expectations of their customers. At Shaw, we remain guided by the words of our late founder, JR Shaw, to "be bold and courageous, and thrive on change." The well-being of the customers that our company has cherished over the last fifty years, and their futures, are at the heart of this deal. That is why we have chosen to join forces with Rogers.

2. The proposed combination of Shaw and Rogers will benefit Canadians and strengthen Canada, for the next fifty years and beyond. The global communications industry is at a transformative point of inflection that creates opportunities for all aspects of our economy and society. For Canadian consumers and businesses, we see enormous potential for more affordable, seamless connectivity that is constantly improving, at a moment where Canada urgently needs to bolster its position for a new era of global competitiveness. With strong connectivity, we can bring meaningful technological innovation to life for Canadians, driving our country's ongoing prosperity. At the same time, we need to ensure that *all* Canadians, including Indigenous, rural and remote communities, have an equal chance to participate in the digital society of the future.

3. Given the foundational technological change ahead of us, the policies that may have worked in the past will not assure success for the future. Canada should be proud of our collective achievements to date, where the quality and resilience of our networks lead the world, while prices are steadily declining.[1] However, we cannot take affordable network connectivity for granted. Going forward, our policy framework needs to sharpen its focus on support for the massive next-generation network infrastructure builds that our country needs to bridge the digital divide and create a platform for economic growth.

4. Together, Shaw and Rogers will be able to join their respective wireline and wireless assets to create more resilient and innovative networks, much more rapidly, and with much more expansive coverage than each could have done on their own. Consumers and businesses will see higher speeds and reliability, lower latency, and a more affordable, seamless experience, while the full potential of 5G emerges over the coming years, driving growth and jobs.

[1] See: CRTC, Communications Monitoring Report (2020) [**CRTC CMR 2020**], which found that nationally, average internet prices across speed bands have gone down since 2016 (CMR, pg.148). See also CRTC CMR 2020 at:

- Table 5.1 *Average reported monthly price, price differential and growth, by service (region: Canada)*, which demonstrates that between 2016-2019, prices for internet plans meeting the CRTC's universal service objective (50/10 Mbps) decreased by 5.6%, online: https://crtc.gc.ca/eng/publications/reports/policyMonitoring/2020/cmr5.htm#t5.1.
- Table 5.2 *Mobile baskets included in the 2019 Annual Communications Pricing* Survey, which demonstrates that between 2016-2019, prices for all wireless service tiers decreased, online: https://crtc.gc.ca/eng/publications/reports/policyMonitoring/2020/cmr5.htm#t5.2

5. During this Committee's study, certain parties asked you to look at this transaction through an unduly myopic lens that is coloured by debates of the past and distorts the facts of the deal. We respectfully ask Committee members to assess these rigid, misleading arguments with skepticism. As parliamentarians, the Committee understands that we cannot look backwards for solutions to guide us going forward. The future of all Canadians, and the prosperity of our country, depend on a modern approach, rooted in support for building the world-leading, secure connectivity that will foster a path to success.

6. The facts of the deal, and the future reality it will deliver, are as follows. With Shaw and Rogers bringing their overwhelmingly *complementary* assets from *different geographies* together, we can expand and accelerate the investments needed to compete more effectively so that consumers across a broader footprint can benefit from more affordable and higher quality services over the longer term. Canadians, including those in more remote areas, will also be able to access the next-generation networks they need to seize economic opportunities – including more and better jobs – much more rapidly. In short, the coming together of Shaw and Rogers will translate into extraordinary consumer benefits and greater prosperity for Canada in the increasingly competitive global digital economy.

7. As the Committee is aware, the proposed transaction is subject to various regulatory review processes under applicable legislation and policies that will take place over the next several months. Shaw will work closely and constructively with Rogers and the regulators throughout these processes. During the review period, we also look forward to demonstrating to Canadians the benefits of this deal and everything it offers them for their futures.

***Canada's Future Depends on World Leading Connectivity***

8. The proposed combination of Shaw and Rogers comes amid a global pandemic during which connectivity has provided a lifeline to our economic, social, cultural, and physical well-being. Over the course of a few days last spring, the nerve-centres of Canadian businesses and institutions, ranging from large to small, shifted from office buildings to kitchen tables and living rooms. Despite the magnitude of that migration and lack of advance warning, Canada's broadband networks performed impressively well at that intensely challenging moment, and through the various lockdown waves over the past year. This was only possible because of the billions of dollars invested each year by Canada's telecom sector, which contributed more than $74 billion in GDP and supported more than 630,000 jobs across Canada in 2019 alone.[2]

9. We should be proud of how our networks performed during the pandemic, but we should be equally alarmed by the fact that many Canadians did not experience this connectivity triumph. Regrettably, approximately 600,000 Canadians live in areas without broadband connectivity. The rural/urban digital divide is the most urgent of our telecommunications policy challenges and one of the primary drivers for the proposed coming together of Shaw and Rogers.

[2] Accenture Strategy, "Investing in Canada's Digital Infrastructure: The Economic Impact of Wireless/Wireline Broadband and the Post-COVID Recovery" (2020), online: EN_Investing_in_Canadas_Digital_Infrastructure.pdf (cwta.ca), at pg. 13.

10. While it is imperative that we address the digital divide, it is also critical that we turn our minds to the unparalleled demands that our networks will face in the coming years. The connectivity infrastructure that sustained us through COVID-19 is no match for what Canada needs as our economy and society experience a full digital transformation – a transformation that COVID-19 has accelerated. In the new digital world, Canada's network infrastructure will require capacity and coverage on a scale that is many multiples of what we have today. The financial resources needed to build the networks of tomorrow cannot be overestimated.

11. As this Committee knows well, the transition to 5G is underway across the globe and will continue over the next several years. 5G represents much more than simply a new version of 4G. For many Canadians, 5G may be a mysterious future state that is difficult to understand or appreciate. So why should Canadians care about 5G or other next-generation investments? The *mystery* of 5G is the *opportunity*. Innovation comes from the undiscovered solution or novel approach, and there are so many potential developments and outcomes from 5G that we do not know and cannot articulate today. Their shape and relevance to Canadians will be designed by the human imagination and ingenuity of creators.

12. For Shaw, we want those creators to be Canadian, and for many of those innovations to take place on Canadian soil. Neither Shaw, nor any member of this Committee, nor any Canadian, should be satisfied with watching from the sidelines as other countries lead the way in 5G innovations. Canadian policymakers have the responsibility to lay the groundwork for Canada's success in the deployment of 5G. With that groundwork in place, Canadian network builders, including the combined Shaw/Rogers, will invest in the networks we need for that world. Without those networks, Canada's innovative potential in a digital world will be stifled.

13. Despite the unknowns, there are many things we already know that confirm 5G's transformative potential. It will enhance Canadians' quality of life, contributing nearly $40 billion in annual GDP by 2026, and adding nearly 250,000 permanent jobs to the Canadian economy. [3] These high-quality jobs will be critically important throughout Canada as we begin our post-pandemic economic recovery, especially in Shaw's home province of Alberta, which has been hard hit by the dual impact of the pandemic and the resource sector downturn. As just one example, the combined Shaw/Rogers company will have the resources to transform Calgary into a 5G technology hub that will kick-start a robust, diversified recovery, with an influx of new skilled jobs in engineering and technology.

14. In terms of applications, we know that municipalities all over the world see the potential of 5G to resolve many of their most significant challenges. The "Smart Cities" umbrella covers a broad range of initiatives that allow towns, cities, and communities of all sizes to significantly reduce costs and environmental impacts, while enhancing the effectiveness of their operations for the benefit of citizens.[4] Cars can move better through streets with sensor

[3] Accenture Strategy/CWTA, "Fuel For Innovation: Canada's Path in the Race to 5G" (2018), online: https://www.5gcc.ca/wp-content/uploads/2018/06/CWTA-Accenture-Whitepaper-5G-Economic-Impact_Updates_WEB_06-19-2018.pdf, at pg. 2.

[4] Accenture Strategy, "Smart Cities: How 5G Can Help Municipalities Become Vibrant Smart Cities" (2017), online: https://www.accenture.com/_acnmedia/PDF-43/Accenture-5G-Municipalities-Become-Smart-Cities.pdf#zoom=50 [**Accenture Smart Cities**], at pgs. 6-10.

technology, which will reduce carbon emissions, travel time, and accidents.[5] Outdoor lighting can be triggered by need, which will reduce cost, light-pollution and carbon emissions.[6] The structural integrity of highways and bridges can be monitored more efficiently, which will reduce costs, support targeted repair, and enhance safety.[7] "Smart" communities will also depend on the proliferation of "smart buildings" whose maintenance, lighting, heating, ventilation, and air conditioning will be guided by the sensor connections made possible by 5G.[8] In the world of food production, 5G sensors will play a critical role in improving precision and efficiency, [9] while the world of healthcare can look forward to remote surgeries, among other transformative innovations for patients and care.[10] As shown in several of the examples above, 5G also offers the potential to provide real solutions to the most pressing social policy issue of our time: climate change.[11]

15. Canadians want and deserve to be global leaders in the new "smart" world, but they need the networks that can support that leadership. Each of the smart car, smart power-grid, smart building, smart farm – or any other smart thing – is only "smart" because of the power of connection. Networks provide the essential links between the sensors, objects, information systems, data analyses and, of course, people. These links empower limitless interactions and the corresponding creations that emerge from them. Without network connections, the world of "*smart*" will not exist.

16. That is why the race to 5G is a contest in bringing wireless and wireline technologies together to achieve a scale in all types of connections, requiring many times the amount of radio equipment, spectrum, and wireline transport that have been used in conventional networks. Moreover, 5G will not arrive with the flick of a switch. The proliferation of 5G-enabled applications, many of which will be powered by Artificial Intelligence and the Internet of Things, depends on a level of ultra-low latency, seamless coverage, speed, and capacity that will take time, technological evolution, and billions of dollars in investments. If our two companies come together, we'll have the resources to make these investments, which is why the combination of Shaw and Rogers will be a net contributor of investment and jobs in Western Canada.

17. There are no "short cuts" in the race to 5G. As explained by Ericsson, 5G will bring new security challenges for connectivity networks, "with broader attack surfaces, more devices and increased traffic loads. We must have networks that are trustworthy, resilient, and secure

[5] Accenture Strategy/CWTA, "Accelerating 5G in Canada: Benefits for Cities and Rural Communities" (2019), online: https://www.cwta.ca/wp-content/uploads/2019/11/Accelerating-5G-in-Canada-V11-Web.pdf [**Accenture Accelerating 5G**], pg. 7
[6] Accenture Smart Cities, pg. 7.
[7] Raconteur, "Why 5G smart roads are the future of transport." (2019), online: https://www.raconteur.net/technology/5g/5g-smart-roads/.
[8] Accenture Accelerating 5G, pg. 10.
[9] Farm Credit Canada, "Why 5G connectivity matters to agriculture", online: https://www.fcc-fac.ca/en/knowledge/5g-connectivity-matters-to-agriculture.html.
[10] PWC, "How can 5G connect a post-COVID healthcare ecosystem?", online: https://www.pwc.com/gx/en/industries/tmt/5g/5g-in-healthcare.html.
[11] See: Accenture Strategy/CWTA, "Accelerating 5G in Canada: The Role of 5G in the Fight Against Climate Change", online: https://www.cwta.ca/wp-content/uploads/2020/10/5G_Role_In_Fight_Against_Climate_Change.pdf. As described in this report (pg. 4), "5G will be key in enabling reductions in carbon emissions across Canadian industries, while reducing the carbon footprint of the wireless industry itself."

by design – all on day one."[12] As 5G will be the foundation for virtually all critical sectors, it is easy to see the increasing importance of network security and data privacy. The policy and regulatory environment must support the investment needed for the robust and reliable network infrastructure that is immune to security threats – and such investments will be monumental.

18. Together, Rogers and Shaw will have the scale to deploy high-quality, high-capacity, and secure 5G and other next-generation networks at a pace that will put Canada in a position of international leadership.

***The Urgent Need to Bridge the Digital Divide***

19. Just as the pandemic has highlighted the essentiality of robust and reliable broadband, it has also exposed the unacceptable rural-urban digital divide. A disproportionate number of rural, remote, and Indigenous communities are currently cut-off from the educational, economic, health and social benefits of connectivity, denying their full participation in the economy and society, and further marginalizing certain communities. Bridging the rural-urban digital divide is the most urgent, nationally important telecommunications policy problem facing our country.

20. Without connectivity, underserved communities are cut-off from the information and resources they need to get by. However, "getting by" is not the standard we should apply. We want all Canadians to *thrive* in the digital era. Strong connectivity enables that. Remote surgery for someone living in a fly-in community will only be possible with seamless connectivity. Entrepreneurs who want to develop and run new businesses from a rural community can do so with high-quality connectivity, bringing fresh streams of ideas to our innovation economy. Indigenous peoples can leverage the power of broadband to create new economic opportunities within their communities, while enriching their cultural heritage and sharing it with the rest of Canada.

21. Given the possibilities associated with connectivity, Shaw strongly supports the Government's highly ambitious target of connecting 98% of Canadian households by 2026.[13] However, as of 2019, only 87.4% of households had access to broadband that meets the CRTC's universal service objective (50Mbps download, 10Mpbs upload),[14] with only 45.6% of rural households and 34.8% of First Nations reserves, versus 98.6% of households in urban areas.[15]

22. If Canada is going to effectively address the challenge of connecting underserved communities, we cannot underestimate the size of the problem. Canada is an enormous country, with a small population and low population density. Canada's network builders need

[12] Ericsson, "5G network security is national security" (23 Apr 2020), online: https://www.ericsson.com/en/blog/2020/4/5g-network-security-is-national-security.
[13] Government of Canada, *Fall Economic Statement 2020: Supporting Canadians and Fighting COVID-19*, online: https://www.budget.gc.ca/fes-eea/2020/report-rapport/toc-tdm-en.html, pg. 81.
[14] CRTC CMR 2020, at Table 4.1 *Key telecommunications availability indicators (% of population for mobile services and % of households for Internet services)*, online: https://crtc.gc.ca/eng/publications/reports/policyMonitoring/2020/cmr4.htm#a2.1.
[15] CRTC CMR 2020, at *Availability of broadband in various communities*, online: https://crtc.gc.ca/eng/publications/reports/policyMonitoring/2020/cmr4.htm#a2.3.

to invest in much more expansive networks than our global peers, but with a much smaller addressable market. That is why it is so important for Shaw and Rogers to come together. Combining our assets, and our addressable markets, will take advantage of strong network economies of scale and avoid inefficient duplicative investment, freeing up resources for economically challenging expansion to underserved parts of the country.

23. With the specific commitments made by Rogers, and the inherent efficiencies derived from combining Shaw with Rogers, the proposed transaction will help bring an equality of opportunity to currently underserved Indigenous, remote, and rural communities. By connecting the people and businesses of these communities to the rest of the world, we will give those communities the power of expression, the prosperity of economic growth and – critically – the flexibility to stay close to home and not move to the city.

***Investment and Competition Depend on Scale and Regulatory Certainty***

24. Shaw is, and always has been, a network builder. The decision to combine with Rogers reflects our fundamental commitment to facilities-based investment and competition, and the associated benefits to Canadians. We know the Committee is aware of the many billions of dollars that Shaw has spent building wireline and wireless networks over five decades. The Shaw family and the entire Shaw Communications organization take great pride in what we have been able to achieve for all the communities and Canadians we serve.

25. As we look ahead to the next chapter of telecommunications investment in Canada, it is clear to Shaw that delivering quality, choice, and affordability to Canadians in the next-generation landscape requires the scale and scope of a converged network that can only be achieved by joining forces with Rogers. The geographic expanse of our wireless radio access network is just one example. Despite five years of intense investment of over $7 billion, representing roughly a third of Shaw's market capitalization, our coverage is relatively small.[16] We want to do so much more, but Shaw is a small company in comparison with leading telecommunications companies in North America.[17] With our small addressable market and already high penetration rates, we have come to see the inherent scale limitations in what Shaw can do alone for Canada's future connectivity.

26. On top of these challenges, over the past two years, Shaw's expansion and next-generation investment plans have been chilled due to unexpected tremors in the regulatory framework.

[16] See network maps prepared and filed by Shaw/Rogers with this Committee.
[17] As of August 31, 2020, Shaw served 7.1M subscribers and generated $5.4B (CAD) in total operating revenues in F20. By way of comparison:

- AT&T serves 249.8M subscribers and generated $171.8B (USD) in operating revenues in 2020
- Verizon Communications Inc. serves 142M subscribers and generated $128.3B (USD) in operating revenues in 2020
- Comcast Corporation serves 33.1M subscribers and generated $128.3B (USD) in operating revenues in 2020
- América Móvil serves 287.5M subscribers and generated approximately $63.6B (CAD) in operating revenues in 2020

See: Shaw 2020 Annual Report (year ended 31 Aug 2020), online: https://www.shaw.ca/corporate/investor-relations/financial-reports; AT&T (year ended 31 Dec 2020), online: https://investors.att.com/~/media/Files/A/ATT-IR/financial-reports/quarterly-earnings/2020/q4-2020/4Q20_Financial_Statements.pdf; Comcast 2020 Annual Report (year ended December 31, 2020), online: https://www.cmcsa.com/financials/annual-reports; Verizon Communications Inc. – Q4 2020 Results (year ended December 31, 2020), online: https://www.verizon.com/about/investors/quarterly-reports/4q-2020-earnings-conference-call-webcast; América Móvil – Q4 2020 Quarterly Report (year ended 31 Dec 2020), online: https://www.americamovil.com/investors/reports-and-filings/quarterly-results/default.aspx

As we recently told this Committee,[18] Shaw's confidence in making investment and strategic decisions has been shaken by significant uncertainty in the regulatory framework's support for facilities-based investment and competition.

27. In February 2019, the Commission announced its "preliminary view" that it would be appropriate to mandate a mobile virtual network operator (**MVNO**) regime. This sent a very unfortunate and shocking signal that the CRTC is willing to provide resellers of wireless services with privileged, regulated access to incumbent networks.[19] Later that same year, in August 2019, the CRTC unexpectedly imposed drastically lower rates that network builders like Shaw can charge resellers for third-party internet access (**TPIA**).[20] These unsustainable rates are significantly below-cost and fail to provide any reasonable return on investment.

28. The TPIA rate decision caused many providers, including Shaw, to pause and reformulate investment plans, distracting and delaying the industry from making the massive investments that Canadians need. Similarly, the CRTC's preliminary view in support of MVNO forced Shaw to revise our 600 MHz spectrum auction strategy on the eve of that auction, and to pull back on our plans to expand our wireless network to new markets.

29. As of April 13, 2021, the uncertainty in our regulatory ecosystem persists. This is a concern for all Canadian network builders and should be a concern for members of this Committee. The threat of regulated MVNO still looms, even as the application deadline for the 3500 MHz spectrum auction has passed. At the same time, the TPIA rates remain under review by the CRTC, with ongoing uncertainty as to whether the CRTC will set just and reasonable rates that properly compensate network builders for their costs and incent further investment. In a country which needs more investment and more connectivity in underserved communities, not less, these uncertainties are troubling.

30. For Shaw, it has been entirely unclear over the past two years whether the regulatory framework remains focused on "ensuring that Canadians have access to a world-class communication system that promotes innovation and enriches their lives."[21] This needs to change. The uncertainty needs to be definitively resolved in favour of facilities-based investment and competition so that we can collectively deliver to Canadians on this mandate and achieve the critical benefits of the digital society described above.

31. For Canada's network builders to meet the needs of Canadians, we need to make multi-billion dollar next-generation investments *and* bridge the digital divide. For that to happen, network builders need clarity and confirmation that the regulatory regime supports our efforts and recognizes their value to Canadians, while acknowledging the risks involved in the investments we undertake. If Canada's regulatory regime is designed to provide artificial

[18] See: Shaw Submissions to INDU Committee as part of the study on the Accessibility and Affordability of Telecommunications Services (18 Dec 2020), at paras. 20-27; and Shaw Submissions to INDU Committee as part of the study regarding the Canadian Response to the COVID-19 Pandemic (2 Jul 2020), paras. 16-27.
[19] Telecom Notice of Consultation CRTC 2019-57 – *Review of mobile wireless services* (28 Feb 2020).
[20] Telecom Order CRTC 2019-288 – *Follow-up to Telecom Orders 2016-396 and 2016-448 – Final Rates for Aggregated Wholesale High-speed Access Services* (15 Aug 2019) [**TO 2019-288**]. For a background and summary regarding the wholesale wireline regime and impact of TO 2019-288, see: Shaw Submissions to INDU Committee re Response to COVID-19 (2 Jul 2020), at paras. 19-23
[21] CRTC, "Our Mandate, Mission and What We Do," online: https://crtc.gc.ca/eng/acrtc/acrtc.htm.

support – and remove all risks – for resellers, this will permanently damage Canada's network strengths and economic competitiveness for decades to come.

32. Shaw sincerely wants Canada to realize the full potential of the digital transformation. The pervasive state of regulatory uncertainty, and the undue emphasis on artificial regulatory support for resale, are inconsistent with what our country needs: to build advanced and secure next-generation networks across the country. Regulators and policymakers around the world have identified 5G and rural broadband as critical priorities, and have supported and accelerated deployment through predictable, streamlined regulatory rules and requirements that incentivize and support private sector investment. Canada must do the same.

***The Transaction Results in Intensified, Expanded Competition, including in Rural Areas***

33. Shaw has always been a fierce advocate for policies that encourage sustainable, facilities-based competition. Nothing has changed. Our decision to combine with Rogers reflects our strong belief that network investment and facilities-based competition are the foundation of Canada's telecommunications system. As Canada's digital transformation accelerates, Canadian policymakers must reaffirm their commitment to the public interest in building a world-class, competitive connectivity ecosystem, which includes supporting Shaw's combination with Rogers.

34. As shown in the maps that Rogers and Shaw have tabled before this Committee in a filed undertaking, the vast bulk of Shaw's and Rogers' assets and businesses do not overlap or compete with one another. Bringing those assets together enables a nationwide converged network of complementary fibre, cable, satellite, wireless, and Wi-Fi assets that will be capable of bringing more choice and more value to a greater number of Canadian consumers and businesses, positioning Canada for the most sustainably competitive environment possible in the 5G ecosystem and beyond.

35. Canadian consumers and businesses don't – and shouldn't need to – care about the details of different assets and technologies – such as fixed, mobile, Wi-Fi, 5G, LTE, etc. What Canadian consumers and businesses do and should care about is the quality and affordability of the connection. Figuring out how to do that with the correct asset mix is the job of network builders. For Shaw and Rogers, delivering that affordable, quality connection in the future depends on this transaction.

36. 5G requires, and is driving, a convergence of connectivity where different modes of access – particularly wireless and wireline – must work together to provide the coverage and capacity that Canadians need. The web of connections needed to support 5G applications depend on innumerable wireless radio antennae deployed over many sites – what the industry calls network densification. It also demands extensive network capacity, which is fuelled through spectrum holdings. In this regard, Bell and Telus each enjoy a significant competitive advantage stemming from their combined spectrum holdings, which renders Shaw and Rogers much less effective on our own. For example, in the city of Edmonton, Bell and Telus hold 42% of the commercial mobile spectrum through their sharing arrangement, as compared to 26% held by Rogers and 15% by Shaw. The transaction will give Shaw and Rogers a fighting chance against the other national competitors.

37. The importance of wireline and its convergence with wireless for 5G applications cannot be overstated. For 5G radio antennae to connect to the world, they need to link back to robust wireline backhaul. That infrastructure, like all network infrastructure, cannot be taken for granted. For companies like Shaw and Rogers, we must make significant generational investments in our fibre-based cable networks so that we can continue to compete effectively and provide world-leading connectivity services that are seamless and affordable, while also supporting the wireline backbone on which 5G will depend.

38. If Rogers and Shaw were to compete on their own effectively in this future, converged world, they would need to duplicate the investments of the other in the asset class they lack. Otherwise, they risk becoming a stand-alone niche player that cannot innovate or contend in the connectivity ecosystem that Canada needs. However, this type of duplicative investment by Rogers and Shaw won't enhance facilities-based competition or otherwise offer incremental benefits to consumers. Instead, it will drain resources away from the investments in 5G and rural broadband that a combined Rogers/Shaw could make to compete more intensely with more affordable and more innovative services.

39. In addition to intensifying competition, the proposed transaction will expand competition. The combined company can take the resources freed up from the strong economies of scale realized by avoiding unnecessary, duplicative investments, and redeploy those resources to expanding its network footprint to areas where neither company currently competes, whether that be in rural Saskatchewan or Manitoba, or the many communities in B.C. and Alberta where the former telco monopoly remains the only game in town. The combined Shaw/Rogers company can thereby bring more valuable and affordable options to many of those who live in these Western Canadian communities that currently have little or no choice.

40. Combining the complementary Shaw and Rogers networks and businesses will create a national, converged platform with sufficient scale and resources to make the substantial investments necessary to compete vigorously in the converged, 5G environment. We are already seeing evidence of the investment and dynamic competition spurred by this transaction, with a $1.3 billion capital-raise by Telus in the weeks following the announcement.[22] That capital will be used to accelerate investments in fibre and 5G. SaskTel has similarly accelerated its 5G and fibre investment,[23] and Bell recently confirmed that the transaction makes Bell's accelerated investment plan "even more competitively important."[24] Bell's accelerated capital plan is the largest in its 141-year history.[25]

[22] Telus Press Release (via Globe Newswire), "TELUS announces closing of C$1.3 billion equity offering" (31 Mar 2021), online: https://www.globenewswire.com/news-release/2021/03/31/2202515/0/en/TELUS-announces-closing-of-C-1-3-billion-equity-offering.html#:~:text=VANCOUVER%2C%20British%20Columbia%2C%20March%2031,announced%20on%20March%2025%2C%202021.

[23] SaskTel Press Release (5 Apr 2021), "SaskTel investing $323 million in Saskatchewan in 2021-22", online: https://www.sasktel.com/about-us/news/2021/sasktel-investing-323-million-in-sk-2021-22.

[24] Presentation by BCE Inc. (Mirko Bibic) at the Scotiabank 2021 Telecom, Media & Technology Conference (March 30, 2021), online: https://www.bce.ca/investors/events/show/scotiabank-2021-telecom-media-technology-conference.

[25] Bell Press Release (4 Feb 2021), "Bell to advance fibre, wireless and rural network rollouts with at least $1 billion in accelerated capital investment over the next 2 years", online: https://www.bce.ca/news-and-media/releases/show/Bell-to-advance-fibre-wireless-and-rural-network-rollouts-with-at-least-1-billion-in-accelerated-capital-investment-over-the-next-2-years-1?page=1&month=&year=&perpage=25

41. As this discussion shows, sustainable competition does not depend on a large number of players, especially in a scale business like telecommunications. In the early 2010s, some Canadian cities had six mobile players – Mobilicity, Wind, Public Mobile, Bell, Telus and Rogers. While the number of players has declined since that time, the competitive intensity of the wireless market has increased. What matters much more than the number of players is the extent to which competitors are equipped to advance the many dimensions of competition and consumer welfare – price, value, innovation, adoption, usage and penetration. In the dynamic connectivity market of the converged 5G world, our combined entity will compete intensely and deliver on all these objectives.

42. Joining Shaw's unique satellite network and distinct wireline assets in the West with Rogers' distinct wireline assets in Central and Atlantic Canada, and combining them with the unique wireless and Wi-Fi assets of both companies will create a national, converged platform that can compete for a wide variety of consumer and business customers across the country, including in a much broader expanse of Indigenous, rural, and remote communities and in a 5G converged world. The positive economic spin-offs of empowering Canadians and our small, medium, and large businesses with more robust connectivity and more dynamic competition are limitless. In the digital world, our citizens and entrepreneurs need rapid access to competitive, innovative services across broader footprints. All of that is made possible with this transaction.

***Conclusion: Our Commitment to Build Strong, Competitive Networks for Canada***

43. Since our joint announcement of this proposed transaction, Rogers has been very clear in its specific commitments to Indigenous and remote connectivity, telecommunications affordability, jobs in Western Canada, and accelerated 5G investment. These and so many other aspects of the deal demonstrate its immense potential to position Canada for growth: in networks, in strong competition, in digital innovation, in high paying, high quality jobs, and in our country's prosperity and well-being.

44. Shaw and Rogers know we will create something extraordinary for Canada together. Both companies have been bright lights in the communications industry, for our country, and for Canadians. With this deal, we will be brighter together. By combining complementary assets into a next-generation converged network, our merged company can accelerate investment, empowering Canadians with the transformative opportunities of 5G more powerfully, sooner, and over a broader geography, than we could on our own. This will translate into stronger competition across a more expansive footprint, new jobs, more innovation, and intensified growth throughout all sectors of Canada's economy.

45. We respectfully ask for this Committee's support to advance the strength and reach of Canada's digital infrastructure and put Canada on a path for success in the post-pandemic recovery and digital era.

46. Shaw appreciates the opportunity to assist this Committee in its study of the transaction.

This is **Exhibit "83"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

This is **Exhibit "84"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

# ADVANCING HOW CANADIANS CONNECT WITH EACH OTHER AND THE WORLD


BCE

ANNUAL REPORT 2021

# Our purpose is to advance how Canadians connect with each other and the world. The Bell team is accelerating our positive momentum with unmatched investments in our networks, services and content to benefit all Bell stakeholders and support Canada's recovery while building a sustainable future as we move forward together.

## Build the best networks

Continuing to enhance our key competitive advantage with a focus on delivering the leading broadband fibre and wireless networks in locations large and small.

## Drive growth with innovative services

Leveraging our leading networks to provide truly differentiated communications services to Canadians and drive revenue growth.

## Deliver the most compelling content

Taking a unified approach across our media and distribution assets to deliver the content Canadians want the most.

## Champion customer experience

Making it easier for customers to do business with Bell at every level, from sales to installation to ongoing support.

## Operate with agility and cost efficiency

Underscoring a focus on operational excellence and cost discipline throughout every part of our business.

## Engage and invest in our people and create a sustainable future

Strengthening our leading workplace culture, recognizing that Bell's success requires a dynamic and engaged team that is committed to the highest environmental, social and governance (ESG) standards.

# Network and service innovation supports recovery and growth

Bell continued to adapt to keep Canadians connected throughout 2021, with the Bell team delivering market-leading innovations that are laying the foundation for long-term success while providing sustainable dividend growth for our shareholders.

## 2021 FINANCIAL PERFORMANCE

| | ACTUAL | TARGET |
|---|---|---|
| Revenue growth * | 2.5% | 2%–5% |
| Adjusted EBITDA growth (1)* | 3.0% | 2%–5% |
| Net earnings growth * | 7.2% | n/a |
| Capital intensity (2) | 20.6% | 18%–20% |
| Net earnings per share (EPS) growth * | 8.3% | n/a |
| Adjusted EPS growth (1)* | 5.6% | 1%–6% |
| Cash flows from operating activities ($ millions) | $8,008 | n/a |
| Free cash flow ($ millions) (1) | $2,995 | $2,850–$3,200 |

* Compared to 2020

## DRIVING GROWTH IN SHAREHOLDER VALUE

**20.9%** Increase in share price in 2021

**27.9%** Total shareholder return in 2021 (3)

**5.1%** Increase in dividend per common share for 2022

**14** Consecutive years of 5% or greater dividend growth

(1) Adjusted EBITDA is a total of segments measure, adjusted EPS is a non-GAAP ratio and free cash flow is a non-GAAP financial measure. These financial measures do not have any standardized meaning under International Financial Reporting Standards (IFRS). Therefore, they are unlikely to be comparable to similar measures presented by other issuers. We define adjusted EPS as adjusted net earnings per BCE common share. Refer to section 11, *Non-GAAP financial measures, other financial measures and key performance indicators (KPIs)* of the BCE 2021 MD&A, on pages 121 to 125 of the BCE 2021 Annual Report for more information on these measures including, in the case of adjusted EBITDA, a reconciliation to net earnings being the most comparable IFRS financial measure and for free cash flow, a reconciliation to cash flows from operating activities being the most comparable IFRS financial measure.

(2) Capital intensity is defined as capital expenditures divided by operating revenues.

(3) The change in BCE's common share price for a specified period plus BCE common share dividends reinvested, divided by BCE's common share price at the beginning of the period.

# Connecting Canadians with the best in broadband communications

The Bell team met the challenges of an evolving COVID situation to support our customers and lead the way in Canadian communications, with consistent improvement on customer experience and the fastest networks to deliver outstanding financial and operational results. Our strong focus on innovation and investment enabled solid subscriber growth in retail Internet, IPTV and wireless, while ensuring we exceeded our broadband network expansion targets. We're also supporting Canada's digital future by building the next-generation broadband fibre and wireless infrastructure that will enhance our delivery of world-class solutions for consumers, business customers and governments.

| BCE RETAIL SUBSCRIBERS (millions) | **2021** | 2020 | Change |
|---|---|---|---|
| Mobile phone | 9.46 | 9.16 | +3.2% |
| Mobile connected device | 2.25 | 2.06 | +9.4% |
| Internet (1) | 3.86 | 3.70 | +4.2% |
| TV (1) | 2.74 | 2.74 | (0.1%) |
| Residential telephone services (1) (2) | 2.30 | 2.48 | (7.5%) |
| **Total (1)** | **20.60** | **20.15** | **+2.3%** |

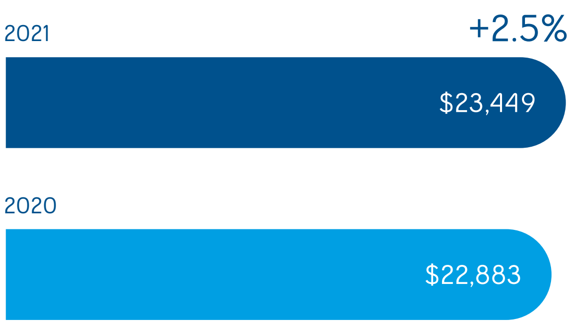
**23.55M**
Total Bell consumer, business and wholesale customer connections

(1) Excludes wholesale subscribers.
(2) Excludes business telephone services.

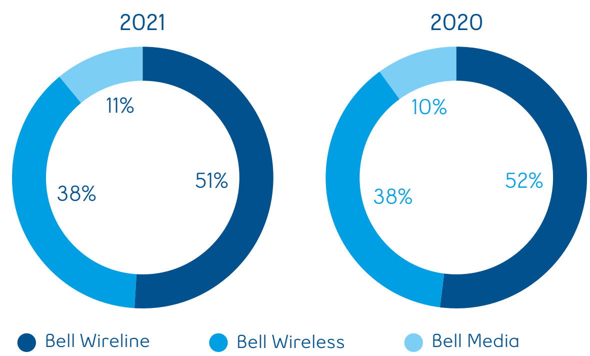
# Growing our business while supporting Canada's economic recovery

Strong strategic execution by the Bell team enabled us to achieve our revenue and adjusted EBITDA targets for the year while continuing to fund our network expansion plans. Our historic capital expenditure acceleration program is bringing broadband connections to more urban and rural locations while delivering innovative services and the most compelling content that Canadians want.

OPERATING REVENUES ($ millions)




OPERATING REVENUES BY SEGMENT




NET EARNINGS
($ millions)

| | | |
|---|---|---|
| **2021** | **$2,892** | +7.2% |
| 2020 | $2,699 | |

ADJUSTED EBITDA
($ millions)

| | | |
|---|---|---|
| **2021** | **$9,893** | +3.0% |
| 2020 | $9,607 | |

NET EARNINGS ATTRIBUTABLE TO COMMON SHAREHOLDERS
($ millions)

| | | |
|---|---|---|
| **2021** | **$2,709** | +8.4% |
| 2020 | $2,498 | |

ADJUSTED NET EARNINGS[1]
($ millions)

| | | |
|---|---|---|
| **2021** | **$2,895** | +6.0% |
| 2020 | $2,730 | |

CASH FLOWS FROM OPERATING ACTIVITIES
($ millions)

| | | |
|---|---|---|
| **2021** | **$8,008** | +3.3% |
| 2020 | $7,754 | |

FREE CASH FLOW
($ millions)

| | | |
|---|---|---|
| **2021** | **$2,995** | (10.5%) |
| 2020 | $3,348 | |

CAPITAL EXPENDITURES
($ millions)

| | | |
|---|---|---|
| **2021** | **$4,837** | +15.1% |
| 2020 | $4,202 | |

(1) Adjusted net earnings is a non-GAAP financial measure. This financial measure does not have any standardized meaning under IFRS. Therefore, it is unlikely to be comparable to similar measures presented by other issuers. Refer to section 11, *Non-GAAP financial measures, other financial measures and key performance indicators (KPIs)* of the BCE 2021 MD&A, on pages 121 to 125 of the BCE 2021 Annual Report for more information on this measure including a reconciliation of adjusted net earnings to net earnings attributable to common shareholders being the most comparable IFRS financial measure.

# Accelerating positive momentum towards a better future

Throughout the COVID-19 pandemic, BCE has maintained a clear focus on building positive momentum for all Canadians. In 2021, our actions continued to drive positive social and economic changes, helping connect more customers, communities, employees, partners and shareholders to a better future.

As Canada's leading builder of communications networks since 1880, Bell has a long history of connecting Canadians to the people and things that matter. Recognizing the important role our networks and services have in the social and economic well-being of Canadians, Bell accelerated capital expenditures in fibre, rural broadband and 5G wireless networks in 2021, delivering the world's best communications technologies to more homes and businesses than originally projected. Our accelerated capital expenditures are set to continue throughout 2022.

Bell's overriding purpose is to advance how Canadians connect with each other and the world. Increased capital spending on accelerated network deployments, the acquisition of additional wireless spectrum auctioned by the Government of Canada and ongoing support for rural broadband initiatives are all in line with our purpose, as are investments we are making to achieve our ESG targets.

### BELL FOR BETTER: ESG LEADERSHIP

For the BCE group of companies, our environmental, social and governance (ESG) leadership defines who we are, what we stand for and what we do.

Launched in 2021, our Bell for Better commitments to help build a better world, better communities and a better workplace encapsulate our approach to ESG. As one of Canada's largest employers and with a presence in communities across the country, we have always excelled at driving economic growth and important societal changes that improve quality of life, deliver new opportunities and support responsible and sustainable growth. We are proud to continue this tradition.

Along with delivering networks and services that reduce harmful emissions and support a greener economy, Bell is the first communications company in North America to receive ISO 50001 certification for energy management. Consistently ranked as one of Canada's greenest employers, we continued building on our successful environmental initiatives with new commitments announced in 2021: to achieve carbon neutral operations across Bell by 2025, and to move forward with the adoption of science-based targets to reduce greenhouse gas emissions by 2030 in line with the Paris Agreement.

Bell also continues to gain widespread recognition as a top employer across a range of categories, including as one of Canada's most family-friendly employers and one of the best workplaces for young people and young professionals. Named one of Canada's Top Diversity Employers for the fifth consecutive year in 2021, we are always building support for DEI within Bell and elsewhere, for gender diversity and Black, Indigenous and People of Colour (BIPOC) and LGBTQ+ communities.

Our flagship commitment to addressing mental health now stands at $155 million by 2025, in support for Bell Let's Talk initiatives – including anti-stigma, community access and care, research and workplace programs. This includes increased support in 2021 for the ground-breaking Bell Let's Talk Diversity Fund and the Bell Let's Talk Post-Secondary Fund.

## SUSTAINABLE GROWTH ENABLED BY A STRONG FINANCIAL PERFORMANCE

Bell's clear strategic roadmap and focus on investing in growth opportunities has enabled us to help millions of Canadians manage through the pandemic, as well as to build momentum for a strong recovery and a more positive future for all our stakeholders.

This of course included delivering value to our shareholders. In this regard, backed by the efforts of our strong management team, BCE's quarterly results improved sequentially throughout 2021 as we adapted to the ongoing impacts of COVID-19. Notably, BCE revenue was back to approximately 99% of pre-pandemic levels in 2021.

Our healthy free cash flow generation together with a strong balance sheet supported accelerated capital expenditures totalling $4.8 billion in 2021 as well as our $2.07 billion acquisition of high-value 3500 MHz wireless spectrum which is critical to enabling the full potential of 5G. And our sound financial position allowed us to increase our common share dividend 5.1% to $3.68 effective with the Q1 2022 payment on April 15, 2022, the 14th consecutive year BCE has increased the dividend by at least 5%.

## BOARD UPDATE

All of us on the BCE Board of Directors were saddened by the passing of Thomas Richards in October 2021 and, more recently, Ian Greenberg in January. Tom was a seasoned technology and telecom executive who brought a wealth of experience and leadership insights to the Board after joining in 2020 and serving into 2021. Ian was a role model in media innovation, corporate leadership and community service and a valued member of the Board since Astral Media's acquisition by BCE in 2013, inspiring all of us with his integrity, insight and optimism for the future.

Integrity and optimism are also guiding our DEI initiatives across the BCE group of companies, and in 2021 we adopted a new target of minimum 35% gender-diverse directors on the BCE Board.

As your Chair and on behalf of every member of the BCE Board, I thank shareholders for your support and confidence in our great company as we strive to achieve a better and more sustainable future.

Gordon M. Nixon
Chair of the Board
BCE Inc.

# Stepping up for customers and communities

## For Bell, customers are at the centre of everything we do. Attracting, winning and retaining customers is essential to achieving our purpose: to advance how Canadians connect with each other and the world.

Bell is Canada's leading communications company, and as the COVID-19 pandemic continued throughout 2021, we moved forward with initiatives to better connect, inform and entertain Canadians while also investing to support Canada's pandemic recovery and future growth.

Guided by six purpose-driven strategic imperatives – build the best networks; drive growth with innovative services; deliver the most compelling content; champion customer experience; operate with agility and cost efficiency; and engage and invest in our people and create a sustainable future – Bell is better positioned than ever to drive positive change forward.

### ACCELERATING INVESTMENTS IN NETWORKS AND DRIVING INNOVATION

To help Canadians and our business recover from COVID-19 and grow well into the future, Bell increased our investments to historic levels as part of a two-year acceleration launched in 2021. Enabled by our solid financial position and a stable policy and regulatory environment, we spent an unprecedented $4.8 billion in capital expenditures for fibre, 5G and rural broadband deployments, expanding the availability of better broadband to 7.2 million homes and businesses in Atlantic Canada, Ontario, Québec and Manitoba. This includes meeting our target of reaching 1 million homes and businesses in hundreds of rural communities with our Wireless Home Internet service a full year ahead of schedule.

Our ongoing fibre expansion provides more Canadians with access to the world's best Internet technology, supporting remote work and online learning as well as providing the advanced connectivity that businesses, organizations and communities need. Deploying more pure fibre connections in urban and rural communities alike also expands the availability of our innovative Fibe TV and other digital services, and in 2021, we added Internet subscribers at levels not seen in several years, supporting our plan to accelerate fibre deployments even more aggressively in 2022.

We are equally committed to driving investment in wireless services. Accelerating investments in our 5G network, the most awarded in Canada, also ensures more of our customers can access wireless services that are among the best in the world. Now reaching more than 70% of the national population, the fast speed of Bell 5G connections is set to become even faster and their latency lower as we increase coverage and deploy newly-acquired 3500 MHz spectrum in 2022.

Overall, our accelerated investments mean that innovative applications and solutions for customers that rely on converged fibre and 5G networks are becoming more widely available. This includes TSN 5G View / Vision 5G RDS launched in 2021, as well as new services for Canadian businesses, such as Smart Supply Chain powered by Bell IoT Smart Connect. We have also entered into partnerships with Amazon Web Services (AWS), Google Cloud and others that will expand the use of multi-access edge computing (MEC) and other next-generation technologies.

### CHAMPIONING CUSTOMER EXPERIENCE

Making it easier for customers to do business with Bell, we continue to develop self-serve tools like our award-winning MyBell, Virgin Plus and Lucky Mobile My Account apps. At the same time, we are adopting artificial intelligence (AI) and machine learning capabilities to enhance how the Bell team works with customers and expand the availability of innovative services like Move Valet, Self Install and, new in 2021, Virtual Repair.

Every initiative continues to drive better customer service experiences. According to the 2020–2021 annual report from Canada's Commission for Complaints for Telecom-television Services (CCTS), we led the industry for a sixth consecutive year in significantly reducing customer complaints. In fact, Bell had a decline of 8% overall while complaints across the industry saw an increase of 9%.

### CREATING AND DELIVERING COMPELLING CONTENT FOR CANADIANS

Increasingly competing with large global content providers, Bell Media remains focused on creating and delivering content that reflects the communities we serve. With new and award-winning original series, documentaries and Canada's top-rated national and local news programs, CTV, CTV News, TSN and RDS continued to be top choices for Canadians in 2021. In addition, our entertainment specialty channels CTV Comedy, Discovery and CTV Drama ranked as the top three this past broadcast year for the first time.

Our Noovo network also emerged as a much-welcomed competitive alternative for customers in Québec as we continue to reinforce our commitment to deliver great content across all genres for French-language audiences. Building on the popularity of our on-demand digital services and apps – including ctv.ca, noovo.ca, Crave, TSN Direct and RDS Direct, and iHeartRadio – we also launched the ad-supported NoovoMoi.ca video platform in 2021 and, more recently, the noovo.info news service.

### INVESTING IN OUR TEAM

Facing many challenges due to the COVID-19 pandemic, Bell team members remain as engaged as ever in helping move our business forward, embracing new ways of working while continuing to improve customer experiences and provide the critical connectivity, support and information that our customers need.

In 2021, we continued to provide opportunities for our team members to develop and apply skills needed to succeed. We also expanded mental health support and fostered a more inclusive and accessible workplace, strengthening a culture that reflects values we share with the communities we serve.

By investing in our people, we continue to build on a legacy that has been a key to Bell's success for 142 years – an ability to help Canadians recover from crises and become stronger than before. Moving forward with leading ESG initiatives and Bell for Better commitments, we are all helping to create a thriving, prosperous and more connected world. On behalf of the entire Bell team, I thank all of our shareholders for your ongoing support as we continue to advance how Canadians connect with each other and the world.

Mirko Bibic
President and Chief Executive Officer
BCE Inc. and Bell Canada

# Build the best networks

Bell has always been a builder from our earliest days, starting with the telephone and continuing to bring generations of Canadians together with the latest technology. Today, Bell is delivering the future to customers with an unmatched infrastructure investment in the best broadband fibre and wireless technologies, including the country's best 5G network.

Bell's world-class networks have been a difference-maker throughout the evolving COVID crisis, providing reliable telecommunications infrastructure that is contributing to economic recovery and supporting remote work, online learning and critical connections for businesses, organizations and communities. Even with unprecedented demand, Bell's wireless and wireline networks have consistently delivered over 99.99% availability, enabling Canadians to connect and do business with the world and positioning us for success in the digital economy.

In 2021, Bell advanced our boldest buildout program ever with additional planned capital expenditures of $1.7 billion over the next two years in network expansion of broadband fibre, Wireless Home Internet (WHI) and mobile 5G. This capital expenditure acceleration is in addition to the approximately $4 billion in capital expenditure that Bell typically spends on broadband network infrastructure and expansion each year.

Bell's historic capital expenditures are already delivering faster and better connectivity to more Canadians. With the largest and fastest-growing fibre footprint in Canada, in 2021 our network reached more rural communities in Atlantic Canada, Québec, Ontario and Manitoba.

Bell surpassed our 2021 network expansion targets, delivering approximately 1.1 million new fibre and Wireless Home Internet locations, and expanding mobile 5G coverage to more than 70% of the national population. Notably, Bell completed our Wireless Home Internet buildout reaching our target of 1 million households one year ahead of schedule.

In Québec, Bell continued to roll out high-speed Internet as part of Operation High Speed, a partnership with the Canadian and Québec governments to provide 100% fibre Internet connections to more than 30,000 homes and businesses in nearly 100 communities. Building on Bell's early 5G launch in Montréal, most regions of Québec now have 5G access following Bell's ambitious expansion to municipalities across the province.

In Canada's North, Bell subsidiary Northwestel is bringing full fibre high-speed Internet access to every land-served community in the northern territories through the Every Community project. Agreements with low Earth orbit (LEO) satellite companies Telesat and OneWeb are exploring the further expansion of high-speed Internet to remote communities throughout the North, bridging the digital divide.

The Bell team completed a major undersea cable replacement project in the Bay of Fundy, a critical piece of fibre infrastructure, which provides Internet and voice services to communities across Atlantic Canada.

We're delivering broadband to more Canadians, surpassing our accelerated network expansion targets in 2021, passing 1 million locations with Wireless Home Internet one year ahead of schedule and expanding our direct fibre footprint to communities large and small across the country.

## GOING FARTHER AND FASTER

Not only are we reaching more Canadians, we're delivering speeds that are enabling smart cities and businesses, immersive video and gaming experiences, remote telehealth, self-driving vehicles, and new applications that will change the way we work, live and play.

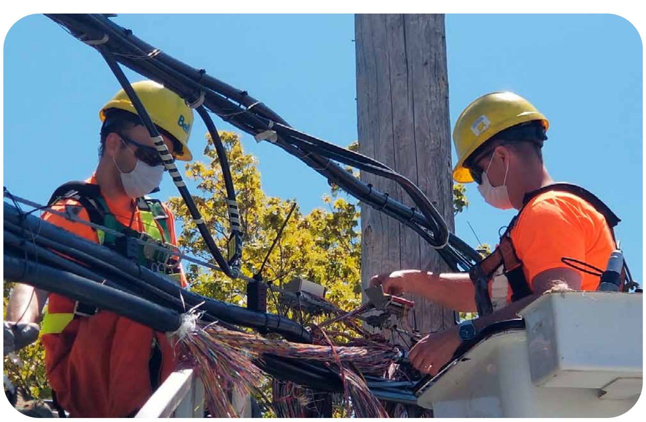
PCMag again ranked Bell's 4G and 5G mobile networks as the fastest in the country in its latest national network performance tests while Global Wireless Solutions (GWS) ranked Bell 5G as the nation's best.

With more than 2,700 central office locations across the country, Bell has more network points of presence than any other carrier in Canada, a key enabler for multi-access edge computing (MEC) that brings the computing power, processing and storage potential of 5G closer to developers and end users.

These 5G connections are poised to become even better in 2022 as we enhance the network's capabilities using 3500 MHz spectrum acquired in 2021. This investment will not only drive Bell's ongoing leadership in 5G, it will help bridge the digital divide with enhanced broadband access for more rural and remote communities and offer infinite service possibilities for consumers and business users, from augmented reality and machine learning to smart homes, vehicles and cities.

Bell built on 5G research partnerships at Western University and Université de Sherbrooke to support IoT applications, innovative manufacturing and smart energy management as part of a new project with The PIER (Port Innovation, Engagement, and Research) and Halifax Port Authority to help shape the future of the transportation, supply chain and logistics industries in Canada.

Our ongoing network expansion across the board is also delivering clear results for Bell, with industry-leading net subscriber Internet additions reaching levels not seen in several years. It's also opening the door to new innovations and future growth opportunities for Bell and its customers across the country.



Bell continues to advance our boldest buildout program ever with historic planned capital expenditures to deliver faster and better connectivity to more Canadians.

# Drive growth with innovative services

Bell is enabling success in an increasingly digital world, bringing more innovation to Canadian homes and businesses on the best networks available. Our historic infrastructure investment means that more people have access to services and tools to grow their business, share information, connect remote communities, be entertained and capitalize on new ideas to improve our world.

This includes fast home and mobile Internet access, industry-leading Wi-Fi and Smart Home products, and the next generation of remote work, security and cloud solutions.

Throughout the COVID crisis, Bell not only kept Canadians connected and informed with outstanding reliability, we continued to deliver new innovations built on the strength of our leading broadband wireless and 5G networks.

### THE 5G ADVANTAGE

As the most awarded 5G network in Canada, Bell continued to drive the next generation of mobile innovation, and is in a great position to capture more IoT and next-generation solutions revenue through the convergence of 5G and fibre.

Bell 5G capitalizes on the power of both wireless and fibre communications, and with 94% of Bell's cell sites connected to its fibre network and more network points of presence than any other carrier, Bell 5G leads in providing the low latency critical to real-time applications ranging from remote surgery to ultra-HD video.

The speed and capacity of Bell's 5G network, coupled with our unparalleled fibre infrastructure and rapidly expanding network footprint, is helping us take the country's top-ranked 5G service even further. The result is a future with infinite service possibilities for consumers and business users, from augmented reality and machine learning to smart homes, vehicles and cities to benefit Canadians no matter where they live.

### INNOVATIVE PARTNERSHIPS FOR GROWTH

In 2021, Bell was the first Canadian communications provider to partner with AWS to leverage MEC, building on our leadership in next-generation services for business customers and consumers across the country. This was followed by a collaboration with AWS and VMware to help organizations across Canada plan, simplify and manage their hybrid cloud transformations.

Bell also joined with Google Cloud to combine our 5G network leadership with Google's expertise in multicloud services, data analytics and AI to deliver next-generation experiences for Bell customers across Canada.

A partnership with SCALE AI, a Montréal-based investment and innovation hub, is helping reduce installation time for new fibre connections by accelerating several steps in the supply chain using AI solutions. Bell is also offering a portfolio of software-as-a-service (SaaS) solutions for enterprise customers to support their digital transformations, including Smart Supply Chain powered by Bell IoT Smart Connect for fleet and supply chain operators. This secure cloud-based platform aggregates IoT and operational data, delivering a single unified view of a company's drivers and entire fleet of vehicles, as well as other data such as the temperature of cargo, to optimize and automate tracking and management.

Bell Business Markets is also simplifying and enhancing security operations for major organizations as they shift to the cloud with the launch of BSURE, a fully managed cybersecurity solution for business that combines Bell's proven security expertise with state-of-the-art threat detection and management technology from Fortinet.




Bell continues to be the most awarded 5G network in Canada, including being ranked Canada's Fastest 5G Network for the second time in a row in the Ookla 2021 Speedtest Awards and winning top honours from GWS for best 5G network as well as PCMag recognition for fastest mobile networks (4G and 5G) overall.


The power of 5G is delivering more innovations like the expansion of TSN 5G View / Vision 5G RDS, the exclusive in-app feature for TSN's coverage of Toronto Raptors home games.

## MAKING COMMUNITIES BETTER

With Canada's largest portfolio of IoT solutions specifically designed to empower smart city transformations, Bell is enabling the fast and secure collection of data from multiple sources for a diverse array of applications, including water leak detection, asset management, smart waste management and energy management.

Working with Esri, Canada's leading geographic information system (GIS) provider, Bell continued to collaborate on the creation of Smart City IoT solutions for municipal governments across the country. The Bell Integrated Smart City Ecosystem is helping communities of all sizes build on their existing smart city investments, adopting new pre-integrated IoT solutions to deliver seamless data solutions to city management, workers and citizens.


The speed and capacity of Bell's 5G is delivering infinite service possibilities for consumers and business users, from augmented reality and machine learning to smart homes, vehicles and cities to benefit Canadians no matter where they live.

## ENGAGING CONSUMERS AT HOME AND ON THE GO

Bell continues to be Canada's largest TV and Internet service provider, and the ongoing expansion of our fibre connections is contributing to subscriber growth and increased customer satisfaction.

We continued to expand the availability of our products and services to recognize the multiple devices consumers use at home and on the go. In addition to a strong lineup of leading smartphones, devices, modems, apps and other products, in 2021 Bell launched the new Home Hub 4000 featuring powerful Wi-Fi 6 technology for fibre customers in Ontario and Québec.

The power of Bell's 5G also included initiatives like the expansion of TSN 5G View / Vision 5G RDS to Toronto Raptors home games in addition to regional coverage of the Montreal Canadiens and Toronto Maple Leafs. Our 5G collaborations continued with a partnership with TikTok Canada that lets creators paint together with friends in real time while physically apart, and a new connected car partnership equipping Honda and Acura vehicles with built-in Wi-Fi hotspots powered by the Bell LTE network.

Bell also continued to deliver unparalleled value to Canadians by further reducing monthly pricing for Virgin Plus mobile data plans. The price reductions also achieved the federal government's target of a 25% drop in wireless pricing for mid-range plans ahead of schedule.

# Deliver the most compelling content

Bell Media is Canada's #1 content creation company with premier assets in TV, radio, digital media, out-of-home advertising and leading-edge distribution platforms like Crave, Bell Fibe TV, Virgin Plus TV and Bell Satellite TV, offering a full range of options to consumers and advertisers alike.

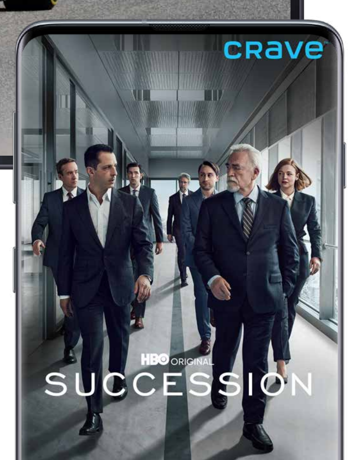
Reflecting our focus on accelerating digital revenue growth, Bell Media launched Bell DSP, a new demand-side ad-tech platform developed with advanced advertising company Xandr. Available now to Canadian advertisers and agencies, Bell DSP delivers a world-class programmatic marketplace with increased automation and discoverability for easier media buying and more impactful results.

Bell Media's French-language network Noovo celebrated a successful first year, delivering impressive ratings growth and increased market share. Noovo Info aired its first French-language federal leaders' debate and election night coverage, bringing new voices and fresh perspectives to the Québec news scene while working alongside CTV's experienced news team. The partnership was a game changer for our news organization and reinforced our commitment to a unified content strategy, delivering the most compelling content to Canadians in French and English.

This year also saw the launch of Noovo's ad-supported all-in-one digital video platform Noovo.ca and the new Noovo app, offering access to live and on-demand Noovo programming as well as content from lifestyle destination NoovoMoi.ca, and specialty channels Canal D, Canal Vie, Investigation, VRAK and Z.


Bell's investment to acquire the operations of Montréal's Octane Racing Group Inc., promoter of the Formula 1 Canadian Grand Prix, the largest annual sports and tourism event in the country, secures this prestigious event through 2031. This transaction confirms Bell's commitment to deliver the most compelling content across every platform, increasing our presence in the Québec media marketplace through significant investments in culture, sports and entertainment.

CTV marked a milestone 20th year as Canada's most-watched network, while CTV.ca confirmed the top spot as the country's #1 Canadian advertising-based video-on-demand (AVOD) platform. As a leading investor in Canadian content, CTV launched its fall season with a robust lineup, featuring new original series, and specials, which join a strong roster of award-winning shows across Bell Media properties, and CTV News, Canada's most-trusted news brand.


Bell Media is Canada's content leader, spanning conventional, pay, specialty and streaming TV in both official languages across channels like Crave, Noovo, TSN and more.


Bell Media is Canada's premier destination for the most championship sports events, original homegrown hit series and top trending reality TV.


Bell Media remains Canada's sports leader, with TSN and RDS home to the most championship events, and wall-to-wall sports action. This year Canada's #1 sports network TSN made history with the first all-female broadcast team for an NBA game.

The launch of TSN 5G View / Vision 5G RDS was an industry first, offering fans an immersive in-game sports viewing experience powered by Bell's 5G network. With TSN 5G View / Vision 5G RDS, viewers control how they watch the action directly from their Bell smartphones, including Montreal Canadiens, Toronto Maple Leafs and Toronto Raptors home games, while enhancing TSN and RDS broadcasts with up-close access through a multitude of in-arena cameras.

Bell Media's English-language entertainment specialty channels CTV Comedy, Discovery and CTV Drama took the Top 3 spots for the first time ever this past broadcast year with A18–49; Bell Media also had the top French entertainment specialty channel this fall with Canal D. This year MuchMusic was revitalized as a digital-first network available across major social media platforms and is now the #2 Canadian broadcast brand on TikTok with more than 1 million followers, second only to TSN.

Bell Media also remains Canada's top radio broadcaster with 109 stations available through our iHeartRadio platforms. This year, Bell Media rebranded 25 stations with the launch of the BOUNCE radio network. BOUNCE joins Bell Media's suite of national radio brands including MOVE Radio, Pure Country and Virgin. Astral, our out-of-home advertising business, continues to manage its more than 50,000 advertising locations in key urban markets nationally.

## EXPANDING CONSUMER CHOICE WITH COMPELLING CONTENT

Now serving more than 2.9 million Crave subscribers, Bell continued to deliver new options with the launch of Crave Mobile, offering access to the streaming service's unparalleled content library, and Crave Total for multiple user access across a full range of screens.

Meeting evolving audience demand for content in the format of their choice, Bell also charted an increase in time viewers spent across its roster of TV services, including Virgin Plus TV, the Bell Streamer, the Fibe TV app, and Bell Media's AVOD platforms, CTV.ca and Noovo.ca and their apps.

Bell Media original productions continued to enjoy growing success in the United States. Roku recently acquired CTV original comedy Children Ruin Everything, and Mary Makes It Easy debuted on Food Network US. Fan favourite Letterkenny is airing a new season on Hulu while Letterkenny spinoff series Shoresy was also acquired by Hulu. Canadian hit Transplant will launch its second season on NBC this year.

Production resources continue to expand with the construction of new stages and production facilities at Pinewood Toronto Studios, and our partnership with Montréal's Grandé Studios continues to bring increased resources to Québec's French-language content creation and production communities.

Bell Media was recognized with 10 awards at the 36th Prix Gémeaux Gala, an impressive 50 Canadian Screen Awards, 7 films supported by Crave and Super Écran featured at Toronto International Film Festival (TIFF), and received 36 National and local news awards from the Radio Television Digital News Association (RTDNA).

Bell Media's suite of brands cater to every type of media consumer across all platforms, in both official languages, with the most-compelling content in Canada in news, sports and entertainment.

# Champion customer experience

We continue to make it easier for customers to do business with Bell at every level, from sales to installation to ongoing support. Amid a time of continuous change and uncertainty, the Bell team has been agile and efficient in delivering service improvements for our customers. Focused on championing the customer experience, we have kept Canadians connected with expansive and ongoing innovation in the ways we deliver service and support in an increasingly digital world.

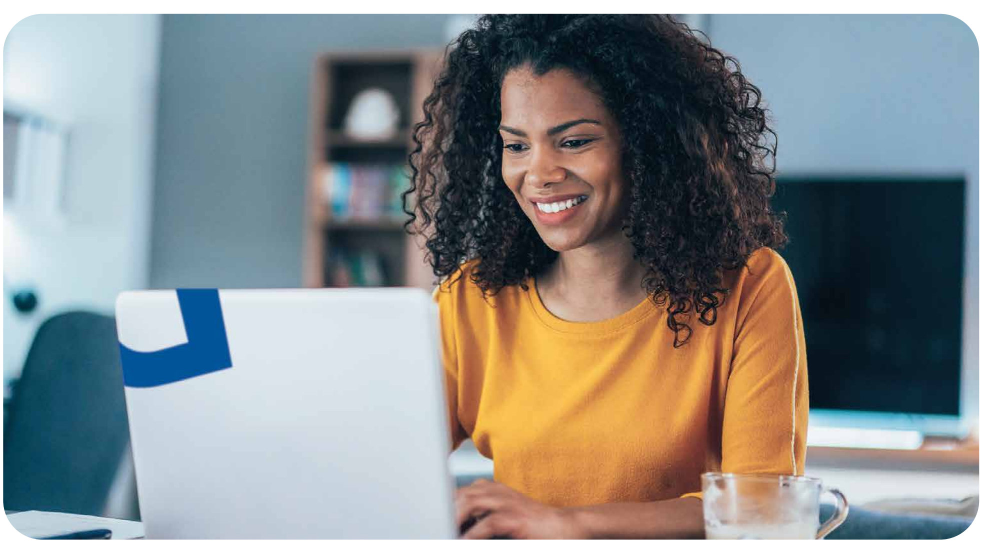
Since the start of the COVID-19 crisis, Bell's pandemic response has been focused on keeping Canadians connected and informed, while protecting the health and safety of the public, our customers and team. Our unparalleled investments in our customer experience teams and specialized service platforms are continuing to drive higher customer satisfaction levels.

Canadians are relying on communications services and networks like never before. With Bell's historic two-year $1.7 billion accelerated capital expenditures for broadband network expansion and investments in service enhancements like digital self-serve platforms, we're offering our customers enhanced and more reliable access to Bell products and services to meet the needs of today and tomorrow.

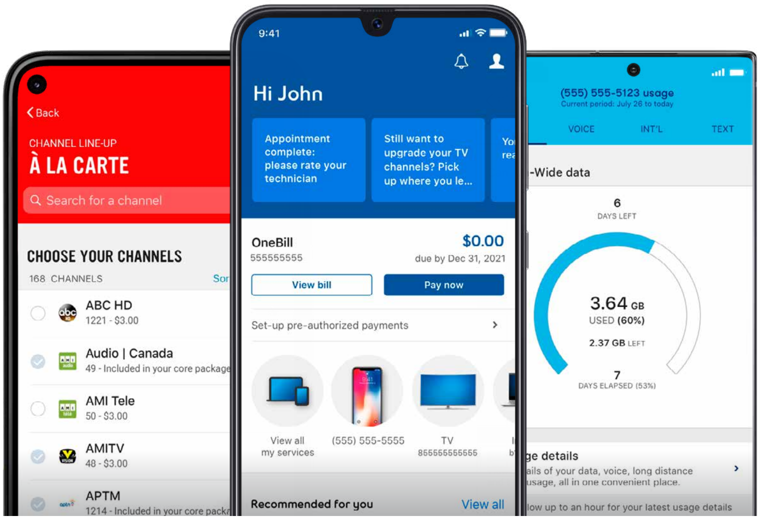
## DIGITAL SERVICE INNOVATION

We're delivering a better customer experience with a focus on safety and end-to-end service innovation, including developing leading-edge online support tools and expanding dedicated service programs like Move Valet, a next-generation platform that ensures the seamless transfer of Internet, TV and phone services when customers change their residence, to Atlantic Canada.

As more customers are needing digital, at-home service delivery options that can adapt quickly and effectively to ensure business continuity and fulfill new consumer expectations in a dynamic and fast-changing economy, Bell is meeting the demand with the introduction of Virtual Repair in 2021. Building on the successful launch of self-install options for customers in 2020 in response to the COVID-19 pandemic, Virtual Repair enables residential customers in Ontario and Québec to troubleshoot and resolve common Internet, TV and phone issues with a self-serve tool right in the safety of their own home.



During COVID-19 Bell accelerated its investments to expand its broadband networks to connect more Canadians in communities large and small to the most innovative services as they worked and learned from home.




Bell's focus on better customer experience includes leading-edge online and mobile support tools that allow customers to manage all their services and troubleshoot common issues remotely.

## LEVERAGING EMERGING TECHNOLOGIES

As part of Bell's commitment to improve the customer experience, we're continuing to adopt emerging technologies such as AI and machine learning to increase Bell's competitiveness and ongoing service improvement. To reduce costs and increase content accessibility, the Bell Media team harnessed the power of AI with their new automated caption tool, which first launched at CTV Vancouver and CTV Calgary and is now being deployed at CTV studios across the country.

Bell has also implemented Dynamic Call Routing and Intelligent Routing, which are programs that match incoming calls from customers to an agent with the right skill set to enhance the customer experience and reduce the manual work for customer service agents.

Maintaining the integrity of our network infrastructure is critical to Bell's success, ensuring our outstanding levels of network reliability and a positive customer experience. Initiated to optimize preventative maintenance jobs, Bell's AI-powered Cable Maintenance Program is using a machine learning model to simplify dispatching for maintenance work orders.

## INDUSTRY-LEADING PERFORMANCE

The MyBell app was named Best Telecommunication Mobile Application of the Year at the 2021 Mobile Web Awards, demonstrating Bell's commitment to customer experience as we continue to enhance the capabilities of our app-based self-serve options. In 2021, for the fourth year in a row, MyBell was awarded the Platinum MarCom Award as the best service app.

The app experience was a top priority for Bell and our commitment to digital service excellence extends to Virgin Plus My Account, with the platform winning the 2021 Gold MarCom Award as the top app in the service category along with being named Best Telecommunications Mobile App by the Web Marketing Association.

For the sixth year in a row, Bell continued to lead the national telecom industry in reducing customer complaints, according to the Commissioner for Complaints for Telecom-television Services (CCTS). While complaints to the CCTS across the industry increased by 9% for the year, customer complaints about Bell declined by 8%. Overall, Bell's share of complaints continued its downward trend, dropping by 4% from the previous year.


Virgin Mobile Canada rebranded to Virgin Plus reflecting the company's evolving service offerings which now include Internet and app-based TV service for Members in Ontario and Québec.

# Operate with agility and cost efficiency

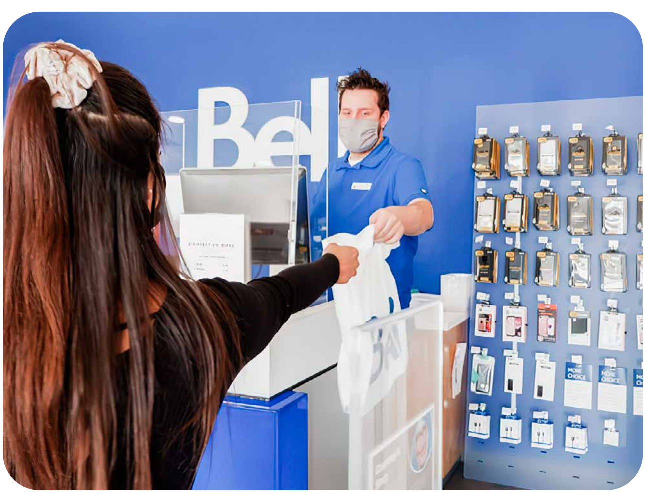
The Bell team is dedicated to leading the way in a fast-changing Canadian communications industry, driven by a strong focus on agility and efficiency. As Canada's largest communications company, Bell is consistently investing to improve the customer experience by delivering the best networks, services and content to a growing subscriber base while laying a foundation for long-term growth by centralizing processes and leveraging innovation to reduce costs.

In 2021, Bell continued with initiatives that highlight the team's focus on operational excellence, efficiency and cost discipline in all aspects of our planning, execution and delivery. This commitment to improving processes, tools and approaches is not only providing better results for customers, but greater efficiency in how work gets done, delivering greater cost efficiency.

Bell's agile approach was demonstrated in our response to the evolving COVID environment, as we found new ways to support employees working from home and improved on our efforts to safely serve customers in our stores and in the field – all while investing in our networks to enhance speed, reliability and access to keep Canadians connected.

### ACCELERATING OUR NETWORK LEADERSHIP

We are able to deliver productivity improvements and cost efficiencies resulting from the expansion of Bell's all-fibre network footprints and the service innovations enabled by new broadband technologies.



Bell's target to spend up to $14 billion in capital expenditures from 2020 through 2022 is delivering broadband connectivity to more Canadians in locations large and small. Bell's unparalleled fibre infrastructure is the backbone of Canada's most-awarded 5G network, driving competitive efficiencies and enabling the technology of the future, including connected homes and cars, smart cities and other advanced IoT solutions.

We will continue to leverage this inter-connectedness as well as the scope and scale of our fibre footprint to ensure future operational success and value.

### TEAMWORK DRIVES FINANCIAL PERFORMANCE

The Bell team is dedicated to delivering on our strategic focus to build the best networks and champion customer experience, delivering innovative service innovations that are reducing churn and operating costs.

Our ongoing investments in next-generation tools, processes and resources are enabling customers to easily manage their accounts and services from anywhere, further boosting Bell's strong customer experience track record. Simplifying how we do business for our customers is also streamlining our internal processes, with the added benefit of helping us achieve our objectives more cost-effectively.

Across all customer touchpoints, Bell is committed to creating a seamless experience.

Our focus on operational excellence increases the impact of Bell's scale and resources.

Innovative approaches are also leading to great effectiveness on the Bell Media side as well, delivering the most compelling content, the way Canadians want, across all platforms. We are staying ahead of consumer demand by innovating and investing in new technologies to drive new opportunities for all our stakeholders. In 2021, we launched Canada's first self-serve platform for TV and digital advertisers, offering clients unique opportunities to create innovative targeted marketing campaigns across multiple channels.

## BELL'S ESG APPROACH DELIVERS LASTING BENEFITS

Bell's ESG approach is not only making a positive difference in our communities and our world, it's also having a transformative effect across our business. It's leading to new ways of executing on our plans, and generating operational effectiveness and cost management improvements.

Ongoing initiatives such as fleet modernization, electric vehicle charging stations, lighting and heating system optimization, renewable energy use, and accelerated use of cloud and virtual conferencing services are contributing to reductions in our environmental impact and lowering operational costs.

## SOLID FOUNDATION SUPPORTS FUTURE SUCCESS

A solid financial performance for BCE in 2021, including consolidated revenues and other key metrics almost reaching pre-COVID levels achieved in 2019, has allowed us to maintain significant liquidity, investment-grade credit ratings and fully funded pension plans, all of which support ongoing investments that help us operate more efficiently and effectively. As we continue expanding our fibre and 5G networks, we are able to increase digital adoption and interactions, expand customer self-serve capabilities and enhance our products and services while continuing to improve the ways we work at Bell and make it easier for customers to do business with us. Our financial strength also enables Bell to invest in the industry-leading ESG initiatives that are all part of our Bell for Better commitment.

Bell is building on our long legacy of service and innovation, accelerating Canada's network infrastructure and maintaining our positive customer service momentum with an eye on disciplined cost management. We're constantly adapting to lead in a dynamic marketplace to advance how Canadians connect with each other and the world.

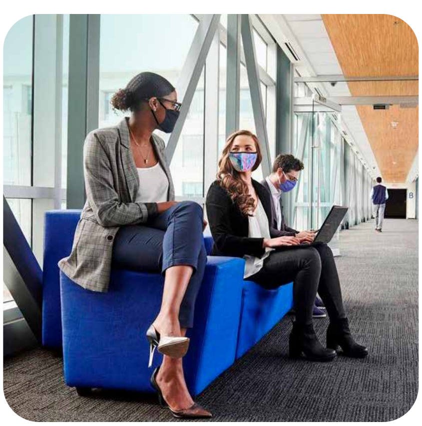
# Engage and invest in our people and create a sustainable future

The Bell team brings our strategy to life every day, making an impact on how Canadians connect, work, learn and play as they deliver leading edge technology, develop compelling new content, and support our company and communities. We're committed to providing growth opportunities for our 50,000 employees across the country and to foster a dynamic culture that creates a better today and tomorrow.

## CREATING A SUSTAINABLE FUTURE

Reflecting our long-standing commitment to the highest ESG standards, we're now embedding our focus on creating a more sustainable future directly into our six strategic imperatives. As one of Canada's largest companies, we are driven to continually improve our impact and our contribution to society with our connectivity commitments, investments in mental health initiatives, environmental sustainability and an engaged workplace.

We are helping build better communities across the country, and contributing to Canada's pandemic recovery and economic growth in every region. In 2021, we accelerated our investment to deliver broadband connectivity to Canadians in locations large and small. We're donating refurbished computers, printers and other electronic devices to schools through the national Computers for Schools Plus program. And Bell's capital expenditures in R&D of approximately $500 million annually includes support for university research in 5G, AI and cybersecurity, delivering a stream of new innovation to Canadian homes and businesses. Consistently named one of Canada's Greenest Employers, Bell is working to reduce greenhouse gas emissions and plans to achieve carbon neutral operations by 2025.



Across the country, almost 50,000 dedicated Bell employees are innovating, adapting and ensuring our customers have the best possible experience.

## BELL'S EVOLVING COVID-19 RESPONSE

Throughout the COVID crisis, the team has consistently stepped up to provide critical support, connections and information for our customers, communities and each other. We continued to evolve our health and safety protocols in line with the latest public health guidance to protect everyone's health and safety.

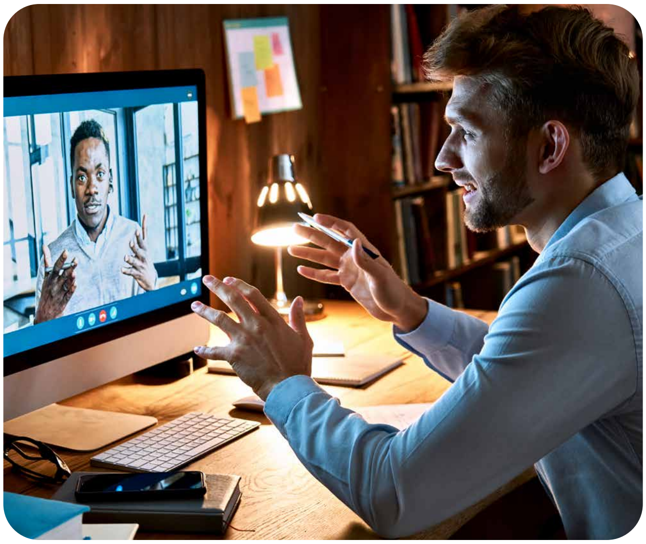
This included introducing Bell Workways, a flexible hybrid work model that provides the Bell team with more flexibility, collaboration and support in how and where it works, while continuing to deliver the best networks, services and content to Canadians everywhere. The program builds on the experiences of the pandemic, recognizing the team's strong ability to adapt and deliver results as we move forward from the challenges of COVID-19.

Bell also adapted its COVID protocols throughout 2021, including enhanced health and safety measures in the field, retail stores and other Bell workplaces, prioritizing the well-being of our employees and communities, and developing a phased, adaptable plan for resuming more normal business operations.

Recognizing the ongoing challenges of the pandemic, Bell also continued to lead with enhanced workplace and community mental health supports, including significant investments in community mental health partnerships, and most recently adding to our programs and resources with unlimited mental health benefit coverage for team members and their eligible family members.

## AN INCLUSIVE WORKPLACE WHERE EVERYONE BELONGS

Bell is committed to enhancing diversity, equity and inclusion, understanding that different backgrounds, experiences and ideas create a positive work culture and lead to better outcomes. Bell continued to accelerate our work to create an inclusive, equitable and accessible workplace, building new partnerships and making new commitments for action.



Throughout the COVID crisis, the Bell team has consistently stepped up to provide critical support, connections and information.

In partnership with the Onyx Initiative, Bell welcomed its first cohort of Black students into its inaugural training and mentorship/coaching program, and continued to team up with the Black Professionals in Tech Network, Ascend Canada, Indigenous Works and Women in Tech to enhance the diverse representation in our workplace.

Working to address the mental health impacts of systemic racism, the Bell Let's Talk Diversity Fund distributed $2.25 million in grants to 16 organizations since its launch in 2020, and continues to provide opportunities to groups performing vital work in their communities.

Bell also launched a company-wide accessibility program to make our products and services more accessible and ensure people with disabilities have equal opportunities through the use of advanced communication technologies.

Bell is committed to growing diversity, equity and inclusion at every level of the company, from student hiring to the BCE Board. A member of the 30% Club and a signatory to the Catalyst Accord 2022, Bell leads with more ambitious targets: we aim for a minimum 35% gender-diverse representation among directors on the BCE Board moving forward, and at least 35% of Bell leaders at the VP level and above by the end of 2023.

In 2021, we achieved our target of 40% BIPOC representation in Bell's new grad and intern hires and continue to target at least 25% BIPOC representation on our senior management team by 2025.

## A CULTURE OF RECOGNITION AND GROWTH

Committed to sustaining a high-performance culture, Bell enhanced programs that focus on continuous learning, including Bell's Leadership Development Pathway and Bell U, a virtual university providing skill development opportunities in high-demand, technology-focused areas.

A new team recognition program called Better Together was launched with more engaging opportunities to highlight outstanding work, customer champions, great partnership, community difference makers, advocates for mental health and inclusion, and contributors to positive change and growth at Bell.

Bell also provided more meaningful opportunities for our next generation of leaders by investing in programs for recent graduates, interns and summer students. Our award-winning Graduate Leadership and Internship programs also help develop the leaders of tomorrow, with 1,355 new graduate and other students joining the company in 2021, including more BIPOC representation.

## A LEADING EMPLOYER WITH A FOCUS ON THE FUTURE

Bell was again named an outstanding place to work, both nationally and in our headquarters city of Montréal, along with honours as a top employer for young people, one of Canada's best diversity employers, and one of its greenest companies.

The 2021 launch of Bell for Better reinforced our long-term commitment to create better outcomes for all stakeholders, looking forward to the future with a purpose-driven approach to making our team, workplaces and communities even better.

2021 CANADA'S BEST DIVERSITY EMPLOYERS

Montréal's Top Employers 2021

Canada's Top 100 Employers 2021

CANADA'S TOP FAMILY-FRIENDLY EMPLOYERS 2021

CANADA'S TOP EMPLOYERS FOR YOUNG PEOPLE 2021

2021 CANADA'S GREENEST EMPLOYERS

# 2021 environmental, social and governance highlights

Bell's corporate responsibility approach balances economic growth, social responsibility and environmental sustainability. Focused on our purpose of advancing how Canadians connect with each other and the world, Bell provides millions of Canadian consumers and businesses with leading communications networks, services and media content. We are making a significant overall contribution to Canada's social and economic prosperity while creating value for shareholders and providing meaningful careers for people nationwide.

The topics Bell reports on reflect the intersection of our company's value chain, current and emerging sustainability trends and stakeholder interests, and their potential impacts on our business.

## CLIMATE CHANGE

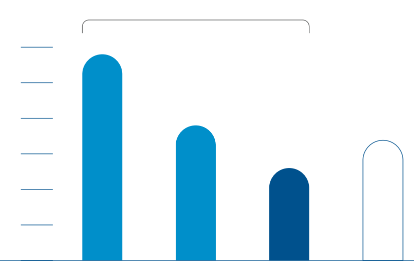
Bell is taking action to help address climate change and adapt to its consequences. Our efforts to mitigate climate change start with energy consumption, as we strive to save energy and reduce associated greenhouse gas (GHG) emissions while helping customers reduce theirs. For example, our networks are supporting remote work for millions of Canadians while averting GHG emissions related to travel. Among other targets, we are increasing electricity efficiency at Bell facilities, electrifying our fleet and generating renewable energy at remote sites. Reporting regularly on our energy performance and associated GHG emissions demonstrates to our stakeholders that we take these initiatives seriously.

- Key metrics
  Bell's objective is to achieve carbon neutral operations [1] starting in 2025. For 2030, we have set science-based GHG emissions reduction targets that are consistent with limiting global warming to 1.5°C [2], in line with the most ambitious temperature goal of the Paris Agreement [3].
- Key achievements
  In 2021, we surpassed our GHG reduction target by 15%, with our GHG emissions per network usage showing a 55% improvement since 2019.

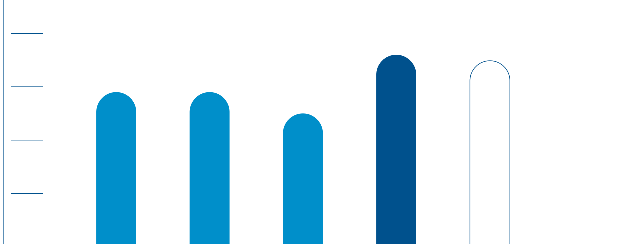
## DIVERSITY, EQUITY AND INCLUSION

At Bell, we are proud of our commitment to foster an inclusive, equitable and accessible workplace where all team members feel valued, respected and supported. We are dedicated to building a workforce that reflects the diversity of the communities we serve, with a commitment to ensuring every team member has the opportunity to reach their full potential.

**Key target:**
**Bell's 2021 intensity GHG reduction target**



**Key target:**
**Gender-diverse directors on the BCE Board (in %)** [4]



(1) Operational GHG emissions include scope 1 and scope 2 emissions. Scope 1 emissions are direct GHG emissions from sources that are owned or controlled by Bell. Scope 2 emissions are indirect GHG emissions associated with the consumption of purchased electricity, heating/cooling and steam required by Bell's activities.

(2) Pending approval by the Science Based Targets initiative (SBTi).

(3) Science-based targets are GHG emissions reduction targets that are in line with what the latest climate science says is necessary to meet the goals of the Paris Agreement – to limit global warming to well below 2°C above pre-industrial levels and pursue efforts to limit warming to 1.5°C.

(4) Woman, and directors that identify with a gender other than a man or woman.

A 2021 research project, a collaboration between Bell, Québec-based solar energy company Stace and Université de Sherbrooke, studied the viability of these solar voltaic cells to generate renewable energy to provide primary power for remote telecommunications towers – displacing diesel generators and reducing the associated greenhouse gas emissions.

- Key metrics

  A member of the 30% Club and a signatory to the Catalyst Accord 2022, Bell leads with more ambitious targets: we are aiming for a minimum of 35% gender-diverse representation among directors on the BCE Board moving forward, and at least 35% of Bell leaders at the vice-presidential (VP) level and above by the end of 2023.

  Bell continues to target BIPOC representation in Bell senior management of at least 25% by 2025 and maintaining at least 40% BIPOC representation in new graduate and intern hires.

- Key achievements

  As of December 31, 2021, women represented 36% of the BCE Board of Directors. Going forward, we target a minimum of 35% gender-diverse directors. Upon the election of all director nominees at BCE's 2022 annual shareholder meeting, this target will continue to be met, with five of the director nominees, representing 38% of all directors, identifying as women. At the end of 2021, women represented 33% of Bell leaders at the VP level and above. Our support for gender equity in the workplace has been recognized with Platinum Parity Certification by Women in Governance.

  Bell was again recognized as one of Canada's Best Diversity Employers in 2021. To further accelerate diversity and inclusion on our team, Bell partnered with the Onyx Initiative, which brings together major companies and academic institutions to support professional development and recruiting opportunities for Black post-secondary students and graduates. We also teamed up with the Black Professionals in Tech Network, Ascend Canada and Indigenous Works to drive progress in hiring and promotion for BIPOC talent in Canadian telecom and tech, and joined with BIPOC TV & Film to launch HireBIPOC to connect creators and crew with opportunities in Canadian media.

## PRIVACY AND INFORMATION SECURITY

Our customers, team members and investors expect us to demonstrate that we collect data appropriately, use it for purposes that advance their interests and keep it secure.

Our approach to data governance encompasses the protection and appropriate use of data across its lifecycle, and we incorporate data governance proactively as a core consideration in all our business initiatives and technology decisions.

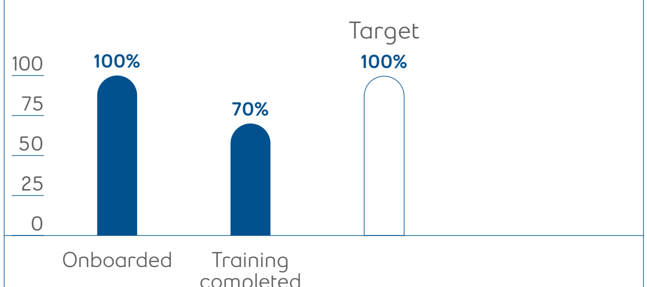
- Key metrics

  We expect our team members selected for the Be Cyber Savvy Information Security training program to complete the full training cycle by the end of 2022. This training program includes onboarding to our specialized Be Cyber Savvy platform, performing phishing simulations and taking four cybersecurity courses. To measure the success of our training program, we aim to improve the phishing simulation report rate of our team members on a year over year basis. We also aim to align our program to the ISO 27001 standard for information security management by the end of 2023.

- Key achievements

  During 2021, we onboarded 100% of selected team members, and 70% completed the full training program. We are aligning our information security management system to the ISO 27001 standard, achieving 50% conformity at the end of 2021.

**Key target:**
**Selected employees to complete Bell's Be Cyber Savvy information security training program by the end of 2022**




To learn more about our ESG approach and our reporting, please visit BCE.ca/Responsibility.

# Bell Let's Talk accelerates investment in Canadian mental health

## 12th annual Bell Let's Talk Day breaks previous records with the world's largest conversation on mental health – $8,214,941 more for mental health in Canada. Millions of Canadians and people around the world joined together on Bell Let's Talk Day and took action to create positive change, growing the global conversation and resulting in more Bell donations for Canadian mental health.

In January 2022, Bell Let's Talk announced almost $8 million in funding for new mental health projects:

- $1.5 million in funding from the Bell-Graham Boeckh Foundation Partnership will help Foundry improve integrated health and social services for youth and their families and caregivers in BC and support other emerging Integrated Youth Services initiatives around the country.
- Following the release of the National Standard of Canada for Mental Health and Well-Being for Post-Secondary Students (itself funded in part by Bell), a further $1 million in implementation grants were awarded to 16 universities, colleges and cégeps that are using the Standard to address specific gaps or needs in their mental health support services by building new initiatives.
- $600,000 to 6 new recipients of the Bell Let's Talk Diversity Fund, a $5 million commitment launched in July 2020 to support the mental health and well-being of BIPOC communities across Canada.
- Fondation CERVO will use $250,000 from Bell Let's Talk to acquire a second rTMS machine to significantly increase the number of people receiving rTMS treatment in Québec City and the surrounding region.
- With previous support from Bell Let's Talk, Red Cross Canada announced the expansion of the Friendly Calls program with cultural adaptation for Indigenous communities in Manitoba and around Canada.
- 5 multidisciplinary teams were selected to receive funding from the $4 million Bell Let's Talk-Brain Canada Mental Health Research Program to develop more effective, sustainable, and accessible mental health care solutions for all people living in Canada.
- A $370,000 donation, in partnership with the Government of Yukon and Northwestel, to Strongest Families Institute to support child, youth and adult mental health in Yukon.

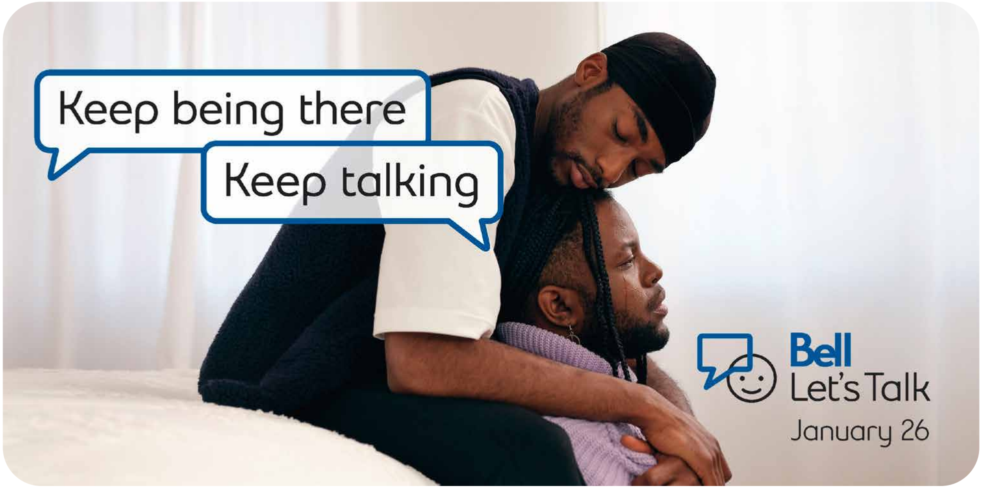
In 2021, the campaign reflected the profound impact COVID-19 had on our mental health and focused on the message that when it comes to mental health, now more than ever, every action counts. In 2022, Bell Let's Talk Day continued to focus on action, encouraging Canadians to keep talking, listening and being there for themselves and for one another.

Every Bell Let's Talk Day, Bell donates 5 cents to Canadian mental health programs for every eligible call, text and social media message of support for action in mental health, at no cost to participants other than what they may normally pay their service provider for phone, text or internet access. On our most recent Bell Let's Talk Day, Canadians and people around the world set all-new records for engagement in the mental health conversation, sharing 164,298,820 messages of support.

The additional $8,214,941 generated by the messaging total brought Bell's overall funding commitment to $129,588,747.75, well on the way to our objective of at least $155 million by 2025.

Many communities and partner organizations across the country took part in Bell Let's Talk flag raisings to show their support for mental health and to highlight supports available in their communities. More than 180 flags were raised by cities, towns and legislative assemblies; universities and colleges; hospitals and other public facilities; and by the Canadian Armed Forces, including at CFS Alert near the North Pole and by the crew onboard the deployed HMCS Montréal.

Bell Let's Talk




Bell Let's Talk Day provided a timely opportunity to build on increased awareness around mental health and to inspire Canadians to keep playing an active role in moving mental health forward in Canada as a priority issue.

## MAKING A DIFFERENCE ALL YEAR ROUND

Bell Let's Talk is active year round funding organizations in every province and territory that are working to reduce stigma, improving access to mental health care and undertaking critical research. Bell has partnered with more than 1,300 hospitals, universities, national associations and local community service providers since 2010.

In May 2021, Bell announced a five-year $1 million donation to Rise Asset Development to empower entrepreneurship for Canadians with mental health and addiction challenges. Building on Bell's earlier support for Rise programs, the gift is enabling Rise to engage even more Canadians with mental health and addiction challenges in entrepreneurship training, mentorship and lending and supports the organization's expansion into Manitoba with the launch of Rise Winnipeg.

Spring 2021 saw 6 recipients of the new Bell Let's Talk Diversity Fund unveiled with $750,000 in donations distributed. During Mental Health Week, we also launched the From Where We Stand: Conversations on Race and Mental Health podcast series, which explores the mental health challenges and barriers to accessing care faced by BIPOC communities.

Bell Let's Talk continues to spotlight the work of our mental health partners in a variety of ways, including through the Bell for Better campaign. In 2021, we featured the stories of Jack.org advocate Jay Legaspi and Kids Help Phone Indigenous Advisory Council member Ashley Cummings, who are working to transform mental health for Canadian youth.

The Bell Let's Talk Community Fund has now provided $15 million to 888 organizations nationwide since 2011, enabling partners to improve access to mental health care, supports and services.

Since 2013, the Bell True Patriot Love Fund has provided more than $2 million and over 115 grants to organizations across the country improving access to mental health care to military members, Veterans and their families. In 2021, a total of $350,000 was awarded to 11 organizations making a meaningful difference in the military community.

Please visit **Bell.ca/letstalk** to learn more about how Bell is supporting Canadian mental health every day of the year.


Bell Let's Talk continues to invest in mental health year round, partnering to increase access to care in communities from coast to coast to coast.


# Building networks to connect Canadians since 1880

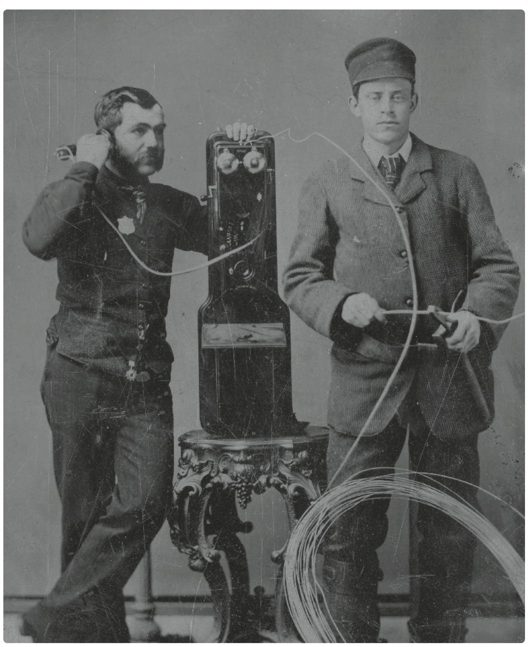
Bell has been leading the way building and supporting networks of the future for more than 141 years. Our unrelenting focus began with the telephone, building networks that connected Canadians within their community, across the country and around the world. Using that same relentless passion today, our Bell team builds networks that support the most advanced Internet and wireless technologies in the world.

## BUILDING A NATIONAL NETWORK – TECHNOLOGY

Bell's original quest to connect Canadians focused on one single technology: the telephone, which was markedly different than the smartphones we carry in our pockets today. The early phones consisted of three boxes mounted on a backboard – the bottom contained the battery, the middle had a hole to speak into and the top one, from which the receiver hung, housed a magneto generator and crank used to initiate a call to the operator.

Until the end of 1882, these phones were connected to the operator with iron and metal wires strung across trees, fences and roofs using the ground to complete the power circuit. These wires were soon replaced with copper pairs, producing the first early upgrade to our telecommunications infrastructure.

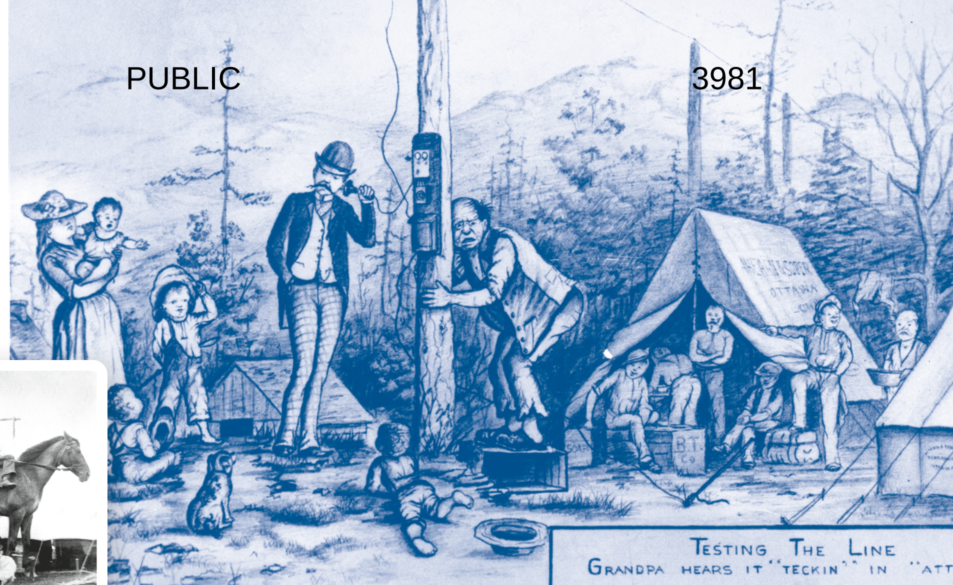
The operator would manually connect these calls using a magneto switchboard supporting a number of pairs carried by early transmission cables. The early operators were an essential part of the Bell network and the true voice of our company, connecting calls and sharing useful information ranging from weather to time of day, election results and sports scores. You might say they were our CTV News/TSN broadcast team of the late 1800s.



Bell employees A. T. Smith and R. Freeman, Brockville (Ontario), 1881

Miss Ida Gardner, first operator in Winchester (Ontario) at switchboard, around 1897


Wooden roof fixture carrying subscribers' lines into the telephone office on Colborne Street, Brantford (Ontario), 1902




Building the Almonte–Pembroke long distance telephone line, drawn by Morris Ahearn, 1886

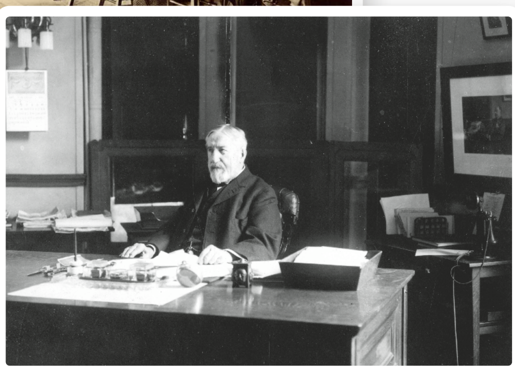
Bell construction gang posed for the photographer somewhere on the road between Napanee and Deseronto (Ontario), 1895

## BUILDING A NATIONAL NETWORK – THE PEOPLE

The operator was a true reflection of the pioneering spirit of our first generation of Bell employees, who were also stepping into new professions as sales agents, clerks, foremen, maintenance workers and plant technicians.

Bell's first construction teams, generally about 20 men, arrived at work in horse-drawn wagons for 11-hour workdays, 6 days a week. The linemen, as they were later called, were essential in building and expanding our early telephone network, erecting poles and running phone lines across Bell's territory.

Bell operators seated at a multiple magneto switchboard, "Main" central office, Montréal, 1888



Photograph of Charles Fleetford Sise, Sr. was taken in his office at the company's head office, 1914

## BUILDING A NATIONAL NETWORK – CONSTRUCTION

These construction teams were at the centre of Bell's first long distance line, built between Toronto and Hamilton in 1881. By 1885, long distance lines were supporting all points from Montréal to Windsor, and by the end of the 19th century, Bell customers could call almost anywhere in Québec and Ontario and up to 1,000 miles into the United States.

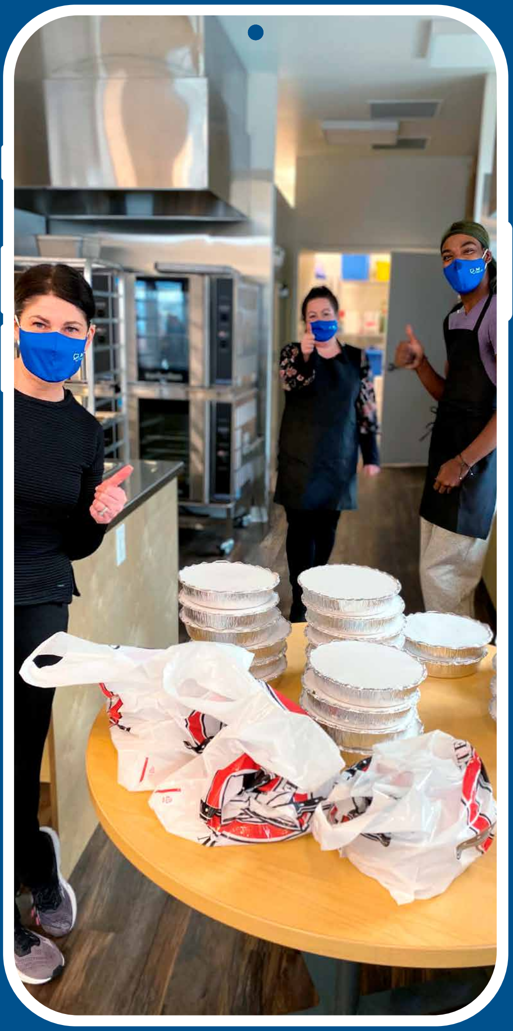
The number of phone lines grew from 2,100 in 1880 to 78,195 in 1905, thanks to the tremendous efforts of the linemen who installed over 14,000 km of pole lines and 60,000 km of transmission cables. That doesn't include the first underground cables, which were laid in Toronto for the first time in 1889.

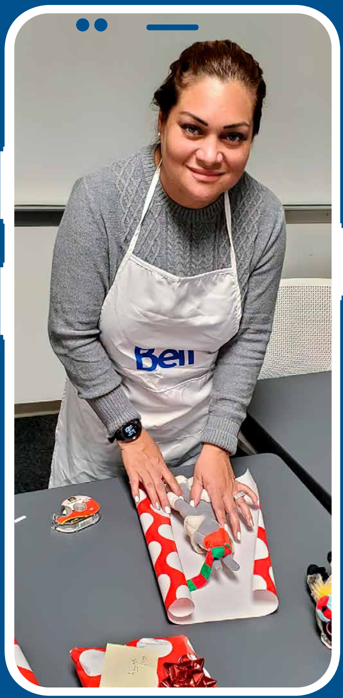
When Charles F. Sise invested more than $20,000, financing part of the cost of the first long distance connection between Hamilton and Toronto, he began a passion for building our country's strongest network. With our $1.7 billion capital expenditure acceleration program introduced in 2021, which will be completed in 2022, to accelerate fibre, rural and 5G network rollouts, we are proud to build on Bell's 141-year passion for building the best networks and giving our company a critical advantage over our competition.

A Bell construction team laying underground cable on Queen Street, Sault-Ste-Marie, 1909

A Bell crew raising a 60-foot telephone pole near the corner of King and Dufferin Streets, Toronto, 1895

# The network we're most proud of: our people.





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# Management's discussion and analysis



In this management's discussion and analysis (MD&A), *we*, *us*, *our*, *BCE* and *the company* mean, as the context may require, either BCE Inc. or, collectively, BCE Inc., Bell Canada, their subsidiaries, joint arrangements and associates. *Bell* means, as the context may require, either Bell Canada or, collectively, Bell Canada, its subsidiaries, joint arrangements and associates.

All amounts in this MD&A are in millions of Canadian dollars, except where noted. Please refer to section 11, *Non-GAAP financial measures, other financial measures and key performance indicators (KPIs)* on pages 121 to 125 for a list of defined non-GAAP financial measures, other financial measures and KPIs.

Please refer to BCE's audited consolidated financial statements for the year ended December 31, 2021 when reading this MD&A.

In preparing this MD&A, we have taken into account information available to us up to March 3, 2022, the date of this MD&A, unless otherwise stated.

You will find additional information relating to BCE, including BCE's audited consolidated financial statements for the year ended December 31, 2021, BCE's annual information form for the year ended December 31, 2021, dated March 3, 2022 (BCE 2021 AIF) and recent financial reports, on BCE's website at **BCE.ca**, on SEDAR at **sedar.com** and on EDGAR at **sec.gov**.

Documents and other information contained in BCE's website or in any other site referred to in BCE's website or in this MD&A are not part of this MD&A and are not incorporated by reference herein.

This MD&A comments on our business operations, performance, financial position and other matters for the two years ended December 31, 2021 and 2020.

## CAUTION REGARDING FORWARD-LOOKING STATEMENTS

BCE's 2021 annual report, including this MD&A and, in particular, but without limitation, section 1.3, Key corporate developments, section 1.4, Capital markets strategy, section 1.6, *Environmental, social and governance practices*, section 2, *Strategic imperatives*, section 3.2, *Business outlook and assumptions*, section 5, *Business segment analysis* and section 6.7, *Liquidity* of this MD&A, contains forward-looking statements. These forward-looking statements include, without limitation, statements relating to our projected financial performance for 2022, BCE's dividend growth objective and 2022 annualized common share dividend and dividend payout ratio level, BCE's anticipated capital expenditures, network deployment plans and the benefits expected to result therefrom, including our two-year increased capital expenditure acceleration program for the accelerated expansion of our fibre, Wireless Home Internet (WHI) and Fifth Generation (5G) networks, BCE's financial policy targets, the sources of liquidity we expect to use to meet our anticipated 2022 cash requirements, our expected post-employment benefit plans funding including an anticipated reduction in contributions to our defined benefit (DB) pension plans in 2022, our environmental, social and governance (ESG) objectives which include, without limitation, our objectives concerning diversity, equity and inclusion (DEI), our targeted reductions in the level of our greenhouse gas (GHG) emissions including, without limitation, our plans to be carbon neutral for our operational GHG emissions starting in 2025 and to achieve science-based targets (SBTs) by 2030, our objectives concerning reductions in waste to landfill, e-waste recovery, community investment, privacy and information security, corporate governance and ethical business conduct leadership, BCE's business outlook, objectives, plans and strategic priorities, and other statements that do not refer to historical facts. A statement we make is forward-looking when it uses what we know and expect today to make a statement about the future. Forward-looking statements are typically identified by the words *assumption*, *goal*, *guidance*, *objective*, *outlook*, *project*, *strategy*, *target* and other similar expressions or future or conditional verbs such as *aim*, *anticipate*, *believe*, *could*, *expect*, *intend*, *may*, *plan*, *seek*, *should*, *strive* and *will*. All such forward-looking statements are made pursuant to the safe harbour provisions of applicable Canadian securities laws and of the United States (U.S.) *Private Securities Litigation Reform Act of 1995*.

Unless otherwise indicated by us, forward-looking statements in BCE's 2021 annual report, including in this MD&A, describe our expectations as at March 3, 2022 and, accordingly, are subject to change after that date. Except as may be required by applicable securities laws, we do not undertake any obligation to update or revise any forward-looking statements, whether as a result of new information, future events or otherwise.

Forward-looking statements, by their very nature, are subject to inherent risks and uncertainties and are based on several assumptions, both general and specific, which give rise to the possibility that actual results or events could differ materially from our expectations expressed in, or implied by, such forward-looking statements and that our business outlook, objectives, plans and strategic priorities may not be achieved. These statements are not guarantees of future performance or events, and we caution you against relying on any of these forward-looking statements. Forward-looking statements are presented in BCE's 2021 annual report, including in this MD&A, for the purpose of assisting investors and others in understanding our objectives, strategic priorities and business outlook as well as our anticipated operating environment. Readers are cautioned, however, that such information may not be appropriate for other purposes.

We have made certain economic, market, operational and other assumptions in preparing the forward-looking statements contained in BCE's 2021 annual report, including this MD&A, and, in particular, but without limitation, the forward-looking statements contained in the previously mentioned sections of this MD&A. These assumptions include, without limitation, the assumptions described in the various sub-sections of this MD&A entitled *Assumptions*, which sub-sections are incorporated by reference in this cautionary statement. Subject to various factors including, without limitation, the future impacts of the COVID-19 pandemic, which are difficult to predict, we believe that our assumptions were reasonable at March 3, 2022. If our assumptions turn out to be inaccurate, actual results or events could be materially different from what we expect.

Important risk factors that could cause actual results or events to differ materially from those expressed in, or implied by, the previously-mentioned forward-looking statements and other forward-looking statements contained in BCE's 2021 annual report, and in particular in this MD&A, include, but are not limited to: the adverse effects of the COVID-19 pandemic including from the restrictive measures implemented or to be implemented as a result thereof and supply chain disruptions; adverse economic and financial market conditions, a declining level of retail and commercial activity, and the resulting negative impact on the demand for, and prices of, our products and services; the intensity of competitive activity including from new and emerging competitors; the level of technological substitution and the presence of alternative service providers contributing to disruptions and disintermediation in each of our business segments; changing customer behaviour and the expansion of over-the-top (OTT) television (TV) and other alternative service providers, as well as the fragmentation of, and changes in, the advertising market; rising content costs and challenges in our ability to acquire or develop key content; the proliferation of content piracy; higher Canadian smartphone penetration and reduced or slower immigration flow; regulatory initiatives, proceedings and decisions, government consultations and government positions that affect us and influence our business including, without limitation, concerning the conditions and prices at which access to our networks may be mandated and spectrum may be acquired in auctions; the inability to protect our physical and non-physical assets from events such as information security attacks, unauthorized access or entry, fire and natural disasters; the failure to implement effective data governance; the failure to evolve and transform our networks, systems and operations using next-generation technologies while lowering our cost structure; the inability to drive a positive customer experience; the failure to attract, develop and retain a diverse and talented team capable of furthering our strategic imperatives; labour disruptions and shortages; the failure to maintain operational networks; the risk that we may need to incur significant unplanned capital expenditures to provide additional capacity and reduce network congestion; the complexity of our operations; the failure to implement or maintain highly effective processes and information technology (IT) systems; events affecting the functionality of, and our ability to protect, test, maintain, replace and upgrade, our networks, IT systems, equipment and other facilities; in-orbit and other operational risks to which the satellites used to provide our satellite TV services are subject; our dependence on third-party suppliers, outsourcers, and consultants to provide an uninterrupted supply of the products and services we need; the failure of our vendor selection, governance and oversight processes, including our management of supplier risk in the areas of security, data governance and responsible procurement; the quality of our products and services and the extent to which they may be subject to defects or fail to comply with applicable government regulations and standards; the inability to access adequate sources of capital and generate sufficient cash flows from operating activities to meet our cash requirements, fund capital expenditures and provide for planned growth; uncertainty as to whether dividends will be declared by BCE's board of directors (BCE Board) or whether the dividend on common shares will be increased; the inability to manage various credit, liquidity and market risks; new or higher taxes due to new tax laws or changes thereto or in the interpretation thereof, and the inability to predict the outcome of government audits; the failure to reduce costs, as well as unexpected increases in costs, and the inability to generate anticipated benefits from acquisitions and corporate restructurings; the failure to evolve practices to effectively monitor and control fraudulent activities; pension obligation volatility and increased contributions to post-employment benefit plans; unfavourable resolution of legal proceedings and, in particular, class actions; the failure to develop and implement strong corporate governance practices and compliance frameworks and to comply with legal and regulatory obligations; the failure to recognize and adequately respond to climate change and other environmental concerns and expectations; pandemics, epidemics and other health risks, including health concerns about radio frequency emissions from wireless communications devices and equipment; the inability to adequately manage social issues; and internal factors, such as the failure to implement sufficient corporate and business initiatives, as well as various external factors which could challenge our ability to achieve our ESG targets including, without limitation, those related to GHG emissions reduction and DEI.

These and other risk factors that could cause actual results or events to differ materially from our expectations expressed in, or implied by, our forward-looking statements are discussed in this MD&A and, in particular, in section 9, *Business risks* of this MD&A.

Forward-looking statements contained in BCE's 2021 annual report, including in this MD&A, for periods beyond 2022 involve longer-term assumptions and estimates than forward-looking statements for 2022 and are consequently subject to greater uncertainty. In particular, our GHG emissions reduction targets are based on a number of assumptions including, without limitation, the following principal assumptions: implementation of various corporate and business initiatives to reduce our electricity and fuel consumption, as well as reduce other direct and indirect GHG emissions enablers; no new corporate initiatives, business acquisitions or technologies that would materially increase our anticipated levels of GHG emissions; our ability to purchase sufficient credible carbon credits and renewable energy certificates to offset or further reduce our GHG emissions, if and when required; no negative impact on the calculation of our GHG emissions from refinements in or modifications to international standards or the methodology we use for the calculation of such GHG emissions; no required changes to our SBTs pursuant to the Science Based Targets initiative (SBTi) methodology that would make the achievement of our updated SBTs more onerous; and sufficient supplier engagement and collaboration in setting their own SBTs and sufficient collaboration with partners in reducing their own GHG emissions.

We caution readers that the risk factors described above and in the previously mentioned section and in other sections of this MD&A are not the only ones that could affect us. Additional risks and uncertainties not currently known to us or that we currently deem to be immaterial may also have a material adverse effect on our business, financial condition, liquidity, financial results or reputation. From time to time, we consider potential acquisitions, dispositions, mergers, business combinations, investments, monetizations, joint ventures and other transactions, some of which may be significant. Except as otherwise indicated by us, forward-looking statements do not reflect the potential impact of any such transactions or of special items that may be announced or that may occur after March 3, 2022. The financial impact of these transactions and special items can be complex and depends on facts particular to each of them. We therefore cannot describe the expected impact in a meaningful way, or in the same way we present known risks affecting our business.

# 1 Overview



## COVID-19

BCE's purpose is to advance how Canadians connect with each other and the world. Our strategy builds on our longstanding strengths in networks, service innovation and content creation, and positions the company for continued growth and innovation leadership. Through our Bell for Better initiative, we are investing to create a better today and a better tomorrow by supporting the social and economic prosperity of our communities. With our connectivity initiatives from the smallest rural communities to the largest cities, investments in mental health initiatives, environmental sustainability and an engaged workplace, we look to create a thriving, prosperous and more connected world for Canadians across the country, especially as we recover from the unprecedented challenges of the COVID-19 pandemic. Through our capital expenditure acceleration program, we are delivering more connections to help Canada's social and economic recovery from the COVID-19 pandemic.

Our financial and operating performance saw a steady improvement in 2021 despite the continued adverse impacts of the COVID-19 pandemic experienced throughout the year, due to our strong operational execution and the easing of government restrictions in the second half of the year. It has been almost two years since the pandemic began affecting our performance and we have since adapted many aspects of our business to better operate in this environment. Additionally, compared to 2020, the effects of the pandemic on our year-over-year performance were considerably reduced, with Q2 2020 being the quarter most significantly affected by the pandemic. The impacts of the COVID-19 pandemic, although moderated, continued to unfavourably affect Bell Wireless product and roaming revenues, Bell Media advertising revenues, as well as Bell Wireline business market equipment revenues, due to reduced commercial activity as a result of the government restrictions put in place to combat the pandemic, particularly in the first half of the year, and the global supply chain challenges experienced in the second half of the year.

Due to uncertainties relating to the severity and duration of the COVID-19 pandemic and possible resurgences in the number of COVID-19 cases, including as a result of the potential emergence of other variants, and various potential outcomes, it is difficult at this time to estimate the impacts of the COVID-19 pandemic on our business or future financial results and related assumptions. Our business and financial results could continue to be unfavourably impacted, and could again become more significantly and negatively impacted, in future periods, including, among others, as a result of global supply chain challenges adversely affecting our wireless and wireline product revenues.

In addition, the extent to which the COVID-19 pandemic will continue to adversely impact us will depend on future developments that are difficult to predict, including the prevalence of COVID-19 variants that are more contagious and may lead to increased health risks, the timely distribution of effective vaccines and treatments, the potential development and distribution of new vaccines and treatments, vaccination hesitancy and the number of individuals who choose to remain unvaccinated, the time required to achieve broad immunity, as well as new information which may emerge concerning the severity and duration of the COVID-19 pandemic, including the number and intensity of resurgences in COVID-19 cases, and the actions required to contain the coronavirus or remedy its impacts, among others. Any of the risks referred to in this MD&A, and others arising from the COVID-19 pandemic, could have a material adverse effect on our business, financial condition, liquidity, financial results or reputation.

# 1.1 Introduction



## AT A GLANCE

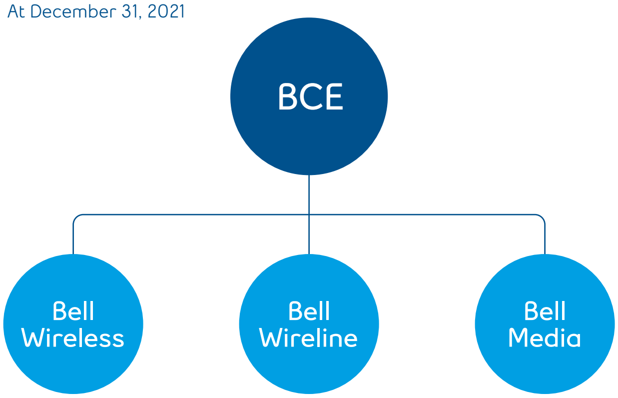
BCE is Canada's largest communications company, providing residential, business and wholesale customers with a wide range of solutions for all their communications needs. BCE's shares are publicly traded on the Toronto Stock Exchange and on the New York Stock Exchange (TSX, NYSE: BCE).

Our results are reported in three segments: Bell Wireless, Bell Wireline and Bell Media.

Bell Wireless provides wireless voice and data communication products and services to our residential, small and medium-sized business and large enterprise customers as well as consumer electronics products across Canada.

### **BCE** is Canada's largest communications company

**BCE's business segments**
At December 31, 2021




Bell Wireline provides data, including Internet access and Internet protocol television (IPTV), local telephone, long distance, as well as other communication services and products to our residential, small and medium-sized business and large enterprise customers, primarily in Ontario, Québec, the Atlantic provinces and Manitoba, while satellite TV service and connectivity to business customers are available nationally across Canada. In addition, this segment includes our wholesale business, which buys and sells local telephone, long distance, data and other services from or to resellers and other carriers.

Bell Media provides conventional TV, specialty TV, pay TV, streaming services, digital media services, radio broadcasting services and out-of-home (OOH) advertising services to customers nationally across Canada.

We also hold investments in a number of other assets, including:

- a 28% indirect equity interest in Maple Leaf Sports & Entertainment Ltd. (MLSE)
- a 50% indirect equity interest in Glentel Inc. (Glentel)
- an 18.4% indirect equity interest in entities that operate the Montréal Canadiens Hockey Club, evenko and the Bell Centre in Montréal, Québec, as well as Place Bell in Laval, Québec

## BCE 2021 CONSOLIDATED RESULTS

| Operating revenues | Net earnings | Adjusted EBITDA [1] |
|---|---|---|
| $23,449 million | $2,892 million | $9,893 million |
| +2.5% vs. 2020 | +7.2% vs. 2020 | +3.0% vs. 2020 |



| Net earnings attributable to common shareholders | Adjusted net earnings [1] | Cash flows from operating activities | Free cash flow [1] |
|---|---|---|---|
| $2,709 million | $2,895 million | $8,008 million | $2,995 million |
| +8.4% vs. 2020 | +6.0% vs. 2020 | +3.3% vs. 2020 | (10.5%) vs. 2020 |

## BCE CUSTOMER CONNECTIONS

| Wireless Total mobile phones [2] | Retail high-speed Internet [3] | Retail TV [4] | Retail residential network access services (NAS) lines |
|---|---|---|---|
| +3.2% | +4.2% | (0.1%) | (7.5%) |
| 9.5 million subscribers at the end of 2021 | 3.9 million subscribers at the end of 2021 | 2.7 million subscribers at the end of 2021 | 2.3 million subscribers at the end of 2021 |

## OUR PURPOSE

BCE's purpose is to advance how Canadians connect with each other and the world. Our strategy builds on our longstanding strengths in networks, service innovation and content creation, and positions the company for continued growth and innovation leadership. Our primary business objectives are to grow our subscriber base profitably and to maximize revenues, operating profit, free cash flow and return on invested capital by further enhancing our position as the foremost provider in Canada of comprehensive communications services to residential, business and wholesale customers, and as Canada's leading content creation company. We seek to take advantage of opportunities to leverage our networks, infrastructure, sales channels, and brand and marketing resources across our various lines of business to create value for our customers and other stakeholders.

Our strategy is centred on our disciplined focus and execution of six strategic imperatives that position us to deliver continued success in a fast-changing communications marketplace. The six strategic imperatives that underlie BCE's business plan are:

### Bell's six strategic imperatives

- Build the best networks
- Drive growth with innovative services
- Deliver the most compelling content
- Champion customer experience
- Operate with agility and cost efficiency
- Engage and invest in our people and create a sustainable future

In 2022, we embedded our focus on creating a more sustainable future directly into our six strategic imperatives, reflecting our long-standing commitment to the highest ESG standards. As one of Canada's largest companies, we are driven to continually improve our impact and our contribution to society with our connectivity commitments, investments in mental health initiatives, environmental sustainability and an engaged workplace.

(1) *Adjusted EBITDA is a total of segments measure, and adjusted net earnings and free cash flow are non-GAAP financial measures. See section 11.3,* Total of segments measures *and section 11.1,* Non-GAAP financial measures *in this MD&A for more information on these measures.*

(2) *Effective January 1, 2021, we changed our wireless operating metrics to reflect our revised approach to reporting wireless subscriber units. Consequently, we are now reporting in two categories, mobile phone subscriber units and mobile connected device subscriber units (e.g. tablets, wearables and mobile Internet devices). Additionally, mobile connected device subscribers now include previously undisclosed Internet of Things (IoT) units (e.g. connected telematics services, monitoring devices, connected cars and fleet management solutions). These changes are consistent with the way we manage our business, reflect our focus on mobile phone subscribers and align to industry peers. As a result, previously reported 2020 subscribers and associated operating metrics (gross and net activations (losses) and churn) have been restated for comparability. See section 11.6,* KPIs, *in this MD&A for more details.*

(3) *At the beginning of Q1 2021, our retail high-speed Internet subscriber base was increased by 4,778 subscribers due to the transfer of fixed wireless Internet subscribers from our mobile connected devices subscriber base.*

(4) *At the beginning of Q1 2021, we adjusted our satellite TV subscriber base to remove 6,125 non-revenue generating units.*

# 1.2 About BCE

We report the results of our operations in three segments: Bell Wireless, Bell Wireline and Bell Media. We describe our product lines by segment below, to provide further insight into our operations.

## OUR PRODUCTS AND SERVICES

## Bell Wireless

### SEGMENT DESCRIPTION

- Provides integrated digital wireless voice and data communication products and services to residential and business customers across Canada
- Includes the results of operations of Bell Mobility Inc. (Bell Mobility) and our national consumer electronics retailer, The Source (Bell) Electronics Inc. (The Source)

### OUR BRANDS INCLUDE

Bell, Virgin plus, lucky mobile, THE SOURCE

### OUR NETWORKS AND REACH

We hold wireless spectrum licences, with holdings across various spectrum bands and regions across Canada, totalling more than 6.4 billion megahertz per population (MHz-Pop), corresponding to an average of approximately 182 megahertz (MHz) of spectrum per Canadian.

The vast majority of our cell towers are connected with fibre, the latest network infrastructure technology, for a faster and more reliable connection.

Our Fourth Generation (4G) Long-term Evolution (LTE) and LTE Advanced (LTE-A) nationwide wireless broadband networks are compatible with global standards and deliver high-quality and reliable voice and high-speed data services to virtually all of the Canadian population. Our 5G network, the next generation of wireless technology, is available in cities, towns and communities across Canada, with full deployment over the next few years. Our LTE network will be the backbone for our 5G network as it expands across Canada.

- LTE coverage of over 99% of Canada's population coast to coast, with LTE-A covering approximately 96% of Canada's population and 5G covering over 70% of Canada's population at December 31, 2021
- Peak theoretical mobile data access download speeds: 5G, up to 1.7 gigabit(s) per second (Gbps) (average expected speeds of 69 to 385 megabits per second (Mbps) in the Greater Toronto Area (GTA)); LTE-A, up to 1.5 Gbps [(1)] (average expected speeds of 25 to 325 Mbps); LTE, up to 150 Mbps (expected average speeds of 18 to 40 Mbps); high-speed packet access plus (HSPA+), up to 42 Mbps (expected average speeds of 7 to 14 Mbps) [(2)]
- Reverts to LTE/LTE-A technology and speeds when customers are outside 5G coverage areas
- Bell also operates a LTE-category M1 (LTE-M) network, which is a subset of our LTE network, supporting low-power IoT applications with enhanced coverage, longer device battery life and lower costs for IoT devices connecting to Bell's national network. Our LTE-M network is available in most Canadian provinces.

We have more than 6,000 retail points of distribution across Canada, including approximately 1,100 Bell, Virgin Plus, Lucky Mobile (Lucky) and The Source locations, as well as Glentel-operated locations (WIRELESSWAVE, Tbooth wireless and WIRELESS etc.) and other third-party dealer and retail locations.

### OUR PRODUCTS AND SERVICES

- **Data and voice plans:** From plans focused on affordability to premium services, we have plans that cater to all customer segments, available on either postpaid or prepaid options, including unlimited data, shareable, device financing plans and Connect Everything plans. Our services provide fast Internet access for video, social networking, messaging and mobile applications, as well as a host of call features.
- **Specialized plans:** for tablets, smartwatches, Connected Car, trackers, laptops, security cameras and mobile Internet
- **Extensive selection of devices:** the latest 5G, 4G LTE and LTE-A smartphones, tablets, smartwatches, mobile Internet hubs and sticks, mobile Internet devices and connected things (Bell Connected Car, trackers, connected home, lifestyle products and virtual reality)
- **Travel:** roaming services with other wireless service providers in more than 230 outbound destinations worldwide with LTE roaming in 208 outbound destinations and 5G roaming in several international destinations, Roam Better feature and Travel Passes
- **Mobile business solutions:** push-to-talk, field service management, worker safety and mobility management
- **IoT solutions:** asset management, smart buildings, smart cities, fleet management and other IoT services

(1) *Peak theoretical download speeds of up to 1.5 Gbps on LTE-A are currently available in Kingston, Waterloo, Toronto, Mississauga, Vaughan, Richmond Hill, Markham, Brampton, North Bay, Niagara-on-the-Lake, Cambridge, Pickering, Ajax, Burlington, Guelph, London, Niagara Falls, Oakville, St. Catharines, Thorold, Thunder Bay, Welland and Ottawa. Compatible device required.*

(2) *Network speeds vary with location, signal and customer device. Compatible device required.*

# Bell Wireline

## SEGMENT DESCRIPTION

- Provides data, including Internet access and IPTV, voice, comprising local telephone and long distance, as well as other communication services and products to residential, small and medium-sized business and large enterprise customers, primarily in Ontario, Québec, the Atlantic provinces and Manitoba, while satellite TV service and connectivity to business customers are available nationally across Canada. We also offer competitive local exchange carrier (CLEC) services in Alberta and British Columbia.
- Includes the results of our wholesale business, which buys and sells local telephone, long distance, data and other services from or to resellers and other carriers, and the wireline operations of Northwestel Inc. (Northwestel), which provides telecommunications services in Canada's Northern Territories

## OUR BRANDS INCLUDE

Bell, Fibe™, Bell Aliant, Bell MTS, NorthwesTel, Virgin plus

## OUR NETWORKS AND REACH

- Extensive local access network in Ontario, Québec, the Atlantic provinces and Manitoba, as well as in Canada's Northern Territories
- Broadband fibre network, consisting of fibre-to-the-premise (FTTP) and fibre-to-the-node (FTTN) locations, covering approximately 10 million homes and businesses in Ontario, Québec, the Atlantic provinces and Manitoba. Our FTTP direct fibre footprint encompassed approximately 6.2 million homes and commercial locations at the end of 2021, representing the largest FTTP footprint in Canada.
- Wireless-to-the-premise (WTTP) footprint covering approximately 1 million locations primarily in rural areas. WTTP is 5G-capable fixed wireless technology delivered over Bell's LTE wireless network that provides broadband residential Internet access to smaller and underserved communities.
- Largest Internet protocol (IP) multi-protocol label switching footprint of any Canadian provider, enabling us to offer business customers a virtual private network (VPN) service for IP traffic and to optimize bandwidth for real-time voice and TV
- Approximately 700 Bell and Virgin Plus locations

## OUR PRODUCTS AND SERVICES

### *RESIDENTIAL*

- **Internet:** high-speed Internet access through fibre optic broadband technology, 5G-capable WTTP technology or digital subscriber line (DSL) with a wide range of options, including reliable Wi-Fi, unlimited usage, security services and mobile Internet. Our Internet service, marketed as Fibe Internet, offers total download access speeds of up to 1.5 Gbps with FTTP or download speeds of up to 100 Mbps with FTTN, while our WHI fixed wireless service currently delivers broadband download speeds of up to 50 Mbps. We also offer Internet service under the Virgin Plus brand offering download speeds of up to 100 Mbps.
- **TV:** IPTV services (Fibe TV, Fibe TV app and Virgin Plus TV) and satellite TV service. Bell Fibe TV provides extensive content options with full high-definition (HD) and 4K resolution (4K) Whole Home personal video recorder (PVR), 4K Ultra HD programming, on-demand content and innovative features including wireless receivers, the Fibe TV app, Restart and access to Crave, Netflix, Prime Video and YouTube. The Fibe TV app live TV streaming service offers live and on-demand programming on Bell Streamer, Apple TV, Amazon Fire TV, Google Chromecast, smartphones, tablets, computers and other devices with no traditional TV set-top box (STB) required. Bell Streamer is a 4K high dynamic range (HDR) streaming device powered by Android TV offering all-in-one access to the Fibe TV app, support for all major streaming services and access to thousands of apps on Google Play. We also offer an app-based live TV streaming service branded as Virgin Plus TV.
- **Home Phone:** local telephone service, long distance and advanced calling features
- **Smart Home:** home security, monitoring and automation services from Bell Smart Home
- **Bundles:** multi-product bundles of Internet, TV, home phone and smart home services with monthly discounts

### *BUSINESS*

- **Internet and private networks:** business Internet, Ethernet, IP VPN, Wavelength, global network solutions, software-defined solutions
- **Communications:** IP telephony, local and long distance, audio, video and web conferencing and webcasting, contact centre solutions
- **Cloud:** cloud computing, cloud connect, cloud backup and disaster recovery, cloud managed services
- **Other:** security, managed services, professional services

# Bell Media

## SEGMENT DESCRIPTION

- Canada's leading content creation company with premier assets in TV, radio and OOH, monetized through traditional and digital platforms
- Revenues are derived primarily from advertising and subscriber fees
  - Conventional TV, radio and OOH revenues are derived from advertising
  - Specialty TV revenue is generated from subscription fees and advertising
  - Pay TV revenue is derived from subscription fees

## OUR BRANDS INCLUDE



## OUR ASSETS AND REACH

*TV*

- 35 conventional TV stations including **CTV**, Canada's #1 network for 20 consecutive years, #1 Canadian AVOD platform and leading digital news destination ctvnews.ca, and the French-language **Noovo** network in Québec, including its popular advertising-based video on demand (AVOD) platform and recently launched digital news destination Noovo.info
- 27 specialty TV channels, including **TSN**, Canada's most-watched sports channel and **RDS**, the top French-language sports network
- 4 pay TV services and 4 direct-to-consumer (DTC) streaming services, including **Crave**, the exclusive home of HBO in Canada, **TSN Direct** and **RDS Direct**

*RADIO*

- 109 licensed radio stations in 58 markets across Canada, all available through the iHeartRadio app alongside an extensive catalogue of podcasts

*OOH ADVERTISING*

- Network of more than 50,000 advertising faces in key urban markets across Canada

*BROADCAST RIGHTS*

- **Sports:** long-term media rights to key sports properties and official Canadian broadcaster of the Super Bowl, Grey Cup and International Ice Hockey Federation (IIHF) World Junior Championship. Live sports coverage includes the Toronto Maple Leafs, Montréal Canadiens, Winnipeg Jets and Ottawa Senators, Canadian Football League (CFL), National Football League (NFL), National Basketball Association (NBA), Major League Soccer (MLS), Fédération Internationale de Football Association (FIFA) World Cup events, Curling's Season of Champions, Major League Baseball (MLB), Golf's Majors, NASCAR Cup Series, Formula 1 (F1), Grand Slam Tennis, Ultimate Fighting Championship (UFC), National Collegiate Athletic Association (NCAA), March Madness and more.
- **HBO:** long-term agreement to deliver all current-season, past-season and library HBO programming in Canada exclusively on our linear, on-demand and OTT platforms
- **HBO Max:** long-term exclusive agreement to deliver original, non-children's programming produced by Warner Bros. Television Group for HBO Max
- **SHOWTIME:** content licensing and trademark agreement for past, present and future SHOWTIME-owned programming
- **STARZ:** long-term agreement with Lionsgate for premium STARZ programming in Canada
- **iHeartRadio:** exclusive partnership for digital and streaming music services in Canada

*OTHER ASSETS*

- Majority stake in Pinewood Toronto Studios, the largest purpose-built production studio in Canada
- Partnership in Just for Laughs, the live comedy event and TV producer
- Equity interest in Dome Productions Partnership, one of North America's leading providers of sports and other event production and broadcast facilities
- Minority interest in Montréal's Grandé Studios, a Montréal-based multipurpose TV, film and equipment company which provides production facilities, equipment rentals, and technical services
- Operations of Montréal's Octane Racing Group Inc., promoter of the F1 Canadian Grand Prix, the largest annual sports and tourism event in the country

## OUR PRODUCTS AND SERVICES

- Varied and extensive array of video content to broadcast distributors across Canada
- **Advertising** on our TV, radio and OOH properties to both local and national advertisers across a wide range of industry sectors
- **Crave** bilingual subscription-based on-demand TV streaming service offering a large collection of premium content in one place, including HBO, HBO Max, SHOWTIME, STARZ and Super Écran programming, on STBs, mobile devices, streaming devices and online. Crave is offered through a number of Canadian TV providers and is available directly to all Canadian Internet subscribers as an OTT service.
- **TSN Direct and RDS Direct** streaming services offering live and on-demand TSN and RDS content directly to consumers through an annual, monthly or single-day subscription on computers, tablets, mobile devices, Apple TV and other streaming devices

## Other BCE investments

BCE also holds investments in a number of other assets, including:

- a 28% indirect equity interest in MLSE, a sports and entertainment company that owns several sports teams, including the Toronto Maple Leafs, the Toronto Raptors, Toronto FC and the Toronto Argonauts, as well as real estate and entertainment assets in Toronto
- a 50% indirect equity interest in Glentel, a Canadian-based connected services retailer
- an 18.4% indirect equity interest in entities that operate the Montréal Canadiens Hockey Club, evenko (a promoter and producer of cultural and sports events) and the Bell Centre in Montréal, Québec, as well as Place Bell in Laval, Québec



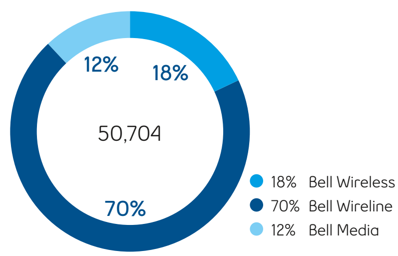
## OUR PEOPLE

### EMPLOYEES

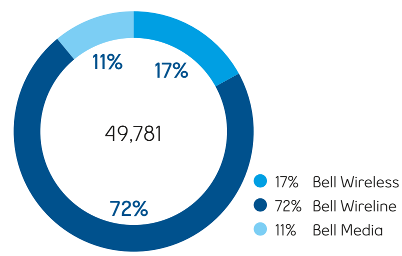
At the end of 2021, our team consisted of 49,781 employees, a decrease of 923 employees compared to the end of 2020, attributable to natural attrition, retirements and workforce reductions, offset in part by call centre hiring.

Approximately 39% of total BCE employees were represented by labour unions at December 31, 2021.

BCE
2020 employees




BCE
2021 employees




### BELL CODE OF BUSINESS CONDUCT

The ethical business conduct of our people is core to the integrity with which we operate our business. The Bell Code of Business Conduct sets out specific expectations and accountabilities, providing employees with practical guidelines to conduct business in an ethical manner. Our commitment to the Code of Business Conduct is renewed by employees each year in an ongoing effort to ensure that all employees are aware of, and adhere to, Bell's standards of conduct.

# 1.3 Key corporate developments

This section contains forward-looking statements, including relating to our capital expenditure acceleration program and certain of our ESG objectives. Refer to the section *Caution regarding forward-looking statements* at the beginning of this MD&A.

## CAPITAL EXPENDITURE ACCELERATION PROGRAM

In 2021, Bell commenced its program to accelerate the rollout of its broadband fibre and wireless networks with a $1.7 billion acceleration in capital expenditures over the next two years to help drive Canada's recovery from the COVID-19 crisis. Enabled by a positive investment climate reflecting government support for infrastructure development, this $1.7 billion capital expenditure acceleration is in addition to the approximately $4 billion in capital expenditures that Bell has typically spent each year on network infrastructure and expansion over the last decade, and will significantly increase the connections in localities across Canada. Bell spent approximately $800 million of this additional capital expenditure in 2021 to deliver approximately 1.1 million new direct fibre and WHI locations and expand mobile 5G coverage to more than 70% of Canadians. In 2022, our capital expenditures will include $900 million in accelerated capital expenditures to reach up to 900,000 more homes and businesses with direct fibre connections, expand the reach of our national 5G network to more than 80% of the national population, further densify our wireless network with new 5G sites to meet growing customer usage requirements, and enable the launch of a 5G standalone core leveraging 3500 MHz spectrum that will drive enhanced speeds, lower latency and enable next-generation services.

## ACQUISITION OF ADDITIONAL HIGH-VALUE 3500 MHZ WIRELESS SPECTRUM

Bell acquired significant additional mid-band, flexible-use 3500 MHz wireless spectrum – critical to enabling the full potential of 5G – in ISED's Canadian spectrum auction completed in July 2021. Bell acquired 271 licences in a number of urban and rural markets for 678 million MHz-Pop of 3500 MHz spectrum for $2.07 billion. Essential to Canada's ongoing transition to 5G communications, these high-capacity airwaves extend Bell's leadership in delivering enhanced 5G digital experiences to Canadian consumers and businesses in urban, rural and remote communities. This acquisition increases Bell's total 3500 MHz spectrum holdings to 1,690 million MHz-Pop.

## LAUNCH OF BELL FOR BETTER INITIATIVE

In June 2021, Bell launched Bell for Better, our long-term commitment to create better outcomes for all stakeholders, including Canadian communities everywhere, employees, customers and shareholders. With our connectivity initiatives from the smallest rural communities to the largest cities, investments in mental health initiatives, environmental sustainability and an engaged workplace, Bell looks to create a thriving, prosperous and more connected world for Canadians across the country, especially as we recover from the unprecedented challenges of the COVID-19 crisis. With Bell for Better, Bell is underscoring its objective to achieve the highest ESG standards based on three pillars:

**Better world**

- Target to reduce GHG emissions by 2030 in line with the Paris Climate Agreement and the SBTi, and to achieve carbon neutral operations by 2025. Bell is the first communications company in North America to receive ISO 50001 certification for energy management and has been named one of Canada's Greenest Employers for five straight years.
- Continue to lead the industry and corporate Canada in mental health with $155 million committed to mental health initiatives by 2025 through Bell Let's Talk, Canada's largest-ever corporate commitment to mental health
- Bell was the first Canadian telecom company to launch a sustainability bond offering, part of a new Sustainable Financing Framework that builds ESG considerations into our investment decisions

**Better communities**

- Target to invest up to $14 billion in capital expenditures from 2020 to 2022 to deliver faster and better connectivity to more Canadians
- Connect rural and underserved communities by making fast and reliable WHI available to 1 million households in rural communities
- Invest in Canadian innovation with a historical industry-leading amount of approximately $500 million in research and development capital expenditures annually
- Donate refurbished company computers, printers and other electronic devices to schools through the national Computers for Success Plus program

**Better workplace**

- Foster an inclusive culture, building on its recognition as one of the largest and Best Employers in Canada, including one of the Best Diversity Employers, Greenest Employers, Top Family-Friendly Employers and a Montréal Top Employer
- Enable the next generation of Bell leaders through our Graduate Leadership Programs, building on its recognition as a Top Employer for Young People
- Encourage diversity at the top, targeting at least 35% gender diverse representation in executive positions (vice-president and above) by the end of 2023, and Black, Indigenous and People of Colour (BIPOC) representation on our senior management team of at least 25% by 2025

## ACQUISITION OF INTERNET PROVIDER EBOX

On February 24, 2022, Bell announced its acquisition of EBOX, an independent Internet, telephone and television service provider based in Longueuil, Québec. Bell will maintain the EBOX brand and operations, and EBOX will continue providing telecommunications options for consumers and businesses in Québec and parts of Ontario. As part of its commitment to provide Québec residents with fast and reliable telecommunications services now and in the future, Bell invests heavily in network infrastructure and expansion throughout urban and rural Québec. Under Bell, EBOX will benefit from the resources, scale and access to the technology needed to support the growth of the business and continue delivering improvements to the great services at competitive prices that have earned EBOX loyal customers over the past 25 years. The acquisition is expected to accelerate growth in Bell's residential and small business customers. The results of the acquired business will be included in our Bell Wireline segment.

# 1.4 Capital markets strategy

This section contains forward-looking statements, including relating to BCE's dividend growth objective, 2022 annualized common share dividend, dividend payout ratio level and financial policy targets, and our business outlook, objectives and plans. Refer to the section *Caution regarding forward-looking statements* at the beginning of this MD&A.

We seek to deliver sustainable shareholder returns through consistent dividend growth. This objective is underpinned by substantial free cash flow generation and a strong balance sheet, supporting a significant ongoing capital investment on advanced broadband networks and services that are essential to driving the long-term growth of our business.

## DIVIDEND GROWTH AND PAYOUT POLICY

| Dividend yield [1] | 2022 dividend increase | Dividend payout [2] policy |
|---|---|---|
| 5.3% | +5.1% | 65%–75% |
| in 2021 | to $3.68 per common share | of free cash flow |

On February 3, 2022, we announced a 5.1%, or 18 cents, increase in the annualized dividend payable on BCE's common shares for 2022 to $3.68 per share from $3.50 per share in 2021, starting with the quarterly dividend payable on April 15, 2022. This is BCE's 14th consecutive year of 5% or better dividend growth.

Our objective is to seek to achieve dividend growth while maintaining our dividend payout ratio within the target policy range of 65% to 75% of free cash flow and balancing our strategic business priorities. BCE's dividend payout policy, increases in the common share dividend and the declaration of dividends are subject to the discretion of the BCE Board and, consequently, there can be no guarantee that BCE's dividend policy will be maintained, that the dividend on common shares will be increased or that dividends will be declared. In 2021, our dividend payout ratio was 105%, which is higher than our policy range due to a planned acceleration in capital expenditures and the financial impacts of the COVID-19 pandemic. Due mainly to another planned acceleration in capital expenditures this year, BCE's dividend payout ratio is expected to remain above our target policy range in 2022.

## EXECUTIVE COMPENSATION ALIGNMENT

BCE's management equity-based incentive plans are structured to maximize shareholder value, share price and capital returns, as well as delivering on our goal of advancing how Canadians connect with each other and the world, through the successful execution of our six strategic imperatives. We have a strong alignment of interest between shareholders and our management's equity-based incentive plans.

### Best practices adopted by BCE for executive compensation

- Stringent share ownership requirements
- Emphasis on pay at risk for executive compensation
- Double trigger change-in-control policy
- Anti-hedging policy on share ownership and incentive compensation
- Clawbacks for the President and Chief Executive Officer (CEO) and all Executive Vice-Presidents as well as all option holders
- Caps on BCE supplemental executive retirement plans and annual bonus payouts, in addition to mid-term and long-term incentive grants
- Vesting criteria fully aligned to shareholder interests

## USE OF LIQUIDITY

Consistent with our capital markets objective to deliver sustainable shareholder returns through dividend growth, while maintaining planned levels of capital investment, investment-grade credit ratings and considerable overall financial flexibility, we deploy excess free cash flow [3] in a balanced manner and on uses that include, but are not limited to:

- Funding of strategic acquisitions and investments (including wireless spectrum purchases) that support the growth of our business
- Debt reduction
- Voluntary contributions to BCE's DB pension plans to improve the funded position of the plans and reduce the use of letters of credit for funding deficits
- Share buybacks through normal course issuer bid programs

In 2021, excess free cash flow was negative $137 million, down from $373 million in 2020. The year-over-year decrease was primarily attributable to higher capital expenditures consistent with our 2-year capital expenditure acceleration program to accelerate the rollout of Bell's 5G, fibre and rural WHI networks. This increase in capital expenditures compared to 2020 more than offset cash flows from operating activities of $8,008 million, which increased by $254 million year-over-year.

(1) *Annualized dividend per BCE common share divided by BCE's share price at the end of the year.*
(2) *Dividend payout ratio is a non-GAAP ratio. Refer to section 11.2,* Non-GAAP ratios *in this MD&A for more information on this measure.*
(3) *Excess free cash flow is a non-GAAP financial measure. Refer to section 11.1,* Non-GAAP financial measures *in this MD&A for more information on this measure.*

## TOTAL SHAREHOLDER RETURN PERFORMANCE

**Five-year total shareholder return** [1]

+48.5%

2017–2021

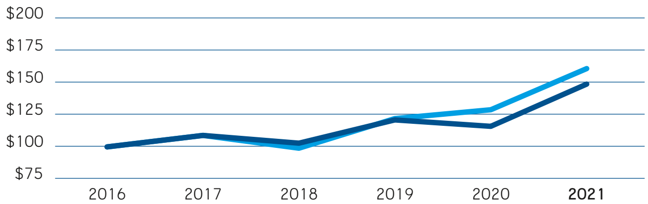
**One-year total shareholder return** [1]

+27.9%

2021

### FIVE-YEAR CUMULATIVE TOTAL VALUE OF A $100 INVESTMENT [2]

DECEMBER 31, 2016 – DECEMBER 31, 2021




This graph compares the yearly change in the cumulative annual total shareholder return of BCE common shares against the cumulative annual total return of the S&P/TSX Composite Index [3], for the five-year period ending December 31, 2021, assuming an initial investment of $100 on December 31, 2016 and the quarterly reinvestment of all dividends.

● BCE common shares ● S&P/TSX Composite Index



## STRONG CAPITAL STRUCTURE

BCE's balance sheet is underpinned by a healthy available liquidity [4] position of approximately $3.4 billion at the end of 2021, comprised of $207 million in cash, $400 million available under our securitized trade receivable program and $2.8 billion available under our $3.5 billion committed bank credit facilities, and an investment-grade credit profile, providing the company with a solid financial foundation and a high level of overall financial flexibility. BCE has an attractive long-term debt maturity profile with no material maturities until the first quarter of 2023. We continue to monitor the capital markets for opportunities to lower our cost of debt and optimize our cost of capital. We seek to proactively manage financial risk in terms of currency exposure of our U.S. dollar-denominated purchases, as well as equity risk exposure under BCE's long-term equity-based incentive plans and interest rate and foreign currency exposure under our various debt instruments. We also seek to maintain investment-grade credit ratings with stable outlooks.

### ATTRACTIVE LONG-TERM PUBLIC DEBT MATURITY PROFILE [5]

- Average term of Bell Canada's publicly issued debt securities: approximately 12.8 years
- Average after-tax cost of publicly issued debt securities: 2.8%
- No material publicly issued debt securities maturing until Q1 2023

### STRONG LIQUIDITY POSITION [5]

- $2,789 million available under our $3.5 billion multi-year committed credit facilities
- $400 million accounts receivable securitization available capacity
- $207 million cash

### INVESTMENT GRADE CREDIT PROFILE [5] [6]

- Long-term debt credit rating of BBB (high) by DBRS Limited (DBRS), Baa 1 by Moody's Investors Service, Inc. (Moody's) and BBB+ by S&P, all with stable outlooks

(1) *Shareholder return is defined as the change in BCE's common share price for a specified period plus BCE common share dividends reinvested, divided by BCE's common share price at the beginning of the period.*

(2) *Based on BCE's common share price on the TSX and assuming the reinvestment of dividends.*

(3) *As the headline index for the Canadian equity market, the S&P/TSX Composite Index is the primary gauge against which to measure total shareholder return for Canadian-based, TSX-listed companies.*

(4) *Available liquidity is a non-GAAP financial measure. Refer to section 11.1,* Non-GAAP financial measures *in this MD&A for more information on this measure.*

(5) *As at December 31, 2021*

(6) *These credit ratings are not recommendations to buy, sell or hold any of the securities referred to, and they may be revised or withdrawn at any time by the assigning rating agency. Ratings are determined by the rating agencies based on criteria established from time to time by them, and they do not comment on market price or suitability for a particular investor. Each credit rating should be evaluated independently of any other credit rating.*

We monitor our capital structure by utilizing a number of measures, including net debt leverage ratio [(1)], adjusted EBITDA to adjusted net interest expense ratio [(1)], and dividend payout ratio.

As a result of financing a number of strategic acquisitions made since 2010, including CTV Inc. (CTV), Astral Media Inc. (Astral), MLSE, Bell Aliant Inc. and Manitoba Telecom Services Inc. (MTS); voluntary pension plan funding contributions to reduce our pension solvency deficit; wireless spectrum purchases; as well as a one-time unfavourable impact in 2019 due to the adoption of IFRS 16 that added $2.3 billion of lease liabilities to net debt [(1)] on our balance sheet on January 1, 2019, our net debt leverage ratio has increased above our internal target range. At December 31, 2021, our net debt leverage ratio was 3.18 times adjusted EBITDA, which exceeded the upper end of our internal target range by 0.68.

BCE's adjusted EBITDA to adjusted net interest expense ratio at the end of 2021 remained above our internal target range of greater than 7.5 times adjusted EBITDA at 8.77, providing good predictability in our debt service costs and protection from interest rate volatility.

| BCE CREDIT RATIOS | INTERNAL TARGET | DECEMBER 31, 2021 |
|---|---|---|
| Net debt leverage ratio | 2.0–2.5 | 3.18 |
| Adjusted EBITDA to adjusted net interest expense ratio | >7.5 | 8.77 |

In 2021, Bell Canada successfully completed a proxy solicitation with respect to proposed amendments to its trust indenture dated July 1, 1976. The amendments, which were approved at a special meeting of holders of debentures on November 12, 2021, align the 1976 Indenture more closely with current and generally accepted market practice in Canada for investment-grade senior unsecured debt and provide Bell Canada with more flexibility with respect to raising capital to finance its business and operations, including enabling us to maintain Bell Canada as the sole public debt issuer in BCE's corporate structure.

Bell Canada successfully accessed the debt capital markets in March 2021, May 2021 and August 2021, raising a total of $2.05 billion in gross proceeds from the issuance in Canada of medium-term note (MTN) debentures, and $2.35 billion in U.S. dollars ($2.94 billion in Canadian dollars) in gross proceeds from the issuance of notes in the U.S. Both the Canadian-dollar and U.S.-dollar issuances contributed to modestly lowering our after-tax cost of outstanding publicly issued debt securities to approximately 2.8% (3.8% on a pre-tax basis), and increasing the average term to maturity to 12.8 years. The net proceeds of the 2021 offerings were used to fund the early redemption of $1.7 billion of Bell Canada MTN debentures maturing in 2022, to fund part of the $2.07 billion cost of 3500 MHz spectrum licences Bell secured pursuant to the Canadian spectrum auction completed in July 2021, to finance or re-finance, in whole or in part, new and/or existing green and social eligible investments as set out in BCE's Sustainable Financing Framework, to repay short-term debt and for general corporate purposes.

Subsequent to year end, on February 11, 2022, Bell Canada issued 3.65% Series US-7 Notes with a principal amount of $750 million in U.S. dollars ($954 million in Canadian dollars), which mature on August 15, 2052. The net proceeds of the offering are intended to be used towards the cost of funding, on March 16, 2022, the redemption, prior to maturity, of Bell Canada's 3.35% Series M-26 MTN debentures, with early debt redemption charges of $18 million. The M-26 MTN debentures have an outstanding principal amount of $1 billion and were due on March 22, 2023.

In addition, subsequent to year end, on February 24, 2022, BCE announced its intention to redeem all of its outstanding Cumulative Redeemable First Preferred Shares, Series AO (Series AO Preferred Shares) on March 31, 2022 at a redemption price of $25.00 per Series AO Preferred Share, for a total amount of $115 million.

# 1.5 Corporate governance and risk management

## CORPORATE GOVERNANCE PHILOSOPHY

The Board and management of BCE believe that strong corporate governance practices contribute to superior results in creating and maintaining shareholder value. That is why we continually seek to strengthen our leadership in corporate governance and ethical business conduct by adopting best practices, and providing full transparency and accountability to our shareholders. The Board is responsible for the supervision of the business and affairs of the company.

Below are our key Board information and governance best practices:

| | | | |
|---|---|---|---|
| ✓ | Directors are ALL Independent (except CEO) | ✓ | Directors' Tenure Guidelines |
| **99%** | 2021 Board and Committee Director Attendance Record for Director Nominees | ✓ | Board Renewal: 8 Non-Executive Director Nominees ≤ 6 Years Tenure |
| ✓ | Board Committee Members are All Independent | ✓ | Share Ownership Guidelines for Directors and Executives |
| ✓ | Board Diversity Policy and Target for Gender Representation | ✓ | Code of Business Conduct and Ethics Program |
| ✓ | Annual Election of All Directors | ✓ | Annual Advisory Vote on Executive Compensation |
| ✓ | Directors Elected Individually | ✓ | Formal Board Evaluation Process |
| ✓ | Majority Voting Policy for Directors | ✓ | Board Risk Oversight Practices |
| ✓ | Separate Chair and CEO | ✓ | ESG Strategy Reviewed by Board |
| ✓ | Board Interlocks Guidelines | ✓ | Robust Succession Planning |

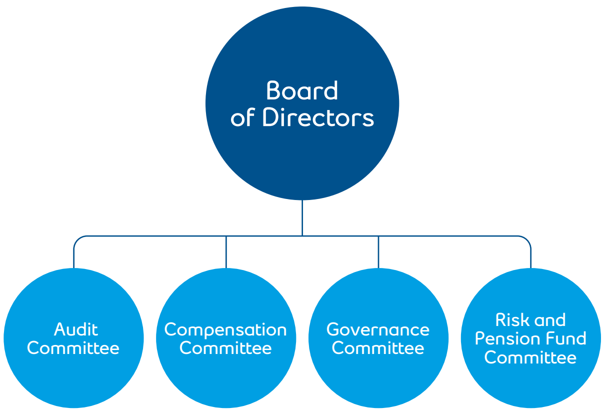
For more information, please refer to BCE's most recent notice of annual general shareholder meeting and management proxy circular (the Proxy Circular) filed with the Canadian provincial securities regulatory authorities (available at **sedar.com**) and furnished to the U.S. Securities and Exchange Commission (available at **sec.gov**), and available on BCE's website at **BCE.ca**.

(1) *Net debt leverage ratio and adjusted EBITDA to adjusted net interest expense ratio are capital management measures and net debt is a non-GAAP financial measure. See section 11.4,* Capital management measures *and section 11.1,* Non-GAAP financial measures *in this MD&A for more information on these measures.*

# RISK GOVERNANCE FRAMEWORK

## BOARD OVERSIGHT

BCE's full Board is entrusted with the responsibility for identifying and overseeing the principal risks to which our business is exposed and seeking to ensure there are processes in place to effectively identify, monitor and manage them. These processes seek to mitigate rather than eliminate risk. A risk is the possibility that an event might happen in the future that could have a negative effect on our business, financial condition, liquidity, financial results or reputation. While the Board has overall responsibility for risk, the responsibility for certain elements of the risk oversight program is delegated to Board committees in order to ensure that they are treated with appropriate expertise, attention and diligence, with reporting to the Board on a regular basis.




Risk information is reviewed by the Board or the relevant committee throughout the year, and business leaders present regular updates on the execution of business strategies, risks and mitigation.

- The Risk and Pension Fund Committee has oversight responsibility for the organization's risk governance framework, which exists to identify, assess, mitigate and report key risks to which BCE is exposed. As part of its Charter, the Risk and Pension Fund Committee is tasked with oversight of risks relating to business continuity plans, work stoppage and disaster recovery plans, regulatory and public policy, information management and privacy, information and physical security, fraud, vendor and supply chain management, the environment, the pension fund, and other risks as required. The Risk and Pension Fund Committee receives a report on security matters, including information security, at each of its meetings.
- The Audit Committee is responsible for overseeing financial reporting and disclosure, as well as the organization's internal control systems and compliance with legal requirements
- The Management Resources and Compensation Committee (Compensation Committee) oversees risks relating to compensation, succession planning and workplace policies and practices
- The Corporate Governance Committee (Governance Committee) assists the Board in developing and implementing BCE's corporate governance guidelines and determining the composition of the Board and its committees. The Governance Committee is also responsible for oversight of our corporate purpose and our ESG matters, including climate-related risks and the organization's policies concerning business conduct, ethics and public disclosure of material information.

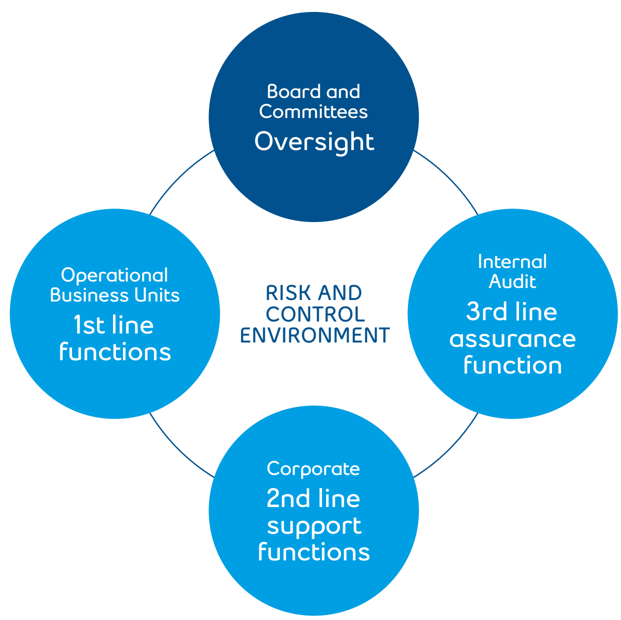
## RISK MANAGEMENT CULTURE

There is a strong culture of risk management at BCE that is actively promoted by the Board, the Risk and Pension Fund Committee and the President and CEO, at all levels within the organization. It is a part of how the company operates on a day-to-day basis and is woven into its structure and operating principles, guiding the implementation of the organization's strategic imperatives.

The President and CEO, selected by the Board, has set his strategic focus through the establishment of six strategic imperatives and focuses risk management around the factors that could impact the achievement of those strategic imperatives. While the constant state of change in the economic environment and the industry creates challenges that need to be managed, clarity around strategic objectives, performance expectations, risk management and integrity in execution ensures discipline and balance in all aspects of our business.

## RISK MANAGEMENT FRAMEWORK

While the Board is responsible for BCE's risk oversight program, operational business units are central to the proactive identification and management of risk. They are supported by a range of corporate support functions that provide independent expertise to reinforce implementation of risk management approaches in collaboration with the operational business units. The Internal Audit function provides a further element of expertise and assurance, working to provide insight and support to the operational business units and corporate support functions, while also providing the Audit Committee, and other Board committees as required, with an independent perspective on the state of risk and control within the organization. Collectively, these elements can be thought of as a "three lines" approach to risk management. Although the risk management framework described in this section 1.5 is aligned with industry practices, there can be no assurance that it will be sufficient to prevent the occurrence of events that could have a material adverse effect on our business, financial condition, liquidity, financial results or reputation.



*FIRST LINE – OPERATIONAL BUSINESS UNITS*

The first line refers to management within our operational business segments (Bell Wireless, Bell Wireline and Bell Media), who are expected to understand their operations in great detail and the financial results that underpin them. There are regular reviews of operating performance involving the organization's executive and senior management. The discipline and precision associated with this process, coupled with the alignment and focus around performance goals, creates a high degree of accountability and transparency in support of our risk management practices.

As risks emerge in the business environment, they are discussed in a number of regular forums to share details and explore their relevance across the organization. Executive and senior management are integral to these activities in driving the identification, assessment, mitigation and reporting of risks at all levels. Formal risk reporting occurs through strategic planning sessions, management presentations to the Board and formal enterprise risk reporting, which is shared with the Board and the Risk and Pension Fund Committee during the year.

Management is also responsible for maintaining effective internal controls and for executing risk and control procedures on a day-to-day basis. Each operational business unit develops its own operating controls and procedures that fit the needs of its unique environment.

*SECOND LINE – CORPORATE SUPPORT FUNCTIONS*

BCE is a very large enterprise, with 49,781 employees as at December 31, 2021, multiple business units and a diverse portfolio of risks that is constantly evolving based on internal and external factors. In a large organization, it is common to manage certain functions centrally for efficiency, scale and consistency. While the first line is often central to identification and management of business risks, in many instances operational management works collaboratively with, and also relies on, the corporate functions that make up the second line of support in these areas. These corporate functions include Regulatory, Finance, Corporate Security, Corporate Risk Management, Legal, Corporate Responsibility, Human Resources, Real Estate and Procurement.

**Regulatory function:** This function is responsible for the regulatory portfolio, including an expanding range of obligations set out in new privacy and data protection laws being enacted in Canada and around the world. BCE has developed, and will maintain, an enhanced Data Governance Policy that encompasses the protection and appropriate use of data across its lifecycle. A significant element of the data governance program relies on the Corporate Security activities outlined below and these two functions work jointly with data owners, data custodians and other relevant employees to ensure this policy is appropriately implemented. We recognize that a strong and consistently applied approach to data governance is essential to maintaining the social licence necessary to achieve our business objectives. For more information on our approach to privacy and data security, refer to section 1.6, *Environmental, social and governance practices*, in this MD&A.

**Finance function:** BCE's Finance function plays a pivotal role in seeking to identify, assess and manage risks through a number of activities, which include financial performance management, external reporting, pension management, capital management, and oversight and execution practices related to the U.S. *Sarbanes-Oxley Act of 2002* and equivalent Canadian securities legislation, including the establishment and maintenance of appropriate internal control over financial reporting. BCE has also established and maintains disclosure controls and procedures to seek to ensure that the information it publicly discloses, including its business risks, is accurately recorded, processed, summarized and reported on a timely basis. For more details concerning BCE's internal control over financial reporting and disclosure controls and procedures, refer to the Proxy Circular and section 12, *Effectiveness of internal controls* of this MD&A.

**Corporate Security function:** This function is responsible for all aspects of security, which requires a deep understanding of the business, the risk environment and the external stakeholder environment. Based on this understanding, Corporate Security sets the standards of performance required across the organization through security policy definitions and monitors the organization's performance against these policies. In high and emerging risk areas such as information security, Corporate Security leverages its experience and competence and, through collaboration with the operational business units, develops strategies intended to seek to mitigate the organization's risks. For instance, we have implemented security awareness training and policies and procedures that seek to mitigate information security threats. We further rely on security assessments to identify risks, projects and implementation controls with the objective of ensuring that systems are deployed with the appropriate level of control based on risk and technical capabilities, including access management, vulnerability management, security monitoring and testing, to help identify and respond to attempts to gain unauthorized access to our information systems and networks. We evaluate and seek to adapt our security policies and procedures designed to protect our information and assets in light of the continuously evolving nature and sophistication of information security threats. However, given in particular the complexity and scale of our business, network infrastructure, technology and IT supporting systems, there can be no assurance that the security policies and procedures that we implement will prevent the occurrence of all potential information security breaches. In addition, although BCE has contracted an insurance policy covering information security risk, there can be no assurance that any insurance we may have will cover the costs, damages, liabilities or losses that could result from the occurrence of any information security breach.

**Corporate Risk Management function:** This function works across the company to gather information and report on the organization's assessment of its principal risks and the related exposures. Annually, senior management participate in a risk survey that provides an important reference point in the overall risk assessment process.

In addition to the activities described above, the second line is also critical in building and operating the oversight mechanisms that bring focus to relevant areas of risk and reinforce the bridges between the first and second lines, thereby seeking to ensure that there is a clear understanding of emerging risks, their relevance to the organization and the proposed mitigation plans.

To further coordinate efforts between the first and second lines, BCE has established a Health and Safety, Security, Environment and Compliance Oversight Committee (HSSEC Committee). A significant number of BCE's most senior leaders are members of the HSSEC Committee, the purpose of which is to oversee BCE's strategic security (including information security), compliance, environmental, and health and safety risks and opportunities. This cross-functional committee seeks to ensure that relevant risks are adequately recognized and mitigation activities are well integrated and aligned across the organization and are supported with sufficient resources. The HSSEC Committee also mandates the company's Energy Board, a working group composed of business unit employees, including vice-presidents and directors, to ensure oversight of our overall energy consumption and costs with the objective of minimizing financial and reputational risks while maximizing business opportunities.

In addition, in order to support the evolution of our corporate responsibility strategy, in 2021 we created a Corporate Responsibility (CR) Board composed of a significant number of employees at the senior vice-president, vice-president and director levels. The CR Board is responsible, among others, to embed corporate responsibility considerations into corporate and business unit strategies, assist in identifying corporate responsibility areas for further improvement, establish relevant ESG KPIs, respond to stakeholders' concerns and support various corporate responsibility initiatives. The CR Board reports on progress to the HSSEC Committee, the co-chairs of which report to the Risk and Pension Fund Committee, Governance Committee and Compensation Committee of the Board of Directors.

*THIRD LINE – INTERNAL AUDIT FUNCTION*

Internal Audit is a part of the overall management information and control system and has the responsibility to act as an independent appraisal function. Its purpose is to provide the Audit Committee, other Board committees as required, and management with objective evaluations of the company's risk and control environment, to support management in fulfilling BCE's strategic imperatives and to maintain an audit presence throughout BCE and its subsidiaries.



## 1.6 Environmental, social and governance practices

This section contains forward-looking statements, including relating to our ESG objectives and network deployment plans. Refer to the section *Caution regarding forward-looking statements* at the beginning of this MD&A.

ESG practices form an integral part of BCE's corporate responsibility approach. Since our founding in 1880, Bell has been enabling Canadians to connect with each other and the world. Our approach to corporate responsibility is to manage the company in ways that support the social and economic prosperity of our communities while safeguarding the environment, with a commitment to the highest ESG standards.

### CORPORATE RESPONSIBILITY UNDERPINS OUR SIX STRATEGIC IMPERATIVES

Corporate responsibility is a fundamental element of each of the six strategic imperatives that inform BCE's policies, decisions and actions. Reflecting our long-standing commitment to the highest ESG standards, our focus is on creating a more sustainable future by embedding it directly into our six strategic imperatives. As one of Canada's largest companies, we are driven to continually improve our impact and our contribution to society with our connectivity commitments, investments in mental health initiatives, environmental sustainability and engaged workplace. This approach also supports our purpose to advance how Canadians connect with each other and the world.

The Board has established clear oversight of our corporate responsibility programs and our approach to ESG practices, with primary accountability at the committee level. The Governance Committee is responsible for oversight of our corporate purpose and our ESG strategy and disclosure, which includes oversight and related disclosure of climate-related risks. It is also responsible for our governance practices and policies, including those concerning business conduct and ethics. In addition, the Risk and Pension Fund Committee oversees environmental, safety and security risks, including data governance and cybersecurity, while the Compensation Committee has oversight of human resource issues, including respectful workplace practices, health and safety, and tracks corporate performance against our ESG targets. In 2020, the Compensation Committee formally added ESG targets to corporate performance metrics, establishing a link to compensation. Furthermore, as of 2022, additional ESG related metrics were added and are embedded into each of the strategic imperatives, which is reflective of how ESG is embedded into the overall strategy of the business. ESG is targeted to represent, in aggregate, at least 30% of the total strategic imperatives score in 2022. The Compensation Committee reviews the detailed metrics and targets and approves them early in the year, tracking progress throughout the year.

We report annually on our corporate responsibility performance and our ESG practices in our Corporate Responsibility Report, available at BCE.ca. We report on the ESG topics that are of greatest importance to our stakeholders and which could have a relevant impact on our business.

BCE is recognized around the world for the effectiveness of its corporate responsibility and ESG programs, as reflected in its inclusion in various sustainability indices and its receipt of sustainability awards. In 2021, BCE continued to be listed on socially responsible investment indices such as the FTSE4Good Index, the Jantzi Social Index, the Ethibel Sustainability Index (ESI) Excellence Global, and the Euronext Vigeo World 120 index.

### COMMUNITY

Since 2010, the Bell Let's Talk mental health initiative has raised awareness and action for Canadian mental health, with a focus on helping reduce the stigma around mental illness, improving access to care, supporting world-class research and leading by example in workplace mental health – and is a driver of Bell for Better. Over the last 12 years, Canadians and people worldwide have taken action to create positive change by engaging in the mental health conversation, working hard to help create a Canada where everyone can get the culturally-appropriate mental health support they need. To date, Bell Let's Talk has committed over $129.5 million in funding to mental health initiatives and has partnered with more than 1,300 organizations providing mental health support and services throughout Canada.

#### WHY MENTAL HEALTH MATTERS

The current COVID-19 situation has affected our mental health. Two-thirds of Canadians are feeling more isolated, with young people experiencing the greatest decline since the pandemic began. As well, the mental health challenges of BIPOC communities have underscored the need to address mental illness in culturally appropriate and barrier-free ways. Practising physical distancing makes it even more important that we make an extra effort to remain emotionally connected. Finding ways to stay connected with friends, family and loved ones will support good mental health and well-being and will help ensure Canadians get through this together.

*WHAT WE ARE DOING*

In the lead up to Bell Let's Talk Day 2022, almost $8 million in funding for mental health was awarded to projects across the country. This included:

- $4 million for research projects from the Bell Let's Talk/Brain Canada Mental Health Research Program
- $1.5 million from the Bell-Graham Boeckh Foundation for Foundry to transform youth mental health
- $1 million from the Bell Let's Talk Post-Secondary Fund to support 16 colleges, universities and cégeps
- $600,000 from the Bell Let's Talk Diversity Fund to six organizations supporting the mental health and well-being of BIPOC communities in Canada
- $370,000 to Strongest Families Institute, in partnership with the Government of Yukon and Northwestel
- $250,000 to Canadian Red Cross to expand the Friendly Calls program to Indigenous communities
- $250,000 to Fondation CERVO to purchase a second neuromodulation device

In January 2022, more than 180 communities and organizations across Canada and around the world showed their support for mental health by raising the Bell Let's Talk flag at city and town halls, military bases and schools. Students at 217 Canadian universities, colleges and cégeps across the country also engaged in a variety of initiatives in their learning environments to promote student mental health.

On January 26, 2022 – the 12th annual Bell Let's Talk Day – Canadians and people around the world set all-new records for engagement in the mental health conversation, sharing 164,298,820 messages of support and driving $8,214,941 in new mental health funding by Bell.

*KEY METRIC*

Adding the funding amount of the latest Bell Let's Talk Day to the original Bell Let's Talk commitment of $50 million in 2010, along with the results of the first 11 Bell Let's Talk Days and the additional $5 million funding committed in response to the COVID-19 pandemic, Bell has now committed $129,588,747.75 to improving Canadian mental health.

## SOCIETY AND ECONOMY

Being an engaged corporate citizen has been central to our identity for over 140 years. Our networks and services are fundamental to the success of the communities we serve, the nation's economy and Canadian society as a whole. We work closely with governments, regulators and our customers to maximize these societal benefits.

### WHY DIGITAL ACCESS MATTERS

Canadians are increasingly dependent on digital technologies and require access to the digital ecosystem to learn, work, socialize and access essential services. Access to high-speed, reliable and affordable Internet has become an essential service and a key driver of improved societal well-being as we help bridge the digital divide and provide accessibility to everyone.

*WHAT WE ARE DOING*

Bell investments are delivering benefits directly to our customers, from providing more consumers with better access to family and friends, remote learning and entertainment to enabling businesses and communities to operate more efficiently and grow in the digital economy. At the same time, as we continue to close the digital divides that separate communities, we are also supporting growth among suppliers and partners as we help build and drive innovation across the Canadian digital ecosystem.

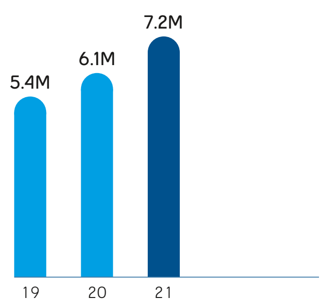
As a result of Bell's capital expenditure acceleration program, Bell increased its combined FTTP all-fibre and rural WHI broadband footprint to reach approximately 7.2 million homes and business locations in Atlantic Canada, Québec, Ontario and Manitoba at the end of 2021, including the deployment of pure fibre services in major urban centres and more than 50 additional smaller communities.

Bell continues to deliver wireless technology that is among the most advanced in the world. Bell's LTE wireless network is available to over 99% of the national population, with Bell 5G accessible to more than 70% of Canadians at the end of 2021 with coverage expected to increase to more than 80% of the national population by the end of 2022.

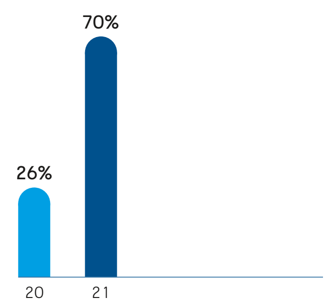
In May 2021, Bell completed a Canadian public offering of $500 million of MTN debentures which was Bell's first sustainability bond offering pursuant to BCE's new Sustainable Financing Framework (Framework) and which constituted the first sustainability bond offering by a Canadian telecommunications company. The net proceeds of this offering were allocated to finance or re-finance, in whole or in part, new or existing green and social eligible investments as set out in the Framework including, without limitation, investments for the deployment of networks in underserved or unconnected areas.

*KEY METRICS*

**FTTP and WTTP footprint**
at December 31
(homes and businesses passed)




**5G network coverage**
at December 31



## TEAM MEMBERS

To execute on our strategic imperatives, we rely on the engagement and expertise of our team members. We focus on attracting, developing and retaining the best talent, as well as creating a positive team member experience that drives effectiveness, high performance and agility in our evolving business environment. Through workplace wellness initiatives and by celebrating diversity in the workplace, we reinforce our goal of creating a safe and inclusive atmosphere for all team members.

### WHY EMPLOYEE WELL-BEING MATTERS

We believe that everyone deserves a respectful, positive, professional and rewarding work environment. Engaging and investing in our people and creating a sustainable future is a strategic imperative which recognizes that our success requires a dynamic and engaged team that is committed to the highest ESG standards. The Bell team is critical to our company's success, enabling our purpose of advancing how Canadians connect with each other and the world, while also making a difference in communities across the country.

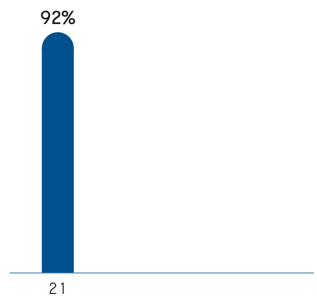
At Bell, we believe that taking care of the well-being of our team members is essential to their personal success and to our organization's ongoing progress.

*WHAT WE ARE DOING*

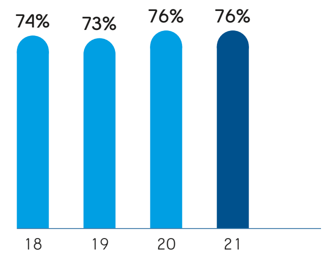
To foster the well-being of our team members, we believe that engaging our members as well as nurturing an inclusive environment are both essential. We are proud to be ranked as one of Canada's Top Employers. Bell has been recognized by Mediacorp as one of Canada's Best Diversity Employers, Top Employers for Young People, Top Family-Friendly Employers and one of Canada's Greenest Employers. We are focused on developing and retaining the best talent in the country by providing a workplace that is positive, professional and rewarding, and which enables creativity and innovation. We also continue to develop, implement and share world-leading mental health practices in the workplace, and to broaden our approach to emphasize total-health support. We educate team members through our best-in-class training programs and campaigns, support them through an extensive range of mental health services and supports and adapt workplace policies and practices to foster a psychologically safe workplace. Since 2010, over 90 KPIs have been measured quarterly and assessed for trends and program insights to closely monitor the psychological health of our workplace. Collecting qualitative and quantitative data is crucial to ensuring that we are heading in the right direction and making any required adjustments to our mental health programs.

*KEY METRICS*

**People leaders who completed mandatory base training on Mental Health**




**Overall team member engagement score (1)**




(1) *This metric is calculated as the average score obtained in the annual Bell team member satisfaction survey. The Team Member Engagement score is based on five specific questions and the percentage of employees who responded favourably (Strongly agree or Agree) to these questions out of the total number of employees who responded to the survey.*

### WHY DIVERSITY, EQUITY AND INCLUSION MATTERS

Bell is committed to an inclusive, equitable and accessible workplace where all team members feel valued, respected, supported and have the opportunity to reach their full potential. A truly diverse team and inclusive workplace fosters innovation and creativity, better reflects the customers we serve and increases team member engagement.

*WHAT WE ARE DOING*

Our diversity, equity and inclusion strategy is supported by a strong governance framework that includes the Diversity Leadership Council, business unit committees and employee-led networks, including Black Professionals at Bell, Pride at Bell and Women at Bell.

In step with our overarching corporate commitment to improve gender diversity, we are strategically focused on increasing the diversity of our senior leadership. Bell is a signatory to the Catalyst Accord 2022 and member of the 30% Club. Exceeding the Catalyst Accord and 30% Club target, Bell leads with more ambitious targets: we aim for a minimum 35% gender diverse representation among directors on the BCE Board moving forward, and at least 35% of Bell leaders at the VP level and above by the end of 2023.

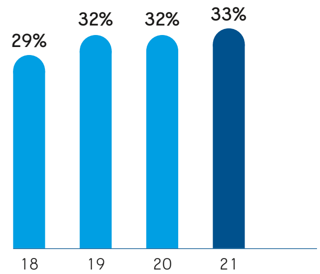
In 2021, Bell continued its commitment to taking meaningful actions to address the impacts of systemic racism on team members and others in BIPOC communities. This includes:

- Targets for BIPOC representation on our senior management team of at least 25% by 2025 and 40% of new graduate and intern hires
- Partnerships with the Onyx Initiative and the Black Professionals in Tech Network that are helping drive the recruitment of Black college and university students and promote Black talent in technology
- Promoting greater diversity in Canadian media with the launch of the HireBIPOC website and the Bell Media Content Diversity Task Force in partnership with BIPOC TV & Film
- $5 million Bell Let's Talk Diversity Fund to support the mental health and well-being of Canada's BIPOC communities
- Reinforcing our culture of inclusion with review of internal policies and practices, and successful launch of the Inclusive Leadership Development Program to people leaders, exceeding our goal of over 30% completion within the first year

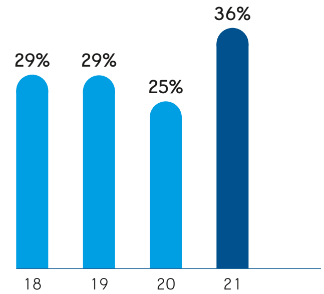
Looking ahead, we plan to continue building momentum for our diversity, equity and inclusion strategy based on concrete objective-setting and the integration of inclusive leadership practices.

*KEY METRICS*

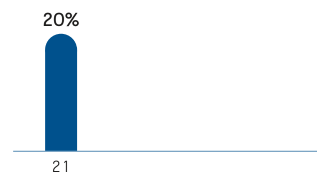
**Gender diverse [(1)] representation in executive positions**
(vice-president level and above)



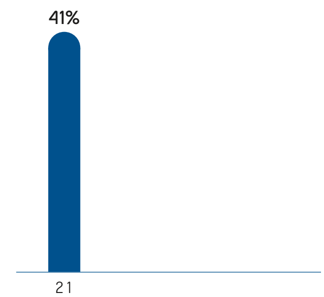

**Gender diverse [(1)] representation among directors on the BCE Board**




**BIPOC representation in Bell senior management**




**BIPOC representation among new graduates and interns**




## ENVIRONMENT

We believe that it is our responsibility to minimize the negative environmental impacts of our operations, and to create positive impacts where possible. We also know that our team members, our customers, and our investors expect this. Taking care of the environment makes good business sense. If we fail to take action to reduce our negative impacts on the environment, we risk losing our valuable team members and customers to competitors, we risk increased costs due to fines or remediation requirements, and we will likely lose investors, all of which could adversely impact our business.

We have been implementing and maintaining programs to reduce the environmental impact of our operations for more than 25 years. Our Environmental Policy, first issued in 1993, reflects our team members' values, as well as the expectations of customers, investors and society that we regard environmental protection as an integral part of doing business that needs to be managed systematically under a continuous improvement process. We implemented an environmental management system (EMS) to help with this continuous improvement, and it has been certified ISO 14001 [(2)] since 2009, making us the first North American communications company to be so designated. We have continuously maintained this certification since then. In addition, Bell Canada's energy management system was certified ISO 50001 [(3)] in 2020, making us the first North American communications company to be so designated.

### WHY CLIMATE CHANGE MATTERS

The changing climate can lead to increased risks for any business – including financial, operational and reputational risks. Moreover, public health and supply chains could suffer major negative impacts from climate change. We believe that we have an important role to play in doing our fair share by reducing our GHG emissions, and in providing our customers with technologies that help them address climate change and adapt to related impacts on their businesses.

*WHAT WE ARE DOING*

We are taking action both to help fight climate change and adapt to its consequences. We adapt by taking action to maintain our resiliency in the face of climate change, and are helping our customers do the same. To fight climate change, we are focused on reducing our energy consumption and GHG emissions, while also helping customers reduce theirs. Fostering innovation that helps reduce our customers' and Bell's carbon footprint is part of our culture. On an annual basis, we calculate, monitor and publicly report on our energy performance and associated GHG emissions as part of our rigorous environmental and energy management systems. Since 2003, we report on our climate change mitigation and adaptation efforts through the CDP, a not-for-profit organization that gathers information on climate-related risk and opportunities from organizations worldwide. In 2021, we obtained an

(1) *Defined as women, and directors and executives who identify with a gender other than a man or woman.*

(2) *Our ISO 14001 certification covers Bell Canada's oversight of the EMS associated with the development of policies and procedures for the delivery of landline, wireless, TV and Internet services, broadband and connectivity services, data hosting, cloud computing, radio broadcasting and digital media services, along with related administrative functions.*

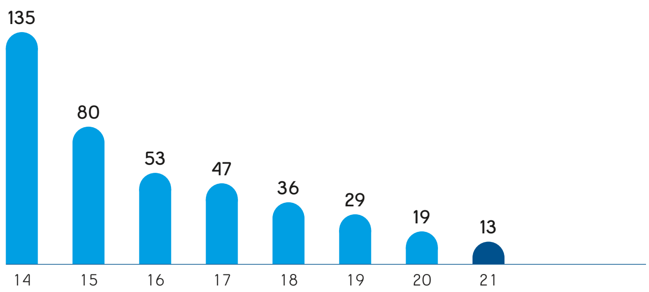
(3) *Our ISO 50001 certification covers Bell Canada's energy management program associated with the activities of real estate management services, fleet services, radio broadcasting and digital media services, landline, wireless, TV, Internet services, connectivity, broadband services, data hosting and cloud computing, in addition to related general administrative functions.*

A- score, ranking us in the "Leadership Band" for the sixth consecutive year, recognizing our leadership on climate action, our alignment with current best practices and the transparency of our climate-related disclosures. Furthermore, we disclose annually on our risks and opportunities related to climate change following the 11 recommendations of the Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD). In 2021, we surpassed our GHG emissions intensity reduction objective by 15%. Going forward, our target is to be carbon neutral for our operational GHG emissions [(1)] starting in 2025. For 2030, we have set science-based GHG emissions reduction targets that are consistent with limiting global warming to 1.5°C [(2)], in line with the most ambitious temperature goal of the Paris Agreement.

*KEY METRIC*

### Reduce the ratio of our operational GHG emissions to our network usage

Operational emissions (tonnes) divided by network usage (petabytes)




### WHY CIRCULAR ECONOMY MATTERS

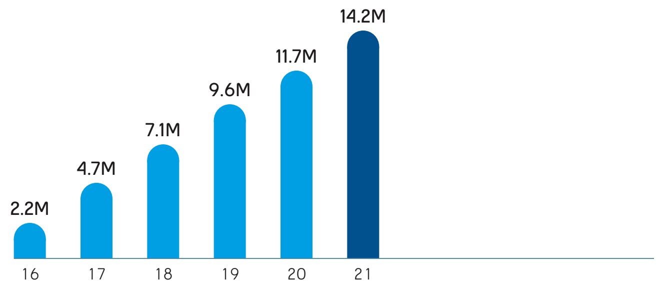
The circular economy model enables organizations to rethink the traditional linear business model of "take, make, waste" and encourages them to implement solutions that detach growth from accelerating raw material consumption in an effort to reduce the environmental impact of their operations. The traditional linear model, where it has been deployed in Bell's business operations, generates waste. Reducing waste is an essential part of our commitment to improve on our operational efficiency and aligns with the values and expectations of our employees, customers and investors. The circular economy model provides Bell with a framework for repositioning waste as a resource, for both environmental and economic benefit.

*WHAT WE ARE DOING*

Bell has managed waste reduction, reuse and recycling programs for more than 30 years. We have ambitious waste reduction goals and strong monitoring processes in place that enable us to track and report on our waste-generating activities. To manage the waste created from the electronic devices we distribute to customers, we have implemented effective and accessible e-waste collection programs for the recovery, reuse, refurbishment and recycling of customer-facing devices, including national take-back programs, drop boxes and mail-in instructions. To measure the success of these programs, we have set a goal of collecting 7 million used TV receivers, modems, mobile phones and Wi-Fi pods from January 2021 to the end of 2023. At Bell, we believe in leading by example, and so to continue to manage and reduce the waste generated from our own operations, we have adopted a new target to reach and maintain a 15% reduction of total waste sent to landfill by 2025, with a reference year of 2019. Through setting ambitious waste reduction targets such as the ones listed above, we are striving to build a resilient path to circularity with the ambition of sending zero waste to landfill and are investing in research and development of products where current technology does not provide responsible waste diversion methods.

*KEY METRIC*

### Cumulative recovery of used TV receivers, modems, Wi-Fi pods [(3)] and mobile phones




## PRIVACY AND INFORMATION SECURITY

Privacy and information security present both potentially significant risks and opportunities for any business operating in the digital economy. They are the subject of an expanding range of obligations in new privacy and data protection laws being enacted in Canada and around the world. Our customers, team members and investors increasingly expect us to demonstrate that we collect data appropriately, use it for purposes that advance their interests, and keep it secure.

### WHY DATA GOVERNANCE MATTERS

We recognize that to achieve our purpose of advancing how Canadians connect with each other and the world, we must maintain the social licence from our customers and all Canadians to collect and use data in our operations. A strong and consistently applied approach to data governance is critical to maintaining that social licence by focusing on respecting the privacy of our customers' data and protecting such data against information security threats. Conversely, failure to meet customer expectations regarding the appropriate use and protection of their data can have negative reputational, business and financial consequences for our company.

(1) *Operational GHG emissions include scope 1 and scope 2 emissions. Scope 1 GHG emissions are direct emissions from sources that are owned or controlled by Bell. Scope 2 GHG emissions are indirect emissions associated with the consumption of purchased electricity, heat, steam and cooling.*

(2) *Pending approval by the SBTi.*

(3) *Wi-Fi pods have been included in the scope starting in 2021.*

*WHAT WE ARE DOING*

Our approach to data governance encompasses the protection and appropriate use of data across its lifecycle, and we are incorporating data governance proactively as a core consideration in all our business initiatives and technology decisions. The BCE Board adopted an enhanced data governance policy in 2020, bringing together multiple existing policies and programs in the interrelated areas of privacy, information security, data access management and records management. In 2021, we implemented mandatory data governance training for all employees as part of our biannual code of conduct training program.

### WHY INFORMATION SECURITY MATTERS

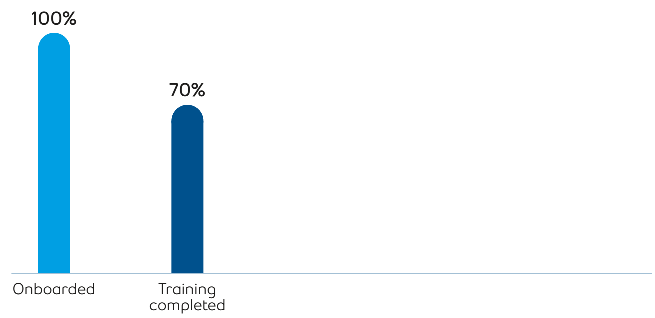
Cybersecurity threats give rise to new and emerging standards and regulations. We need to be able to identify and address information security risks in a timely manner in order to be in a better position to protect our market share and reputation, and these efforts align with our strategic imperative to champion customer experience, while at the same time reducing exposure to cyberattacks. Avoiding data breaches can also limit the increase in expenses associated with remediation efforts and legal exposures, aligning with our strategic imperative to operate with agility and cost efficiency.

*WHAT WE ARE DOING*

We are focused on maintaining the trust that our customers have in us to protect their data. To do this, we implement prevention, detection, and response programs related to security threats. In addition, we are helping define industry security and risk management practices, and we train our team members on data protection. To that end, in 2021, we onboarded 100% of our selected team members to Bell's Be Cyber Savvy information security training program and 70% completed the full program. This training program involves our specialized Be Cyber Savvy platform, and includes phishing simulations and four courses that team members must complete in one year. Additionally, we set a new target to improve, year over year, the phishing simulation report rate for our team members. These initiatives enable a stronger cybersecurity culture and greater awareness of cybersecurity risks. We also aim to align our information security management to the ISO 27001 standard by the end of 2023.

*KEY METRIC*

**Be Cyber Savvy information security training for all applicable team members across Bell**




## ASSUMPTIONS

### GHG EMISSIONS REDUCTION TARGETS

Our GHG emissions reduction targets are based on a number of assumptions including, without limitation, the following principal assumptions:

- Implementation of various corporate and business initiatives to reduce our electricity and fuel consumption, as well as reduce other direct and indirect GHG emissions enablers
- No new corporate initiatives, business acquisitions or technologies that would materially increase our anticipated levels of GHG emissions
- Ability to purchase sufficient credible carbon credits and renewable energy certificates to offset or further reduce our GHG emissions, if and when required
- No negative impact on the calculation of our GHG emissions from refinements in or modifications to international standards or the methodology we use for the calculation of such GHG emissions
- No required changes to our SBTs pursuant to the SBTi methodology that would make the achievement of our updated SBTs more onerous
- Sufficient supplier engagement and collaboration in setting their own SBTs and sufficient collaboration with partners in reducing their own GHG emissions

### DIVERSITY, EQUITY AND INCLUSION TARGETS

Our diversity, equity and inclusion (DEI) targets are based on a number of assumptions including, without limitation, the following principal assumptions:

- Ability to leverage DEI partnerships and recruitment agencies to help identify qualified diverse talent for vacant positions
- Sufficient diverse labour market availability
- Implementation of corporate and business initiatives to increase awareness, education and engagement in support of our DEI targets
- Propensity of existing employees and job-seekers to self-identify to enable a diverse workforce representation

# 2 Strategic imperatives

*Our success is built on the BCE team's dedicated execution of the six strategic imperatives that support our purpose to advance how Canadians connect with each other and the world.*

This section contains forward-looking statements, including relating to our network deployment plans and our 2022 objectives, plans and strategic priorities. Refer to the section *Caution regarding forward-looking statements* at the beginning of this MD&A.



## 2.1 Build the best networks

**Continuing to enhance our key competitive advantage with a focus on delivering the leading broadband fibre and wireless networks in locations large and small.**

*2021 PROGRESS*

- Continued to expand our FTTP direct fibre footprint, reaching approximately 6.2 million homes and businesses in Ontario, Québec, the Atlantic provinces and Manitoba. FTTP delivers total broadband access speeds of up to 1.5 Gbps currently, with faster speeds expected in the future as equipment evolves to support these higher speeds.
- Completed the buildout of our WHI service in smaller towns and rural communities across Ontario, Québec, the Atlantic provinces and Manitoba, reaching our target of 1 million locations one year ahead of schedule. WHI delivers access speeds of up to 50/10 (50 Mbps download/10 Mbps upload).
- Acquired 271 licences for 678 million MHz-Pop of 3500 MHz spectrum in a number of urban and rural markets for $2.07 billion following ISED's wireless spectrum auction, extending Bell's leadership in delivering enhanced 5G digital experiences to Canadian consumers and businesses
- Expanded our 5G wireless network to reach more than 70% of Canada's population
- Bell remained Canada's fastest and most awarded 5G network
  - Ranked as Canada's fastest 5G network for the second time in a row in Ookla's 2021 Speedtest Awards
  - Recognized as Canada's best 5G network by Global Wireless Solutions (GWS). GWS determined that Bell 5G offers the fastest data speeds of any mobile network in the country, and is also the top national network for gaming and video applications.
  - Bell's 4G and 5G networks were ranked Canada's fastest for the second year in a row in PCMag's Fastest Mobile Networks Canada 2021
- Worked closely with federal and provincial governments on projects to bring broadband access to remote and other hard to serve areas, including Québec's Operation High Speed project, the federal Universal Broadband Fund and multiple initiatives in Atlantic Canada
- Became a Founding Partner and exclusive telecommunications provider of The PIER at the Halifax Seaport, deploying a 5G-ready wireless private network to enable a living lab that will shape the future of the transportation, supply chain and logistics industries in Canada
- Collaborated with Nokia to conduct the first successful test of 25G passive optical network (PON) fibre broadband technology in North America, validating that current GPON and XGS-PON broadband technology and future 25G PON can work seamlessly together on the same fibre hardware, which is being deployed throughout the network today

*2022 FOCUS*

- Further deployment of direct fibre to more homes and businesses within our wireline footprint
  - Increase the number of customer locations covered with direct fibre connections by as many as 900,000, bringing our total broadband footprint to approximately 8.1 million homes and businesses by the end of 2022
- Continued deployment of 5G wireless network offering coverage that is competitive with other national operators
  - Expand mobile 5G coverage to more than 80% of the Canadian population
  - Launch 5G standalone core leveraging 3500 MHz spectrum that will drive enhanced speeds, lower latency and enable next-generation services

## 2.2 Drive growth with innovative services

**Leveraging our leading networks to provide truly differentiated communications services to Canadians and drive revenue growth.**

*2021 PROGRESS*

- Added 294,842 total net postpaid and prepaid mobile phone subscribers, up 54.6% over 2020
- Expanded our lineup of 5G, 4G LTE and LTE-A devices, including Apple's iPhone 13 Series, the Samsung Galaxy S21 5G series and Google's Pixel 6 and Pixel 6 Pro
- Entered into an agreement with Amazon Web Services, Inc. (AWS) to support 5G innovation and accelerate cloud adoption across Canada. Bell is the first Canadian communications company to offer AWS-powered 5G MEC (multi-access edge computing) for business and government customers.
- Formed a strategic partnership with Google Cloud to help power Bell's company-wide digital transformation, enhance its network and IT infrastructure, and enable a more sustainable future. The multi-year partnership will combine Bell's 5G network leadership with Google's expertise in multicloud, data analytics, and artificial intelligence (AI), to deliver next-generation experiences for Bell customers across Canada.

- Launched TSN 5G View/Vision 5G RDS, an exclusive in-app feature that leverages Bell's mobile 5G network to offer fans interactive new ways to watch sports, including the ability to control their viewing angle on every play from their mobile device. TSN 5G View/Vision 5G RDS is available for Montréal Canadiens, Toronto Maple Leafs and Toronto Raptors home game broadcasts on TSN and RDS, and will expand to more sports events, teams and venues over time.
- Collaborated with TikTok Canada on Paint Portal, a 5G multi-user augmented reality (AR) experience that lets the TikTok community paint together while physically apart, powered by Bell's 5G network
- Partnered with VMware and AWS to help organizations across Canada plan, simplify and manage their hybrid cloud transformations
- Entered into an agreement with Esri Canada, the nation's leading geographic information system (GIS) provider, to create the Bell Integrated Smart City Ecosystem, an integrated solution combining Bell's award-winning 5G network and IoT solutions with Esri's real-time analytics and location intelligence capabilities to help cities of all sizes across Canada become connected communities, empowering them to realize their smart city ambitions
- Launched Smart Supply Chain powered by Bell IoT Smart Connect, an "as-a-service" IoT aggregation solution designed for fleet and supply chain operators. The new platform aggregates multiple IoT data sources and operational data sets into a single dashboard accessible through Bell's Self Serve Centre.
- Formed a connected car partnership with Honda Canada equipping Honda and Acura vehicles with built-in Wi-Fi hotspots that enable drivers and their passengers to stay fully connected online, safely and hands-free, while on the open road
- Built on our position as the leading Internet service provider (ISP) in Canada with a retail high-speed Internet subscriber base of 3,861,653 at December 31, 2021, up 4.2% over 2020, including approximately 2 million FTTP customers at December 31, 2021
- Bell was named Best Gaming Internet provider among Canada's major providers in PCMag's Best Gaming ISPs 2022 report
- Launched Home Hub 4000 featuring powerful Wi-Fi 6 technology for fibre customers in Ontario and Québec
- Virgin Mobile Canada officially rebranded to Virgin Plus, a new name and identity that reflects the company's evolving service offerings beyond mobility, including Internet and app-based TV service
- Launched the Bell Security Unified Response Environment (BSURE), a new service that combines Bell's national security operations with industry-leading security technologies from Fortinet, Inc. (Fortinet), a U.S. based network security company, to provide Bell Business Markets customers with a robust 24/7 managed cyber security solution
- Partnered with SCALE AI, a Montréal-based investment and innovation hub, to reduce installation time for new fibre connections using AI

*2022 FOCUS*

- Maintain our market share of national operators' postpaid mobile phone net additions
- Growth of our prepaid mobile phone subscriber base
- Introduction of more 5G devices
- Increased adoption of unlimited data plans and device financing plans
  - In January 2022, Bell introduced new mobile unlimited Ultimate plans to make the most of 5G with more data at max speeds, international messaging, HD video quality and hotspot capability
- Accelerated business customer adoption of advanced 5G and IoT solutions
- Continued diversification of Bell's distribution strategy with a focus on expanding DTC and online transactions
- Cross sell to customers who do not have all their telecommunication services with Bell
- Continued growth in retail Internet subscribers
- Enhance Internet product superiority through new service offerings with next generation speeds and hardware to provide an enhanced customer experience in the home
- Invest in direct fibre expansion, 5G and new solutions in key portfolios such as Internet and private networks, cloud services, unified communications, security and IoT to improve the business client experience and increase overall business customer spending on telecommunications products and services
- Continue to deliver network-centric managed and professional services solutions to large and medium-sized businesses that increase the value of connectivity services

## 2.3 Deliver the most compelling content

**Taking a unified approach across our media and distribution assets to deliver the content Canadians want the most.**

*2021 PROGRESS*

- Maintained our position as Canada's largest TV provider with 2,735,010 retail subscribers at December 31, 2021, and increased our total number of IPTV subscribers by 4.2% to 1,882,441
- Grew our Crave subscriber base to more than 2.9 million, up 6% over 2020
- Launched Crave Mobile, offering access to the streaming service's unparalleled content library on a single mobile device, and Crave Total for multiple user access across a full range of screens
- Maintained CTV's #1 ranking as the most-watched TV network in Canada for the 20th year in a row
- Bell Media had 5 of the top 10 English entertainment specialty channels among Adults 25-54 (A25-54), comprising CTV Comedy, Discovery, CTV Drama, CTV Sci-Fi and Much. CTV Comedy was the #1 entertainment specialty channel in 2021.
- TSN remained Canada's sports leader and RDS remained the top French-language sports network
- Noovo had the largest primetime viewership growth among adults Adults 25-54 versus its two main French-language competitors
- Noovo expanded its digital offering available on the Noovo.ca website and via the Noovo app, showcasing its extensive catalogue of French-language programming and launched the Noovo Info news service (including original French-language news program Noovo Le Fil), featuring a strong team of journalists covering current affairs and subjects of interest for viewers across Québec

- MuchMusic was revitalized as a digital-first network available across major social media platforms
- Launched Bell demand-side platform (DSP), a new ad tech platform for Canadian advertisers and agencies, delivering a world class programmatic marketplace to facilitate new and easier media buying capabilities. Bell DSP allows the advertising community to leverage Bell's privacy compliant first party data to discover and activate on Bell Media's premium digital inventory, as well as the inventory on the open market across multiple formats including digital video, connected TV, and audio. Bell DSP is the result of a strategic alliance announced in 2021 between Bell and advanced advertising technology company Xandr.
- Acquired the operations of Montréal's Octane Racing Group Inc., promoter of the F1 Canadian Grand Prix, the largest annual sports and tourism event in the country

*2022 FOCUS*

- Continued growth in IPTV subscribers
- Enhance TV product superiority through new service offerings and innovation to provide an enhanced customer experience in the home
- Reinforce industry leadership in conventional TV, specialty TV, pay TV, streaming and sports services
- Continued scaling of Crave through broader content offering, user experience improvements and Crave Mobile
- Continued investment in Noovo originals to increase market share and bolster our position in news through continued audience growth
  - In January 2022, Bell Media launched the new digital platform noovo.info, which expands the reach of our Noovo Info French-language news division, offering breaking news coverage, original broadcasts and podcasts, and exclusive multimedia content
- Grow ad revenue and maximize market share as demand continues to return across all platforms
- Scale our Strategic Audience Management (SAM) TV and Bell DSP buying platforms
- Increase inventory for CTV and Noovo AVOD platforms with the addition of connected TV platforms
- Optimize unique partnerships and strategic content investments to monetize content rights and Bell Media properties across all platforms

## 2.4 Champion customer experience

**Making it easier for customers to do business with Bell at every level, from sales to installation to ongoing support.**

*2021 PROGRESS*

- Led all national providers in reducing customer complaints for the 6th straight year according to the 2020–21 Annual Report from the Commission for Complaints for Telecom-television Services (CCTS). The CCTS reported that while complaints across the industry increased by 9%, Bell had a decline of 8%. Overall, Bell's share of complaints continued its declining trend, dropping 4% from the previous year.
- MyBell was named Best Telecommunication Mobile Application of the Year at the 2021 Mobile Web Awards
- MyBell and Virgin Plus My Account won the 2021 Platinum and Gold MarCom Awards as the top service apps
- Improved blended mobile phone churn by 0.03 pts over 2020 to 1.23%
- Improved customer churn rates across all wireline residential services over 2020
- Expanded Bell Move Valet, a service that ensures the seamless transfer of Internet, TV and phone services from one residential address to another, to Atlantic Canada
- Launched self-serve Virtual Repair tool online and through the MyBell and Virgin Plus apps, enabling Bell and Virgin Plus residential customers in Ontario and Québec to troubleshoot and resolve common Internet, TV and phone issues at home
- Leveraged AI and machine learning to improve our digital capabilities with new features including personalized messages, in-app chat and data management controls
- Integrated our innovative Manage Your Appointment tool directly into the Virgin Plus My Account app, enabling customers to easily add or modify a service appointment, send information to a technician such as entry codes and parking instructions, receive advance notifications and rate their service experience directly on the app
- Introduced a complete self-installation option for Bell and Virgin Plus customers in Ontario and Québec who are already connected to our fibre network

*2022 FOCUS*

- Improve customer experience with continued scaling of digital sales capabilities and functionality
- Further improve and expand self-installation capabilities
- Further improve customer satisfaction scores
- Further evolve our self-serve tools
- Further reduce the total number of customer calls to our call centres as well as the number of truck rolls
- Continue to invest in AI and machine learning to resolve customer issues faster

## 2.5 Operate with agility and cost efficiency

**Underscoring a focus on operational excellence and cost discipline throughout every part of our business.**

*2021 PROGRESS*

- Improved BCE consolidated adjusted EBITDA margin [(1)] by 0.2 pts over 2020
- Reduced wireline operating costs by 1.4%, contributing to Bell Wireline adjusted EBITDA margin improvement of 0.6 pts over 2020
- Delivered productivity improvements and cost efficiencies resulting from the expansion of Bell's all-fibre network footprint and service innovations enabled by new broadband technologies
- Lowered Bell Canada's average after-tax cost of publicly issued debt securities to 2.8%

*2022 FOCUS*

- Continued sharp focus on our cost structure
- Realize cost savings from:
  - operating efficiencies enabled by a growing direct fibre footprint
  - changes in consumer behaviour and digital adoption
  - product and service enhancements and innovation
  - new call centre technology and digital investments that are enabling self-serve capabilities
  - other improvements to the customer service experience
  - management workforce reductions including attrition and retirements
  - lower contracted rates from our suppliers
  - rationalization of real estate footprint

## 2.6 Engage and invest in our people and create a sustainable future

**Strengthening our leading workplace culture, recognizing that Bell's success requires a dynamic and engaged team that is committed to the highest ESG standards.**

*2021 PROGRESS*

- Recognized as one of Canada's Top 100 Employers for the seventh consecutive year in Mediacorp's annual review of the best workplaces across the country, reflecting our company's broad range of learning opportunities, commitment to workplace mental health and focus on diversity
- Named one of Canada's Best Diversity Employers for the fifth year in a row in Mediacorp's 2021 report on workplace diversity and inclusion in recognition of Bell's commitment to an inclusive, equitable and accessible workplace that reflects Canada's diversity and our ongoing action to combat systemic racism
- Named one of Canada's Top Employers for Young People for the fourth consecutive year by Mediacorp in recognition of our industry-leading recruitment and career development programs for students
- Named one of Canada's Top Family-Friendly Employers by Mediacorp in recognition of a wide range of employee benefits that support families
- Named one of Canada's Greenest Employers for the fifth straight year
- Reached our 40% target for BIPOC representation among new graduate and intern hires, 4 years ahead of our 2025 goal
- Continued our initiatives to support BIPOC team members and communities, working with our employee-led Black Professionals at Bell Network, which supports professional development for Black team members, and partnerships with groups like the Onyx Initiative and the Black Professionals in Tech Network to promote the recruitment of Black talent and initiatives such as HireBIPOC and the Bell Let's Talk Diversity Fund
- Launched a company-wide Accessibility Program to make our products and services more accessible and ensure people with disabilities have equal opportunities through the use of advanced communication technologies
- Introduced Bell Workways, a hybrid work model that provides our team members with more flexibility, collaboration and support in how and where they work
- Launched our new company-wide employee recognition program Better Together, offering more engaging opportunities to highlight outstanding work and accomplishments
- Provided multiple resources to help team members deal with the change and adversity resulting from the COVID crisis, supporting a healthy work-life balance while working from home
- Continued to reinforce our COVID-19 operating principles and align with all government protocols, with a focus on protecting the health and safety of our customers, colleagues and communities.
- Implemented a vaccination policy that prioritizes the health of our employees, customers and communities as well as reflects government and public health guidance
- Launched Bell for Better, our long-term commitment to create better outcomes for all stakeholders

*2022 FOCUS*

- In 2022, we embedded our focus on creating a more sustainable future directly into our six strategic imperatives, reflecting our long-standing commitment to the highest ESG standards
- In January 2022, we rolled out unlimited mental health benefit coverage for team members and their eligible family members to support their mental health and well-being
- In January 2022, we introduced a flexible holiday policy, including the ability to substitute days, reflecting our support for flexibility and diversity in the workplace
- In February 2022, we enhanced Bell's Employee and Family Assistance Program with the launch of a new website and mobile app with improved support and wellness resources
- Launch an Employee Value Proposition, capturing Bell's promise to current and future employees as well as the values and experiences that make Bell unique
- Launch a unified mentorship program to support the development of leaders
- Deliver on diversity, equity and inclusion commitments
- Build Bell's talent advantage by expanding critical skills and upskilling program, Bell U
- Move forward with ESG initiatives and Bell for Better commitments

(1) *Adjusted EBITDA margin is defined as adjusted EBITDA divided by operating revenues.*

# 3 Performance targets, outlook, assumptions and risks

This section provides information pertaining to our performance against 2021 targets, our consolidated business outlook and operating assumptions for 2022 and our principal business risks.

## 3.1 BCE 2021 performance vs. guidance targets

| FINANCIAL MEASURE | 2021 TARGET | 2021 PERFORMANCE AND RESULTS | |
|---|---|---|---|
| Revenue growth | 2%–5% | 2.5% | BCE revenues increased by 2.5% in 2021 compared to last year, reflecting our strong operational execution as we continued to recover from the impact of the COVID-19 pandemic. The growth was driven by our Bell Wireless and Bell Media segments, offset in part by a decline in Bell Wireline. Service and product revenue were both up year over year, 2.6% and 1.6%, respectively. |
| Adjusted EBITDA growth | 2%–5% | 3.0% | BCE adjusted EBITDA increased by 3.0% in 2021, compared to 2020, attributable to growth across all three of our segments, driven by higher revenues, offset in part by greater operating expenses. |
| Net earnings growth | Not applicable | 7.2% | In 2021, net earnings increased by 7.2%, compared to 2020, mainly due to higher adjusted EBITDA, higher other income and lower impairment of assets primarily at our Bell Media segment, partly offset by higher income taxes, lower net earnings from discontinued operations as a result of a gain on sale, net of taxes, of $211 million in Q4 2020 from the completion of the sale of substantially all of our data centre operations, higher depreciation and amortization, and higher severance, acquisition and other costs. |
| Capital intensity [1] | 18%–20% | 20.6% | 2021 capital expenditures increased by 15.1% over last year to $4,837 million, with a corresponding capital intensity of 20.6%, up 2.2 pts over 2020. Capital intensity came in higher than our target range, consistent with our two-year plan to accelerate the rollout of our mobile 5G, fibre and rural WHI networks. |
| Net earnings per share (EPS) growth | Not applicable | 8.3% | Net earnings attributable to common shareholders in 2021 increased by $211 million, or $0.23 per common share, compared to 2020, mainly due to higher adjusted EBITDA, higher other income and lower impairment of assets primarily at our Bell Media segment, partly offset by higher income taxes, lower net earnings from discontinued operations as a result of a gain on sale, net of taxes, of $211 million in Q4 2020 from the completion of the sale of substantially all of our data centre operations, higher depreciation and amortization, and higher severance, acquisition and other costs. |
| Adjusted net earnings per share (adjusted EPS) [2] growth | 1%–6% | 5.6% | Excluding the impact of severance, acquisition and other costs, net mark-to-market gains (losses) on derivatives used to economically hedge equity settled share-based compensation plans, net equity gains (losses) on investments in associates and joint ventures, net gains (losses) on investments, early debt redemption costs, impairment of assets and discontinued operations, net of tax and non-controlling interest (NCI), adjusted net earnings in 2021 was $2,895 million, or $3.19 per common share, compared to $2,730 million, or $3.02 per common share, in 2020. |
| Cash flows from operating activities | Not applicable | $8,008 million | In 2021, BCE's cash flows from operating activities increased by $254 million, compared to 2020, mainly due to higher adjusted EBITDA and higher cash from working capital due mainly to the timing of supplier payments, partly offset by higher severance and other costs paid and higher income taxes paid. Additionally, there was lower cash from discontinued operations in 2021 as the sale of substantially all of our data centre operations was completed in Q4 2020. |
| Free cash flow | $2,850 million – $3,200 million | $2,995 million | Free cash flow decreased by $353 million in 2021, compared to 2020, mainly due to higher capital expenditures, partly offset by higher cash flows from operating activities, excluding cash from discontinued operations and acquisition and other costs paid. |
| Annualized common dividend per share | $3.50 per share | $3.50 per share | Annualized BCE common dividend per share for 2021 increased by 17 cents, or 5.1%, to $3.50 compared to $3.33 per share in 2020. |

(1) *Capital intensity is defined as capital expenditures divided by operating revenues.*

(2) *Adjusted EPS is a non-GAAP ratio. Refer to section 11.2,* Non-GAAP ratios *in this MD&A for more information on this measure.*

## 3.2 Business outlook and assumptions

This section contains forward-looking statements, including relating to our projected financial performance and expected contribution levels to our DB pension plans in 2022, our network deployment plans and our 2022 annualized common share dividend and business outlook, objectives, plans and strategic priorities. Refer to the section Caution regarding forward-looking statements at the beginning of this MD&A.

We expect that our financial performance in 2022 will surpass pre-COVID-19 achieved in 2019 levels as we build on the favourable financial performance, significant broadband investments and operating momentum we delivered in 2021. Due to uncertainties relating to the severity and duration of the COVID-19 pandemic and possible resurgences in the number of COVID-19 cases and the potential emergence of other variants, and various potential outcomes, it is difficult at this time to estimate the impacts of the COVID-19 pandemic on our business or future financial results and related assumptions. Our business and financial results could continue to be unfavourably impacted, and could again become more significantly and negatively impacted, in future periods. In addition, the extent to which the COVID-19 pandemic will continue to adversely impact us will depend on future developments that are difficult to predict, including the prevalence of COVID-19 variants that are more contagious and may lead to increased health risks, the timely distribution of effective vaccines and treatments, the potential development and distribution of new vaccines and treatments, vaccination hesitancy and the population level that chooses to remain unvaccinated, the time required to achieve broad immunity, as well as new information which may emerge concerning the severity and duration of the COVID-19 pandemic, including the number and intensity of resurgences in COVID-19 cases, and the actions required to contain the coronavirus or remedy its impacts, among others.

Our strategic priorities in 2022 centre on:

- Achieving our accelerated network expansion targets
- Deploying growth capital to: drive higher Internet penetration and win share; maintain momentum on our higher-value mobile phone and 5G strategy; and continue development on converged fibre and 5G IoT, MEC and other advanced services to drive future growth
- Accelerating our digital-first media strategy
- Improving the customer experience with scaling of digital sales and support capabilities and functionality
- Maintaining a sharp focus on our cost structure

Underpinning our outlook for 2022 is a positive financial profile for all three Bell operating segments that reflects sound industry fundamentals and our consistent execution in a competitive marketplace. Wireless, retail Internet and TV subscriber base growth, together with pricing discipline and the flow-through of operating cost savings from fibre-related operating efficiencies and continued service improvement, are projected to drive year-over-year growth in revenue and adjusted EBITDA. This, together with an expected reduction in contributions to our DB pension plans and lower cash income taxes, is expected to drive higher free cash flow, providing support for the higher BCE common share dividend for 2022, as well as increased capital expenditures to forge ahead even more aggressively with our largest-ever annual fibre buildout and expand the reach of our 5G network.

The key 2022 operational priorities for BCE are:

- Maintain our market share of national operators' postpaid mobile phone net additions
- Growth of our prepaid mobile phone subscriber base
- Continued deployment of 5G wireless network offering coverage that is competitive with other national operators
- Increased adoption of unlimited data plans and device financing plans
- Accelerated business customer adoption of advanced 5G and IoT solutions
- Continued growth in retail Internet and IPTV subscribers
- Further deployment of direct fibre to more homes and businesses within our wireline footprint
- Enhance Internet and TV product superiority through new service offerings and innovation to provide an enhanced customer experience in the home
- Cross sell to customers who do not have all their telecommunication services with Bell
- Realization of cost savings enabled by a growing direct fibre footprint, changes in consumer behaviour, digital adoption, product innovation, expanding self-serve capabilities, other improvements to the customer service experience, management workforce reductions including attrition and retirements, and lower contracted rates from our suppliers
- Media revenue growth from expected continued strong demand in TV advertising, including scaling of SAM TV and Bell DSP buying platforms, and a gradual recovery in radio and OOH advertising combined with DTC subscriber growth, while seeking to control TV programming and premium content cost escalation.
- Continued scaling of Crave through broader content offering, user experience improvements and Crave Mobile
- Continued investment in Noovo original programming to better serve our French-language customers with a wider array of content, in the language of their choice, on their preferred platforms
- Optimize unique partnerships and strategic content investments to monetize content rights and Bell Media properties across all platforms

Our projected financial performance for 2022 enabled us to increase the annualized BCE common share dividend for 2022 by 18 cents, or 5.1%, to $3.68 per share.

## ASSUMPTIONS

### ASSUMPTIONS ABOUT THE CANADIAN ECONOMY

We have made certain assumptions concerning the Canadian economy, which in turn depend on important assumptions about the evolution of the COVID-19 pandemic, including the progress of the vaccination rollout. Notably, it is assumed that most public health restrictions in Canada are eased in the first quarter of 2022 and pandemic-related effects on demand diminish gradually over time. In particular, we have assumed:

- Strong economic growth as demand remains robust and supply recovers from the effects of the pandemic, given the Bank of Canada's most recent estimated growth in Canadian gross domestic product of around 4% on average in 2022
- Strong household consumption growth supported by improving confidence and some spending of accumulated savings
- Robust business investment outside the oil and gas sector due to growing demand, improving business confidence and the gradual easing of supply constraints
- Strong labour market
- Higher immigration levels
- Interest rates expected to increase in 2022
- Elevated consumer price index (CPI) inflation from strong demand, supply shortages and high energy prices over the first half of 2022. Inflation is anticipated to decline by the end of 2022 as these pandemic-related pressures dissipate.
- Canadian dollar expected to remain at or near current levels. Further movements may be impacted by the degree of strength of the U.S. dollar, interest rates and changes in commodity prices.

### MARKET ASSUMPTIONS

- A consistently high level of wireline and wireless competition in consumer, business and wholesale markets
- Higher, but slowing, wireless industry penetration
- A shrinking data and voice connectivity market as business customers migrate to lower-priced telecommunications solutions or alternative OTT competitors
- While the advertising market continues to be adversely impacted by cancelled or delayed advertising campaigns from many sectors due to the economic downturn during the COVID-19 pandemic, we do expect gradual recovery in 2022
- Declines in broadcasting distribution undertakings (BDU) subscribers driven by increasing competition from the continued rollout of subscription video-on-demand streaming services together with further scaling of OTT aggregators

### ASSUMPTIONS UNDERLYING EXPECTED REDUCTIONS IN CONTRIBUTIONS TO OUR DB PENSION PLANS

- At the relevant time, our DB pension plans will remain in funded positions with going concern surpluses and maintain solvency ratios that exceed the minimum legal requirements for a contribution holiday to be taken
- No significant declines in investment returns or interest rates
- No material experience losses from other unforeseen events such as through litigation or changes in laws, regulations or actuarial standards



## 3.3 Principal business risks

Provided below is a summary description of certain of our principal business risks that could have a material adverse effect on all of our segments. Certain additional business segment-specific risks are reported in section 5, *Business segment analysis*. For a detailed description of the principal risks relating to our regulatory environment and a description of the other principal business risks that could have a material adverse effect on our business, financial condition, liquidity, financial results or reputation, refer to section 8, *Regulatory environment* and section 9, *Business risks*, respectively.

### COVID-19 PANDEMIC AND ASSOCIATED GENERAL ECONOMIC CONDITIONS

Since the COVID-19 pandemic's inception, governments and businesses worldwide have adopted restrictive measures to combat the spread of the coronavirus, such as physical distancing, the wearing of masks or face coverings and capacity restrictions in public settings, the temporary closure of non-essential businesses and schools, stay-at-home and work-from-home policies, quarantine periods, border closures, travel bans and advisories, vaccine passports, testing requirements, curfews and other restrictions. These measures have significantly disrupted retail and commercial activities in most sectors of the economy. While the subsequent easing of certain of these measures across Canada allowed many businesses to resume or increase some level of activities, often with certain operational adjustments, amid the uncertainty caused by the COVID-19 pandemic, resurgences in new COVID-19 cases and the emergence and progression of new variants have caused and could again cause governments to strengthen or re-introduce restrictive measures including, depending on a resurgence's intensity, certain or all of the strict confinement measures and business closures previously mandated or, potentially, additional measures. The strengthening or re-introduction of restrictive measures, or a more prolonged duration of the pandemic, could result in increased adverse economic disruption and financial market volatility. The uncertainty brought about by the COVID-19 pandemic could result in increased insolvencies, bankruptcies, permanent store closures and decreased consumer and corporate spending in Canada and around the world. Economic uncertainty could continue or worsen for as long as measures taken to contain the spread of COVID-19 persist and certain of such economic conditions could continue even upon the gradual or complete removal of such measures and thereafter. While government programs supporting workers and certain businesses, coupled with low interest rates, have sustained some level of consumer and business activities, it is unknown for what period of time such government programs will be maintained. In addition, it is difficult to predict the speed and magnitude of travel and economic recovery, or the associated impact on our business, once government programs and health restrictions limiting movement of people are withdrawn.

Restrictive measures adopted or encouraged to combat the spread of the coronavirus and the resulting adverse economic conditions are expected to continue to adversely affect our business, financial condition, liquidity and financial results for as long as such measures remain in place or are re-introduced and potentially upon and after their gradual or complete removal and such adverse effect could be material. Should the COVID-19 pandemic continue for a more prolonged period of time or worsen, it could result in more financial hardship adversely affecting spending by our customers, both businesses and consumers, which could continue or accelerate the decrease in the purchase of certain of our products and services. It may also result in continued suppression by customers of mobile phone data and offloading onto Wi-Fi networks as customers work from home, as well as influence customer adoption of new services including, without limitation, 5G and IoT.

A more prolonged COVID-19 pandemic could continue to result in lower business customer activity, which could continue to lead to further reduction or cancellation of our services due to economic uncertainty. These adverse results would be exacerbated should the temporary closure of certain businesses continue or be reintroduced as a result of resurgences in the number of COVID-19 cases. Business customers may continue to postpone purchases of hardware products, downgrade data connectivity speeds, or re-prioritize various business projects with a focus on business continuity instead of growth. We may be unable to perform work and render services on the premises of certain business customers due to existing, new or reintroduced government guidelines and health and safety measures. Finally, a certain number of our business customers could become insolvent or otherwise cease to carry on business as a result of the COVID-19 pandemic.

Measures adopted to combat the spread of COVID-19 have resulted in the suspension, delay or cancellation of some live programming and other productions, resulting in reduced audience levels in certain Bell Media market segments. In addition, measures such as social distancing and stay-at-home and work-from-home policies have adversely impacted Bell Media's radio audience levels and OOH business, while economic pressures on advertisers have led to the cancellation or deferral of advertising campaigns. These events have adversely affected, and could continue to adversely affect, for as long as they persist, Bell Media's revenues.

In addition, risk factors including, without limitation, those described in section 9, *Business risks*, have been and/or could be exacerbated, or become more likely to materialize, as a result of the COVID-19 pandemic. While we have implemented business continuity plans and taken additional steps where required, including various preventive measures and precautions, there can be no assurance that these actions in response to the COVID-19 pandemic will succeed in preventing or mitigating, in whole or in part, the negative impacts of the pandemic on our company, employees or customers, and these actions may have adverse effects on our business, that may continue following the COVID-19 pandemic.

As a result of the COVID-19 pandemic, there is a higher degree of uncertainty in determining forward-looking information, including BCE's 2022 financial guidance. The extent to which the COVID-19 pandemic will continue to adversely impact our business and financial results will depend on future developments that are difficult to predict, including the prevalence of COVID-19 variants that are more contagious and may lead to increased health risks, the timely distribution of vaccines and treatments and their long-term effectiveness, the potential development and distribution of new vaccines and treatments, vaccination hesitancy and the number of individuals who choose to remain unvaccinated, the time required to achieve broad immunity, as well as new information which may emerge concerning the severity and duration of the COVID-19 pandemic, including the number and intensity of resurgences in COVID-19 cases, and the actions required to contain the coronavirus or remedy its impacts, among others. Any of the developments and risks referred to above and elsewhere in this MD&A, and others arising from the COVID-19 pandemic, could have a material adverse effect on our business, financial condition, liquidity, financial results or reputation.

## COMPETITIVE ENVIRONMENT

***Competitive activity in our industry, including from technological substitution and the expansion of alternative service providers, is intense and contributes to disruptions in each of our business segments***

As the scope of our businesses increases and evolving technologies drive new services, delivery models and strategic partnerships, our competitive landscape intensifies and expands to include new and emerging competitors, certain of which were historically our partners or suppliers, as well as global-scale competitors, including, in particular, cloud and OTT service providers, IoT hardware and software providers, voice over IP (VoIP) providers and other web-based players that are penetrating the telecommunications space with significant resources and a large customer base over which to amortize costs. Certain of these competitors are changing the competitive landscape by establishing material positions, which has accelerated during the COVID-19 pandemic. Established competitors further seek to consolidate or expand their product offerings through acquisitions in order to increase scale and market opportunities in light of these changes in market dynamics. Failure to effectively respond to such evolving competitive dynamics could adversely affect our business and financial results.

Technology substitution, IP networks and recent regulatory decisions, in particular, continue to facilitate entry in our industry. In addition, the effects of government policies reserving spectrum at favourable pricing for regional facilities-based wireless service providers continue to impact market dynamics. Together, these factors have changed industry economics and allowed competitors to launch new products and services and gain market share with far less investment in financial, marketing, human, technological and network resources than has historically been required. In particular, some competitors deliver their services over our networks, leveraging regulatory obligations applicable to us, therefore limiting their need to invest in building their own networks and impacting the network-based differentiation of our services. Such lower required investment challenges the monetization of our networks and our operating model. Moreover, foreign OTT players are currently not subject to the same Canadian content investment obligations as those imposed on Canadian domestic digital suppliers, which provides them with a competitive advantage over us.

Greater customer adoption of services like 5G, as well as IoT services and applications in the areas of retail (e.g., home automation), business (e.g., remote monitoring), transportation (e.g., connected car and asset tracking) and urban city optimization (smart cities), is expected to accelerate growth opportunities as well as competition in these areas. If we are unable to develop and deploy new solutions in advance of or concurrently with our competitors, or if the market does not adopt these new technologies in pace with our deployment of new solutions, our business and financial results could be adversely affected.

We expect these trends, some of which have intensified during the COVID-19 pandemic, to continue in the future, and the increased competition we face as a result could negatively impact our business including, without limitation, in the following ways:

- The acceleration of disruptions and disintermediation in each of our business segments could adversely affect our business and financial results
- The COVID-19 pandemic and the restrictive measures mandated or recommended to contain the spread of the coronavirus have changed consumer behaviour and activity and the way businesses operate, and such changes could continue or further evolve for as long as such measures persist, and potentially thereafter, which could adversely affect the sale of our products and services, as well as our revenues and cash flows
- Adverse economic conditions, such as economic downturns or recessions, increasing interest rates and inflation, adverse conditions in the financial markets or a declining level of retail and commercial activity, could have a negative impact on the demand for, and prices of, our wireline, wireless and media products and services
- Competitors' aggressive market offers, combined with heightened customer sensitivity around pricing, could result in pricing pressures, lower margins and increased costs of customer acquisition and retention, and our market share and sales volumes could decrease if we do not match competitors' pricing levels or increase customer acquisition and retention spending
- The proposed combination of Rogers Communications Inc. (Rogers) and Shaw Communications Inc. (Shaw) could create a Canadian competitor with larger scale, which could have implications for each of our business segments
- Should our value proposition on pricing, network, speed, service or features not be considered sufficient for customers in light of available alternatives, or should our products and services not be provided over customers' preferred delivery channels, this could lead to increased churn
- The shift to online transactions during the COVID-19 pandemic amid store closures and reduced store traffic could continue, thereby adversely impacting our ability to leverage our extensive retail network to increase the number of subscribers and sell our products and services
- The convergence of wireline and wireless services is impacting product purchase choice by customers and could accelerate product substitution in favour of lower-margin products as well as accelerate churn, which trends are expected to increase with the introduction of 5G
- Regulatory decisions regarding wholesale access to our wireless and fibre networks could facilitate entry of new competitors, including OTT players, or strengthen the market position of current competitors, which may negatively impact our retail subscriber base in favour of lower-margin wholesale subscribers and thus could negatively impact our capacity to optimize scale and invest in our networks
- The timely rollout of 5G mobile service may be adversely impacted by government decisions, constraints on access to network equipment, the limited availability of 5G-compatible handsets due to supply chain disruptions and inventory constraints, labour shortages and potential operational challenges in delivering new technology
- The accelerated cloud-based and OTT-based substitution and the market expansion of lower-cost VoIP, collaboration and software-defined networking in a wide area network (SD WAN) solutions offered by local and global competitors, such as traditional software players, are changing our approach to service offerings and pricing and could have an adverse effect on our business
- Spending rationalization by business customers could lead to further reductions in sales of traditional connectivity value-added services and margin erosion, driven by technology substitution, economic factors and customers' operational efficiencies
- Multinational business consumers' desire to consolidate global network service supply with one supplier could accelerate the disruptions in our wireline segment
- The pressure from simpler, lower-cost, agile service models is driving in-sourcing trends, which could have an adverse impact on our managed services business
- Subscriber and viewer growth is challenged by changing viewer habits, the expansion and accelerated market penetration of global scale low-cost OTT content providers, OTT aggregators and other alternative service providers, some of which may offer content as loss leaders to support their core business, as well as account stacking, Canadian Radio-television and Telecommunications Commission (CRTC) arbitration and a fragmentation of audience due to an abundance of choices
- Competition with global competitors such as Netflix, Amazon and Disney, in addition to traditional Canadian TV competitors, for programming content could drive significant increases in content acquisition and development costs as well as reduced access to key content as some competitors withhold content to enhance their OTT service offering
- The proliferation of content piracy could negatively impact our ability to monetize products and services beyond our current expectations, while creating bandwidth pressure without corresponding revenue growth in the context of regulated wholesale high-speed Internet access rates
- Traditional radio faces accelerated substitution from new music players and alternative streaming services such as those offered by global audio streaming players and those made available by new technologies, including smart car services, which has been exacerbated by the COVID-19 pandemic due to a decline in radio audience driven by reduced travel needs and altered daily routines
- The launch by Canadian and international competitors of low earth orbit (LEO) satellites to provide connectivity, primarily in rural areas and the North, intensifies competition, which could adversely affect our network deployment strategy in such areas and negatively impact demand for our connectivity services. The ability of our subsidiary Northwestel, operating in Canada's North, to respond to the competitive threat from these providers is further hampered by CRTC retail Internet regulations.

For a further discussion of our competitive environment and related risks, as well as a list of our main competitors, on a segmented basis, refer to *Competitive landscape and industry trends* and *Principal business risks* in section 5, *Business segment analysis*.

## REGULATORY ENVIRONMENT

***Our regulatory environment influences our strategies, and adverse governmental or regulatory decisions could have negative financial, operational, reputational or competitive consequences for our business***

Although most of our retail services are not price-regulated, government agencies and departments such as the CRTC, Innovation, Science and Economic Development Canada (ISED), Canadian Heritage and the Competition Bureau continue to play a significant role in regulatory matters such as mandatory access to networks, spectrum auctions, the imposition of consumer-related codes of conduct, approval of acquisitions, broadcast and spectrum licensing, foreign ownership requirements and control of copyright piracy. As with all regulated organizations, strategies are contingent upon regulatory decisions.

Adverse decisions by governments or regulatory agencies, increased regulation or lack of effective anti-piracy remedies could have negative financial, operational, reputational or competitive consequences for our business. As a result of the COVID-19 pandemic, additional legislation or regulations, regulatory initiatives or proceedings, or government consultations or positions, may be adopted or instituted, as the case may be, that impose additional constraints on our operations and may adversely impact our ability to compete in the marketplace.

For a discussion of our regulatory environment and the principal risks related thereto, refer to section 8, *Regulatory environment* as well as the applicable segment discussions under *Principal business risks* in section 5, *Business segment analysis*.

## SECURITY MANAGEMENT AND DATA GOVERNANCE

***Our operations, service performance, reputation and business continuity depend on how well we protect our physical and non-physical assets, including from information security threats***

Our operations, service performance, reputation and business continuity depend on how well we protect our physical and non-physical assets, including networks, IT systems, offices, corporate stores and sensitive information, from events such as information security attacks, unauthorized access or entry, fire, natural disasters, power loss, building cooling loss, acts of war or terrorism, sabotage, vandalism, actions of neighbours and other events. The protection and effective organization of our systems, applications and information repositories are central to the secure and continuous operation of our networks and business, as electronic and physical records of proprietary business and personal data, such as confidential customer and employee information, are all sensitive from a market and privacy perspective.

Information security breaches can result from deliberate or unintended actions by a growing number of sophisticated actors, including hackers, organized criminals, state-sponsored organizations and other parties. Information security attacks have grown in complexity, magnitude and frequency in recent years and the potential for damage is increasing. Information security attacks may be perpetrated using a complex array of ever evolving and changing means including, without limitation, the use of stolen credentials, social engineering, computer viruses and malicious software, phishing and other attacks on network and information systems. Information security attacks aim to achieve various malicious objectives including unauthorized access to, ransom/encryption of, and theft of, confidential, proprietary, sensitive or personal information, as well as extortion and business disruptions.

We are also exposed to information security threats as a result of actions that may be taken by our customers, suppliers, outsourcers, business partners, employees or independent third parties, whether malicious or not, including as a result of the use of social media, cloud-based solutions and IT consumerization. Our use of third-party suppliers and outsourcers and reliance on business partners, which may also be subject to information security threats, also expose us to risks as we have less immediate oversight over their IT domains. Furthermore, the introduction of 5G, cloud computing and the proliferation of data services, including mobile TV, mobile commerce, mobile banking and IoT applications, as well as increased digitization and the use of emerging technologies such as AI, robotics and smart contracts leveraging blockchain for digital certification, have significantly increased the threat surface of our network and systems, resulting in higher complexity that needs to be carefully monitored and managed to minimize security threats. Failure to implement an information security program that efficiently considers relationships and interactions with business partners, suppliers, customers, employees and other third parties across all methods of communication, including social media and cloud-based solutions, could adversely affect our ability to successfully defend against information security attacks.

The COVID-19 pandemic has increased our exposure to information security threats. Remote work arrangements of our employees and those of our suppliers have increased remote connectivity to our systems and the potential use of unauthorized communications technologies. In addition, the COVID-19 pandemic has seen an increase in global criminal activity, which further pressures our security environment.

If information security threats were to become successful attacks resulting in information security breaches, they could harm our brand, reputation and competitiveness, decrease customer and investor confidence and adversely affect our business, financial results, stock price and long-term shareholder value, given that they could lead to:

- Network operating failures and business disruptions, which could negatively impact our ability to sell products and services to our customers and adversely affect their ability to maintain normal business operations and deliver critical services, and/or the ability of third-party suppliers to deliver critical services to us
- Unauthorized access to proprietary or sensitive information about our business, which could result in diminished competitive advantages and loss of future business opportunities
- Theft, loss, unauthorized disclosure, destruction, encryption or corruption of data and confidential information, including personal information about our customers or employees, that could result in financial loss, exposure to claims for damages by customers, employees and others, extortion threats due to ransomware and difficulty in accessing materials to defend legal actions
- Lost revenue resulting from the unauthorized use of proprietary information or the failure to retain or attract customers after an incident
- Physical damage to network assets impacting service continuity
- Fines and sanctions for failure to meet legislative requirements or from credit card providers for failing to comply with payment card industry data security standards for protection of cardholder data
- Increased fraud as criminals leverage stolen information against our customers, our employees or our company
- Remediation costs such as liability for stolen information, equipment repair and service recovery, and incentives to customers or business partners in an effort to maintain relationships after an incident
- Increased information security protection costs, including the costs of deploying additional personnel and protection technologies, training and monitoring employees, and engaging third-party security experts and auditors
- Changes in the terms, conditions and pricing of customer, supplier and financial contracts and agreements that we may have

In light of the evolving nature and sophistication of information security threats, our information security policies, procedures and controls must continuously adapt and evolve in order to seek to mitigate risk and, consequently, require constant monitoring to ensure effectiveness. However, given the complexity and scale of our business, network infrastructure, technology and IT supporting systems, there can be no assurance that the security policies, procedures and controls that we implement will be effective against all information security attacks. In addition, there can be no assurance that any insurance we may have will cover all or part of the costs, damages, liabilities or losses that could result from the occurrence of any information security breach.

***Failure to implement effective data governance could harm our brand and reputation, expose us to regulatory pressure and penalties, constrain our competitive opportunities, and adversely affect our business and financial results***

To achieve our purpose of advancing how Canadians connect with each other and the world, we must preserve the social licence from our customers and all Canadians to collect and use data in our operations. A strong and consistently applied approach to data governance is critical to maintaining that social licence, requiring us to focus on respecting the privacy of our customers' data and protecting such data against information security threats. As our operations involve receiving, processing and storing such proprietary business and personal data, effective policies, procedures and controls must be implemented to protect information systems and underlying data in accordance with applicable privacy legislation. Failure to meet customer and employee expectations regarding the appropriate use and protection of their data can have negative reputational, business and financial consequences for the company.

There has also been increased regulatory scrutiny over the use, collection, and disclosure of personal information in Canada. We are subject to various privacy legislation, such as Canada's anti-spam legislation (CASL) and the Personal Information Protection and Electronic Documents Act, as well as foreign privacy legislation via the mandatory flow-through of privacy-related obligations by our customers, including those of the General Data Protection Regulation (EU). Global and domestic regulation around privacy and data practices are evolving rapidly and new or amended privacy legislation has been proposed federally and in a number of Canadian provincial jurisdictions with significant obligations, limitations on the use of personal information, penalties and short implementation horizons. Our data governance framework must not only meet applicable privacy requirements, but also be able to evolve for continuous improvement. Effective data governance is also a component of good ESG practices, which are considered an increasingly important measure of corporate performance and value creation.

Failure to implement effective data governance encompassing the protection and appropriate use of data across its life cycle, and incorporating data governance as a core consideration in our business initiatives and technology decisions, could harm our brand, reputation and competitiveness, decrease customer and investor confidence and adversely affect our business and financial results. It could give rise to litigation, investigations, fines and liability for failure to comply with increasingly stringent privacy legislation, as well as increased audit and regulatory scrutiny that could divert resources from business operations.

# 4 Consolidated financial analysis

This section provides detailed information and analysis about BCE's performance in 2021 compared with 2020. It focuses on BCE's consolidated operating results and provides financial information for our Bell Wireless, Bell Wireline and Bell Media business segments. For further discussion and analysis of our business segments, refer to section 5, *Business segment analysis*.

## 4.1 Introduction

### BCE CONSOLIDATED INCOME STATEMENTS

| | 2021 | 2020 | $ CHANGE | % CHANGE |
|---|---|---|---|---|
| Operating revenues | | | | |
| Service | **20,350** | 19,832 | 518 | 2.6% |
| Product | **3,099** | 3,051 | 48 | 1.6% |
| Total operating revenues | **23,449** | 22,883 | 566 | 2.5% |
| Operating costs | **(13,556)** | (13,276) | (280) | (2.1%) |
| Adjusted EBITDA | **9,893** | 9,607 | 286 | 3.0% |
| *Adjusted EBITDA margin* | ***42.2%*** | *42.0%* | | *0.2 pts* |
| Severance, acquisition and other costs | **(209)** | (116) | (93) | (80.2%) |
| Depreciation | **(3,627)** | (3,475) | (152) | (4.4%) |
| Amortization | **(982)** | (929) | (53) | (5.7%) |
| Finance costs | | | | |
| Interest expense | **(1,082)** | (1,110) | 28 | 2.5% |
| Interest on post-employment benefit obligations | **(20)** | (46) | 26 | 56.5% |
| Impairment of assets | **(197)** | (472) | 275 | 58.3% |
| Other income (expense) | **160** | (194) | 354 | n.m. |
| Income taxes | **(1,044)** | (792) | (252) | (31.8%) |
| **Net earnings from continuing operations** | **2,892** | 2,473 | 419 | 16.9% |
| **Net earnings from discontinued operations** | **–** | 226 | (226) | (100.0%) |
| **Net earnings** | **2,892** | 2,699 | 193 | 7.2% |
| Net earnings from continuing operations attributable to: | | | | |
| Common shareholders | **2,709** | 2,272 | 437 | 19.2% |
| Preferred shareholders | **131** | 136 | (5) | (3.7%) |
| Non-controlling interest | **52** | 65 | (13) | (20.0%) |
| **Net earnings from continuing operations** | **2,892** | 2,473 | 419 | 16.9% |
| Net earnings attributable to: | | | | |
| Common shareholders | **2,709** | 2,498 | 211 | 8.4% |
| Preferred shareholders | **131** | 136 | (5) | (3.7%) |
| Non-controlling interest | **52** | 65 | (13) | (20.0%) |
| **Net earnings** | **2,892** | 2,699 | 193 | 7.2% |
| **Adjusted net earnings** | **2,895** | 2,730 | 165 | 6.0% |
| Net earnings per common share (EPS) | | | | |
| Continuing operations | **2.99** | 2.51 | 0.48 | 19.1% |
| Discontinued operations | **–** | 0.25 | (0.25) | (100.0%) |
| **Net earnings per common share** | **2.99** | 2.76 | 0.23 | 8.3% |
| **Adjusted EPS** | **3.19** | 3.02 | 0.17 | 5.6% |

*n.m.: not meaningful*

### BCE STATEMENTS OF CASH FLOWS – SELECTED INFORMATION

| | 2021 | 2020 | $ CHANGE | % CHANGE |
|---|---|---|---|---|
| Cash flows from operating activities | **8,008** | 7,754 | 254 | 3.3% |
| Capital expenditures | **(4,837)** | (4,202) | (635) | (15.1%) |
| Free cash flow | **2,995** | 3,348 | (353) | (10.5%) |

BCE operating revenues grew 2.5%, over last year, reflecting our strong operational execution as we continued to recover from the effects of the COVID-19 pandemic and includes the unfavourable retroactive impact of the Q2 2021 CRTC decision on wholesale high-speed Internet access services of $44 million. The increase in operating revenues was driven by higher year-over-year service revenues of 2.6% from continued growth in our mobile phones, retail Internet and IPTV subscriber bases combined with rate increases, as well as higher media advertising and subscriber revenues. This growth was moderated by ongoing erosion in our voice, satellite TV and legacy data revenues. Product revenues were also up year over year, increasing by 1.6%, primarily due to a higher sales mix of premium mobile phones in Bell Wireless, offset in part by reduced equipment sales in our large business market.

In 2021, net earnings increased by 7.2%, compared to 2020, mainly due to higher adjusted EBITDA, higher other income and lower impairment of assets primarily at our Bell Media segment, partly offset by higher income taxes, lower net earnings from discontinued operations as a result of a gain on sale, net of taxes, of $211 million in Q4 2020 from the completion of the sale of substantially all of our data centre operations, higher depreciation and amortization, and higher severance, acquisition and other costs.

BCE's adjusted EBITDA grew by 3.0% in 2021, compared to 2020, attributable to growth across all three segments and includes the unfavourable retroactive impact of the Q2 2021 CRTC decision on wholesale high-speed Internet access services of $44 million. The growth was due to higher revenues, offset in part by greater operating costs in Bell Media and Bell Wireless, moderated by lower costs in Bell Wireline. This resulted in an adjusted EBITDA margin of 42.2% in 2021, which represented a 0.2 pts increase over last year, driven by greater service revenue flow-through and the non-recurrence of a number of COVID-19 related expenses incurred last year.

In 2021, BCE's cash flows from operating activities increased by $254 million, compared to 2020, mainly due to higher adjusted EBITDA and higher cash from working capital due mainly to the timing of supplier payments, partly offset by higher severance and other costs paid and higher income taxes paid. Additionally, there was lower cash from discontinued operations in 2021 as the sale of substantially all of our data centre operations was completed in Q4 2020.

Free cash flow decreased by $353 million in 2021, compared to 2020, mainly due to higher capital expenditures, partly offset by higher cash flows from operating activities, excluding cash from discontinued operations and acquisition and other costs paid.



## 4.2 Customer connections

### BCE NET ACTIVATIONS (LOSSES)

| | 2021 | 2020 | % CHANGE |
|---|---|---|---|
| Wireless mobile phone net subscriber activation (losses) [1] | **294,842** | 190,675 | 54.6% |
| *Postpaid* | ***301,706*** | *152,693* | *97.6%* |
| *Prepaid* | ***(6,864)*** | *37,982* | *n.m.* |
| Wireless mobile connected devices net subscriber activations [1] | **193,641** | 227,981 | (15.1%) |
| Wireline retail high-speed Internet net subscriber activations | **152,285** | 148,989 | 2.2% |
| Wireline retail TV net subscriber activations (losses) | **2,530** | (33,859) | n.m. |
| *IPTV* | ***76,068*** | *39,191* | *94.1%* |
| *Satellite* | ***(73,538)*** | *(73,050)* | *(0.7%)* |
| Wireline retail residential NAS lines net losses | **(185,327)** | (213,551) | 13.2% |
| **Total services net activations** | **457,971** | 320,235 | 43.0% |

*n.m.: not meaningful*

(1) *Effective January 1, 2021, we changed our wireless operating metrics to reflect our revised approach to reporting wireless subscriber units. Consequently, we are now reporting in two categories, mobile phone subscriber units and mobile connected device subscriber units (e.g. tablets, wearables and mobile Internet devices). Additionally, mobile connected device subscribers now include previously undisclosed IoT units (e.g. connected telematics services, monitoring devices, connected cars and fleet management solutions). These changes are consistent with the way we manage our business, reflect our focus on mobile phone subscribers and align to industry peers. As a result, previously reported 2020 subscribers and associated operating metrics (gross and net activations (losses) and churn) have been restated for comparability. See section 11.6,* KPIs, *in this MD&A for more details.*

### TOTAL BCE CUSTOMER CONNECTIONS

| | 2021 | 2020 | % CHANGE |
|---|---|---|---|
| Wireless mobile phone subscribers [1] | **9,459,185** | 9,164,343 | 3.2% |
| *Postpaid* | ***8,630,045*** | *8,328,339* | *3.6%* |
| *Prepaid* | ***829,140*** | *836,004* | *(0.8%)* |
| Wireless mobile connected devices subscribers [1] | **2,249,794** | 2,056,153 | 9.4% |
| Wireline retail high-speed Internet subscribers [2] | **3,861,653** | 3,704,590 | 4.2% |
| Wireline retail TV subscribers [3] | **2,735,010** | 2,738,605 | (0.1%) |
| *IPTV* | ***1,882,441*** | *1,806,373* | *4.2%* |
| *Satellite* [3] | ***852,569*** | *932,232* | *(8.5%)* |
| Wireline retail residential NAS lines | **2,298,605** | 2,483,932 | (7.5%) |
| **Total services subscribers** | **20,604,247** | 20,147,623 | 2.3% |

(1) *Effective January 1, 2021, we changed our wireless operating metrics to reflect our revised approach to reporting wireless subscriber units. Consequently, we are now reporting in two categories, mobile phone subscriber units and mobile connected device subscriber units (e.g. tablets, wearables and mobile Internet devices). Additionally, mobile connected device subscribers now include previously undisclosed IoT units (e.g. connected telematics services, monitoring devices, connected cars and fleet management solutions). These changes are consistent with the way we manage our business, reflect our focus on mobile phone subscribers and align to industry peers. As a result, previously reported 2020 subscribers and associated operating metrics (gross and net activations (losses) and churn) have been restated for comparability. See section 11.6,* KPIs, *in this MD&A for more details.*

(2) *At the beginning of Q1 2021, our retail high-speed Internet subscriber base was increased by 4,778 subscribers due to the transfer of fixed wireless Internet subscribers from our mobile connected devices subscriber base.*

(3) *At the beginning of Q1 2021, we adjusted our satellite TV subscriber base to remove 6,125 non-revenue generating units.*

BCE added 457,971 net retail subscriber activations in 2021, increasing by 43.0% compared to last year. The net retail subscriber activations in 2021 consisted of:

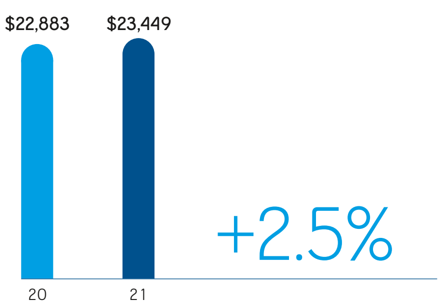
- 294,842 wireless mobile phone net subscriber activations, along with 193,641 wireless mobile connected devices net subscriber activations
- 152,285 retail high-speed Internet net subscriber activations
- 2,530 retail TV net subscriber activations comprised of 76,068 retail IPTV net subscriber activations, offset in part by 73,538 retail satellite TV net subscriber losses
- 185,327 retail residential NAS lines net losses

At December 31, 2021, BCE's retail subscriber connections totaled 20,604,247, up 2.3% year over year, and consisted of:

- 9,459,185 wireless mobile phone subscribers, up 3.2% year over year, and 2,249,794 wireless mobile connected devices subscribers, up 9.4% year over year
- 3,861,653 retail high-speed Internet subscribers, 4.2% higher than last year
- 2,735,010 total retail TV subscribers, down 0.1% compared to last year, comprised of 852,569 retail satellite TV subscribers, down 8.5% year over year, and 1,882,441 retail IPTV subscribers, up 4.2% year over year
- 2,298,605 retail residential NAS lines, down 7.5% over last year

## 4.3 Operating revenues

### BCE
**Revenues**
(in $ millions)




| | 2021 | 2020 | $ CHANGE | % CHANGE |
|---|---|---|---|---|
| Bell Wireless | **8,999** | 8,683 | 316 | 3.6% |
| Bell Wireline | **12,178** | 12,206 | (28) | (0.2%) |
| Bell Media | **3,036** | 2,750 | 286 | 10.4% |
| Inter-segment eliminations | **(764)** | (756) | (8) | (1.1%) |
| **Total BCE operating revenues** | **23,449** | 22,883 | 566 | 2.5% |

### BCE

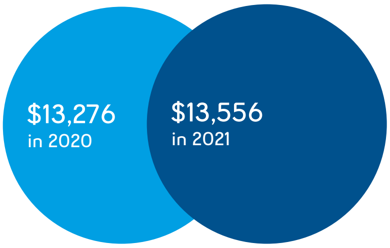
Total operating revenues at BCE increased by 2.5% in 2021, compared to last year, as we continued to recover from the impacts of the COVID-19 pandemic and includes the unfavourable retroactive impact of the Q2 2021 CRTC decision on wholesale high-speed Internet access services of $44 million. BCE service revenues of $20,350 million and product revenues of $3,099 million in 2021, grew by 2.6% and 1.6%, respectively, over last year.

The year-over-year increase in 2021 operating revenues was driven by growth in our Bell Wireless and Bell Media segments, offset in part by a decline in our Bell Wireline segment. Bell Wireless operating revenues increased by 3.6% compared to last year due to both higher service revenues of 3.7% and higher product revenues of 3.4%. Bell Media operating revenues grew by 10.4% in 2021, from higher advertising and subscriber revenues. Bell Wireline operating revenues declined by 0.2% in 2021, due to lower product revenues of 7.0%, offset in part by service revenue growth of 0.1%, from higher data and other services revenues, offset in part by ongoing voice erosion.

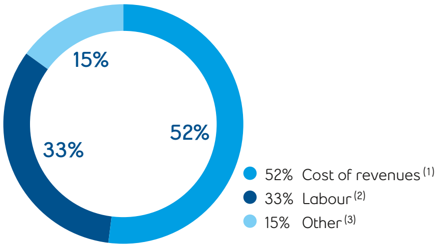


## 4.4 Operating costs

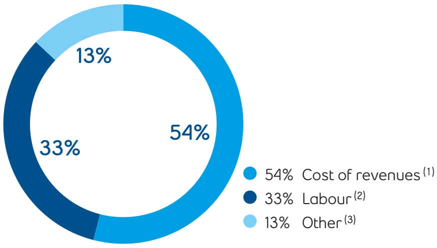
BCE
**Operating costs**
(in $ millions)




BCE
**Operating cost profile**
2020




BCE
**Operating cost profile**
2021




| | 2021 | 2020 | $ CHANGE | % CHANGE |
|---|---|---|---|---|
| Bell Wireless | (5,146) | (5,017) | (129) | (2.6%) |
| Bell Wireline | (6,863) | (6,960) | 97 | 1.4% |
| Bell Media | (2,311) | (2,055) | (256) | (12.5%) |
| Inter-segment eliminations | 764 | 756 | 8 | 1.1% |
| **Total BCE operating costs** | (13,556) | (13,276) | (280) | (2.1%) |

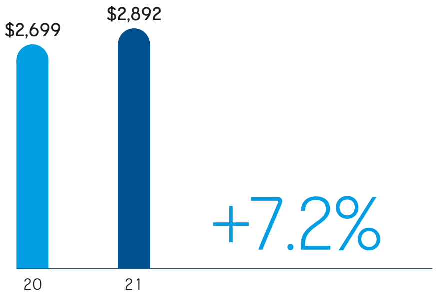
(1) *Cost of revenues includes costs of wireless devices and other equipment sold, network and content costs, and payments to other carriers.*
(2) *Labour costs (net of capitalized costs) include wages, salaries and related taxes and benefits, post-employment benefit plans service cost, and other labour costs, including contractor and outsourcing costs.*
(3) *Other operating costs include marketing, advertising and sales commission costs, bad debt expense, taxes other than income taxes, IT costs, professional service fees and rent.*

### BCE

BCE operating costs increased by 2.1% compared to 2020, due to greater expenses in Bell Media of 12.5% and Bell Wireless of 2.6%, offset in part by reduced expenses in Bell Wireline of 1.4%. The increase in operating expenses was mainly driven by higher wireless cost of goods sold and increased media programming and production costs.

# 4.5 Net earnings

**BCE**
**Net earnings**
(in $ millions)

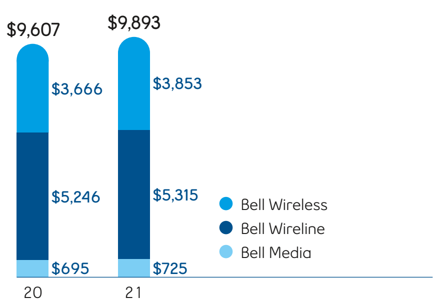



In 2021, net earnings increased by 7.2%, compared to 2020, mainly due to higher adjusted EBITDA, higher other income and lower impairment of assets primarily at our Bell Media segment, partly offset by higher income taxes, lower net earnings from discontinued operations as a result of a gain on sale, net of taxes, of $211 million in Q4 2020 from the completion of the sale of substantially all of our data centre operations, higher depreciation and amortization, and higher severance, acquisition and other costs.

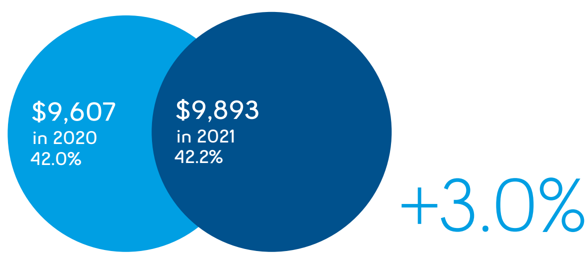


# 4.6 Adjusted EBITDA

**BCE**
**Adjusted EBITDA**
(in $ millions)




**BCE**
**Adjusted EBITDA**
(in $ millions)
(% adjusted EBITDA margin)




| | 2021 | 2020 | $ CHANGE | % CHANGE |
|---|---|---|---|---|
| Bell Wireless | 3,853 | 3,666 | 187 | 5.1% |
| Bell Wireline | 5,315 | 5,246 | 69 | 1.3% |
| Bell Media | 725 | 695 | 30 | 4.3% |
| Total BCE adjusted EBITDA | 9,893 | 9,607 | 286 | 3.0% |

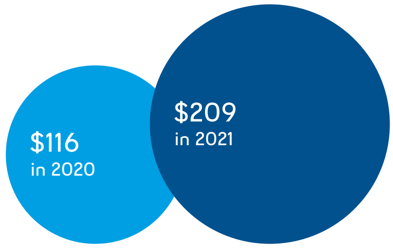
### BCE

BCE's adjusted EBITDA grew by 3.0% in 2021, compared to last year, driven by growth across all three of our segments and includes the unfavourable retroactive impact of the Q2 2021 CRTC decision on wholesale high-speed Internet access services of $44 million. The growth was attributable to higher operating revenues, moderated by greater operating costs. Adjusted EBITDA margin of 42.2% in 2021, increased by 0.2 pts over last year, mainly driven by greater service revenue flow-through and the non-recurrence of a number of COVID-19 related expenses incurred last year.

# 4.7 Severance, acquisition and other costs

*This category includes various income and expenses that are not related directly to the operating revenues generated during the year. This includes severance costs consisting of charges related to involuntary and voluntary employee terminations, as well as transaction costs, such as legal and financial advisory fees, related to completed or potential acquisitions, employee severance costs related to the purchase of a business, the costs to integrate acquired companies into our operations, costs relating to litigation and regulatory decisions, when they are significant, and other costs.*

**BCE**
**Severance, acquisition and other costs**
(in $ millions)




### 2021

Severance, acquisition and other costs included:

- Severance costs of $171 million related to involuntary and voluntary employee terminations
- Acquisition and other costs of $38 million

### 2020

Severance, acquisition and other costs included:

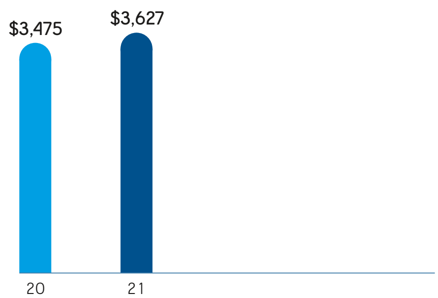
- Severance costs of $35 million related to involuntary and voluntary employee terminations
- Acquisition and other costs of $81 million

## 4.8 Depreciation and amortization

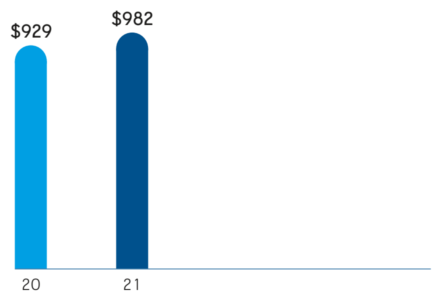
*The amount of our depreciation and amortization in any year is affected by:*

- *How much we invested in new property, plant and equipment and intangible assets in previous years*
- *How many assets we retired during the year*
- *Estimates of the useful lives of assets*

**BCE**
**Depreciation**
(in $ millions)




**BCE**
**Amortization**
(in $ millions)




### DEPRECIATION

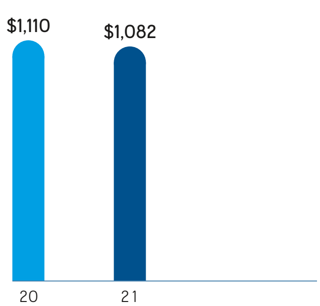
Depreciation in 2021 increased by $152 million, compared to 2020, in part due to a higher asset base as we continued to invest in our broadband and wireless networks as well as our IPTV services and accelerated depreciation of 4G network elements as we transition to 5G.

### AMORTIZATION

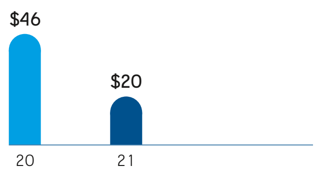
Amortization in 2021 increased by $53 million, compared to 2020, mainly due to a higher asset base.

## 4.9 Finance costs

**BCE**
**Interest expense**
(in $ millions)




**BCE**
**Interest on post-employment benefit obligations**
(in $ millions)




### INTEREST EXPENSE

Interest expense in 2021 decreased by $28 million, compared to 2020, mainly due to lower interest rates, partly offset by higher average debt levels.

### INTEREST ON POST-EMPLOYMENT BENEFIT OBLIGATIONS

Interest on our post-employment benefit obligations is based on market conditions that existed at the beginning of the year. On January 1, 2021, the discount rate was 2.6% compared to 3.1% on January 1, 2020.

In 2021, interest expense on post-employment benefit obligations decreased by $26 million, compared to last year, due to a lower discount rate and a lower net post-employment benefit obligation at the beginning of the year.

The impacts of changes in market conditions during the year are recognized in other comprehensive income (OCI).

## 4.10 Impairment of assets

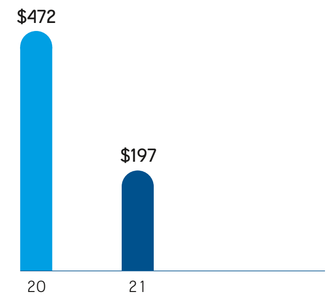
### 2021

During the second quarter of 2021, we identified indicators of impairment for our Bell Media radio markets, notably a decline in advertising revenue and an increase in the discount rate resulting from the impact of the ongoing COVID-19 pandemic. Accordingly, impairment testing was required for our group of radio cash generating units (CGUs).

During Q2 2021, we recognized $163 million of impairment charges for various radio markets within our Bell Media segment. These charges included $150 million allocated to indefinite-life intangible assets for broadcast licences, and $13 million to property, plant and equipment mainly for buildings and network infrastructure and equipment.

There was no impairment of Bell Media goodwill.

BCE
Impairment of assets
(in $ millions)




### 2020

During the second quarter of 2020, we identified indicators of impairment for certain of our Bell Media TV services and radio markets, notably declines in advertising revenues, lower subscriber revenues and overall increases in discount rates resulting from the economic impact of the COVID-19 pandemic. Accordingly, impairment testing was required for certain groups of CGUs as well as for goodwill.

During Q2 2020, we recognized $452 million of impairment charges for our English and French TV services as well as various radio markets within our Bell Media segment. These charges included $291 million allocated to indefinite-life intangible assets for broadcast licences, $146 million allocated to finite-life intangible assets, mainly for program and feature film rights, and $15 million to property, plant and equipment for network and infrastructure and equipment.

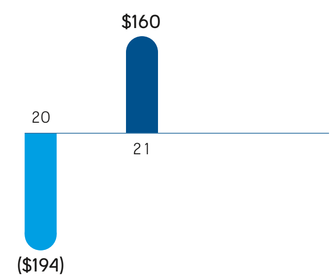
There was no impairment of Bell Media goodwill.

## 4.11 Other income (expense)

*Other income (expense) includes income and expense items, such as:*

- *Net mark-to-market gains or losses on derivatives used to economically hedge equity settled share-based compensation plans*
- *Early debt redemption costs*
- *Equity income or losses from investments in associates and joint ventures*
- *Gains or losses on retirements and disposals of property, plant and equipment and intangible assets*
- *Net gains or losses on investments, including gains or losses when we dispose of, write down or reduce our ownership in investments*

BCE
Other income (expense)
(in $ millions)




### 2021

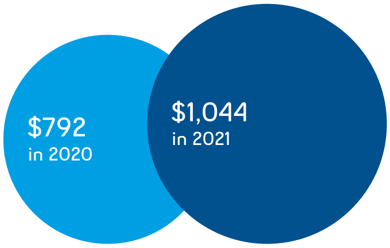
Other income of $160 million included net mark-to-market gains on derivatives used to economically hedge equity settled share-based compensation plans of $278 million, partly offset by early debt redemption costs of $53 million, losses on our equity investments which included a loss of $49 million on BCE's share of an obligation to repurchase at fair value the minority interest in one of BCE's joint ventures and losses on operations from our equity investments of $46 million.

### 2020

Other expense of $194 million included losses on retirements and disposals of property, plant and equipment and intangible assets of $83 million, which included a loss related to a change in strategic direction of the ongoing development of some of our TV platform assets under construction, net mark-to-market losses on derivatives used to economically hedge equity settled share-based compensation plans of $51 million, early debt redemption costs of $50 million and losses on operations from our equity investments of $38 million. These expenses were partly offset by gains on our equity investments of $43 million, which included gains on BCE's share of an obligation to repurchase at fair value the minority interest in one of BCE's joint ventures.

# 4.12 Income taxes

**BCE**
**Income taxes**
(in $ millions)



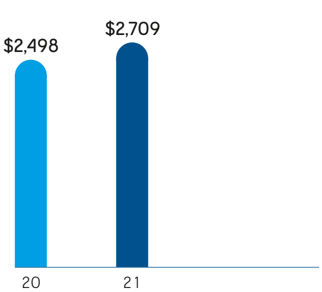

The following table reconciles the amount of reported income taxes in the income statements with income taxes calculated at a statutory income tax rate of 26.8% for 2021 and 26.9% for 2020.

| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 |
|---|---|---|
| Net earnings from continuing operations | 2,892 | 2,473 |
| Add back income taxes | 1,044 | 792 |
| Earnings from continuing operations before income taxes | 3,936 | 3,265 |
| Applicable statutory tax rate | 26.8% | 26.9% |
| Income taxes computed at applicable statutory rates | (1,055) | (878) |
| Non-taxable portion of (losses) gains on investments | (1) | 1 |
| Uncertain tax positions | 16 | 21 |
| Effect of change in provincial corporate tax rate | – | 9 |
| Change in estimate relating to prior periods | 2 | 6 |
| Non-taxable portion of equity (losses) gains | (26) | 2 |
| Previously unrecognized tax benefits | 15 | 47 |
| Other | 5 | – |
| **Total income taxes from continuing operations** | (1,044) | (792) |
| **Average effective tax rate** | 26.5% | 24.3% |

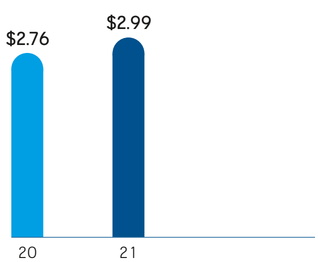
Income taxes in 2021 increased by $252 million, compared to 2020, mainly due to higher taxable income, partly offset by a lower value of previously unrecognized tax benefits.

# 4.13 Net earnings attributable to common shareholders and EPS

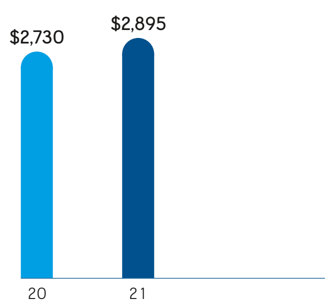
**BCE**
**Net earnings attributable to common shareholders**
(in $ millions)



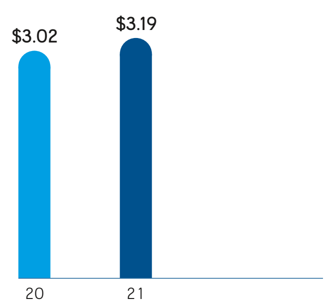

**BCE**
**EPS**
(in $)




**BCE**
**Adjusted net earnings**
(in $ millions)




**BCE**
**Adjusted EPS**
(in $)



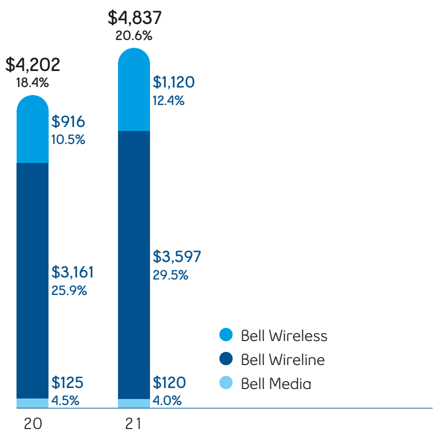

Net earnings attributable to common shareholders in 2021 increased by $211 million, or $0.23 per common share, compared to 2020, mainly due to higher adjusted EBITDA, higher other income and lower impairment of assets primarily at our Bell Media segment, partly offset by higher income taxes, lower net earnings from discontinued operations as a result of a gain on sale, net of taxes, of $211 million in Q4 2020 from the completion of the sale of substantially all of our data centre operations, higher depreciation and amortization, and higher severance, acquisition and other costs.

Excluding the impact of severance, acquisition and other costs, net mark-to-market gains (losses) on derivatives used to economically hedge equity settled share-based compensation plans, net equity gains (losses) on investments in associates and joint ventures, net gains (losses) on investments, early debt redemption costs, impairment of assets and discontinued operations, net of tax and NCI, adjusted net earnings in 2021 was $2,895 million, or $3.19 per common share, compared to $2,730 million, or $3.02 per common share, in 2020.

## 4.14 Capital expenditures

BCE capital expenditures increased by 15.1% in 2021, compared to last year to $4,837 million with a corresponding capital intensity of 20.6%, up 2.2 pts over 2020. The year-over-year growth in capital spending is consistent with our two-year plan to accelerate the rollout of our mobile 5G, fibre and rural WHI networks.

**BCE**
**Capital expenditures**
(in $ millions)
**Capital intensity**
(%)

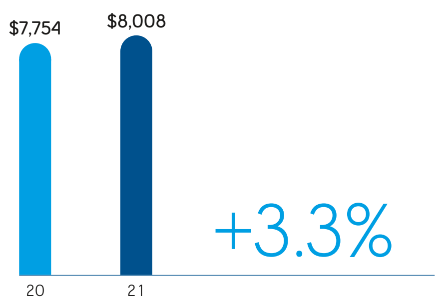



## 4.15 Cash flows

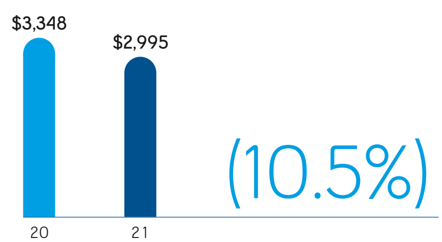
In 2021, BCE's cash flows from operating activities increased by $254 million, compared to 2020, mainly due to higher adjusted EBITDA and higher cash from working capital due mainly to the timing of supplier payments, partly offset by higher severance and other costs paid and higher income taxes paid. Additionally, there was lower cash from discontinued operations in 2021 as the sale of substantially all of our data centre operations was completed in Q4 2020.

Free cash flow decreased by $353 million in 2021, compared to 2020, mainly due to higher capital expenditures, partly offset by higher cash flows from operating activities, excluding cash from discontinued operations and acquisition and other costs paid.

**BCE**
**Cash flows from operating activities**
(in $ millions)




**BCE**
**Free cash flow**
(in $ millions)



# 5 Business segment analysis

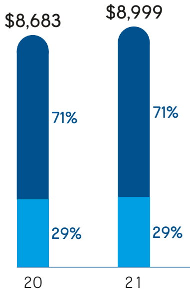
## 5.1 Bell Wireless

*We delivered leading wireless financial results in 2021 with service revenue growth of 3.7%, 5.1% higher adjusted EBITDA and a 1.2% increase in mobile phone blended average revenue per user (ARPU)[1] as we welcomed 294,842 total net new postpaid and prepaid mobile phone subscribers, up 54.6%. We remain focused on growing high-value postpaid mobile phone subscribers, managing customer churn and delivering industry-leading service revenue growth and profitability.*

### FINANCIAL PERFORMANCE ANALYSIS

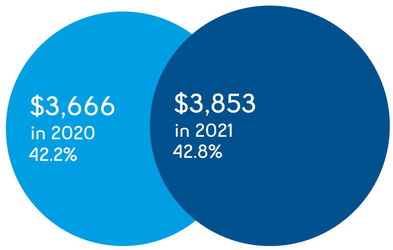
#### 2021 PERFORMANCE HIGHLIGHTS

**Bell Wireless Revenues**
(in $ millions)




+3.6%

**Bell Wireless Adjusted EBITDA**
(in $ millions)
(% adjusted EBITDA margin)




+5.1%

**Total mobile phone subscriber[2] growth**
+3.2%
in 2021

**Mobile phone postpaid net subscriber activations[2] in 2021**
301,706
Improved 97.6% vs. 2020

**Mobile phone prepaid net subscriber losses[2] in 2021**
(6,864)
Declined vs. 2020

**Mobile phone postpaid churn[2] in 2021**
0.93%
Increased 0.01 pts vs. 2020

**Mobile phone blended ARPU**
per month
+1.2%
2021: $57.66
2020: $56.97

(1) *Effective Q4 2021, we are no longer reporting mobile phone blended average billing per user (ABPU). Instead, we are reporting mobile phone blended ARPU in order to align with industry peers. Mobile phone blended ARPU is calculated by dividing wireless operating service revenues by the average mobile phone subscriber base for the specified period and is expressed as a dollar unit per month.*

(2) *Effective January 1, 2021, we changed our wireless operating metrics to reflect our revised approach to reporting wireless subscriber units. Consequently, we are now reporting in two categories, mobile phone subscriber units and mobile connected device subscriber units (e.g. tablets, wearables and mobile Internet devices). Additionally, mobile connected device subscribers now include previously undisclosed IoT units (e.g. connected telematics services, monitoring devices, connected cars and fleet management solutions). These changes are consistent with the way we manage our business, reflect our focus on mobile phone subscribers and align to industry peers. As a result, previously reported 2020 subscribers and associated operating metrics (gross and net activations (losses) and churn) have been restated for comparability. See section 11.6,* KPIs, *in this MD&A for more details.*

## BELL WIRELESS RESULTS

### *REVENUES*

| | 2021 | 2020 | $ CHANGE | % CHANGE |
|---|---|---|---|---|
| External service revenues | 6,355 | 6,122 | 233 | 3.8% |
| Inter-segment service revenues | 45 | 47 | (2) | (4.3%) |
| **Operating service revenues** | 6,400 | 6,169 | 231 | 3.7% |
| External product revenues | 2,593 | 2,508 | 85 | 3.4% |
| Inter-segment product revenues | 6 | 6 | – | – |
| **Operating product revenues** | 2,599 | 2,514 | 85 | 3.4% |
| **Bell Wireless operating revenues** | 8,999 | 8,683 | 316 | 3.6% |

**Bell Wireless operating revenues** increased by 3.6% in 2021, compared to last year, due to both higher service and product revenues.

**Service revenues** increased by 3.7% in 2021, compared to 2020, driven by:

- Continued growth in our mobile phone postpaid subscriber base
- Flow-through of rate increases along with mix shift to higher-value monthly plans, including unlimited data plans
- Higher prepaid revenues driven by greater Lucky mix

These factors were partly offset by:

- Lower data overages driven by greater customer adoption of monthly plans with higher data thresholds, including unlimited and shareable plans, as well as lower voice overages due to increased usage in 2020 driven by the COVID-19 pandemic
- Modest year-over-year decline in outbound roaming revenues due to reduced customer travel as a result of the COVID-19 pandemic. Outbound roaming revenues improved in the second half of the year due to the easing of COVID-related travel restrictions.

**Product revenues** increased by 3.4% in 2021, compared to last year, driven by greater sales mix of premium mobile phones, higher handset prices, increased mobile phone contracted sales volumes, as the prior year was more significantly impacted by the temporary store closures due to the COVID-19 pandemic, and higher sales through our direct and digital channels. This was moderated by greater discounting and lower data device contracted sales volumes.

### *OPERATING COSTS AND ADJUSTED EBITDA*

| | 2021 | 2020 | $ CHANGE | % CHANGE |
|---|---|---|---|---|
| Operating costs | (5,146) | (5,017) | (129) | (2.6%) |
| Adjusted EBITDA | 3,853 | 3,666 | 187 | 5.1% |
| Adjusted EBITDA margin | 42.8% | 42.2% | | 0.6 pts |

**Bell Wireless operating costs** increased by 2.6% in 2021, compared to last year, driven by:

- Higher cost of goods sold due to greater sales mix of premium mobile phones, increased handset costs and higher mobile phone contracted sales volumes
- Increased network operating costs driven by the continued deployment of our mobile 5G network

These factors were partly offset by:

- Lower year-over-year bad debt expense related to the financial difficulty experienced by customers during the COVID-19 pandemic
- Lower labour costs mainly due to retail store closures and reduced operating hours, offset in part by the Canada Emergency Wage Subsidy (CEWS), a wage subsidy program offered by the federal government to eligible employers as a result of the COVID-19 pandemic, recognized last year

**Bell Wireless adjusted EBITDA** increased by 5.1% in 2021, compared to last year, due to greater operating revenues, moderated by higher operating costs. Adjusted EBITDA margin of 42.8% in 2021, increased by 0.6 pts, compared to last year, primarily driven by the flow-through of the service revenue growth and the lower bad debt expense, offset in part by lower product margins.

| | 2021 | 2020 | CHANGE | % CHANGE |
|---|---|---|---|---|
| **Mobile phones** [1] | | | | |
| Blended ARPU ($/month) | **57.66** | 56.97 | 0.69 | 1.2% |
| Gross subscriber activations | **1,653,771** | 1,545,173 | 108,598 | 7.0% |
| *Postpaid* | ***1,201,659*** | *1,025,748* | *175,911* | *17.1%* |
| *Prepaid* | ***452,112*** | *519,425* | *(67,313)* | *(13.0%)* |
| Net subscriber activations (losses) | **294,842** | 190,675 | 104,167 | 54.6% |
| *Postpaid* | ***301,706*** | *152,693* | *149,013* | *97.6%* |
| *Prepaid* | ***(6,864)*** | *37,982* | *(44,846)* | *n.m.* |
| Blended churn % (average per month) | **1.23%** | 1.26% | | 0.03 pts |
| *Postpaid* | ***0.93%*** | *0.92%* | | *(0.01) pts* |
| *Prepaid* | ***4.31%*** | *4.60%* | | *0.29 pts* |
| Subscribers | **9,459,185** | 9,164,343 | 294,842 | 3.2% |
| *Postpaid* | ***8,630,045*** | *8,328,339* | *301,706* | *3.6%* |
| *Prepaid* | ***829,140*** | *836,004* | *(6,864)* | *(0.8%)* |
| **Mobile connected devices** [1] | | | | |
| Net subscriber activations | **193,641** | 227,981 | (34,340) | (15.1%) |
| Subscribers | **2,249,794** | 2,056,153 | 193,641 | 9.4% |

*n.m.: not meaningful*

(1) *Effective January 1, 2021, we changed our wireless operating metrics to reflect our revised approach to reporting wireless subscriber units. Consequently, we are now reporting in two categories, mobile phone subscriber units and mobile connected device subscriber units (e.g. tablets, wearables and mobile Internet devices). Additionally, mobile connected device subscribers now include previously undisclosed IoT units (e.g. connected telematics services, monitoring devices, connected cars and fleet management solutions). These changes are consistent with the way we manage our business, reflect our focus on mobile phone subscribers and align to industry peers. As a result, previously reported 2020 subscribers and associated operating metrics (gross and net activations (losses) and churn) have been restated for comparability. See section 11.6, KPIs, in this MD&A for more details.*

**Mobile phone blended ARPU** of $57.66 increased by 1.2% in 2021, compared to last year, driven by:

- Flow-through of rate increases along with mix shift to higher-value monthly plans including unlimited data plans
- Higher prepaid revenues driven by greater Lucky mix

These factors were partly offset by:

- Decreased data overages driven by greater customer adoption of monthly plans with higher data thresholds, including unlimited and shareable plans, as well as lower voice overages due to increased usage in 2020 driven by the COVID-19 pandemic
- Modest year-over-year decline in outbound roaming revenues due to reduced customer travel as a result of the COVID-19 pandemic. Outbound roaming revenues improved in the second half of the year due to the easing of COVID-19 related travel restrictions.

**Mobile phone gross subscriber activations** increased by 7.0% in 2021, compared to last year, due to higher postpaid gross activations, offset in part by lower prepaid gross activations.

- **Mobile phone postpaid gross subscriber activations** increased by 17.1% in 2021, compared to last year, driven by greater activity in the market as we continued to recover from the effects of the COVID-19 pandemic, including greater temporary closure of retail distribution channels in 2020. Additionally, our focus on growing higher-value mobile phone subscribers, leveraging targeted promotional capabilities and greater sales through our direct and digital channels, also contributed to the growth in mobile phone gross activations.
- **Mobile phone prepaid gross subscriber activations** decreased by 13.0% in 2021, compared to last year, driven by continued low market activity from fewer visitors to Canada and reduced immigration as a result of the COVID-19 pandemic

**Mobile phone net subscriber activations** increased by 54.6% in 2021, compared to last year, due to higher postpaid net activations, offset in part by greater prepaid net losses.

- **Mobile phone postpaid net subscriber activations** increased by 97.6% in 2021, compared to last year, driven by higher gross activations, offset in part by greater subscriber deactivations
- **Mobile phone prepaid net subscriber losses** were 44,846 unfavourable, compared to last year, due to lower gross activations, offset in part by fewer subscriber deactivations

**Mobile phone blended churn** of 1.23% in 2021 improved by 0.03 pts, compared to last year.

- **Mobile phone postpaid churn** of 0.93% in 2021 remained essentially stable, compared to last year, reflecting our continued investment in customer experience, retention and our mobile networks
- **Mobile phone prepaid churn** of 4.31% in 2021 decreased by 0.29 pts, compared to last year, due to lower market activity as a result of the COVID-19 pandemic and the impact from a maturing Lucky subscriber base

**Mobile phone subscribers** at December 31, 2021 totaled 9,459,185 an increase of 3.2%, compared to last year. This consisted of 8,630,045 postpaid subscribers, an increase of 3.6% from 8,328,339 subscribers at the end of 2020, and 829,140 prepaid subscribers, a decrease of 0.8% from 836,004 subscribers at the end of 2020.

**Mobile connected device net subscriber activations** decreased by 15.1% in 2021, compared to last year, due to greater net losses from data devices, primarily lower tablet net activations, offset in part by greater IoT net activations.

**Mobile connected device subscribers** at December 31, 2021 totaled 2,249,794, an increase of 9.4% from 2,056,153 subscribers at the end of 2020.

# COMPETITIVE LANDSCAPE AND INDUSTRY TRENDS

This section contains forward-looking statements, including relating to our business outlook. Refer to the section *Caution regarding forward-looking statements* at the beginning of this MD&A.

## COMPETITIVE LANDSCAPE

The Canadian wireless industry has experienced strong subscriber growth in recent years, supported by immigration and population growth; the trend toward multiple devices, including tablets; the expanding functionality of data and related applications; and the adoption of mobile devices and services, including connected devices. Various forms of public health measures during the global COVID-19 crisis in 2020, including the temporary closure of retail stores, led to pent-up demand in 2021. The mobile phone penetration rate increased to approximately 99% in Canada in 2021, with further increases in penetration expected in 2022. By comparison, the mobile phone penetration rate in the U.S. is well over 100%, and even higher in Europe and Asia.

The 2021 wireless market in Canada continued to face challenges from the COVID-19 pandemic. Growth in ARPU had been moderating as carriers migrated their customer bases to unlimited data plans. However, ARPU moderation was exacerbated by the pandemic, as wireless industry roaming revenue significantly declined from customers' reduced travel activity, which has not yet returned to pre-pandemic levels. Additionally, with large numbers of the workforce working from home during the pandemic, there were associated declines in chargeable data usage from workers offloading their mobile device traffic onto Wi-Fi. The Canadian wireless market continued to experience increased levels of competition nationally. This high level of competition has led to continued declines in chargeable data usage and larger allotments of data, in addition to other factors, such as the popularity of data sharing plans and an evolving shift in the customer mix towards non-traditional wireless devices and tools such as video chats. These factors, combined with increases in overall data usage, which is expected to increase dramatically with the ongoing commercialization of 5G, led to widespread adoption and promotion of unlimited data plans and device financing plans by all national carriers. The build-out of 5G network infrastructure accelerated in 2021, with 5G covering approximately 70% of the Canadian population by the national carriers at the end of 2021. For Bell, our accelerated 5G investments are underpinned by our capital expenditure acceleration program, which commenced in 2021 and will continue in 2022. Our long-standing commitment to network excellence is reflected in multiple independent third-party awards and recognition received in 2021, including winning Canada's Fastest 5G Network award for the second time in a row in the Ookla 2021 Speedtest Awards, as well as top honours from GWS for best 5G network and PCMag for fastest mobile network (4G and 5G) overall.

The Canadian wireless industry continues to be highly competitive and capital-intensive, with carriers continuing to expand and enhance their broadband wireless networks, including the ongoing build-out of 5G, as well as material investments in spectrum.

### *Competitors*

- Large facilities-based national wireless service providers Rogers and the Telus Corporation group of companies (Telus)
- Smaller facilities-based wireless service provider Shaw, which currently provides service in Toronto, Calgary, Vancouver, Edmonton and Ottawa, as well as in several communities in southwestern Ontario
- Regional facilities-based wireless service providers Vidéotron Ltée (Vidéotron), which provides service in Montréal and other parts of Québec; Saskatchewan Telecommunications Holding Corporation, which provides service in Saskatchewan; Bragg Communications Inc. (Eastlink), which provides service in Nova Scotia and Prince Edward Island; and Xplornet Communications Inc., which provides service in Manitoba

## INDUSTRY TRENDS

### *ACCELERATING DATA CONSUMPTION*

The demand for wireless data services is expected to continue to grow, due to: ongoing investment in faster network technologies, such as 5G, that provide a richer user experience and lower network latency; a larger appetite for mobile connectivity, social networking, content streaming (including Crave Mobile), and other applications; increasing adoption of shared plans with multiple devices by families; and the growth of unlimited data plans. Greater customer adoption of services like 5G, international roaming and resumption of travel post COVID-19, as well as IoT services and applications enabled and developed by 5G networks, should also contribute to the demand for data services. In the consumer market, IoT represents a growth area for the industry as wireless connectivity on everyday devices, from home automation to cameras, becomes ubiquitous. However, data overage revenue will continue to be negatively impacted as customers continue to migrate to unlimited and large allotment data plans.

### *SIGNIFICANT INVESTMENTS IN WIRELESS NETWORKS*

Fast growth in mobile data traffic is increasingly putting a strain on wireless carriers' networks and their ability to manage and service this traffic. Industry Canada's 600 MHz, 700 MHz, advanced wireless services-3 (AWS-3), and 2500 MHz spectrum auctions that occurred since 2014 provided wireless carriers with prime spectrum to roll out faster next-generation wireless networks and build greater capacity. Early 5G wireless networks were deployed by the national operators in 2020 utilizing low-band and mid-band spectrum. In 2021, the national operators acquired additional mid-band, flexible-use 3500 MHz wireless spectrum auctioned by ISED. The high capacity and near instant connections offered by mobile 5G will support a virtually unlimited range of new consumer and business applications in coming years, including virtual and augmented reality, AI and machine learning, immersive entertainment services, connected vehicles, smart cities and enhanced rural access, and unprecedented IoT opportunities for business and government enterprises. We expect 5G technology to provide a significant opportunity for future growth in the industry.

## BUSINESS OUTLOOK AND ASSUMPTIONS

This section contains forward-looking statements, including relating to our projected financial performance for 2022 and our 2022 business outlook, objectives, plans and strategic priorities. Refer to the section *Caution regarding forward-looking statements* at the beginning of this MD&A.

### 2022 OUTLOOK

We expect revenue growth to be driven by postpaid and prepaid mobile phone subscriber base expansion. We expect growth in ARPU driven by increased roaming revenue from the easing of travel restrictions implemented as a result of the COVID-19 pandemic, partly offset by reduced data overage revenue resulting from the continued adoption of unlimited plans. We will seek to achieve higher revenues from the flow-through of pricing changes, as well as IoT services and applications in the areas of retail, business, transportation, and urban city optimization. Our intention is to introduce new services to the market in a way that balances innovation with profitability.

We also remain focused on sustaining our market share of national operators' postpaid mobile phone net additions in a disciplined and cost-conscious manner, while also continuing to grow our prepaid subscriber base.

We plan to deliver adjusted EBITDA growth in 2022 from the flow-through of higher revenue and the realization of cost savings related to operational efficiencies enabled by changes in consumer behaviour, digital adoption, product and service enhancements, new call centre and digital investments, and other improvements to the customer service experience.

### ASSUMPTIONS

- Maintain our market share of national operators' wireless postpaid mobile phone net additions and growth of our prepaid subscriber base
- Continued strong competitive intensity and promotional activity across all regions and market segments
- Ongoing expansion and deployment of 5G wireless networks, offering competitive coverage and quality
- Continued diversification of our distribution strategy with a focus on expanding DTC and online transactions
- Growth in mobile phone blended ARPU, driven by growth in 5G subscriptions, and increased roaming revenue from the easing of travel restrictions implemented as a result of the COVID-19 pandemic, partly offset by reduced data overage revenue due to the continued adoption of unlimited plans
- Accelerating business customer adoption of advanced 5G and IoT solutions
- Improving wireless handset device availability in addition to stable device pricing and margins
- Realization of cost savings related to operational efficiencies enabled by changes in consumer behaviour, digital adoption, product and service enhancements, new call centre and digital investments and other improvements to the customer service experience
- No adverse material financial, operational or competitive consequences of changes in or implementation of regulations affecting our wireless business

## KEY GROWTH DRIVERS

- Higher, but slowing, Canadian wireless industry penetration
- A greater number of customers on our 5G network
- Increased adoption of unlimited data plans and device financing plans
- Cross sell to customers who do not have all their telecommunication services with Bell

## PRINCIPAL BUSINESS RISKS

This section discusses certain principal business risks specifically related to the Bell Wireless segment. For a detailed description of the other principal risks that could have a material adverse effect on our business, including those related to the COVID-19 pandemic, refer to section 9, *Business risks*.

### AGGRESSIVE COMPETITION

*RISK*

- The intensity of competitive activity from national wireless operators, smaller or regional facilities-based wireless service providers, non-traditional players and resellers

*POTENTIAL IMPACT*

- Pressure on our revenue, adjusted EBITDA, ARPU and churn would likely result if competitors continue to aggressively pursue new types of price plans, increase discounts, offer shared plans based on sophisticated pricing requirements or offer other incentives, such as multi-product bundles, to attract new customers

### REGULATORY ENVIRONMENT

*RISK*

- Increased regulation of wireless services, pricing and infrastructure (e.g., additional mandated access to wireless networks, and limitations placed on future spectrum bidding)

*POTENTIAL IMPACT*

- Greater regulation could influence network investment and the market structure, limit our flexibility, improve the business position of our competitors, limit network-based differentiation of our services, and negatively impact the financial performance of our wireless business

### MARKET MATURITY

*RISK*

- Slower subscriber growth due to high Canadian smartphone penetration and reduced or slower immigration flow
- Slower travel recovery due to restrictions implemented as a result of the COVID-19 pandemic

*POTENTIAL IMPACT*

- A maturing wireless market could challenge subscriber growth and the cost of subscriber acquisition and retention, putting pressure on the financial performance of our wireless business
- A slower travel recovery could result in a slower recovery of roaming revenue

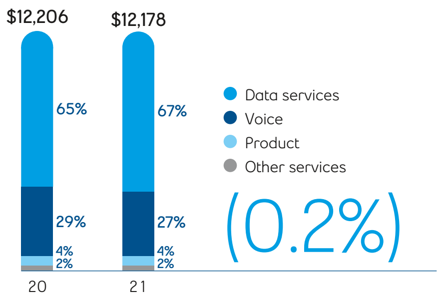
## 5.2 Bell Wireline

*Steady demand for fast, reliable and innovative services to keep residents and businesses connected, informed and productive, drove our best annual retail residential net subscriber performance in 10 years, including an industry-leading 228,353 retail Internet and IPTV subscriber additions, up 21.3%. The broadband footprint advantage that we are building, with our leading fibre network and innovative WHI technology, positions us favourably in both our consumer and business segments over the long term to grow Internet revenue.*

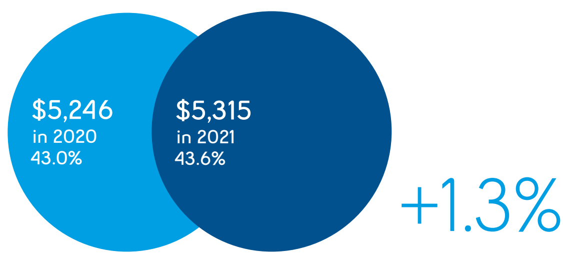
### FINANCIAL PERFORMANCE ANALYSIS

#### 2021 PERFORMANCE HIGHLIGHTS

**Bell Wireline**
**Revenues**
(in $ millions)




**Bell Wireline**
**Adjusted EBITDA**
(in $ millions)
(% adjusted EBITDA margin)




**Retail high-speed Internet** [1]
+4.2%
Subscriber growth
in 2021

**Retail high-speed Internet**
152,285
Total net subscriber activations
in 2021

**Fibre and WTTP footprint**
10.8 million
Homes and businesses
at the end of 2021

**Retail TV** [2]
(0.1%)
Subscriber decline
in 2021

**Retail IPTV**
76,068
Total net subscriber activations
in 2021

**Retail residential NAS lines**
(7.5%)
Subscriber decline
in 2021

(1) *At the beginning of Q1 2021, our retail high-speed Internet subscriber base was increased by 4,778 subscribers due to the transfer of fixed wireless Internet subscribers from our mobile connected devices subscriber base.*

(2) *At the beginning of Q1 2021, we adjusted our satellite TV subscriber base to remove 6,125 non-revenue generating units.*

## BELL WIRELINE RESULTS

### *REVENUES*

| | 2021 | 2020 | $ CHANGE | % CHANGE |
|---|---|---|---|---|
| Data | 7,871 | 7,691 | 180 | 2.3% |
| Voice | 3,154 | 3,402 | (248) | (7.3%) |
| Other services | 289 | 248 | 41 | 16.5% |
| **External service revenues** | 11,314 | 11,341 | (27) | (0.2%) |
| Inter-segment service revenues | 358 | 321 | 37 | 11.5% |
| **Operating service revenues** | 11,672 | 11,662 | 10 | 0.1% |
| Data | 463 | 494 | (31) | (6.3%) |
| Equipment and other | 43 | 49 | (6) | (12.2%) |
| **External product revenues** | 506 | 543 | (37) | (6.8%) |
| Inter-segment product revenues | – | 1 | (1) | (100.0%) |
| **Operating product revenues** | 506 | 544 | (38) | (7.0%) |
| **Bell Wireline operating revenues** | 12,178 | 12,206 | (28) | (0.2%) |

**Bell Wireline operating revenues** declined by 0.2% in 2021, compared to last year, which includes the unfavourable retroactive impact of the Q2 2021 CRTC decision on wholesale high-speed Internet access services of $44 million. The year-over-year decrease was driven by ongoing voice revenue erosion and lower product sales, moderated by higher data and other services revenue.

**Bell Wireline operating service revenues** increased by 0.1%, compared to 2020, which includes the unfavourable retroactive impact of the Q2 2021 CRTC decision described above of $44 million.

- **Data revenues** grew by 2.3% in 2021, compared to last year, driven by:
  - Higher retail Internet and IPTV subscriber bases combined with the flow-through of residential rate increases
  - Greater sales of maintenance contracts on data equipment sold to business customers
  - Growth in business solutions services revenue primarily from our managed services business

  These factors were partly offset by:
  - Ongoing decline in our satellite TV subscriber base
  - Q2 2021 CRTC decision on wholesale high-speed Internet access services as described above
  - Continued legacy data erosion
- **Voice revenues** declined by 7.3% in the year, compared to 2020, driven by:
  - Continued retail residential NAS line erosion mainly due to technological substitution to wireless and Internet based services
  - Ongoing business voice erosion across the customer base
  - COVID-19 related strength in 2020 from conferencing and long distance, as customers have adopted cheaper solutions since the onset of the COVID-19 pandemic

  These factors were partly mitigated by the flow-through of residential rate increases.
- **Other services revenues** increased by 16.5% in the year, compared to 2020, attributable to the acquisition in Q4 2020 of Environics Analytics Group Ltd., a Canadian data and analytics company, along with greater revenues from our Smart Home business driven by subscriber growth.

**Bell Wireline operating product revenues** decreased by 7.0% in 2021, compared to last year, due to strong 2020 equipment sales to large business customers, primarily to the government sector, combined with the impact of global supply chain challenges in the latter part of 2021, driven by the COVID-19 pandemic.

### *OPERATING COSTS AND ADJUSTED EBITDA*

| | 2021 | 2020 | $ CHANGE | % CHANGE |
|---|---|---|---|---|
| Operating costs | (6,863) | (6,960) | 97 | 1.4% |
| **Adjusted EBITDA** | 5,315 | 5,246 | 69 | 1.3% |
| **Adjusted EBITDA margin** | 43.6% | 43.0% | | 0.6 pts |

**Bell Wireline operating costs** decreased by 1.4% in 2021, compared to last year, due to:

- Lower product cost of goods sold and payments to other carriers driven by lower revenues
- Higher 2020 COVID-19 related costs, including employee redeployment, donations and personal protective equipment costs
- Higher 2020 bad debt expense related to the financial difficulty experienced by customers during the COVID-19 pandemic.

These factors were partly offset by:

- Increased labour costs from greater project requirements, moderated by vendor contract savings
- Higher expenses related to the acquisition of Environics Analytics Group Ltd.

**Bell Wireline adjusted EBITDA** increased by 1.3% in 2021, compared to last year, driven by operating expense savings, offset in part by lower year-over-year operating revenues and includes the unfavourable retroactive impact of the Q2 2021 CRTC decision on wholesale high-speed Internet access services of $44 million. Adjusted EBITDA margin of 43.6% in 2021, increased by 0.6 points over 2020, attributable to lower operating costs primarily related to the non-recurrence of a number of COVID-19 related expenses incurred last year, the flow-through of service revenue growth, as well as a decreased proportion of low-margin product sales in our total revenue base.

### *BELL WIRELINE OPERATING METRICS*

#### DATA

**Retail high-speed Internet**

| | 2021 | 2020 | CHANGE | % CHANGE |
|---|---|---|---|---|
| Retail net subscriber activations | 152,285 | 148,989 | 3,296 | 2.2% |
| Retail subscribers [(1)] | 3,861,653 | 3,704,590 | 157,063 | 4.2% |

(1) *At the beginning of Q1 2021, our retail high-speed Internet subscriber base was increased by 4,778 subscribers due to the transfer of fixed wireless Internet subscribers from our mobile connected devices subscriber base.*

**Retail high-speed Internet net subscriber activations** increased by 2.2% in 2021, compared to last year, attributable to greater activations due to increased market activity driven by the ongoing recovery from the effects of the COVID-19 pandemic, reflecting higher activations in our FTTP and WTTP footprints. This was moderated in part by increased year-over-year deactivations from lower 2020 retail residential deactivations due to the COVID-19 pandemic, coupled with greater competitive intensity in 2021.

**Retail high-speed Internet subscribers** totaled 3,861,653 at December 31, 2021, up 4.2% from 3,704,590 subscribers reported at the end of 2020.

**Retail TV**

| | 2021 | 2020 | CHANGE | % CHANGE |
|---|---|---|---|---|
| Retail net subscriber activations (losses) | 2,530 | (33,859) | 36,389 | n.m. |
| *IPTV* | *76,068* | *39,191* | *36,877* | *94.1%* |
| *Satellite* | *(73,538)* | *(73,050)* | *(488)* | *(0.7%)* |
| Total retail subscribers [(1)] | 2,735,010 | 2,738,605 | (3,595) | (0.1%) |
| *IPTV* | *1,882,441* | *1,806,373* | *76,068* | *4.2%* |
| *Satellite* [(1)] | *852,569* | *932,232* | *(79,663)* | *(8.5%)* |

*n.m.: not meaningful*

(1) *At the beginning of Q1 2021, we adjusted our satellite TV subscriber base to remove 6,125 non-revenue generating units.*

**Retail IPTV net subscriber activations** increased by 94.1% in 2021, compared to 2020, reflecting the success of our multi-brand strategy and the ongoing recovery from the effects of the COVID-19 pandemic, including more typical sales activity and the favourable impact of increased sports programming in 2021, which was curtailed last year as a result of the pandemic. Additionally, fewer customers coming off of promotional offers also favourably impacted retail IPTV net activations.

**Retail satellite TV net subscriber losses** were essentially stable year over year, increasing by 0.7% in 2021, compared to last year, as lower gross activations in our retail residential market were offset in part by reduced deactivations as a result of the COVID-19 pandemic.

**Total retail TV net subscriber activations** (IPTV and satellite TV combined) improved by 36,389 in 2021, compared to 2020, driven by higher IPTV net activations, offset in part by higher satellite TV net subscriber losses.

**Retail IPTV subscribers** at December 31, 2021 totaled 1,882,441, up 4.2% from 1,806,373 subscribers reported at the end of 2020.

**Retail satellite TV subscribers** at December 31, 2021 totaled 852,569, down 8.5% from 932,232 subscribers reported at the end of 2020.

**Total retail TV subscribers** (IPTV and satellite TV combined) at December 31, 2021 were 2,735,010, representing a 0.1% decline from 2,738,605 subscribers at the end of 2020.

#### VOICE

| | 2021 | 2020 | CHANGE | % CHANGE |
|---|---|---|---|---|
| Retail residential NAS lines net losses | (185,327) | (213,551) | 28,224 | 13.2% |
| Retail residential NAS lines | 2,298,605 | 2,483,932 | (185,327) | (7.5%) |

**Retail residential NAS lines net losses** improved by 13.2% in 2021 compared to 2020, attributable to lower year-over-year deactivations resulting from the COVID-19 pandemic.

**Retail residential NAS lines** at December 31, 2021 of 2,298,605 declined by 7.5% from 2,483,932 lines reported at the end of 2020. This represented an improvement over the 7.9% rate of erosion experienced in 2020 resulting from fewer deactivations primarily driven by the impact of the COVID-19 pandemic.

# COMPETITIVE LANDSCAPE AND INDUSTRY TRENDS

This section contains forward-looking statements, including relating to our business outlook. Refer to the section *Caution regarding forward-looking statements* at the beginning of this MD&A.

## COMPETITIVE LANDSCAPE

Similar to the Canadian wireless industry, wireline markets and operations were significantly affected by the COVID-19 pandemic. Physical distancing requirements impacted traditional wireline installations as installers were restricted from entering customers' premises. Conversely, with large numbers of workers and students working and learning from home, demand for wireline services surged, with network traffic levels reaching historic levels during the pandemic. Although the residential high-speed Internet market is maturing, with a penetration rate of approximately 90% across Canada at the end of 2021, subscriber growth is expected to continue over the coming years. An estimated 7.5 million Internet subscribers received their service over the networks of the four largest cable companies at the end of 2021, up 3% from approximately 7.3 million at the end of 2020. Meanwhile, an estimated 6.8 million Internet subscribers received their service over the networks of incumbent local exchange carriers (ILECs) like Bell at the end of 2021, up 4% from approximately 6.6 million at the end of 2020. Bell continues to make gains in market share as a result of the ongoing expansion of our FTTP direct fibre network and our rollout of WHI in rural markets, which was completed one year ahead of schedule in 2021. Similar to our accelerated 5G investments, our investments to expand our fibre footprint are supported by our capital investment acceleration program, which commenced in 2021 and will continue in 2022. Additionally, we received recognition from PCMag as the best gaming Internet provider among Canada's major providers in their Best Gaming ISPs 2022 report.

While Canadians still watch traditional TV, digital platforms are playing an increasingly important role in the broadcasting industry and in respect of content. Popular online video services are providing Canadians with more choice about where, when and how to access video content. In 2021, ILECs offering IPTV service grew their subscriber base by an estimated 4% to reach 3.2 million customers, driven by expanded network coverage, enhanced differentiated service and bundled offerings, and marketing and promotions focused on IPTV. Despite this IPTV growth, the combined cable TV and satellite TV subscriber penetration rate was unchanged. Canada's four largest cable companies had an estimated 4.7 million TV subscribers, or a 48% market share, flat compared to 48% at the end of 2020. The balance of industry subscribers were served by satellite TV and regional providers.

In recent years, three of the largest Canadian cable TV companies have launched new TV services based on the Comcast X1 video platform, including Shaw, Rogers and Québecor's Vidéotron brand. Our IPTV platform (Fibe TV, Fibe TV app and Virgin Plus TV) continues to offer numerous service advantages over this cable platform.

The financial performance of the overall Canadian wireline telecommunications market continues to be impacted by the ongoing declines in legacy voice service revenues resulting from technological substitution to wireless and OTT services, as well as by ongoing conversion to IP-based data services and networks by large business customers. Canada's four largest cable companies had approximately 3.2 million telephony subscribers at the end of 2021, representing a national residential market share of approximately 43%, relatively flat compared to 2020. Telecommunications companies had an estimated 3.6 million telephony subscribers at the end of 2021, representing approximately 48% market share, relatively flat compared to 2020. Other non-facilities-based competitors also offer local and long distance VoIP services and resell high-speed Internet services.

### *Competitors*

- Cable TV providers offering cable TV, Internet and cable telephony services, including:
  - Rogers in Ontario, New Brunswick, Newfoundland and Labrador
  - Vidéotron in Québec
  - Cogeco Cable Inc. (a subsidiary of Cogeco Inc.) (Cogeco) in Ontario and Québec
  - Shaw in British Columbia, Alberta, Saskatchewan, Manitoba and Ontario
  - Shaw Direct, providing satellite TV service nationwide
  - Eastlink in every province except Saskatchewan, where it does not provide cable TV and Internet service
- Telus provides residential voice, Internet and IPTV services in British Columbia, Alberta and Eastern Québec
- Telus and Allstream Inc. provide wholesale products and business services across Canada
- Various others (such as TekSavvy Solutions, Distributel, VMedia, and Vonage Canada (a division of Vonage Holdings Corp.) offer resale or VoIP-based local, long distance and Internet services
- OTT voice and/or video services, such as Skype, Netflix, Amazon Prime Video, Disney+, CBS All Access and YouTube
- Digital media streaming devices such as Apple TV, Roku and Google Chromecast
- Other Canadian ILECs and cable TV operators
- Substitution to wireless services, including those offered by Bell
- Customized managed outsourcing solutions competitors, such as systems integrators CGI and IBM
- Wholesale competitors include cable operators, domestic CLECs, U.S. or other international carriers for certain services, and electrical utility-based telecommunications providers
- Competitors for home security range from local to national companies, such as Telus, Rogers, Chubb-Edwards and Stanley Security

## INDUSTRY TRENDS

### *INVESTMENT IN BROADBAND FIBRE DEPLOYMENT*

The Canadian ILECs continue to make significant investments in deploying broadband fibre within their territories, with a focus on direct FTTP access to maintain and enhance their ability to support enhanced IP-based services and higher broadband speeds. Cable TV companies continue to invest to get the most out of their existing DOCSIS 3.1 networks while planning strategic overlays using FTTP enabling them to achieve speed parity with ILEC competitors over the long term. However, the DOCSIS 3.1 platform does not offer the same advanced capabilities as FTTP over the longer term in terms of speed, latency or reliability. FTTP delivers total broadband access speeds of up to 1.5 Gbps currently, with bi-directional multi-gigabit speeds enabled by network modernization to XGS PON in the short term, and speeds growing to 25 Gbps and beyond mid to long term.

### *ALTERNATIVE TV AND OTT SERVICES*

The growing popularity of watching TV and on-demand content anywhere, particularly on handheld devices, is expected to continue as customers adopt services that enable them to view content on multiple screens. Streaming media providers, such as Netflix, Amazon Prime Video and Disney+ continue to enhance OTT streaming services in order to compete for share of viewership in response to evolving viewing habits and consumer demand. TV providers are monitoring OTT developments and evolving their content and market strategy to compete with these non-traditional offerings. We view OTT as an opportunity to add increased capabilities to our linear and on-demand assets, provide customers with flexible options to choose the content they want, and drive greater usage of Bell's high-speed Internet and wireless networks. We continue to enhance our Fibe TV service with additional content and capabilities, including the ability to watch recorded content on the go and access Crave, Netflix, Prime Video and YouTube on STBs.

### *TECHNOLOGY SUBSTITUTION*

Technology substitution, enabled by the broad deployment of higher speed Internet; the pervasive use of e-mail, messaging and social media as alternatives to voice services; and the growth of wireless and VoIP services, continue to drive legacy voice revenue declines for telecommunications companies. Additionally, the disconnection of and reduction in spending for traditional TV (cord-cutting and cord-shaving) continues to rise. Although Bell is a key provider of these substitution services, the decline in this legacy business continues as anticipated.

### *ADOPTION OF IP-BASED SERVICES*

The convergence of IT and telecommunications, facilitated by the ubiquity of IP, continues to shape competitive investments for business customers. Telecommunications companies are providing professional and managed services, as well as other IT services and support, while IT service providers are bundling network connectivity with their software as service offerings. In addition, manufacturers continue to bring all-IP and converged (IP plus legacy) equipment to market, enabling ongoing migration to IP-based solutions. The development of IP-based platforms, which provide combined IP voice, data and video solutions, creates potential cost efficiencies that compensate, in part, for reduced margins resulting from the continuing shift from legacy to IP-based services. The evolution of IT has created significant opportunities for our business markets services, such as cloud services, that can have a greater business impact than traditional telecommunications services.

## BUSINESS OUTLOOK AND ASSUMPTIONS

This section contains forward-looking statements, including relating to our projected financial performance for 2022 and our 2022 business outlook, objectives, plans and strategic priorities. Refer to the section *Caution regarding forward-looking statements* at the beginning of this MD&A.

### 2022 OUTLOOK

Our overall wireline financial growth profile is expected to strengthen progressively in 2022. This is predicated on continued expansion of our retail Internet and TV subscriber bases, supported by a broader FTTP service footprint together with higher household penetration; further penetration of WHI access technology in more rural communities; further scaling of Bell's app-based live TV streaming services Fibe TV App and Virgin TV; the introduction of new TV products and features; improving year-over-year business markets operating profitability; as well as cost reductions to offset competitive pricing pressures and the ongoing decline in voice revenue.

The broadband network advantage that we are building across our urban, suburban and rural service footprint areas positions us extremely well in both our consumer and business markets to continue growing Internet market share and revenue faster than our competitors. We will continue to focus on winning the home by delivering the fastest broadband speeds; the best content on the customer's TV platform of choice; and a superior Wi-Fi experience that leverages Bell's Smart Home automation leadership with services such as Whole Home Wi-Fi, home security, and video and automation, in order to drive higher year-over-year Internet and TV net customer additions.

In business wireline, customers continue to look for opportunities to leverage new technologies to grow and transform the workforce of the future, as well as to lower costs. As a result of these factors, and the unpredictable pace of the economy's recovery from the COVID-19 pandemic, spending by large enterprise customers on telecommunications services and products is expected to be variable. Ongoing customer migrations from traditional technologies to IP-based systems and demand for cheaper bandwidth alternatives will continue to create pressure on overall business markets results in 2022. We intend to offset the revenue decline from traditional legacy telecommunications services by continuing to develop unique services and value enhancements to improve the client experience through new features such as cloud access, and security and collaboration services. Furthermore, we intend to use marketing initiatives and other customer-specific strategies to slow the pace of NAS erosion, while also investing in direct fibre expansion, 5G and new solutions in key portfolios such as Internet and private networks, cloud services, unified communications and security. We will also continue to focus on delivering network-centric managed and professional services solutions to large and medium-sized businesses that increase the value of connectivity services.

We expect the overall level of competitive intensity in our small and medium-sized business markets to remain high, despite the current COVID-19 situation, as cable operators and other telecom competitors look to these customer segments as potential growth opportunities. We also intend to introduce service offerings that help drive innovative solutions and value for our small and medium-sized customers by leveraging Bell's network assets, broadband fibre expansion and service capabilities to expand our relationships with them. We will maintain a focus on overall profitability by seeking to increase revenue per customer and customer retention, as well as through improving our processes to achieve further operating efficiencies and productivity gains.

We are also maintaining a sharp focus on our operating cost structure to help offset pressures related to the growth and retention of IPTV, Internet, IP broadband and hosted IP voice subscribers, the ongoing erosion of high-margin wireline voice and other legacy revenues, competitive repricing pressures in our residential, business and wholesale markets, as well as the financial impacts of the COVID-19 pandemic. This, combined with further operating efficiencies, enabled by the ongoing deployment of new broadband technologies (fibre and fixed WTTP) and incremental service improvement, is expected to deliver meaningful cost savings and productivity gains across the organization.

## ASSUMPTIONS

- Further deployment of direct fibre to more homes and businesses within our wireline footprint
- Continued growth in retail Internet and IPTV subscribers
- Increasing wireless and Internet-based technological substitution
- Continued aggressive residential service bundle offers from cable TV competitors in our local wireline areas, moderated by growing our share of competitive residential service bundles
- Continued large business customer migration to IP-based systems
- Ongoing competitive repricing pressures in our business and wholesale markets
- Continued competitive intensity in our small and medium-sized business markets as cable operators and other telecommunications competitors continue to intensify their focus on business customers
- Traditional high-margin product categories challenged by large global cloud and OTT providers of business voice and data solutions expanding into Canada with on-demand services
- Accelerating customer adoption of OTT services resulting in downsizing of TV packages
- Growing consumption of OTT TV services and on-demand streaming video, as well as the proliferation of devices, such as tablets, that consume large quantities of bandwidth, will require ongoing capital investment
- Realization of cost savings related to operating efficiencies enabled by a growing direct fibre footprint, changes in consumer behaviour and product innovation, expanding self-serve capabilities, other improvements to the customer service experience, management workforce reductions including attrition and retirements, and lower contracted rates from our suppliers
- No adverse material financial, operational or competitive consequences of changes in or implementation of regulations affecting our wireline business

## KEY GROWTH DRIVERS

- Expansion of FTTP footprint
- Increasing FTTP and WTTP customer penetration
- Higher market share of industry retail Internet and IPTV subscribers
- Increased business customer spending on connectivity services and managed and professional services solutions
- Expansion of our business customer relationships to drive higher revenue per customer
- Ongoing service innovation and product value enhancements

## PRINCIPAL BUSINESS RISKS

This section discusses certain principal business risks specifically related to the Bell Wireline segment. For a detailed description of the other principal risks that could have a material adverse effect on our business, including those related to the COVID-19 pandemic, refer to section 9, *Business risks*.

### AGGRESSIVE COMPETITION

*RISK*

- The intensity of competitive activity coupled with new product launches for residential customers (e.g., IoT, smart home systems and devices, innovative TV platforms, etc.) and business customers (e.g., OTT VoIP, collaboration and SD WAN solutions) from national operators, non-traditional players and wholesalers

*POTENTIAL IMPACT*

- An increase in the intensity level of competitive activity could result in lost revenue, higher churn and increased acquisition and retention expenses, all of which would put pressure on Bell Wireline's adjusted EBITDA

### REGULATORY ENVIRONMENT

*RISK*

- The CRTC could mandate rates for the new disaggregated wholesale high-speed access service available on FTTP facilities that are materially different from the rates we proposed, and which do not sufficiently account for the investment required in these facilities, or modify the network configuration of this new service in a way that materially improves the business position of our competitors
- The courts or Cabinet could overturn the new wholesale rates the CRTC set for aggregated high-speed access service in 2021, which were much higher than the rates it had proposed in 2019

*POTENTIAL IMPACT*

- In respect of the new disaggregated wholesale high-speed access service available on FTTP facilities, the mandating of rates that are materially different from the rates we proposed or the adoption of a network configuration advantageous for our competitors, or the implementation of the rates reduced by the CRTC in August 2019 for aggregated wholesale high-speed access services, could change our investment strategy, especially in relation to investment in next-generation wireline networks in smaller communities and rural areas, improve the business position of our competitors, further accelerate penetration and disintermediation by OTT players, and negatively impact the financial performance of our wireline business

### TECHNOLOGICAL ADVANCEMENT AND CHANGING CUSTOMER BEHAVIOUR

*RISK*

- With technological advancement, the traditional TV viewing model (i.e., the subscription for bundled channels) is challenged by an increasing number of legal and illegal viewing options available in the market offered by traditional, non-traditional and global players, as well as increasing cord-cutting and cord-shaving trends
- The proliferation of network technologies impacts business customers' decision to migrate to OTT, VoIP and/or leverage SD WAN architecture
- Changing customer habits further contribute to the erosion of NAS lines

*POTENTIAL IMPACT*

- Our market penetration and number of TV subscribers could decline as a result of innovative offerings by BDUs and an increasing number of domestic and global unregulated OTT providers, as well as a significant volume of content piracy
- The proliferation of IP-based products, including OTT content and OTT software offerings directly to consumers, may accelerate the disconnection of TV services or the reduction of TV spending, as well as the reduction in business IT investments by customers
- The ongoing loss of NAS lines from technological substitution challenges our traditional voice revenues and compels us to develop other service offerings

# 5.3 Bell Media

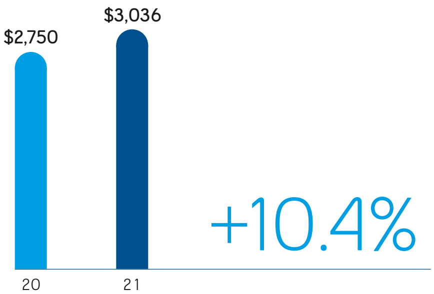
*Operating performance rebounded in 2021 driven by strong TV advertiser demand, which was supported by the return to more normal major league sports and TV programming schedules, while our focus on French-language TV led Noovo to outpace its two main competitors in viewership growth. We are also gaining significant traction from our digital-first strategy to capture a larger share of digital ad spending in Canada, with digital revenues [1] up an impressive 35%.*



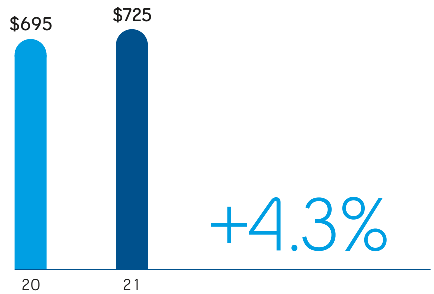
## FINANCIAL PERFORMANCE ANALYSIS

### 2021 PERFORMANCE HIGHLIGHTS

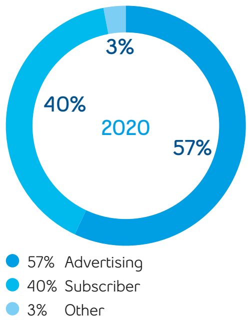
Bell Media
Revenues
(in $ millions)

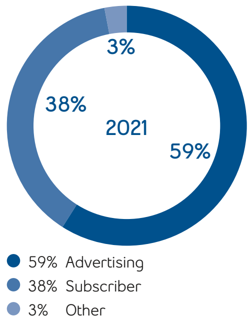



Bell Media
Adjusted EBITDA
(in $ millions)

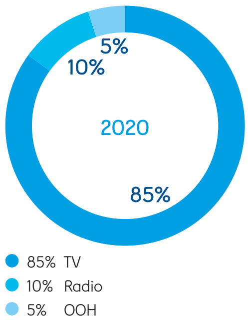


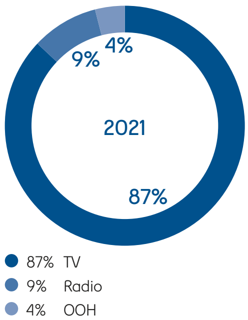

Bell Media
Revenue mix
(product)




Bell Media
Revenue mix
(line of business)




### BELL MEDIA RESULTS

*REVENUES*

| | 2021 | 2020 | $ CHANGE | % CHANGE |
|---|---|---|---|---|
| External revenues | 2,681 | 2,369 | 312 | 13.2% |
| Inter-segment revenues | 355 | 381 | (26) | (6.8%) |
| Bell Media operating revenues | 3,036 | 2,750 | 286 | 10.4% |

(1) *Digital revenues are comprised of advertising revenue from digital platforms including web sites, mobile apps, connected TV apps and OOH digital assets/platforms, as well as advertising procured through Bell digital buying platforms and subscription revenue from direct-to-consumer services and Video on Demand services.*

**Bell Media operating revenues increased** by 10.4% in 2021, compared to last year, reflecting the ongoing recovery from the effects of the COVID-19 pandemic. The year-over-year growth was driven by higher advertising and subscriber revenues. This includes growth in digital revenues of 35% in 2021, compared to last year.

- **Advertising revenues** increased by 16.3% in 2021, compared to 2020, due to growth in TV, offset in part by declines in OOH and radio. Conventional and specialty TV advertising revenue growth was driven by increased demand by advertisers due to the ongoing recovery from the effects of the COVID-19 pandemic. Conventional TV revenues also reflected the favourability from greater original programming in 2021 and the acquisition of V and Noovo.ca in May of 2020. Specialty TV revenues also benefited from the return of more live sporting events in 2021 compared to last year. Both OOH and radio advertising revenues were moderately down over last year, due to slower recovery from the effects of the pandemic, as OOH was unfavourably impacted by government restrictions imposed on certain non-essential services in the first half of the year and radio reflected changes in audience listening habits, due to the COVID-19 pandemic.
- **Subscriber revenues** increased by 4.8% in 2021, compared to last year, primarily from the continued growth in DTC subscribers from Crave, STARZ, and sports streaming services

### *OPERATING COSTS AND ADJUSTED EBITDA*

| | 2021 | 2020 | $ CHANGE | % CHANGE |
|---|---|---|---|---|
| Operating costs | (2,311) | (2,055) | (256) | (12.5%) |
| Adjusted EBITDA | 725 | 695 | 30 | 4.3% |
| Adjusted EBITDA margin | 23.9% | 25.3% | | (1.4) pts |

**Bell Media operating costs** increased by 12.5% in 2021, compared to 2020, driven by:

- Greater sports rights and broadcast costs due to the return of most of the live sporting events in 2021 compared to cancellations and/or suspension of certain sporting events in 2020 as a result of the COVID-19 pandemic
- Higher TV programming costs from greater programming and TV productions in 2021 while 2020 was impacted by COVID-19 related delays and/or cancellations
- The benefit in 2020 from the CEWS
- Increased costs related to the Noovo acquisition

**Bell Media adjusted EBITDA** grew by 4.3% in 2021 compared to last year, driven by higher revenues, moderated by higher operating costs.

### *BELL MEDIA OPERATING METRICS*

- CTV maintained its #1 ranking as the most-watched network in Canada for the 20th year in a row among total viewers in primetime, with 14 of the top 20 programs nationally among total viewers
- Bell Media maintained its leadership position in the specialty and pay TV market with its English specialty and pay TV properties reaching 79% of all Canadian English specialty and pay TV viewers and with its French specialty and pay TV properties reaching 78% of Québec French specialty and pay TV viewers in an average week
- Bell Media continued to rank first in unique visitors, total page views and total page minutes in digital media in 2021 among Canadian broadcast and video network competitors. Bell Media also ranked fifth among online properties in the country in terms of unique visitors and reach, with 24.3 million unique visitors per month, reaching 75% of the digital audience in 2021.
- Bell Media remained Canada's top radio broadcaster in 2021, and it had the #1 radio station in Toronto and Montréal in Fall 2021.
- Astral is one of Canada's leading OOH advertising providers, offering over 50,000 faces across Canada through a range of six product lines: outdoor advertising, street furniture, airport, digital large format, transit and indoor place-based. Our products have the potential to reach 13.0 million Canadians weekly in 60 markets, and we offer exclusive advertising presence including 6 of the top 15 airports and 2 of the top transit commissions in Canada.

## COMPETITIVE LANDSCAPE AND INDUSTRY TRENDS

This section contains forward-looking statements, including relating to our business outlook. Refer to the section *Caution regarding forward-looking statements* at the beginning of this MD&A.

### COMPETITIVE LANDSCAPE

Competition in the Canadian media industry has changed in recent years as content is increasingly being controlled by a small number of global competitors with significant scale and financial resources. Technology has allowed new entrants to become media players in their own right. Some players have become more vertically integrated across both traditional and emerging platforms to better enable the acquisition and monetization of premium content. Global aggregators have also emerged and are competing for both content and viewers.

Bell Media competes in the TV, radio, OOH advertising and digital media markets:

- **TV:** The TV market has become increasingly fragmented and this trend is expected to continue as new services and technologies increase the diversity of information and entertainment outlets available to consumers
- **Radio:** Competition within the radio broadcasting industry occurs primarily in discrete local market areas among individual stations
- **OOH:** The Canadian OOH advertising industry is fragmented, consisting of a few large companies as well as numerous smaller and local companies operating in a few local markets

- **Digital media:** Consumers continue to shift their media consumption towards digital and online media, mobile devices and on-demand content, requiring industry players to increase their efforts in digital content and capabilities in order to compete. This trend is also causing advertisers to direct more of their spending to digital and online rather than traditional media. In addition, the number of competitors has increased as more digital and online media companies, including large global companies, enter the market.

The media industry steadily recovered in 2021 from the effects of the COVID-19 pandemic. As the year progressed, demand for TV advertising strengthened with the return to more normal major league sports and TV programming schedules, while out of home advertising gradually improved due to increased leisure and travel activity with the easing of COVID restrictions. However, radio has been slow to recover and disproportionately impacted by the pandemic, due to ongoing COVID-related restrictions on local businesses and work-from-home protocols.

### *Competitors*

*TV*

- Conventional Canadian TV stations (local and distant signals) and specialty and pay channels, such as those owned by Corus Entertainment Inc. (Corus), Rogers, Québecor and Canadian Broadcasting Corporation (CBC)/Société Radio-Canada
- U.S. conventional TV stations and specialty channels
- OTT streaming providers such as Netflix, Amazon Prime Video, Disney+, Apple TV+, Paramount +, discovery+ and DAZN
- Video-sharing websites such as YouTube, TikTok and Instagram

*RADIO*

- Large radio operators, such as Rogers, Corus, Cogeco and Stingray Group Inc. that also own and operate radio station clusters in various local markets
- Radio stations in specific local markets
- Satellite radio provider SiriusXM
- Music streaming services such as Spotify and Apple Music
- Music downloading services such as Apple's iTunes Store
- Other media such as newspapers, local weeklies, TV, magazines, outdoor advertising and the Internet

*OOH ADVERTISING*

- Large outdoor advertisers, such as Jim Pattison Broadcast Group, Outfront Media, Québecor, Dynamic and Clear Channel Outdoor
- Numerous smaller and local companies operating a limited number of display faces in a few local markets
- Other media such as TV, radio, print media and the Internet

## INDUSTRY TRENDS

*TECHNOLOGY AND CONSUMER HABITS TRANSFORMING THE WAY TV IS DELIVERED*

Technology used in the media industry continues to evolve rapidly, which has led to alternative methods for the distribution, storage and consumption of content. These technological developments have driven and reinforced changes in consumer behaviour as consumers seek more control over when, where and how they consume content. Consumers now have the ability to watch content from a variety of media services on the screen of their choice, including TVs, computers, and mobile devices. In addition, the number of Canadian users who are connected to the Internet through their TVs continues to grow and there are increasingly more access points for content on the TV including connected devices such as Apple TV, Roku and Amazon Fire Stick. Changes in technology and consumer behaviour have resulted in a number of challenges for content aggregators and distributors. Ubiquitous access to content enabled by connected devices introduces risk to traditional distribution platforms by enabling content owners to provide content directly to distributors and consumers, thus bypassing traditional content aggregators.

*GROWTH OF ALTERNATIVES TO TRADITIONAL LINEAR TV*

Consumers continue to have access to an array of online entertainment and information alternatives that did not previously exist. While traditional linear TV has historically been the only way to access entertainment programming, the increase in alternative entertainment options has led to a fragmentation in consumption habits. Although more time is still spent on traditional linear TV compared to other forms of video consumption, people are increasingly consuming content on their own terms from an assortment of services and in a variety of formats. In particular, today's viewers are consuming more content online, watching less scheduled programming live, time-shifting original broadcasts through PVRs, viewing more video on mobile devices, and catching up on an expanded library of past programming on-demand. While the majority of households use pure OTT services, such as Crave, Netflix, Prime Video, Disney+ and Apple TV+, to complement linear TV consumption, an increasing number are using these services as alternatives to a traditional linear package.

*ESCALATING CONTENT COSTS*

Premium video content has become increasingly important to media companies in attracting and retaining viewers and advertisers. This content, including live sports and special events, should continue to draw audiences and advertisers moving forward. Heightened competition for these rights from global competitors, including Netflix, Prime Video, Disney+ and DAZN, has already resulted in higher program rights costs and may also make it more difficult to secure content, which is a trend that is expected to continue into the future.

*MEDIA COMPANIES ARE EVOLVING TO REMAIN COMPETITIVE*

In recognition of changing consumer behaviour, media companies are evolving their content and launching their own solutions with the objective of better competing with non-traditional offerings through DTC products such as Bell Media's bilingual Crave service, TSN and RDS, as well as CTV and Noovo, all of which offer streaming on a variety of platforms. Access to live sports and other premium content has become even more important for acquiring and retaining audiences that in turn attract advertisers and subscriber revenue. Therefore, ownership of content and/or long-term agreements with content owners has also become increasingly important to media companies.

In addition, there has been a shift in how advertisers want to buy advertising across all media platforms. The growth of digital consumption has also given advertisers the opportunity to buy more targeted inventory and to buy inventory via self-serve and programmatically. As a result, Bell Media and other media companies have initiated programs to sell their advertising inventory on a more targeted basis through updated buying platforms with enhanced access to data and are now selling their inventory on programmatic buying platforms.

# BUSINESS OUTLOOK AND ASSUMPTIONS

This section contains forward-looking statements, including relating to our projected financial performance for 2022 and our 2022 business outlook, objectives, plans and strategic priorities. Refer to the section *Caution regarding forward-looking statements* at the beginning of this MD&A.

## 2022 OUTLOOK

Bell Media's financial performance is projected to reflect a continued recovery in 2022, which should result in stronger advertiser demand, as well as strategic pricing on advertising sales and subscriber revenue growth. However, the COVID-19 pandemic is expected to continue to have some negative impact on overall results.

Subscriber revenue performance is projected to reflect the benefits from BDU carriage renewals, and continued scaling of DTC products, including Crave. However, the effects of shifting media consumption towards competing OTT and digital platforms, as well as further TV cord-shaving and cord-cutting, will continue to negatively impact traditional subscriber volumes.

For advertising revenue, we anticipate continued strong demand in TV and a gradual recovery in demand for radio and OOH during the year.

We also intend to continue controlling costs by achieving productivity gains and pursuing operational efficiencies across all of our media properties, while continuing to invest in premium content across all screens and platforms.

Across our media properties, particularly in TV, we intend to leverage the strength of our market position combined with enhanced audience targeting to continue offering advertisers, both nationally and locally, premium opportunities to reach their target audiences. Success in this area requires that we focus on a number of factors, including: successfully acquiring highly rated programming and differentiated content; building and maintaining strategic supply arrangements for content across all screens and platforms; producing and commissioning high-quality Canadian content, including market-leading news; and scaling Bell Media's SAM TV and Bell DSP buying platforms, Bell Media's ad buying optimization platforms which give customers the ability to plan, activate and measure marketing campaigns using Bell's premium first-party data and TV inventory.

Our sports offerings are expected to continue to deliver premium content and exceptional viewing experiences to our TV and DTC audiences. Our sports offerings, combined with the integration of our digital platforms, are integral parts of our strategy to enhance viewership and engagement. We will also continue to focus on creating innovative high-quality productions in the areas of sports news and editorial coverage.

In non-sports specialty TV, audiences and advertising revenues are expected to be driven by investment in quality programming and production.

Through Crave, our bilingual TV and streaming service, we will continue to leverage our investments in premium content (including HBO, HBO Max, SHOWTIME and STARZ) in order to attract pay TV and DTC subscribers. We intend to continue expanding platform availability and delivering user experience improvements.

In our French-language TV services, we will continue to optimize our programming with a view to increasing our appeal to audiences, supported in particular by the investment in Noovo and more French language originals.

In radio, we intend to leverage the strength of our market position to continue offering advertisers, both nationally and locally, premium opportunities to reach their target audiences. Additionally, in conjunction with our TV properties, we will continue to pursue opportunities that leverage our promotional capabilities, provide an expanded platform for content sharing, and offer other synergistic efficiencies.

In our OOH operations, we plan to leverage the strength of our products to provide advertisers with premium opportunities in key Canadian markets. We will also continue to seek new opportunities to support the growing demand in digital, including converting certain premium outdoor structures to digital and adding new boards.

## ASSUMPTIONS

- Overall revenue expected to reflect continued strong demand in TV advertising revenue including scaling of our SAM TV and Bell DSP buying platforms, a gradual recovery in radio and OOH advertisements, as well as DTC subscriber growth
- Continued escalation of media content costs to secure quality programming, as well as the continued return to normal volumes of entertainment programming
- Continued scaling of Crave through broader content offering, user experience improvements and Crave Mobile
- Continued investment in Noovo original programming to better serve our French-language customers with a wider array of content, in the language of their choice, on their preferred platforms
- Leveraging of first-party data to improve targeting, advertisement delivery and attribution
- Ability to successfully acquire and produce highly rated programming and differentiated content
- Building and maintaining strategic supply arrangements for content across all screens and platforms
- No adverse material financial, operational or competitive consequences of changes in or implementation of regulations affecting our media business

## KEY GROWTH DRIVERS

- Grow advertising revenue and increase market share as demand continues to return across all platforms
- Scaling of SAM TV and Bell DSP buying platforms
- Ongoing growth in BDU rates
- Build out digital experiences across Crave, CTV, Noovo, TSN and RDS in order to support audience growth and increase advertising inventory
- Grow market share and generate revenue from continued investment in Noovo original programming
- Maintain strength in audience performance across all platforms

## PRINCIPAL BUSINESS RISKS

This section discusses certain principal business risks specifically related to the Bell Media segment. For a detailed description of the other principal risks that could have a material adverse effect on our business, including those related to the COVID-19 pandemic, refer to section 9, *Business risks*.

### AGGRESSIVE COMPETITION, PIRACY AND REGULATORY CONSTRAINTS

*RISK*

- The intensity of competitive activity from new technologies and alternative distribution platforms such as unregulated OTT content offerings, VOD, personal video platforms, DTC distribution and pirated content, in addition to traditional TV services, in combination with the development of more aggressive product and sales strategies by non-traditional global players

*POTENTIAL IMPACT*

- Adverse impact on the level of subscriptions and/or viewership for Bell Media's TV services and on Bell Media's revenue streams

### ADVERTISING AND SUBSCRIPTION REVENUE UNCERTAINTY

*RISK*

- Advertising is heavily dependent on economic conditions and viewership, and conventional media is under increasing pressure for advertising spend against dominant non-traditional/global digital services. Our ability to grow digital and other alternative advertising media, in the context of a changing and fragmented advertising market, is further being challenged by such global-scale players.
- The advertising market could be again impacted by cancelled or delayed advertising campaigns should a prolonged COVID-19 pandemic lead to further economic downturns. Our radio and OOH properties are particularly vulnerable to pandemic-related measures resulting in lower audience levels from circulation and traffic.
- Bell Media has contracts with a variety of BDUs, under which monthly subscription fees for specialty and pay TV services are earned, that expire on a specific date

*POTENTIAL IMPACT*

- Economic uncertainty could reduce advertisers' spending. Our failure to increase or maintain viewership or capture our share of the changing and fragmented advertising market could result in the loss of advertising revenue.
- The COVID-19 pandemic could again continue to drive a material decline in advertising revenue across all Bell Media platforms
- If we are not successful in obtaining favourable agreements with BDUs, it could result in the loss of subscription revenue

### RISING CONTENT COSTS AND ABILITY TO SECURE KEY CONTENT

*RISK*

- Rising content costs, as an increasing number of domestic and global competitors seek to acquire the same content or to restrict content within their own ecosystems, and the ability to acquire or develop key differentiated content to drive revenues and subscriber growth.
- Additional production delays attributable to the COVID-19 pandemic could further pressure our ability to secure key content in the short term.

*POTENTIAL IMPACT*

- Rising programming costs could require us to incur unplanned expenses, which could result in negative pressure on adjusted EBITDA
- Our inability to acquire or develop popular programming content could adversely affect Bell Media's viewership and subscription levels and, consequently, advertising and subscription revenues

# 6 Financial and capital management



This section tells you how we manage our cash and capital resources to carry out our strategy and deliver financial results. It provides an analysis of our financial condition, cash flows and liquidity on a consolidated basis.

## 6.1 Net debt

| | 2021 | 2020 | $ CHANGE | % CHANGE |
|---|---|---|---|---|
| Long-term debt | **27,048** | 23,906 | 3,142 | 13.1% |
| Debt due within one year | **2,625** | 2,417 | 208 | 8.6% |
| 50% of preferred shares (1) | **2,002** | 2,002 | – | – |
| Cash | **(207)** | (224) | 17 | 7.6% |
| Net debt | **31,468** | 28,101 | 3,367 | 12.0% |

(1) *50% of outstanding preferred shares of $4,003 million in 2021 and 2020 are classified as debt consistent with the treatment by some credit rating agencies.*

The increase of $208 million in debt due within one year and $3,142 million in long-term debt, was due to:

- the issuance by Bell Canada of Series US-3, Series US-4, Series US-5 and Series US-6 Notes, with total principal amounts of $600 million, $500 million, $600 million and $650 million in U.S. dollars, respectively ($747 million, $623 million, $755 million and $818 million in Canadian dollars, respectively). The Notes are fully and unconditionally guaranteed by BCE.
- the issuance by Bell Canada of Series M-54, Series M-55 and Series M-56 MTN debentures, with total principal amounts of $1 billion, $550 million and $500 million in Canadian dollars, respectively. The MTN debentures are fully and unconditionally guaranteed by BCE.
- an increase in our notes payable (net of repayments) of $351 million

Partly offset by:

- the early redemption of Series M-40 MTN debentures with a total principal amount of $1,700 million in Canadian dollars
- a decrease in our securitized trade receivables of $150 million
- a net decrease of $144 million due to lower lease liabilities and other debt

The decrease in cash of $17 million was mainly due to:

- $4,837 million of capital expenditures
- $3,132 million of dividends paid on BCE common shares
- $2,751 million of repayment of long-term debt
- $2,082 million for the acquisition of spectrum licences mainly for the acquisition of 3500 MHz spectrum
- $297 million for the purchase on the open market of BCE common shares for the settlement of share-based payments
- $150 million decrease in securitized trade receivables
- $125 million of dividends paid on BCE preferred shares
- $86 million of cash dividends paid by subsidiaries to NCI
- $78 million of other financing activities which includes the payments for early debt redemption costs
- $72 million of other investing activities

Partly offset by:

- $8,008 million of cash flows from operating activities
- $4,985 million of issuance of long-term debt
- $351 million increase in notes payable
- $261 million from the issuance of common shares under our employee stock option plan

## 6.2 Outstanding share data

| COMMON SHARES OUTSTANDING | NUMBER OF SHARES |
|---|---|
| Outstanding, January 1, 2021 | 904,415,010 |
| Shares issued under employee stock option plan | 4,603,861 |
| Outstanding, December 31, 2021 | 909,018,871 |

| STOCK OPTIONS OUTSTANDING | NUMBER OF OPTIONS | WEIGHTED AVERAGE EXERCISE PRICE ($) |
|---|---|---|
| Outstanding, January 1, 2021 | 15,650,234 | 59 |
| Exercised (1) | (4,603,861) | 57 |
| Forfeited or expired | (267,649) | 60 |
| Outstanding, December 31, 2021 | 10,778,724 | 60 |
| Exercisable, December 31, 2021 | 4,316,424 | 58 |

(1) *The weighted average market share price for options exercised in 2021 was $64.*

At March 3, 2022, 910,920,615 common shares and 8,876,980 stock options were outstanding.

# 6.3 Cash flows

| | 2021 | 2020 | $ CHANGE | % CHANGE |
|---|---|---|---|---|
| **Cash flows from operating activities** | 8,008 | 7,754 | 254 | 3.3% |
| Capital expenditures | (4,837) | (4,202) | (635) | (15.1%) |
| Cash dividends paid on preferred shares | (125) | (132) | 7 | 5.3% |
| Cash dividends paid by subsidiaries to non-controlling interest | (86) | (53) | (33) | (62.3%) |
| Acquisition and other costs paid | 35 | 35 | – | – |
| Cash from discontinued operations (included in cash flows from operating activities) | – | (54) | 54 | 100.0% |
| **Free cash flow** | 2,995 | 3,348 | (353) | (10.5%) |
| Cash from discontinued operations (included in cash flows from operating activities) | – | 54 | (54) | (100.0%) |
| Business acquisitions | (12) | (65) | 53 | 81.5% |
| Acquisition and other costs paid | (35) | (35) | – | – |
| Acquisition of spectrum licences | (2,082) | (86) | (1,996) | n.m. |
| Other investing activities | (72) | (79) | 7 | 8.9% |
| Cash from discontinued operations (included in cash flows from investing activities) | – | 892 | (892) | (100.0%) |
| Increase (decrease) in notes payable and bank advances | 351 | (1,641) | 1,992 | n.m. |
| Decrease in securitized trade receivables | (150) | – | (150) | n.m. |
| Issue of long-term debt | 4,985 | 6,006 | (1,021) | (17.0%) |
| Repayment of long-term debt | (2,751) | (5,003) | 2,252 | 45.0% |
| Issue of common shares | 261 | 26 | 235 | n.m. |
| Purchase of shares for settlement of share-based payments | (297) | (263) | (34) | (12.9%) |
| Cash dividends paid on common shares | (3,132) | (2,975) | (157) | (5.3%) |
| Other financing activities | (78) | (93) | 15 | 16.1% |
| Cash used in discontinued operations (included in cash flows from financing activities) | – | (7) | 7 | 100.0% |
| Net (decrease) increase in cash | (17) | 83 | (100) | n.m. |
| Net decrease in cash equivalents | – | (4) | 4 | 100.0% |

*n.m.: not meaningful*

## CASH FLOWS FROM OPERATING ACTIVITIES AND FREE CASH FLOW

In 2021, BCE's cash flows from operating activities increased by $254 million, compared to 2020, mainly due to higher adjusted EBITDA and higher cash from working capital due mainly to the timing of supplier payments, partly offset by higher severance and other costs paid and higher income taxes paid. Additionally, there was lower cash from discontinued operations in 2021 as the sale of substantially all of our data centre operations was completed in Q4 2020.

Free cash flow decreased by $353 million in 2021, compared to 2020, mainly due to higher capital expenditures, partly offset by higher cash flows from operating activities, excluding cash from discontinued operations and acquisition and other costs paid.

## CAPITAL EXPENDITURES

| | 2021 | 2020 | $ CHANGE | % CHANGE |
|---|---|---|---|---|
| Bell Wireless | 1,120 | 916 | (204) | (22.3%) |
| *Capital intensity* | *12.4%* | *10.5%* | | *(1.9) pts* |
| Bell Wireline | 3,597 | 3,161 | (436) | (13.8%) |
| *Capital intensity* | *29.5%* | *25.9%* | | *(3.6) pts* |
| Bell Media | 120 | 125 | 5 | 4.0% |
| *Capital intensity* | *4.0%* | *4.5%* | | *0.5 pts* |
| BCE | 4,837 | 4,202 | (635) | (15.1%) |
| *Capital intensity* | *20.6%* | *18.4%* | | *(2.2) pts* |

**BCE capital expenditures** increased by 15.1% or $635 million in 2021 over last year to $4,837 million for a corresponding capital intensity of 20.6%, up 2.2 pts over 2020. The growth in capital spending is consistent with our two-year plan to accelerate network investments. The year-over-year increase was driven by:

- Higher capital spending in our wireless segment of $204 million in 2021, compared to last year, primarily due to the ongoing deployment of our mobile 5G network which at the end of 2021 reached more than 70% of the Canadian population
- Greater capital spending in our wireline segment of $436 million in 2021, compared to last year, mainly from the continued expansion of our FTTP network to more homes and businesses and the rollout of our fixed WTTP network to more rural locations

## SPECTRUM PAYMENT

On December 17, 2021, Bell Mobility acquired 271 licences in a number of urban and rural markets for 678 million MHz-Pop of 3500 MHz spectrum for $2.07 billion.

## CASH FROM DISCONTINUED OPERATIONS (INCLUDED IN CASH FLOWS FROM INVESTING ACTIVITIES)

In 2020, cash from discontinued operations (included in cash flows from investing activities) was $892 million mainly due to $933 million (net of debt and other items) received in Q4 2020 from the completion of the sale of substantially all of our data centre operations.

## DEBT INSTRUMENTS

*We use a combination of short-term and long-term debt to finance our operations. Our short-term debt consists mostly of notes payable under commercial paper programs, loans securitized by trade receivables and bank facilities. We usually pay fixed rates of interest on our long-term debt and floating rates on our short-term debt. As at December 31, 2021, all of our debt was denominated in Canadian dollars with the exception of our commercial paper, and Series US-1, US-2, US-3, US-4, US-5 and US-6 Notes, which are denominated in U.S. dollars and have been hedged for foreign currency fluctuations through cross currency interest rate swaps.*

### 2021

During 2021, we issued debt, net of repayments. This included:

- $4,985 million issuance of long-term debt comprised of the issuance of Series US-3, Series US-4, Series US-5 and Series US-6 Notes, with total principal amounts of $600 million, $500 million, $600 million and $650 million in U.S. dollars, respectively ($747 million, $623 million, $755 million and $818 million in Canadian dollars, respectively), and the issuance of Series M-54, Series M-55 and Series M-56 MTN debentures, with total principal amounts of $1 billion, $550 million and $500 million in Canadian dollars, respectively, partly offset by $8 million of discounts on our debt issuances
- $351 million issuance (net of repayments) of notes payable

Partly offset by:

- $2,751 million repayment of long-term debt comprised of early redemption of Series M-40 MTN debentures with a total principal amount of $1,700 million in Canadian dollars and net payments of leases and other debt of $1,051 million
- $150 million decrease in securitized trade receivables

### 2020

During 2020, we repaid debt, net of issuances. This included:

- $1,641 million repayment (net of issuances) of notes payable
- $5,003 million repayment of long-term debt comprised of the repayment by Bell Canada of $1,450 million in U.S. dollars ($2,035 million in Canadian dollars) under its committed credit facilities, the early redemption of Series M-42, Series M-30 and Series M-24 MTN debentures with total principal amounts of $850 million, $750 million and $500 million in Canadian dollars, respectively, and net payments of leases and other debt of $868 million

Partly offset by:

- $6,006 million issuance of long-term debt comprised of the drawdown of $1,450 million in U.S. dollars ($2,035 million in Canadian dollars) under Bell Canada's committed credit facilities and the issuance of Series M-51, Series M-47, Series M-52, and Series M-53 MTN debentures, with total principal amounts of $1,250 million, $1 billion, $1 billion and $750 million in Canadian dollars, respectively, partly offset by $29 million of net discounts on our debt issuances

## ISSUANCE OF COMMON SHARES

The issuance of common shares in 2021 increased by $235 million, compared to 2020, mainly due to a higher number of exercised stock options.

## CASH DIVIDENDS PAID ON COMMON SHARES

In 2021, cash dividends paid on common shares of $3,132 million increased by $157 million, compared to 2020, due to a higher dividend paid in 2021 of $3.4575 per common share compared to $3.2900 per common share in 2020.

## 6.4 Post-employment benefit plans

For the year ended December 31, 2021, we recorded an increase in our post-employment benefit plans and a gain, before taxes, in OCI from continuing operations of $2,433 million. This was due to a higher-than-expected return on plan assets in 2021 and a higher actual discount rate of 3.2% at December 31, 2021, compared to 2.6% at December 31, 2020.

For the year ended December 31, 2020, we recorded an increase in our post-employment benefit plans and a gain, before taxes, in OCI from continuing operations of $687 million. This was due to a higher-than-expected return on plan assets in 2020, partly offset by a lower actual discount rate of 2.6% at December 31, 2020, compared to 3.1% at December 31, 2019.

## 6.5 Financial risk management

Management's objectives are to protect BCE and its subsidiaries on a consolidated basis against material economic exposures and variability of results from various financial risks, including credit risk, liquidity risk, foreign currency risk, interest rate risk, commodity price risk, equity price risk and longevity risk. These risks are further described in Note 2, *Significant accounting policies*, Note 8, *Other income (expense)*, Note 27, *Post-employment benefit plans* and Note 29, *Financial and capital management* in BCE's 2021 consolidated financial statements.

The following table outlines our financial risks, how we manage these risks and their financial statement classification.

| FINANCIAL RISK | DESCRIPTION OF RISK | MANAGEMENT OF RISK AND FINANCIAL STATEMENT CLASSIFICATION |
|---|---|---|
| Credit risk | We are exposed to credit risk from operating activities and certain financing activities, the maximum exposure of which is represented by the carrying amounts reported in the statements of financial position. We are exposed to credit risk if counterparties to our trade receivables, including wireless device financing plan receivables, and derivative instruments are unable to meet their obligations. | • Large and diverse customer base<br>• Deal with institutions with investment-grade credit ratings<br>• Regularly monitor our credit risk and credit exposure<br>• Our trade receivables and allowance for doubtful accounts balances at December 31, 2021, which both include the current portion of wireless device financing plan receivables, were $3,843 million and $136 million, respectively<br>• Our non-current wireless device financing plan receivables and allowance for doubtful accounts balances at December 31, 2021 were $387 million and $15 million, respectively<br>• Our contract assets balances at December 31, 2021 was $665 million, net of an allowance for doubtful accounts balance of $20 million |
| Liquidity risk | We are exposed to liquidity risk for financial liabilities. | • Sufficient cash from operating activities, possible capital markets financing and committed bank facilities to fund our operations and fulfill our obligations as they become due<br>• Refer to section 6.7, *Liquidity – Contractual obligations*, for a maturity analysis of our recognized financial liabilities |
| Foreign currency risk | We are exposed to foreign currency risk related to anticipated purchases and certain foreign currency debt.<br>A 10% depreciation (appreciation) in the value of the Canadian dollar relative to the U.S. dollar would result in a loss of $7 million (loss of $20 million) recognized in net earnings from continuing operations at December 31, 2021 and a gain of $241 million (loss of $221 million) recognized in OCI from continuing operations at December 31, 2021, with all other variables held constant.<br>A 10% depreciation (appreciation) in the value of the Canadian dollar relative to the Philippine peso would result in a gain (loss) of $4 million recognized in OCI from continuing operations at December 31, 2021, with all other variables held constant.<br>Refer to the following *Fair value* section for details on our derivative financial instruments. | • Foreign currency forward contracts and options maturing in 2022 to 2023 of $2.5 billion in U.S. dollars ($3.1 billion in Canadian dollars) and ₱2.3 billion in Philippine pesos ($58 million in Canadian dollars) at December 31, 2021, to manage foreign currency risk related to anticipated purchases and certain foreign currency debt<br>  • For cash flow hedges, changes in the fair value are recognized in OCI from continuing operations, except for any ineffective portion, which is recognized in *Other income (expense)* in the income statements. Realized gains and losses in *Accumulated OCI* are reclassified to the income statements or to the initial cost of the non-financial asset in the same periods as the corresponding hedged transactions are recognized.<br>  • For economic hedges, changes in the fair value are recognized in *Other income (expense)* in the income statements<br>• At December 31, 2021, we had outstanding cross currency interest rate swaps with notional amounts of $3,500 million in U.S. dollars ($4,511 million in Canadian dollars) to hedge the U.S. currency exposure of our U.S. Notes maturing from 2032 and 2052<br>  • For cross currency interest rate swaps, changes in the fair value of these derivatives are recognized in our statements of comprehensive income, except for amounts recorded in *Other income (expense)* in the the income statements to offset the foreign currency translation adjustment on the related debt and any portion of the hedging relationship which is ineffective |

| FINANCIAL RISK | DESCRIPTION OF RISK | MANAGEMENT OF RISK AND FINANCIAL STATEMENT CLASSIFICATION |
|---|---|---|
| Interest rate risk | We are exposed to risk on the interest rates of our debt, our post-employment benefit plans and on dividend rate resets on our preferred shares.<br>A 1% increase (decrease) in interest rates would result in a loss of $4 million (gain of $3 million) in net earnings from continuing operations at December 31, 2021 and a gain of $18 million (loss of $25 million) recognized in OCI from continuing operations at December 31, 2021, with all other variables held constant.<br>Refer to the following *Fair value* section for details on our derivative financial instruments. | • We use cross currency interest rate swaps, cross currency basis rate swaps and forward starting interest rate swaps to hedge interest rate exposure on existing and/or future debt issuances. We also use leveraged interest rate options to economically hedge dividend rate resets on preferred shares.<br>• In 2021, we entered into cross currency interest rate swaps with a notional amount of $600 million in U.S. dollars ($748 million in Canadian dollars) to hedge the interest exposure of our U.S. Notes maturing in 2024<br>  • For cross currency interest rate swaps, changes in the fair value of these derivatives and the related debt are recognized in *Other income (expense)* in the income statements and offset, except for any ineffective portion of the hedging relationship<br>• In 2021, we entered into forward starting interest rate swaps with a notional amount of $127 million to hedge the interest rate exposure on future debt issuances<br>  • For forward starting interest rate swaps, changes in the fair value of these derivatives are recognized in our statements of comprehensive income, except for any ineffective portion of the hedging relationship, which is recognized in *Other income (expense)* in the income statements. Realized gains and losses in *Accumulated OCI* are reclassified to *Interest expense* in the income statements over the term of the related debt.<br>• In 2021, we also entered into cross currency basis rate swaps with a notional amount of $127 million to hedge economically the basis rate exposure on future debt issuances<br>  • For cross currency basis rate swaps, changes in the fair value of these derivatives are recognized in the income statements in *Other income (expense)*<br>• For our post-employment benefit plans, the interest rate risk is managed using a liability matching approach, which reduces the exposure of the DB plans to a mismatch between investment growth and obligation growth |
| Equity price risk | We are exposed to risk on our cash flow related to the settlement of equity settled share-based compensation plans.<br>A 5% increase (decrease) in the market price of BCE's common shares at December 31, 2021 would result in a gain (loss) of $43 million recognized in net earnings from continuing operations, for 2021, with all other variables held constant.<br>Refer to the following *Fair value* section for details on our derivative financial instruments. | • Equity forward contracts with a fair value net asset of $130 million at December 31, 2021 on BCE's common shares to economically hedge the cash flow exposure related to the settlement of equity settled share-based compensation plans<br>  • Changes in the fair value of these derivatives are recorded in the income statements in *Other income (expense)* for derivatives used to hedge equity settled share-based payment plans |
| Commodity price risk | We are exposed to risk on the purchase cost of fuel.<br>Refer to the following *Fair value* section for details on our derivative financial instruments. | • As at December 31, 2021, all fuel swaps had matured<br>  • Changes in the fair value of these derivatives are recorded in the income statements in *Other income (expense)* |
| Longevity risk | We are exposed to life expectancy risk on our post-employment benefit plans. | • The Bell Canada pension plan has an investment arrangement which hedges part of its exposure to potential increases in longevity, which covers approximately $4 billion of post-employment benefit obligations |

## FAIR VALUE

Fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.

Certain fair value estimates are affected by assumptions we make about the amount and timing of future cash flows and discount rates, all of which reflect varying degrees of risk. Income taxes and other expenses that may be incurred on disposition of financial instruments are not reflected in the fair values. As a result, the fair values may not be the net amounts that would be realized if these instruments were settled.

The carrying values of our cash and cash equivalents, trade and other receivables, dividends payable, trade payables and accruals, compensation payable, severance and other costs payable, interest payable, notes payable and loans secured by trade receivables approximate fair value as they are short-term. The carrying value of wireless device financing plan receivables approximates fair value given that their average remaining duration is short and the carrying value is reduced by an allowance for doubtful accounts and an allowance for revenue adjustments.

The following table provides the fair value details of other financial instruments measured at amortized cost in the statements of financial position.

| | | | DECEMBER 31, 2021 | | DECEMBER 31, 2020 | |
|---|---|---|---|---|---|---|
| | CLASSIFICATION | FAIR VALUE METHODOLOGY | CARRYING VALUE | FAIR VALUE | CARRYING VALUE | FAIR VALUE |
| CRTC deferral account obligation | Trade payables and other liabilities and other non-current liabilities | Present value of estimated future cash flows discounted using observable market interest rates | 66 | 67 | 82 | 86 |
| Debt securities and other debt | Debt due within one year and long-term debt | Quoted market price of debt | 23,729 | 26,354 | 20,525 | 24,366 |

The following table provides the fair value details of financial instruments measured at fair value in the statements of financial position.

| | | FAIR VALUE OF ASSET (LIABILITY) | | | |
|---|---|---|---|---|---|
| | CLASSIFICATION | CARRYING VALUE | QUOTED PRICES IN ACTIVE MARKETS FOR IDENTICAL ASSETS (LEVEL 1) | OBSERVABLE MARKET DATA (LEVEL 2)[1] | NON-OBSERVABLE MARKET INPUTS (LEVEL 3)[2] |
| **December 31, 2021** | | | | | |
| Publicly-traded and privately-held investments[3] | Other non-current assets | 183 | 24 | – | 159 |
| Derivative financial instruments | Other current assets, trade payables and other liabilities, other non-current assets and liabilities | 279 | – | 279 | – |
| MLSE financial liability[4] | Trade payables and other liabilities | (149) | – | – | (149) |
| Other | Other non-current assets and liabilities | 122 | – | 185 | (63) |
| **December 31, 2020** | | | | | |
| Publicly-traded and privately-held investments[3] | Other non-current assets | 126 | 3 | – | 123 |
| Derivative financial instruments | Other current assets, trade payables and other liabilities, other non-current assets and liabilities | (51) | – | (51) | – |
| MLSE financial liability[4] | Trade payables and other liabilities | (149) | – | – | (149) |
| Other | Other non-current assets and liabilities | 109 | – | 167 | (58) |

(1) *Observable market data such as equity prices, interest rates, swap rate curves and foreign currency exchange rates.*

(2) *Non-observable market inputs such as discounted cash flows and earnings multiples. A reasonable change in our assumptions would not result in a significant increase (decrease) to our level 3 financial instruments*

(3) *Unrealized gains and losses are recorded in OCI from continuing operations in the statements of comprehensive income and are reclassified from* Accumulated OCI *to the deficit in the statements of financial position when realized*

(4) *Represents BCE's obligation to repurchase the Master Trust Fund's 9% interest in MLSE at a price not less than an agreed minimum price, should the Master Trust Fund exercise its put option. The obligation to repurchase is marked to market each reporting period and the gain or loss is recognized in* Other income (expense) *in the income statements.*

## 6.6 Credit ratings

*Credit ratings generally address the ability of a company to repay principal and pay interest on debt or dividends on issued and outstanding preferred shares.*

*Our ability to raise financing depends on our ability to access the public equity and debt capital markets as well as the bank credit market. Our ability to access such markets and the cost and amount of funding available partly depend on our assigned credit ratings at the time capital is raised. Investment grade credit ratings usually mean that when we borrow money, we qualify for lower interest rates than companies that have ratings lower than investment grade. A ratings downgrade could result in adverse consequences for our funding capacity or ability to access the capital markets.*

The following table provides BCE's and Bell Canada's credit ratings, which are considered investment grade, as at March 3, 2022 from DBRS, Moody's and S&P.

### KEY CREDIT RATINGS

| | BELL CANADA [1] | | |
|---|---|---|---|
| MARCH 3, 2022 | DBRS | MOODY'S | S&P |
| Commercial paper | R-2 (high) | P-2 | A-1 (Low) (Canadian scale) |
| | | | A-2 (Global scale) |
| Long-term debt | BBB (high) | Baa1 | BBB+ |
| Subordinated long-term debt | BBB (low) | Baa2 | BBB |
| | BCE [1] | | |
| | DBRS | MOODY'S | S&P |
| Preferred shares | Pfd-3 | – | P-2 (Low) (Canadian scale) |
| | | | BBB- (Global scale) |

(1) *These credit ratings are not recommendations to buy, sell or hold any of the securities referred to, and they may be revised or withdrawn at any time by the assigning rating agency. Ratings are determined by the rating agencies based on criteria established from time to time by them, and they do not comment on market price or suitability for a particular investor. Each credit rating should be evaluated independently of any other credit rating.*

As of March 3, 2022, BCE's and Bell Canada's credit ratings have stable outlooks from DBRS, Moody's and S&P.

## 6.7 Liquidity

This section contains forward-looking statements, including relating to the expectation that our available liquidity, which is comprised of cash and cash equivalents and amounts available under our securitized trade receivable program and our committed bank credit facilities, will be sufficient to meet our cash requirements for 2022. Refer to the section *Caution regarding forward-looking statements* at the beginning of this MD&A.

### AVAILABLE LIQUIDITY

Total available liquidity at December 31, 2021 was $3.4 billion, comprised of $207 million in cash, $400 million available under our securitized trade receivable program and $2.8 billion available under our $3.5 billion committed bank credit facilities (given $711 million of commercial paper outstanding).

We expect that our available liquidity, 2022 estimated cash flows from operations and capital markets financing will permit us to meet our cash requirements in 2022 for capital expenditures, post-employment benefit plans funding, dividend payments, the payment of contractual obligations, maturing debt, ongoing operations and other cash requirements.

Should our 2022 cash requirements exceed our cash, cash equivalents, cash generated from our operations, and funds raised under capital markets financings and our securitized trade receivable program, we would expect to cover such a shortfall by drawing under committed credit facilities that are currently in place or through new facilities to the extent available.

In 2022, our cash flows from operations, cash, cash equivalents, capital markets financings, securitized trade receivable program and credit facilities should give us flexibility in carrying out our plans for business growth, including business acquisitions, as well as for the payment of contingencies.

We continuously monitor the rapidly changing COVID-19 pandemic for impacts on operations, capital markets and the Canadian economy with the objective of maintaining adequate liquidity.

The table below is a summary of our total bank credit facilities at December 31, 2021.

| DECEMBER 31, 2021 | TOTAL AVAILABLE | DRAWN | LETTERS OF CREDIT | COMMERCIAL PAPER OUTSTANDING | NET AVAILABLE |
|---|---|---|---|---|---|
| Committed credit facilities | | | | | |
| Unsecured revolving and expansion credit facilities [1][2] | 3,500 | – | – | 711 | 2,789 |
| Other | 106 | – | 106 | – | – |
| Total committed credit facilities | 3,606 | – | 106 | 711 | 2,789 |
| Total non-committed credit facilities | 1,939 | – | 1,060 | – | 879 |
| Total committed and non-committed credit facilities | 5,545 | – | 1,166 | 711 | 3,668 |

(1) *Bell Canada's $2.5 billion committed revolving credit facility expires in May 2026 and its $1 billion committed expansion credit facility expires in May 2024.*

(2) *As of December 31, 2021, Bell Canada's outstanding commercial paper included $561 million in U.S. dollars ($711 million in Canadian dollars). All of Bell Canada's commercial paper outstanding is included in* Debt due within one year.

Bell Canada may issue notes under its Canadian and U.S. commercial paper programs up to the maximum aggregate principal amount of $3 billion in either Canadian or U.S. currency provided that at no time shall such maximum amount of notes exceed $3.5 billion in Canadian currency which equals the aggregate amount available under Bell Canada's committed supporting revolving and expansion credit facilities as at December 31, 2021. The total amount of the net available committed revolving and expansion credit facilities may be drawn at any time.

Some of our credit agreements require us to meet specific financial ratios and to offer to repay and cancel the credit agreement upon a change of control of BCE or Bell Canada. In addition, some of our debt agreements require us to offer to repurchase certain series of debt securities upon the occurrence of a change of control event as defined in the relevant debt agreements. We are in compliance with all conditions and restrictions under such agreements.

## CASH REQUIREMENTS

### CAPITAL EXPENDITURES

In 2022, our planned capital spending will be focused on our strategic imperatives, reflecting an appropriate level of investment in our networks and services. Bell will continue its $1.7 billion capital expenditure acceleration program to roll out its direct fibre, WHI and mobile 5G networks under which $800 million was spent in 2021 and the remaining $900 million is expected to be spent in 2022. The 2022 accelerated capital expenditures are expected to be funded through available liquidity, 2022 estimated cash flows from operations and capital markets financing.

### POST-EMPLOYMENT BENEFIT PLANS FUNDING

Our post-employment benefit plans include DB pension and defined contribution (DC) pension plans, as well as other post-employment benefits (OPEBs) plans. The funding requirements of our post-employment benefit plans, resulting from valuations of our plan assets and liabilities, depend on a number of factors, including actual returns on post-employment benefit plan assets, long-term interest rates, plan demographics, and applicable regulations and actuarial standards. Actuarial valuations were last performed for our significant post-employment benefit plans as at December 31, 2020.

We expect to contribute approximately $90 million to our DB pension plans in 2022, subject to actuarial valuations being completed in mid-2022. We expect to contribute approximately $110 million to the DC pension plans and to pay approximately $75 million to beneficiaries under OPEB plans in 2022.

### DIVIDEND PAYMENTS

In 2022, the cash dividends to be paid on BCE's common shares are expected to be higher than in 2021 as BCE's annual common share dividend increased by 5.1% to $3.68 per common share from $3.50 per common share effective with the dividend payable on April 15, 2022. The declaration of dividends is subject to the discretion of the BCE Board.

### CONTRACTUAL OBLIGATIONS

The following table is a summary of our contractual obligations at December 31, 2021 that are due in each of the next five years and thereafter.

| AT DECEMBER 31, 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | THERE-AFTER | TOTAL |
|---|---|---|---|---|---|---|---|
| **Recognized financial liabilities** | | | | | | | |
| Long-term debt | 156 | 1,632 | 2,060 | 2,153 | 1,561 | 16,289 | 23,851 |
| Notes payable | 735 | – | – | – | – | – | 735 |
| Lease liabilities [1] | 1,009 | 833 | 541 | 439 | 406 | 1,922 | 5,150 |
| Loan secured by trade receivables | 900 | – | – | – | – | – | 900 |
| Interest payable on long-term debt, notes payable and loan secured by trade receivables | 918 | 890 | 825 | 770 | 718 | 9,068 | 13,189 |
| Net payments (receipts) on cross currency basis swaps | 11 | 12 | (2) | 12 | 12 | 314 | 359 |
| MLSE financial liability | 149 | – | – | – | – | – | 149 |
| **Commitments (off-balance sheet)** | | | | | | | |
| Commitments for property, plant and equipment and intangible assets | 1,104 | 757 | 461 | 334 | 219 | 161 | 3,036 |
| Purchase obligations | 542 | 380 | 245 | 210 | 292 | 221 | 1,890 |
| Leases committed not yet commenced | 7 | 2 | 6 | 1 | – | – | 16 |
| Total | 5,531 | 4,506 | 4,136 | 3,919 | 3,208 | 27,975 | 49,275 |

(1) *Includes imputed interest of $841 million.*

Our commitments for property, plant and equipment and intangible assets include program and feature film rights and investments to expand and update our networks to meet customer demand.

Purchase obligations consist of contractual obligations under service and product contracts for operating expenditures and other purchase obligations.

Our commitments for leases not yet commenced include OOH advertising spaces, fibre use and real estate. These leases are non-cancellable.

Subsequent to year end, in February 2022, Bell acquired a business that provides Internet, telephone and television services to consumers and businesses in Québec and parts of Ontario. The acquisition is expected to accelerate growth in Bell's residential and small business customers. The results of the acquired business will be included in our Bell Wireline segment.

Additionally, subsequent to year end, we entered into new commitments for property, plant and equipment and intangible assets totaling approximately $1.4 billion, which is payable between 2022 and 2033.

### INDEMNIFICATIONS AND GUARANTEES (OFF-BALANCE SHEET)

As a regular part of our business, we enter into agreements that provide for indemnifications and guarantees to counterparties in transactions involving business dispositions, sales of assets, sales of services, purchases and development of assets, securitization agreements and leases. While some of the agreements specify a maximum potential exposure, many do not specify a maximum amount or termination date.

We cannot reasonably estimate the maximum potential amount we could be required to pay counterparties because of the nature of almost all of these indemnifications and guarantees. As a result, we cannot determine how they could affect our future liquidity, capital resources or credit risk profile. We have not made any significant payments under indemnifications or guarantees in the past.

## 6.8 Litigation

In the ordinary course of our business, we become involved in various claims and legal proceedings seeking monetary damages and other relief. In particular, because of the nature of our consumer-facing business, we are exposed to class actions pursuant to which substantial monetary damages may be claimed. Due to the inherent risks and uncertainties of the litigation process, we cannot predict the final outcome or timing of claims and legal proceedings. Subject to the foregoing, and based on information currently available and management's assessment of the merits of the claims and legal proceedings pending at March 3, 2022, management believes that the ultimate resolution of these claims and legal proceedings is unlikely to have a material and negative effect on our financial statements or operations. We believe that we have strong defences and we intend to vigorously defend our positions.

For a description of important legal proceedings pending at March 3, 2022, please see the section entitled *Legal proceedings* contained in the BCE 2021 AIF.

# 7 Selected annual and quarterly information

## 7.1 Annual financial information

The following table shows selected consolidated financial data of BCE for 2021, 2020 and 2019 based on the annual consolidated financial statements, which are prepared in accordance with IFRS as issued by the International Accounting Standards Board (IASB). We discuss the factors that caused our results to vary over the past two years throughout this MD&A.

Our financial and operating performance saw a steady improvement in 2021 despite the continued adverse impacts of the COVID-19 pandemic experienced throughout the year, due to our strong operational execution and the easing of government restrictions in the second half of the year. It has been almost two years since the pandemic began affecting our performance and we have since adapted many aspects of our business to better operate in this environment. Additionally, compared to 2020, the effects of the pandemic on our year-over-year performance were considerably reduced, with Q2 2020 being the quarter most significantly affected by the pandemic. The impacts of the COVID-19 pandemic, although moderated, continued to unfavourably affect Bell Wireless product and roaming revenues, Bell Media advertising revenues, as well as Bell Wireline business market equipment revenues, due to reduced commercial activity as a result of the government restrictions put in place to combat the pandemic, particularly in the first half of the year, and the global supply chain challenges experienced in the second half of the year. See section 1, *Overview – COVID-19*, in this MD&A for more details.

On June 1, 2020, BCE announced that it had entered into an agreement to sell substantially all of its data centre operations in an all-cash transaction valued at $1.04 billion. We reclassified amounts related to the sale for the previous years to discontinued operations in our consolidated income statements and consolidated statements of cash flows to make them consistent with the presentation for 2020. Property, plant and equipment and intangible assets that were sold were no longer depreciated or amortized effective June 1, 2020. In Q4 2020, we completed the sale for proceeds of $933 million (net of debt and other items) and recorded a gain on sale, net of taxes, of $211 million. The capital gain as a result of the sale was mainly offset by the recognition of previously unrecognized capital loss carry forwards.

| | 2021 | 2020 | 2019 |
|---|---|---|---|
| **CONSOLIDATED INCOME STATEMENTS** | | | |
| Operating revenues | | | |
| Service | **20,350** | 19,832 | 20,566 |
| Product | **3,099** | 3,051 | 3,227 |
| Total operating revenues | **23,449** | 22,883 | 23,793 |
| Operating costs | **(13,556)** | (13,276) | (13,787) |
| Adjusted EBITDA | **9,893** | 9,607 | 10,006 |
| Severance, acquisition and other costs | **(209)** | (116) | (114) |
| Depreciation | **(3,627)** | (3,475) | (3,458) |
| Amortization | **(982)** | (929) | (886) |
| Finance costs | | | |
| Interest expense | **(1,082)** | (1,110) | (1,125) |
| Interest on post-employment benefit obligations | **(20)** | (46) | (63) |
| Impairment of assets | **(197)** | (472) | (102) |
| Other income (expense) | **160** | (194) | 95 |
| Income taxes | **(1,044)** | (792) | (1,129) |
| Net earnings from continuing operations | **2,892** | 2,473 | 3,224 |
| Net earnings from discontinued operations | **–** | 226 | 29 |
| Net earnings | **2,892** | 2,699 | 3,253 |
| Net earnings from continuing operations attributable to: | | | |
| Common shareholders | **2,709** | 2,272 | 3,011 |
| Preferred shareholders | **131** | 136 | 151 |
| Non-controlling interest | **52** | 65 | 62 |
| Net earnings from continuing operations | **2,892** | 2,473 | 3,224 |
| Net earnings attributable to: | | | |
| Common shareholders | **2,709** | 2,498 | 3,040 |
| Preferred shareholders | **131** | 136 | 151 |
| Non-controlling interest | **52** | 65 | 62 |
| Net earnings | **2,892** | 2,699 | 3,253 |
| Net earnings per common share – basic and diluted | | | |
| Continuing operations | **2.99** | 2.51 | 3.34 |
| Discontinued operations | **–** | 0.25 | 0.03 |
| Net earnings per common share – basic and diluted | **2.99** | 2.76 | 3.37 |
| **RATIOS** | | | |
| Adjusted EBITDA margin (%) | **42.2%** | 42.0% | 42.1% |

| | 2021 | 2020 | 2019 |
|---|---|---|---|
| **CONSOLIDATED STATEMENTS OF FINANCIAL POSITION** | | | |
| Property, plant and equipment | 28,235 | 27,513 | 27,636 |
| Total assets | 66,764 | 60,665 | 60,146 |
| Debt due within one year (including notes payable and loans secured by trade receivables) | 2,625 | 2,417 | 3,881 |
| Long-term debt | 27,048 | 23,906 | 22,415 |
| Total non-current liabilities | 34,710 | 31,065 | 28,961 |
| Equity attributable to BCE shareholders | 22,635 | 20,989 | 21,074 |
| Total equity | 22,941 | 21,329 | 21,408 |
| **CONSOLIDATED STATEMENTS OF CASH FLOWS** | | | |
| Cash flows from operating activities | 8,008 | 7,754 | 7,958 |
| Cash flows used in investing activities | (7,003) | (3,540) | (4,036) |
| Capital expenditures | (4,837) | (4,202) | (3,974) |
| Business acquisitions | (12) | (65) | (51) |
| Cash from (used in) discontinued operations | – | 892 | (18) |
| Cash flows used in financing activities | (1,022) | (4,135) | (4,202) |
| Issue of common shares | 261 | 26 | 240 |
| Increase (decrease) in notes payable and bank advances | 351 | (1,641) | (1,073) |
| (Decrease) increase in securitized trade receivables | (150) | – | 131 |
| Issue of long-term debt | 4,985 | 6,006 | 1,954 |
| Repayment of long-term debt | (2,751) | (5,003) | (2,221) |
| Cash dividends paid on common shares | (3,132) | (2,975) | (2,819) |
| Cash dividends paid on preferred shares | (125) | (132) | (147) |
| Cash dividends paid by subsidiaries to non-controlling interest | (86) | (53) | (65) |
| Free cash flow | 2,995 | 3,348 | 3,738 |
| **SHARE INFORMATION** | | | |
| Weighted average number of common shares (millions) | 906.3 | 904.3 | 900.8 |
| Common shares outstanding at end of year (millions) | 909.0 | 904.4 | 903.9 |
| Market capitalization (1) | 59,821 | 49,226 | 54,379 |
| Dividends declared per common share (dollars) | 3.50 | 3.33 | 3.17 |
| Dividends declared on common shares | (3,175) | (3,011) | (2,857) |
| Dividends declared on preferred shares | (131) | (136) | (151) |
| Closing market price per common share (dollars) | 65.81 | 54.43 | 60.16 |
| Total shareholder return | 27.9% | (4.1%) | 17.5% |
| **RATIOS** | | | |
| Capital intensity (%) | 20.6% | 18.4% | 16.7% |
| Price to earnings ratio (times) (2) | 22.01 | 19.72 | 17.85 |
| **OTHER DATA** | | | |
| Number of employees (thousands) | 50 | 51 | 52 |

(1) *BCE's common share price at the end of the year multiplied by the number of common shares outstanding at the end of the year.*

(2) *Price to earnings ratio is defined as BCE's common share price at the end of the year divided by EPS.*

## 7.2 Quarterly financial information

The following table shows selected BCE consolidated financial data by quarter for 2021 and 2020. This quarterly information is unaudited but has been prepared on the same basis as the annual consolidated financial statements. We discuss the factors that caused our results to vary over the past eight quarters throughout this MD&A. Refer to section 1, *Overview – COVID-19*, in this MD&A for a description of the impacts of the COVID-19 pandemic on our financial results during 2021 and 2020.

| | 2021 | | | | 2020 | | | |
|---|---|---|---|---|---|---|---|---|
| | Q4 | Q3 | Q2 | Q1 | Q4 | Q3 | Q2 | Q1 |
| Operating revenues | | | | | | | | |
| Service | 5,243 | 5,099 | 5,040 | 4,968 | 5,090 | 4,924 | 4,800 | 5,018 |
| Product | 966 | 737 | 658 | 738 | 1,012 | 863 | 554 | 622 |
| Total operating revenues | 6,209 | 5,836 | 5,698 | 5,706 | 6,102 | 5,787 | 5,354 | 5,640 |
| Adjusted EBITDA | 2,430 | 2,558 | 2,476 | 2,429 | 2,404 | 2,454 | 2,331 | 2,418 |
| Severance, acquisition and other costs | (63) | (50) | (7) | (89) | (52) | (26) | (22) | (16) |
| Depreciation | (925) | (902) | (905) | (895) | (872) | (876) | (869) | (858) |
| Amortization | (251) | (245) | (248) | (238) | (233) | (232) | (234) | (230) |
| Finance costs | | | | | | | | |
| Interest expense | (275) | (272) | (268) | (267) | (274) | (279) | (280) | (277) |
| Interest on post-employment benefit obligations | (5) | (5) | (5) | (5) | (11) | (12) | (11) | (12) |
| Impairment of assets | (30) | – | (164) | (3) | (12) | (4) | (449) | (7) |
| Other income (expense) | 26 | 35 | 91 | 8 | (38) | (29) | (80) | (47) |
| Income taxes | (249) | (306) | (236) | (253) | (191) | (262) | (96) | (243) |
| Net earnings from continuing operations | 658 | 813 | 734 | 687 | 721 | 734 | 290 | 728 |
| Net earnings from discontinued operations | – | – | – | – | 211 | 6 | 4 | 5 |
| Net earnings | 658 | 813 | 734 | 687 | 932 | 740 | 294 | 733 |
| Net earnings from continuing operations attributable to common shareholders | 625 | 757 | 685 | 642 | 678 | 686 | 233 | 675 |
| Net earnings attributable to common shareholders | 625 | 757 | 685 | 642 | 889 | 692 | 237 | 680 |
| Net earnings per common share – basic and diluted | | | | | | | | |
| Continuing operations | 0.69 | 0.83 | 0.76 | 0.71 | 0.75 | 0.76 | 0.26 | 0.74 |
| Discontinued operations | – | – | – | – | 0.23 | 0.01 | – | 0.01 |
| Net earnings per common share – basic and diluted | 0.69 | 0.83 | 0.76 | 0.71 | 0.98 | 0.77 | 0.26 | 0.75 |
| Weighted average number of common shares outstanding – basic (millions) | 908.8 | 906.9 | 905.0 | 904.5 | 904.4 | 904.3 | 904.3 | 904.1 |
| **OTHER INFORMATION** | | | | | | | | |
| Cash flows from operating activities | 1,743 | 1,774 | 2,499 | 1,992 | 1,631 | 2,110 | 2,562 | 1,451 |
| Free cash flow | 236 | 571 | 1,248 | 940 | 92 | 1,034 | 1,611 | 611 |
| Capital expenditures | (1,459) | (1,159) | (1,207) | (1,012) | (1,494) | (1,031) | (900) | (777) |

### FOURTH QUARTER HIGHLIGHTS

| OPERATING REVENUES | Q4 2021 | Q4 2020 | $ CHANGE | % CHANGE |
|---|---|---|---|---|
| Bell Wireless | 2,475 | 2,408 | 67 | 2.8% |
| Bell Wireline | 3,079 | 3,095 | (16) | (0.5%) |
| Bell Media | 849 | 791 | 58 | 7.3% |
| Inter-segment eliminations | (194) | (192) | (2) | (1.0%) |
| **Total BCE operating revenues** | 6,209 | 6,102 | 107 | 1.8% |

| ADJUSTED EBITDA | Q4 2021 | Q4 2020 | $ CHANGE | % CHANGE |
|---|---|---|---|---|
| Bell Wireless | 951 | 903 | 48 | 5.3% |
| Bell Wireline | 1,326 | 1,312 | 14 | 1.1% |
| Bell Media | 153 | 189 | (36) | (19.0%) |
| **Total BCE adjusted EBITDA** | 2,430 | 2,404 | 26 | 1.1% |

**Total operating revenues** at BCE increased by 1.8% in Q4 2021, compared to the same period last year, as we continued to recover from the impact of the COVID-19 pandemic. BCE service revenues of $5,243 million increased by 3.0% year over year, while product revenues of $966 million declined by 4.5% year over year. The increase in operating revenues was driven by growth in our Bell Wireless and Bell Media segments, offset in part by a decline in our Bell Wireline segment. Wireless operating revenues increased by 2.8% in Q4 2021 compared to Q4 2020, due to higher service revenue of 6.3%, offset in part by lower product revenues of 3.6%. Bell Media operating revenues increased by 7.3% in Q4 2021, compared to Q4 2020, driven by both higher advertising and subscriber revenues. Bell Wireline operating revenues declined by 0.5% in Q4 2021, over the same period last year, due to lower product revenues of 10.5%, whereas service revenue remained stable year over year.

**BCE net earnings** decreased by 29.4% in Q4 2021, compared to Q4 2020, mainly due to lower net earnings from discontinued operations as a result of a gain on sale, net of taxes, of $211 million in Q4 2020 from the completion of the sale of substantially all of our data centre operations, higher depreciation and amortization, higher income taxes and higher impairment of assets, partly offset by higher other income and higher adjusted EBITDA.

**BCE's adjusted EBITDA** grew by 1.1% in Q4 2021, compared to the same period last year, driven by growth in Bell Wireless of 5.3% and Bell Wireline of 1.1%, moderated by a decline in Bell Media of 19.0%. The growth in adjusted EBITDA was driven by higher operating revenues, offset in part by greater operating costs. Adjusted EBITDA margin of 39.1% in Q4 2021 decreased by 0.3 pts over Q4 2020, due to higher operating costs, offset in part by greater service revenue flow-through and reduced low-margin product sales in our total revenue base.

**Bell Wireless operating revenues** increased by 2.8% in Q4 2021, compared to the same period last year, due to higher service revenues, offset in part by lower product revenues. Service revenues grew by 6.3% year over year, driven by the continued growth in our mobile phone postpaid subscriber base, greater outbound roaming revenues from higher international roaming due to the easing of COVID-19 travel restrictions, and the flow-through of rate increases, combined with mix shift to higher-value monthly plans. This was moderated by lower data and voice overages, driven by greater customer adoption of monthly plans with higher data and voice minutes thresholds. Product revenues declined by 3.6% year over year, due to lower contracted sales volumes driven by fewer customer device upgrades and a greater mix of bring-your-own device customer activations due in part to global supply chain challenges driven by the COVID-19 pandemic. The decline in consumer electronic sales at The Source was similarly impacted by global supply chain challenges. These factors were moderated by a greater sales mix of premium mobile phones, offset in part by greater discounting during the holiday period.

**Bell Wireless adjusted EBITDA** increased by 5.3% in Q4 2021, compared to the same period last year, due to higher operating revenues, partly offset by higher operating costs. The increase in operating costs was mainly due to greater network operating costs related to the ongoing deployment of our mobile 5G network, higher cost of goods sold due to the greater sales mix of premium mobile phones and increased handset costs, moderated by lower contracted sales volumes. Greater payments to other carriers associated with the increase in roaming revenues from the easing of COVID-19 travel restrictions also contributed to the increase in operating costs, offset in part by lower labour costs. Adjusted EBITDA margin of 38.4% in Q4 2021 increased by 0.9 pts, compared to the same period last year, primarily driven by the flow-through of the service revenue growth and a lower proportion of low-margin product sales in our total revenue base.

**Bell Wireline operating revenues** declined by 0.5% in Q4 2021, compared to the same period last year, driven by lower product revenues. Service revenues remained stable year over year as the growth from the continued expansion of our retail Internet and IPTV subscriber bases, flow-through of residential rate increases, and higher business solution services sales, were largely offset by ongoing voice and legacy data erosion, declining satellite TV subscriber base, as well as higher acquisition, retention and bundle discounts on residential services. Product revenues declined by 10.5% in Q4 2021, compared to Q4 2020, mainly due to lower sales in our large business markets driven by global supply chain challenges due to the COVID-19 pandemic.

**Bell Wireline adjusted EBITDA** increased by 1.1% in Q4 2021 compared to the same period last year, from operating expense savings, moderated by lower year-over-year operating revenues. The decrease in operating costs was mainly driven by lower product cost of goods sold and payments to other carriers relating to the revenue decline, along with greater costs in 2020 attributable to the COVID-19 pandemic, mainly employee redeployment costs, and purchase of PPE. Adjusted EBITDA margin of 43.1% in Q4 2021 increased by 0.7 points over the same period in 2020, due to reduced operating costs, along with a decreased proportion of low-margin product sales in our total revenue base.

**Bell Media operating revenues** increased by 7.3% in Q4 2021, compared to the same period last year, from higher advertising and subscriber revenues. This includes growth in digital revenues of 36% in Q4 2021 compared to the same period last year. Advertising revenues increased by 11.8% in Q4 2021, compared to the same period in 2020, driven by growth in TV and OOH revenues, offset in part by a modest decline in radio advertising revenues. The growth in TV and OOH revenues reflects the ongoing recovery from the impacts of the COVID-19 pandemic, due to increased demand by advertisers and greater circulation and foot traffic, which favourably impacted OOH. The radio market is experiencing a slower recovery from the effects of the pandemic. Specialty TV advertising revenues benefited from the regular start to the sports season (return of CFL along with National Hockey League (NHL) and NBA regular season starts) compared to delayed starts in 2020 due to the COVID-19 pandemic. Conventional TV also benefited from the return of a full fall 2021 programming schedule. Subscriber revenues increased by 1.9% in Q4 2021, compared to the same period last year, primarily due to the continued growth in DTC subscribers from Crave.

**Bell Media adjusted EBITDA** decreased by 19.0% in Q4 2021, compared to the same period last year, as the increase in operating costs exceeded the growth in revenues. Operating costs increased in Q4 2021, compared to Q4 2020, from greater programming and production costs related to higher sports rights and broadcasting costs due to the regular start of sports seasons along with a full fall 2021 TV programming schedule compared to delays and/or cancellations in Q4 2020 as a result of the COVID-19 pandemic.

**BCE capital expenditures** of $1,459 million in Q4 2021 declined by 2.3%, or $35 million, compared to Q4 2020. This drove a capital intensity of 23.5% in the quarter, down 1.0 pts over the same period last year. The year-over-year decline in spending was due to a significant ramp-up in construction activity in Q4 2020 following a slower pace of spending earlier in 2020 due to the COVID-19 pandemic. Wireless capital spending decreased by $118 million year over year, mainly due to timing of spend as we continued to roll out our mobile 5G network in the quarter. Wireline capital investments increased by $80 million year over year, from the ongoing deployment of our FTTP and fixed WTTP networks, as well as greater investment in customer service digital enhancements.

**BCE severance, acquisition and other costs** of $63 million in Q4 2021 increased by $11 million, compared to Q4 2020, mainly due to higher severance costs related to involuntary and voluntary employee terminations, partly offset by lower acquisition and other costs.

**BCE depreciation** of $925 million in Q4 2021 increased by $53 million, year over year, mainly due to accelerated depreciation of 4G network elements as we transition to 5G, and a higher asset base as we continued to invest in our broadband and wireless networks as well as our IPTV services.

**BCE amortization** of $251 million in Q4 2021 increased by $18 million, year over year, mainly due to a higher asset base.

**BCE interest expense** of $275 million in Q4 2021 increased by $1 million, compared to Q4 2020, mainly due to higher average debt levels, partly offset by lower interest rates.

**BCE other income** of $26 million in Q4 2021 increased by $64 million, year over year, mainly due to higher net mark-to-market gains on derivatives used to economically hedge equity settled share-based compensation plans partly offset by a loss on our equity investments related to BCE's obligation to repurchase at fair value the minority interest in one of BCE's joint ventures.

**BCE income taxes** of $249 million in Q4 2021 increased by $58 million, compared to Q4 2020, mainly as a result of a lower value of previously unrecognized tax benefits and higher taxable income.

**BCE net earnings attributable to common shareholders** of $625 million in Q4 2021, or $0.69 per share, were lower than the $889 million, or $0.98 per share, reported in Q4 2020. The year-over-year decrease was mainly due to lower net earnings from discontinued operations as a result of a gain on sale, net of taxes, of $211 million in Q4 2020 from the completion of the sale of substantially all of our data centre operations, higher depreciation and amortization, higher income taxes and higher impairment of assets, partly offset by higher other income and higher adjusted EBITDA. Adjusted net earnings decreased to $692 million in Q4 2021, compared to $731 million in Q4 2020, and adjusted EPS decreased to $0.76, from $0.81 in Q4 2020.

**BCE cash flows from operating activities** was $1,743 million in Q4 2021 compared to $1,631 million in Q4 2020. The increase is mainly attributed to lower income taxes paid due to timing as well as lower interest paid and higher adjusted EBITDA, partly offset by higher severance and other costs paid.

**BCE free cash flow** generated in Q4 2021 was $236 million, compared to $92 million in Q4 2020. The increase was mainly attributable to higher cash flows from operating activities, excluding cash from discontinued operations and acquisition and other costs paid, and lower capital expenditures.



## SEASONALITY CONSIDERATIONS

Some of our segments' revenues and expenses vary slightly by season, which may impact quarter-to-quarter financial results. The nature of the COVID-19 pandemic has had significant impacts on our business. Due to uncertainties relating to the severity and duration of the COVID-19 pandemic and possible resurgences in the number of COVID-19 cases, including as a result of the potential emergence of other variants, and various potential outcomes, it is difficult at this time to estimate the impacts of the COVID-19 pandemic on our business or future financial results. Therefore, the typical seasonal variations described below may not fully reflect the trends experienced during the COVID-19 pandemic and more recent supply chain disruptions, which affected and continue to affect customer behaviour and spending, as well as the way we operate our business. Accordingly, it is difficult at this time to estimate the impacts of the COVID-19 pandemic on the seasonality trends that normally characterize our business.

**Bell Wireless** operating results are influenced by the timing of new mobile device launches and seasonal promotional periods, such as back-to-school, Black Friday and the Christmas holiday period, as well as the level of overall competitive intensity. Because of these seasonal effects, subscriber additions and retention costs due to device upgrades related to contract renewals are typically higher in the third and fourth quarters. For ARPU, historically we have experienced seasonal sequential increases in the second and third quarters, due to higher levels of usage and roaming in the spring and summer months, followed by historical seasonal sequential declines in the fourth and first quarters. However, this seasonal effect on ARPU has moderated, as unlimited voice and data options have become more prevalent, resulting in less variability in chargeable data usage.

**Bell Wireline** revenue tends to be higher in the fourth quarter because of historically higher data and equipment product sales to business customers. However, this may vary from year to year depending on the strength of the economy and the presence of targeted sales initiatives, which can influence customer spending. Home Phone, TV and Internet subscriber activity is subject to modest seasonal fluctuations, attributable largely to residential moves during the summer months and the back-to-school period in the third quarter. Targeted marketing efforts conducted during various times of the year to coincide with special events or broad-based marketing campaigns also may have an impact on overall wireline operating results.

**Bell Media** revenue and related expenses from TV and radio broadcasting are largely derived from the sale of advertising, the demand for which is affected by prevailing economic conditions as well as cyclical and seasonal variations. Seasonal variations are driven by the strength of TV ratings, particularly during the fall programming season, major sports league seasons and other special sporting events such as the Olympic Games, NHL and NBA playoffs and World Cup soccer, as well as fluctuations in consumer retail activity during the year.

# 8 Regulatory environment

## 8.1 Introduction

This section describes certain legislation that governs our business and provides highlights of recent regulatory initiatives and proceedings, government consultations and government positions that affect us, influence our business and may continue to affect our ability to compete in the marketplace. Bell Canada and several of its direct and indirect subsidiaries, including Bell Mobility, Bell ExpressVu Limited Partnership (ExpressVu), Bell Media, NorthernTel, Limited Partnership (NorthernTel), Télébec, Limited Partnership (Télébec) and Northwestel, are governed by the *Telecommunications Act*, the *Broadcasting Act*, the *Radiocommunication Act* and/or the *Bell Canada Act*. Our business is affected by regulations, policies and decisions made by various regulatory agencies, including the CRTC, a quasi-judicial agency of the Government of Canada responsible for regulating Canada's telecommunications and broadcasting industries, and other federal government departments, in particular ISED and the Competition Bureau. As a result of the COVID-19 pandemic, additional legislation or regulations, regulatory initiatives or proceedings, or government consultations or positions, may be adopted or instituted, as the case may be, that impose additional constraints on our operations and may adversely impact our ability to compete in the marketplace.

In particular, the CRTC regulates the prices we can charge for retail telecommunications services when it determines there is not enough competition to protect the interests of consumers. The CRTC has determined that competition is sufficient to grant forbearance from retail price regulation under the *Telecommunications Act* for the vast majority of our retail wireline and wireless telecommunications services. The CRTC can also mandate the provision of access by competitors to our wireline and wireless networks and the rates we can charge them. Notably, it currently mandates wholesale high-speed access for wireline broadband as well as domestic wireless roaming services and is implementing a wholesale facilities-based mobile virtual network operator (MVNO) access service. Lower mandated wholesale rates or the imposition of unfavourable terms for mandated services could undermine our incentives to invest in network improvements and extensions, limit our flexibility, influence the market structure, improve the business position of our competitors, limit network-based differentiation of our services and negatively impact the financial performance of our businesses. Our TV distribution and our TV and radio broadcasting businesses are subject to the *Broadcasting Act* and are, for the most part, not subject to retail price regulation.

Although most of our retail services are not price-regulated, government agencies and departments such as the CRTC, ISED, Canadian Heritage and the Competition Bureau continue to play a significant role in regulatory matters such as mandatory access to networks, spectrum auctions, the imposition of consumer-related codes of conduct, approval of acquisitions, broadcast and spectrum licensing, foreign ownership requirements, and control of copyright piracy. Adverse decisions by governments or regulatory agencies, increasing regulation or a lack of effective anti-piracy remedies could have negative financial, operational, reputational or competitive consequences for our business.

### REVIEW OF KEY LEGISLATION

On February 2, 2022, the Government of Canada tabled Bill C-11, the Online Streaming Act. Key among the proposed amendments to the Broadcasting Act is that both foreign and domestic online broadcasting undertakings doing business in Canada could be required to contribute to the Canadian broadcasting system in a manner that the CRTC deems appropriate. If enacted, the specifics of such contribution will be determined through the CRTC's public consultation processes and enforced by way of conditions imposed by the CRTC. The impact, if any, of the proposed amendments to the Broadcasting Act on our business and financial results is unclear at this time.

## 8.2 Telecommunications Act

The *Telecommunications Act* governs telecommunications in Canada. It defines the broad objectives of Canada's telecommunications policy and provides the Government of Canada with the power to give general direction to the CRTC on any of its policy objectives. It applies to several of the BCE group of companies and partnerships, including Bell Canada, Bell Mobility, NorthernTel, Télébec and Northwestel.

Under the *Telecommunications Act*, all facilities-based telecommunications service providers in Canada, known as telecommunications common carriers (TCCs), must seek regulatory approval for all telecommunications services, unless the services are exempt or forborne from regulation. Most retail services offered by the BCE group of companies are forborne from retail regulation. The CRTC may exempt an entire class of carriers from regulation under the *Telecommunications Act* if the exemption meets the objectives of Canada's telecommunications policy. In addition, a few large TCCs, including those in the BCE group, must also meet certain Canadian ownership requirements. BCE monitors and periodically reports on the level of non-Canadian ownership of its common shares.

### REVIEW OF MOBILE WIRELESS SERVICES

On February 28, 2019, the CRTC launched its planned review of the regulatory framework for mobile wireless services. The main issues in the CRTC's consultation included (i) competition in the retail market; (ii) the current wholesale mobile wireless service regulatory framework, with a focus on wholesale MVNO access; and (iii) the future of mobile wireless services in Canada, with a focus on reducing barriers to infrastructure deployment. On April 15, 2021, the CRTC released its decision, which requires Bell Mobility, Rogers Communications Canada Inc., Telus Communications Inc. (Telus) and Saskatchewan Telecommunications (SaskTel) to provide MVNO access to their networks to regional wireless carriers to allow them to operate as MVNOs in ISED Tier 4 spectrum licence areas where they own spectrum. The terms and conditions for MVNO access will be established in tariffs to be approved by the CRTC. The rate for MVNO access will not be subject to the CRTC tariff regime but instead is to be commercially negotiated between the parties with final offer arbitration by the CRTC as a recourse if negotiations fail. The CRTC indicated that the mandated access service is intended to be a temporary measure and will, in the absence of certain implementation delays, be phased out seven years from the date tariffed terms and conditions are finalized. In the decision, the CRTC has also required Bell Mobility, Rogers Communications Canada Inc. and Telus to provide seamless handoffs as part of the CRTC's existing mandated domestic roaming service and has confirmed that its mandatory roaming obligations apply to 5G. On July 14, 2021, Bell Mobility, Rogers Communications Canada Inc., Telus, and SaskTel filed proposed tariff terms and conditions for the mandated MVNO access service and Bell Mobility, Rogers and Telus filed proposed amendments to their mandated roaming tariffs to reflect the CRTC's determinations. The CRTC's review process for the proposed tariffs and amendments is ongoing. It is unclear what impact, if any, the measures set out in this decision could have on our business and financial results, and our ability to make investments at the same levels as we have in the past. Further to the release of the CRTC's decision, a petition was brought by DOT Mobile before Cabinet to eliminate eligibility requirements for mandated MVNO access and establish tariffed rates for the service.

### MANDATED DISAGGREGATED WHOLESALE ACCESS TO FTTP NETWORKS

On July 22, 2015, in Telecom Regulatory Policy CRTC 2015-326, the CRTC mandated the introduction of a new disaggregated wholesale high-speed access service, including over FTTP facilities. The first stage of its implementation took place only in Ontario and Québec. This adverse regulatory decision may impact the specific nature, magnitude, location and timing of our future FTTP investment decisions. In particular, the introduction by the CRTC of mandated wholesale services over FTTP undermines the incentives for facilities-based digital infrastructure providers to invest in next-generation wireline networks, particularly in smaller communities and rural areas.

On August 29, 2017, in Telecom Order CRTC 2017-312, the CRTC set interim rates for the new disaggregated wholesale high-speed access service. The final rates remain to be determined. On June 11, 2020, the CRTC launched a new proceeding (refer to section B. III.2.5 Review of network configuration for disaggregated wholesale access below) to reconsider the network configuration of the disaggregated wholesale high-speed access service it mandated in 2015 and suspended the finalization of the interim rates and terms of tariff that were set in 2017 until further notice. The mandating of final rates that are materially different from the rates we proposed could further impact our investment strategy, improve the business position of our competitors and adversely impact our financial results.

### CNOC's APPLICATION ON RETAIL FTTP BROADBAND SERVICES

On January 8, 2021, Canadian Network Operators Consortium Inc. (CNOC) filed an application with the CRTC asking for an order mandating Bell Canada and other large providers to sell retail FTTP broadband services to ISPs, at a mandated discount off the retail price. ISPs would then resell these services under their own brands. CNOC proposed that this mandated access to retail FTTP services would last until the CRTC completes its reviews of all current and near-term proceedings related to wholesale high-speed services. The implementation of CNOC's proposal would undermine the incentives for facilities-based digital infrastructure providers to invest in next-generation wireline networks, particularly in smaller communities and rural areas, as well as improve the business position of our competitors and adversely impact our financial results.

### REVIEW OF WHOLESALE FTTN HIGH-SPEED ACCESS SERVICE RATES

As part of its ongoing review of wholesale Internet rates, on October 6, 2016, the CRTC significantly reduced, on an interim basis, some of the wholesale rates that Bell Canada and other major providers charge for access by third-party Internet resellers to FTTN or cable networks, as applicable. On August 15, 2019, the CRTC further reduced the wholesale rates that Internet resellers pay to access network infrastructure built by facilities-based providers like Bell Canada, with retroactive effect back to March 2016.

The August 2019 decision was stayed, first by the Federal Court of Appeal and then by the CRTC, with the result that it never came into effect. In response to review and vary applications filed by each of Bell Canada, five major cable carriers (Cogeco Communications Inc., Bragg Communications Inc. (Eastlink), Rogers Communications Inc., Shaw Communications Inc. and Vidéotron Ltée) and Telus Communications Inc., the CRTC issued Decision 2021-182 on May 27, 2021, which mostly reinstated the rates prevailing prior to August 2019 with some reductions to the Bell Canada rates with retroactive effect to March 2016. As a result, in the second quarter of 2021, we recorded a reduction in revenue of $44 million in our consolidated income statements.

While there remains a requirement to refund monies to third-party Internet resellers, the establishment of final wholesale rates that are similar to those prevailing since 2019 reduces the impact of the CRTC's long-running review of wholesale Internet rates and ensures a better climate for much-needed investment in advanced networks. The decision is being challenged by at least one reseller, TekSawy Solutions Inc. (TekSawy), before the Federal Court of Appeal, where TekSawy obtained leave to appeal the decision, and in three petitions brought by TekSawy, Competitive Network Operators of Canada (CNOC) and National Capital Freenet before Cabinet to overturn the decision.

### REVIEW OF NETWORK CONFIGURATION FOR DISAGGREGATED WHOLESALE ACCESS

On June 11, 2020, the CRTC launched a proceeding to reconsider the network configuration of the disaggregated wholesale high-speed access service mandated of Bell Canada and large cable carriers. The consultation aims to adopt a model applicable to wholesale providers across the country. It may also result in the adoption of a different level of disaggregation for Bell Canada than had been mandated in 2015 as discussed under *Mandated disaggregated wholesale access to FTTP networks* above. The launch of this new consultation has suspended the finalization of the rates of Bell Canada's existing disaggregated high-speed access service, which will remain at their current interim level until further notice. Revisions that facilitate reseller access to disaggregated wholesale access and/or the mandating of final rates that are materially different from the rates Bell Canada has proposed could undermine the incentives for facilities-based digital infrastructure providers to invest in next-generation wireline networks, improve the business position of resellers of high-speed access services and adversely impact our financial results.

### REVIEW OF THE APPROACH TO RATE SETTING FOR WHOLESALE TELECOMMUNICATIONS SERVICES

On April 24, 2020, the CRTC launched a proceeding to reconsider the current approach used by the CRTC to set rates for mandated wholesale telecommunications services. The proceeding aims to consider the most appropriate methodology for ensuring that such rates are just and reasonable and are established in an efficient manner. This may result in the adoption of a new costing approach that substantially differs from the current Phase II costing methodology. Phase II is a prospective incremental costing methodology currently used by the CRTC to determine rates for regulated wholesale services. If the current Phase II costing methodology is revised or replaced, the impact of such changes may result in more efficient and transparent rate setting, or it may result in a rate-setting process that favours resellers and undermines incentives for facilities-based investment. At this time, it is unclear what impact, if any, the results of the proceeding could have on our business and financial results.

### CRTC REVIEW OF ACCESS TO POLES

On October 30, 2020, the CRTC launched a proceeding to request comments on potential regulatory measures to make access to poles owned by TCCs, such as Bell Canada, more efficient. As part of this proceeding, the CRTC requested comments on whether there should be maximum time limits for the completion of make ready work (i.e. work that is required in certain instances to be carried out on a pole prior to network deployment activities to either add capacity or ensure it can safely accommodate the deployment activities); whether all occupants of a pole should be responsible for the costs associated with pole maintenance and make-ready work; whether there should be a limit on the amount of time for which a pole owner can reserve spare capacity on a pole; and whether the CRTC can and should take steps to improve access to electric utility poles, having regard to the limit of its jurisdiction. We have implemented improvements to our pole access procedures and requested CRTC approval for the implementation of a "one touch make ready" process, starting with a trial in Québec. This proceeding may result in other modifications to the current regulatory process for access to poles. At this time, it is unclear what impact, if any, the results of the proceeding could have on our business and financial results.

### CANADA'S TELECOMMUNICATIONS FOREIGN OWNERSHIP RULES

Under the *Telecommunications Act*, there are no foreign investment restrictions applicable to TCCs that have less than a 10% share of the total Canadian telecommunications market as measured by annual revenues. However, foreign investment in telecommunications companies can still be refused by the government under the *Investment Canada Act*. The absence of foreign ownership restrictions on such small or new entrant TCCs could result in more foreign companies entering the Canadian market, including by acquiring spectrum licences or Canadian TCCs.



## 8.3 Broadcasting Act

The *Broadcasting Act* outlines the broad objectives of Canada's broadcasting policy and assigns the regulation and supervision of the broadcasting system to the CRTC. Key policy objectives of the *Broadcasting Act* are to protect and strengthen the cultural, political, social and economic fabric of Canada and to encourage the development of Canadian expression.

Most broadcasting activities require a programming or broadcasting distribution licence from the CRTC. The CRTC may exempt broadcasting undertakings from complying with certain licensing and regulatory requirements if it is satisfied that non-compliance will not materially affect the implementation of Canadian broadcasting policy.

A corporation must also meet certain Canadian ownership and control requirements to obtain a broadcasting or broadcasting distribution licence, and corporations must have the CRTC's approval before they can transfer effective control of a broadcasting licensee.

Our TV distribution operations and our TV and radio broadcasting operations are subject to the requirements of the Broadcasting Act, the policies and decisions of the CRTC and their respective broadcasting licences. Any changes in the Broadcasting Act, amendments to regulations or the adoption of new ones, or amendments to licences, could negatively affect our competitive position or the cost of providing services.

## 8.4 Radiocommunication Act

ISED regulates the use of radio spectrum under the *Radiocommunication Act* to ensure that radiocommunication in Canada is developed and operated efficiently. All companies wishing to operate a wireless system in Canada must hold a spectrum licence to do so. Under the *Radiocommunication Regulations*, companies that are eligible for radio licences, such as Bell Canada and Bell Mobility, must meet the same ownership requirements that apply to companies under the *Telecommunications Act*.

### 3500 MHZ SPECTRUM AUCTION

On July 29, 2021, provisional spectrum licence winners in the 3500 MHz spectrum auction were announced by ISED. Bell Mobility secured the right to acquire 271 licences in a number of urban and rural markets for 678 million MHz-Pop of 3500 MHz spectrum for $2.07 billion. On August 13, 2021, Bell Mobility made the required deposit of $415 million to ISED. On November 18, 2021, ISED released a Decision on Amendments to SRSP-520, *Technical Requirement for Fixed and/or Mobile Systems, Including Flexible Use Broadband Systems, in the Band 3450–3650 MHz*, in which it amended the technical specifications for use of 3500 MHz spectrum, primarily around major airports. The amended technical specifications will constrain the ability of 3500 MHz licensees to use this spectrum band around major airports and under certain conditions while ISED conducts additional research on the issue. It is unknown at this time how long such constraints will remain in effect. On December 17, 2021, Bell Mobility made the final auction payment for the 3500 MHz spectrum licences acquired in the auction and its spectrum licences were awarded by ISED on the same date.

### CONSULTATION ON 3800 MHZ SPECTRUM LICENSING FRAMEWORK

On December 17, 2021, ISED initiated a consultation seeking input regarding a technical, policy and licensing framework to govern the auction and use of spectrum licences in the 3800 MHz band. The consultation paper seeks comments on the use of a spectrum set-aside for certain auction bidders, a cross-band spectrum cap (with the 3500 MHz band), or a combination of both. ISED proposes that the auctioned licences will have a 20-year term and that there will be limits on the transferability of licences for the first five years of the licence term. In addition, ISED proposes that licensees will be required to provide network coverage to a certain percentage of the population in each licence area at 5, 7, 10 and 20 years following licence issuance. ISED has not yet indicated a specific date when the auction will take place. It is unclear what impact the results of this consultation and future related processes could have on our business and financial results.

### DECISION ON RELEASING MILLIMETRE WAVE SPECTRUM TO SUPPORT 5G

On June 5, 2019, ISED issued its Decision on *Releasing Millimetre Wave Spectrum to Support 5G*. In this decision, ISED announced that spectrum in the 26 gigahertz (GHz), 28 GHz, and 37-40 GHz bands will transition from satellite use to flexible use (i.e., mobile or fixed use). ISED will designate the 64-71 GHz band for licence-exempt operations on a no-interference, no-protection basis. ISED indicated that it will establish the details and specific rules through one or more future consultations. It is unclear what impact the results of this decision and future related processes could have on our business and financial results.

## 8.5 Bell Canada Act

Among other things, the *Bell Canada Act* limits how Bell Canada voting shares and Bell Canada facilities may be sold or transferred. Specifically, under the *Bell Canada Act*, the CRTC must approve any sale or other disposal of Bell Canada voting shares that are held by BCE, unless the sale or disposal would result in BCE retaining at least 80% of all of the issued and outstanding voting shares of Bell Canada. Except in the ordinary course of business, the sale or other disposal of facilities integral to Bell Canada's telecommunications activities must also receive CRTC approval.

## 8.6 Other

### REVIEW OF THE CRTC'S REGULATORY FRAMEWORK FOR NORTHWESTEL

On November 2, 2020, the CRTC launched a proceeding to review the regulatory framework for Northwestel and the state of telecommunications services in Canada's North. This proceeding may result in modifications to the current regulatory framework for Northwestel, including with respect to issues such as rates, wholesale access and subsidies. Modifications to the current regulatory framework may result in additional subsidies and rate flexibility for Northwestel, which would encourage investment, or they may result in rate restrictions or additional wholesale obligations, which would undermine incentives for investment in the North. At this time, it is unclear what impact, if any, the results of the proceeding could have on our business and financial results.

# 9 Business risks

A risk is the possibility that an event might happen in the future that could have a negative effect on our business, financial condition, liquidity, financial results or reputation. The actual effect of any event could be materially different from what we currently anticipate. The risks described in this MD&A are not the only ones that could affect us. Additional risks and uncertainties not currently known to us or that we currently deem to be immaterial may also materially and adversely affect our business, financial condition, liquidity, financial results or reputation.

This section describes the principal business risks that could have a material adverse effect on our business, financial condition, liquidity, financial results or reputation, and cause actual results or events to differ materially from our expectations expressed in, or implied by, our forward-looking statements. Certain of these principal business risks have already been discussed in other sections of this MD&A, and we refer the reader to those sections for a discussion of such risks. All of the risk discussions set out in the sections referred to in the table below, as well as the risk discussion relating to the COVID-19 pandemic and general economic conditions set out in Section 3.3, *Principal business risks*, are incorporated by reference in this section 9.

| RISKS DISCUSSED IN OTHER SECTIONS OF THIS MD&A | SECTION REFERENCES |
|---|---|
| Competitive environment | Section 3.3, *Principal business risks*<br>Section 5, *Business segment analysis* (*Competitive landscape and industry trends* section for each segment) |
| Regulatory environment | Section 3.3, *Principal business risks*<br>Section 8, *Regulatory environment* |
| Security management and data governance | Section 3.3, *Principal business risks* |
| Risks specifically relating to our Bell Wireless, Bell Wireline and Bell Media segments | Section 5, *Business segment analysis* (*Principal business risks* section for each segment) |

The other principal business risks that could also have a material adverse effect on our business, financial condition, liquidity, financial results or reputation are discussed below.

## TECHNOLOGY/INFRASTRUCTURE TRANSFORMATION

***The evolution and transformation of our networks, systems and operations using next-generation technologies, while lowering our cost structure, are essential to effective competition and customer experience***

Globalization, increased competition and ongoing technological advances are driving customer expectations for faster market responses, improved customer service, enhanced user experiences and cost-effective delivery. Meeting these expectations requires the deployment of new service and product technologies along with customer service tools that are network-neutral and based on a more collaborative and integrated development environment. The availability of improved networks and software technologies further provides the foundation for better and faster connections, which have in turn led to a significant growth in IoT applications. Change can be difficult and may present unforeseen obstacles that might impact successful execution, and this transition is made more challenging by the complexity of our multi-product environment, combined with the complexity of our network and IT infrastructure. The failure to accurately assess the potential of new technologies, or to invest and evolve in the appropriate direction in an environment of changing business models, could have an adverse impact on our business and financial results.

In particular, our network and IT evolution activities seek to use new as well as evolving and developing technologies, including network functions virtualization, software-defined networks, cloud technologies, multi-edge computing, open source software, AI and machine learning. They further seek to transform our network and systems through consolidation, virtualization and automation to achieve our objectives of becoming more agile in our service delivery and operations, as well as providing omni-channel capabilities for our customers. Our evolution activities also focus on building next-generation converged wireline and wireless networks, to enable competitive quality and customer experience at a competitive cost structure amid rapidly growing capacity requirements. Alignment across technology platforms, product and service development and operations is increasingly critical to ensure appropriate trade-offs and optimization of capital allocation. Failure to continue to transform our operations to enable a truly customer-centric service experience may hinder our ability to build customers' trust in our innovation and technological capabilities and to compete on footprint, service experience and cost structure. All of the above could have an adverse impact on our business, financial results and reputation.

Customer retention and new customer acquisitions may be hindered during the migration process resulting from our transformation activities if it causes poor service performance, which in turn may adversely affect the ability to achieve our operational and financial objectives. Failure to maximize adaptable infrastructures, processes and technologies to quickly and efficiently respond to evolving customer patterns and behaviours and to leverage IP across all facets of our network and product and service portfolio could inhibit a fully customer-centric approach. It could reduce our ability to provide comprehensive self-serve convenience, real-time provisioning, cost savings and flexibility in delivery and consumption, leading to negative business and financial outcomes.

In parallel to our focus on next-generation investments, adverse regulatory or court decisions may impact the specific nature, magnitude, location and timing of investment decisions. In particular, the lowering of rates by the CRTC of mandated wholesale services over FTTP, the imposition of unfavourable terms or the adoption of unfavourable rates in arbitration processes associated with the facilities-based MVNO access service the CRTC is implementing, the potential for additional mandated access to our networks, or the imposition of broader wholesale obligations on wireless networks would undermine the incentives for facilities-based digital infrastructure providers to invest in next-generation wireline and wireless networks. Failure to continue investment in next-generation capabilities in a disciplined and strategic manner could limit our ability to compete effectively and achieve desired business and financial results.

Other examples of risks affecting the achievement of our desired technology/infrastructure transformation include the following:

- The ongoing COVID-19 pandemic may bring about further incremental costs, delays, unavailability of equipment and materials or inability to access customer premises, as well as unavailability of our employees, or those of our suppliers or contractors, due to government actions, illness, quarantines, absenteeism, workforce reduction initiatives, or other restrictive measures, which may impact our ability to expand our networks or to start, advance or complete both currently planned network deployment projects and other projects
- The operational adaptation to the COVID-19 pandemic and the new flexible work models we and other stakeholders are implementing require a cultural shift and may bring potential volatility, which could impact transformation activities
- We, and other telecommunications carriers upon which we rely to provide services, must be able to purchase high-quality, reputable network equipment and services from third-party suppliers on a timely basis and at a reasonable cost
- Network construction and deployment on municipal or private property requires the issuance of municipal or property owner consents, respectively, for the installation of network equipment, which could increase the cost of, and cause delays in, fibre and wireless rollouts
- Suboptimal capital deployment in network build, infrastructure and process upgrades, and customer service improvements, could hinder our ability to compete effectively
- The successful deployment of WTTP and 5G mobile services could be impacted by various factors affecting coverage and costs
- Higher demand for faster Internet speed and capacity, coupled with governmental policies and initiatives, creates tensions around FTTP and WTTP deployment in terms of geographic preference and pace of rollout
- The increasing dependence on applications for content delivery, sales, customer engagement and service experience drives the need for new and scarce capabilities (sourced internally or externally), that may not be available, as well as the need for associated operating processes integrated into ongoing operations
- New products, services or applications could reduce demand for our existing, more profitable service offerings or cause prices for those services to decline, and could result in a shorter lifecycle for existing or developing technologies, which could increase depreciation and amortization expense
- As content consumption habits evolve and viewing options increase, our ability to aggregate and distribute relevant content and our ability to develop alternative delivery vehicles to compete in new markets and increase customer engagement and revenue streams may be hindered by the significant software development and network investment required
- Successfully managing the development and deployment of relevant product solutions on a timely basis to match the speed of adoption of IoT in the areas of retail, business and government could be challenging
- Customers continue to expect improvements in customer service, new functions and features, and reductions in the price charged to provide those services. Our ability to provide such improvements increasingly relies upon using a number of rapidly evolving technologies, including AI, machine learning, and "big data". However, the use of such technologies is being increasingly scrutinized by legislators and regulators. If we cannot build market-leading competencies in the use of these emerging technologies in a way that respects societal values, we may not be able to continue to meet changing customer expectations and to continue to grow our business.

## CUSTOMER EXPERIENCE

***Driving a positive customer experience in all aspects of our engagement with customers is important to avoid brand degradation and other adverse impacts on our business and financial performance***

As the bar continues to be raised by customers' evolving expectations of service and value, failure to get ahead of such expectations and build a more robust and consistent service experience at a fair value proposition could hinder product and service differentiation and customer loyalty. The foundation of effective customer service is our ability to deliver high-quality, consistent and simple solutions to customers in an expeditious manner and on mutually agreeable terms. However, complexity in our operations resulting from multiple technology platforms, ordering and billing systems, sales channels, marketing databases and a myriad of rate plans, promotions and product offerings, in the context of a large customer base and a workforce that continuously requires to be trained, monitored and replaced, may limit our ability to respond quickly to market changes and reduce costs, and may lead to customer confusion or billing, service or other errors, which could adversely affect customer satisfaction, acquisition and retention. These challenges may be exacerbated as services become more complex. Media attention to customer complaints could also erode our brand and reputation and adversely affect customer acquisition and retention. In addition, the ongoing COVID-19 pandemic may bring about the unavailability of certain employees, or those of our suppliers or contractors, due to government actions, illness, quarantines, absenteeism or workforce reduction initiatives, which could negatively impact the rapidity of our response to customer demands and the overall customer experience.

With the proliferation of connectivity services, apps and devices, customers are accustomed to doing things when, how and where they want through websites, self-serve options, web chat, call centres and social media forums. These customer demands have intensified in response to the COVID-19 pandemic and the resulting shift to online transactions amid store closures. Understanding the customer relationship as a whole in a multi-product environment and delivering a simple, seamless experience at a fair price is increasingly central to an evolving competitive dynamic. While we introduced new services and tools, including self-managed solutions, designed to accelerate our customer experience evolution, we are unable to predict whether such services and tools will be sufficient to meet customer expectations. Failure to develop true omni-channel capabilities and improve our customer experience by digitizing and developing a consistent, fast and on-demand end-to-end experience before, during and after sales using new technologies such as AI and machine learning, in parallel with our network evolution, could also adversely affect our business, financial results, reputation and brand value.

Customers' perception of our products, services, brand and corporate image is also important. Failure to positively influence customer perceptions through effective communication, including through our use of social media and other communication media or otherwise, could adversely affect our business, financial results, reputation and brand value. In addition, customers increasingly factor broader considerations into purchase decisions and look for alignment of personal values with corporate behaviour. Embracing topics that matter to the stakeholder value proposition, such as increasing our focus on ESG subjects and on the reporting of same, adds an important layer to the customer perception of our company and thus to the overall customer experience.

## PEOPLE

***Our people are central to our success and attracting, developing and retaining a diverse and talented team capable of furthering our strategic imperatives is essential to driving a winning culture and outstanding performance***

Our business depends on the efforts, engagement and expertise of our management and non-management employees and contractors, who must be able to operate efficiently and safely based on their responsibilities and the environment in which they are functioning. Demand for highly skilled team members has recently intensified, as retiring workers, limited immigration and an increase in remote-work arrangements allowing more global competition have created an even more competitive marketplace. This emphasizes the importance of developing and maintaining a comprehensive and inclusive human resources strategy and employee value proposition to adequately compete for talent and to identify and secure high-performing candidates for a broad range of job functions, roles and responsibilities. Failure to appropriately train, motivate, remunerate or deploy employees on initiatives that further our strategic imperatives, or to efficiently replace retiring employees, could have an adverse impact on our ability to attract and retain talent and drive performance across the organization. Labour shortages could negatively affect our ability to implement our strategic priorities, as well as sell our products and services and more generally serve our customers.

Establishing a culture that drives inclusivity, employee engagement, development and progression is essential to attract and retain talent. In addition, employees are typically more engaged at work when their value system aligns with their employer's corporate values. Team members and organizations that share values also share a bigger purpose, and this match is critical to creating a long-lasting, successful and motivating place to work. We seek to foster an inclusive, equitable and accessible workplace where team members are valued, respected and supported, reflecting the diversity of the communities we serve and our desire to provide team members with the opportunity to reach their full potential. We further endeavour to establish programs and provide resources to support team members on a wide range of topics, including mental health services and support. Failure to establish robust programs to further these aspirations could adversely affect our ability to attract and retain team members. In addition, a wide range of ESG topics are increasingly important elements of corporate culture and embracing them reinforces our value proposition to drive employee attraction and retention. Failure to sufficiently address evolving employee expectations related to our culture and value proposition could also adversely affect our ability to attract and retain team members.

The COVID-19 pandemic introduced new, and amplified existing, people-related risks. From the beginning of the COVID-19 pandemic, we prioritized the health and safety of our team, including implementing strict sanitation and safety procedures, accelerated remote work arrangements, and providing enhanced access to workplace mental health services. In September 2021, anticipating our eventual return to the office, we introduced the Bell Workways program to help team members and leaders in managing work, family and other commitments by offering a new approach for our workplace that allows flexibility for team members on how and where they work, depending on their new designated role-based work profiles (remote, mobile or full-time office). We must nonetheless continue to manage health and safety concerns related to the COVID-19 pandemic in relation to our regular daily activities, and a prolongation of the COVID-19 pandemic could necessitate a delayed or more gradual return to the office. A further extended period of full-time remote work arrangements for those currently working from home could strain our business continuity plans and introduce additional operational risks or exacerbate our exposure to existing ones. Potential social or mental fatigue from adjusting to prolonged full-time remote work arrangements could further impact productivity, work/life balance and employees' mental health. In addition, should we fail to establish an optimal post-pandemic work arrangement or develop new leadership skills necessary in the context of a new hybrid model, this could impair our ability to engage and motivate employees, impact productivity, increase the number of employees on disability leave for mental health reasons, and introduce additional operational risks or exacerbate our exposure to existing ones, which could impair our ability to manage our business.

Other examples of people-related risks include the following:

- The increasing technical and operational complexity of our businesses and the high demand in the market for skilled resources in strategic areas create a challenging environment for hiring, retaining and developing such skilled resources

- Failure to establish a complete and effective succession plan, including preparation of internal talent and identification of potential external candidates, where relevant, for senior executive and other key roles, could impair our business until qualified replacements are found
- Ensuring the safety of our workforce operating in different environments, including manholes, telephone poles, cell towers, vehicles, foreign news bureaus and war zones, and/or in times of pandemic, requires focus, effective processes and flexibility to avoid injury, illness, service interruption, fines and reputational impact
- Potential deterioration in employee morale and engagement resulting from staff reductions, cost reductions or reorganizations could adversely affect our business and financial results

*Challenges related to collective agreements could adversely affect our business*

Approximately 39% of BCE employees were represented by unions and were covered by collective agreements at December 31, 2021. The positive engagement of members of our team represented by unions is contingent on negotiating collective agreements that deliver competitive labour conditions and uninterrupted service, both of which are critical to achieving our business objectives.

We cannot predict the outcome of collective agreement negotiations. Renewal of collective agreements could result in higher labour costs and be challenging in the context of a declining workload due to transformation, a maturing footprint and improved efficiencies. During the bargaining process there may be project delays and work disruptions, including work stoppages or work slowdowns, which could adversely affect service to our customers and, in turn, our customer relationships and financial performance.

## OPERATIONAL PERFORMANCE

*Our networks and IT systems are the foundation of high-quality consistent services, which are critical to meeting service expectations*

Our ability to provide high-quality consistent wireless, wireline and media services to customers in a complex and changing operating environment is crucial for sustained success. Network capacity demands for content offerings and other bandwidth-intensive applications on our wireline and wireless networks have been growing at unprecedented rates. Unexpected capacity pressures on our networks may negatively affect our network performance and our ability to provide services. Issues relating to network availability, speed, consistency and traffic management on our more current as well as our legacy networks could have an adverse impact on our business and financial performance. Furthermore, we will need to manage the possibility of instability as we transition towards converged wireline and wireless networks and newer technologies, including software-defined networks leveraging open source software and cloud services.

Stay-at-home and work-from-home measures implemented by governments and businesses during the COVID-19 pandemic have impacted the nature of our customers' use of our networks, products and services. This has created unprecedented capacity pressure on certain areas of our wireless, wireline and broadcast media networks in a short period of time. As a result of taking various steps to maintain service continuity, our networks have, in general, adequately sustained such increased usage, but there can be no assurance that this will continue to be the case. Home offices can be anywhere in the country and network performance and/or reliability may vary depending on the location. The recent trend for families to move from urban centres to less urbanized areas also increases the need to develop and/or enhance our network in areas that were not previously served or that were underserved. Network failures and slowdowns could adversely affect our brand and reputation, subscriber acquisition and retention as well as our financial results. We may also need to incur significant capital expenditures in order to provide additional capacity and reduce network congestion during the COVID-19 pandemic and beyond.

In addition, we currently use a very large number of interconnected internal and third-party operational and business support systems for provisioning, networking, distribution, broadcast management, ordering, billing and accounting, which may hinder our operational efficiency. If we fail to implement, maintain or manage highly effective IT systems supported by an effective governance and operating framework, this may lead to inconsistent performance and dissatisfied customers, which over time could result in higher churn.

Further examples of risks to operational performance that could impact our reputation, business operations and financial performance include the following:

- The ongoing COVID-19 pandemic may bring about further incremental costs, delays or unavailability of equipment and materials as well as unavailability of our employees or those of our suppliers or contractors, due to government actions, illness, quarantines, absenteeism, workforce reduction initiatives or other restrictive measures, which may impact our ability to maintain or upgrade our networks in order to accommodate substantially increased network usage due to stay-at-home and work-at-home measures and to provide the desired levels of customer service
- Failure to maintain required service delivery amid operational challenges (including those related to the COVID-19 pandemic and the availability of employees with the required skill set) and a transformation of our infrastructure and technology could adversely affect our brand, reputation and financial results
- Corporate restructurings, system replacements and upgrades, process redesigns, staff reductions and the integration of business acquisitions may not deliver the benefits contemplated and could adversely impact our ongoing operations
- Failure to streamline our significant IT legacy system portfolio and proactively improve operating performance could adversely affect our business and financial results
- We may experience more service interruptions or outages due to legacy infrastructure. In some cases, vendor support is no longer available or legacy vendor operations have ceased.
- There may be a lack of replacement parts and competent and cost-effective resources to perform the lifecycle management and upgrades necessary to maintain the operational status of legacy networks and IT systems
- Climate change increases the probability of severe weather-related events such as ice, snow and wind storms, wildfires, flooding, extended heat waves, hurricanes, tornadoes and tsunamis, all of which could impact network availability and performance and drive more repairs of network equipment

***Our operations and business continuity depend on how well we protect, test, maintain, replace and upgrade our networks, IT systems, equipment and other facilities***

Our operations, service performance, reputation and business continuity depend on how well we and our contracted product and service providers, as well as other telecommunications carriers on which we rely to provide services, protect networks and IT systems, as well as other infrastructure and facilities, from events such as information security attacks, unauthorized access or entry, fire, natural disasters, power loss, building cooling loss, acts of war or terrorism, sabotage, vandalism, actions of neighbours and other events. Climate change, especially in areas of greater environmental sensitivity, could heighten the occurrence of certain of the above-mentioned risks. Establishing response strategies and business continuity protocols to maintain service consistency if any disruptive event materializes is critical to the achievement of effective customer service. Any of the above-mentioned events, as well as the failure by us, or by other telecommunications carriers on which we rely to provide services, to complete planned and sufficient testing, maintenance, replacement or upgrade of our or their networks, equipment and other facilities, which is, among other factors, dependent on our or their ability to purchase equipment and services from third-party suppliers, could disrupt our operations (including through disruptions such as network failures, billing errors or delays in customer service), require significant resources and result in significant remediation costs, which in turn could have an adverse effect on our business and financial performance, or impair our ability to keep existing subscribers or attract new ones.

In addition, the ongoing COVID-19 pandemic may bring about further incremental costs, delays or unavailability of equipment and materials as well as unavailability of our employees or those of our suppliers or contractors, any of which could impact our operations and business continuity strategies.

***Satellites used to provide our satellite TV services are subject to significant operational risks that could have an adverse effect on our business and financial performance***

Pursuant to a set of commercial arrangements between ExpressVu and Telesat Canada (Telesat), we currently have satellites under contract with Telesat. Telesat operates or directs the operation of these satellites, which utilize highly complex technology and operate in the harsh environment of space and are therefore subject to significant operational risks while in orbit. These risks include in-orbit equipment failures, malfunctions and other problems, commonly referred to as anomalies, that could reduce the commercial usefulness of a satellite used to provide our satellite TV services. Acts of war or terrorism, magnetic, electrostatic or solar storms, or space debris or meteoroids could also damage such satellites. Any loss, failure, manufacturing defect, damage or destruction of these satellites, of our terrestrial broadcasting infrastructure or of Telesat's tracking, telemetry and control facilities to operate the satellites could have an adverse effect on our business and financial performance and could result in customers terminating their subscriptions to our satellite TV service.

## VENDOR MANAGEMENT/SUPPLY CHAIN

***We depend on third-party suppliers, outsourcers and consultants, some of which are critical, to provide an uninterrupted supply of the products and services we need, as well as comply with various obligations***

We depend on key third-party suppliers and outsourcers, over which we have no operational or financial control, for products and services, some of which are critical to our operations. If there are gaps in our vendor selection, governance or oversight processes established to seek to ensure full risk transparency at point of purchase and throughout the relationship, including any contract renegotiations, there is the potential for a breakdown in supply, which could impact our ability to make sales, service customers and achieve our business and financial objectives. In addition, any such gaps could result in suboptimal management of our vendor base, increased costs and missed opportunities. Some of our third-party suppliers and outsourcers are located in foreign countries, which increases the potential for a breakdown in supply due to the risks of operating in foreign jurisdictions with different laws, geopolitical environments and cultures, as well as the potential for localized natural disasters.

We may have to select different third-party suppliers for equipment or other products and services, or different outsourcers, in order to meet evolving internal company policies and guidelines as well as regulatory requirements. Should we decide, or be required by a governmental authority or otherwise, to terminate our relationship with an existing supplier or outsourcer, this would decrease the number of available suppliers or outsourcers and could result in significant increased costs, as well as transitional, support, service, quality or continuity issues; delay our ability to deploy new network and other technologies and offer new products and services; and adversely affect our business and financial results.

The use of third-party suppliers and the outsourcing of services generally involve transfer of risks, and we must take appropriate steps to ensure that our suppliers' and outsourcers' approach to risk management is aligned with our own standards in order to maintain continuity of supply and brand strength. Increased focus on supplier risks in areas of security, data governance, responsible procurement and broader ESG factors requires increased attention given that supplier actions or omissions could have significant impacts on our business, financial results, brand and reputation. Furthermore, as cloud-based supplier models continue to evolve and grow, which has accelerated in the context of remote work arrangements implemented in the context of the COVID-19 pandemic, our procurement and vendor management practices must also continue to evolve to fully address associated risk exposures.

In addition, certain company initiatives rely heavily on professional consulting services provided by third-parties, and a failure of such third party services may not be reasonably evident until their work is delivered or delayed. Difficulties in implementing remedial strategies in respect of professional consulting services provided by third parties that are not performed in a proper or timely fashion could result in an adverse effect on our ability to comply with various obligations, including applicable legal and accounting requirements.

Other examples of risks associated with third-party suppliers and outsourcers include the following:

- We rely upon the successful implementation and execution of business continuity plans by our product and service suppliers. To the extent that such plans do not successfully mitigate the impacts of the COVID-19 pandemic or other events and our suppliers or vendors experience operational failures or inventory constraints, such failures or constraints could result in supply chain disruptions that could adversely affect our business. Incremental costs, delays or unavailability of equipment, materials, products or services, as well as unavailability of our suppliers or contractors' employees, could adversely affect our business. Notably, our wireless product revenues and mobile phone and mobile connected device gross and net additions may be unfavourably impacted due to a global chip shortage attributable to the COVID-19 pandemic that is resulting in supply chain disruptions and inventory constraints for consumer electronics and mobile devices, including smartphones and tablets.

- The insolvency of one or more of our suppliers could cause a breakdown in supply and have an adverse effect on our operations, including our ability to make sales or service customers, as well as on our financial results
- Demand for products and services available from only a limited number of suppliers, some of which dominate their global market, may lead to decreased availability, increased costs or delays in the delivery of such products and services, since suppliers may choose to favour global competitors that are larger than we are and, accordingly, purchase a larger volume of products and services. In addition, production issues affecting any such suppliers, or other suppliers, could result in decreased quantities or a total lack of supply of products or services. Any of these events could adversely impact our ability to meet customer commitments and demand.
- A suboptimal outsourcing model could result in the loss of key corporate knowledge and reduced efficiency and effectiveness
- Cloud-based solutions may increase the risk of security and data leakage exposure if security control protocols implemented by our cloud-based partners or suppliers, or by us where we retain responsibility for such protocols, are inadequate
- Failure to maintain strong discipline around vendor administration (especially around initial account setup) may mask potential financial or operational risks and complicate future problem resolutions
- If products and services important to our operations have manufacturing defects or do not comply with applicable government regulations and standards (including product safety practices), our ability to sell products and provide services on a timely basis may be negatively impacted. We work with our suppliers to identify serious product defects (including safety incidents) and develop appropriate remedial strategies, which may include a recall of products. To the extent that a supplier does not actively participate in, and/or bear primary financial responsibility for, a recall of its products, our ability to perform such recall programs at a reasonable cost and/or in a timely fashion may be negatively impacted. Any of the events referred to above could have an adverse effect on our business, reputation and financial results.
- Products (including software) and services supplied to us may contain security issues including, but not limited to, latent security issues that would not be apparent upon an inspection. Should we or a supplier fail to correct a security issue in a timely fashion, there could be an adverse effect on our business, reputation and financial results.
- We rely on other telecommunications carriers from time to time to deliver services. Should these carriers fail to roll out new networks or fail to upgrade existing networks, or should their networks be affected by operational failures or service interruptions, such issues could adversely affect our ability to provide services using such carriers' networks and could, consequently, have an adverse effect on our business, reputation and financial results.
- BCE depends on call centre and technical support services provided by a number of external suppliers and outsourcers, some of which are located in foreign countries. These vendors have access to customer and internal BCE information necessary for the support services that they provide. Information access and service delivery issues that are not managed appropriately may have an adverse impact on our business, reputation, the quality and speed of services provided to customers, or our ability to address technical issues.



## FINANCIAL MANAGEMENT

***If we are unable to raise the capital we need or generate sufficient cash flows from operating activities, we may need to limit our capital expenditures or our investments in new businesses, or try to raise capital by disposing of assets***

Our ability to meet our cash requirements, fund capital expenditures and provide for planned growth depends on having access to adequate sources of capital and on our ability to generate cash flows from operating activities, which is subject to various risks, including those described in this MD&A.

Our ability to raise financing depends on our ability to access the public equity and debt capital markets, the money market, as well as the bank credit market. Our ability to access such markets and the cost and amount of funding available depend largely on prevailing market conditions and the outlook for our business and credit ratings at the time capital is raised.

Risk factors such as capital market disruptions, political, economic and financial market instability in Canada or abroad, government policies, central bank monetary policies, increasing interest rates, changes to bank capitalization or other regulations, reduced bank lending in general or fewer banks as a result of reduced activity or consolidation, could reduce capital available or increase the cost of such capital. In addition, an increased level of debt borrowings could result in lower credit ratings, increased borrowing costs and a reduction in the amount of funding available to us, including through equity offerings. Business acquisitions and our acquisition of wireless spectrum licences could also adversely affect our outlook and credit ratings and have similar adverse consequences. In addition, participants in the public capital and bank credit markets have internal policies limiting their ability to invest in, or extend credit to, any single entity or entity group or a particular industry. Finally, with increasing emphasis by the capital markets on ESG performance and reporting, there is a potential for the cost and availability of funding to be increasingly tied to the quality of our ESG practices and related disclosed metrics.

Our bank credit facilities, including credit facilities supporting our commercial paper program, are provided by various financial institutions. While it is our intention to renew certain of such credit facilities from time to time, there are no assurances that these facilities will be renewed on favourable terms or in similar amounts.

Global financial markets have experienced, and could again experience, significant volatility and weakness as a result of the COVID-19 pandemic. Economic uncertainty could negatively impact equity and debt capital markets, could cause interest rate and currency volatility and movements, and could adversely affect our ability to raise financing in the public capital, bank credit and/or commercial paper markets as well as the cost thereof. Additionally, the negative impact of the COVID-19 pandemic on our customers' financial condition could adversely affect our ability to recover payment of receivables from customers and lead to further increases in bad debts, thereby negatively affecting our revenues and cash flows, as well as our position under our securitized trade receivables program.

Differences between BCE's actual or anticipated financial results and the published expectations of financial analysts, as well as events affecting our business or operating environment, may contribute to volatility in BCE's securities. A major decline in the capital markets in general, or an adjustment in the market price or trading volumes of BCE's securities, may negatively affect our ability to raise debt or equity capital, retain senior executives and other key employees, make strategic acquisitions or enter into joint ventures.

If we cannot access the capital we need or generate cash flows to implement our business plan or meet our financial obligations on acceptable terms, we may have to limit our ongoing capital expenditures and our investment in new businesses or try to raise additional capital by selling or otherwise disposing of assets. Any of these could have an adverse effect on our cash flows from operating activities and on our growth prospects.

***We cannot guarantee that dividends will be increased or declared***

Increases in the BCE common share dividend and the declaration of dividends on any of BCE's outstanding shares are subject to the discretion of BCE's board of directors (BCE Board) and, consequently, there can be no guarantee that the dividend on common shares will be increased or that dividends will be declared. Dividend increases and the declaration of dividends by the BCE Board are ultimately dependent on BCE's operations and financial results which are, in turn, subject to various assumptions and risks, including those set out in this MD&A.

***We are exposed to various credit, liquidity and market risks***

Our exposure to credit, liquidity and market risks, including equity price, interest rate and currency fluctuations, is discussed in section 6.5, *Financial risk management* of this MD&A and in Note 29 to BCE's 2021 consolidated financial statements.

Our failure to identify and manage our exposure to changes in interest rates, foreign exchange rates, BCE's share price and other market conditions could lead to missed opportunities, increased costs, reduced profit margins, cash flow shortages, inability to complete planned capital expenditures, reputational damage, equity and debt securities devaluations, and challenges in raising capital on market-competitive terms.

***Income and commodity tax amounts may materially differ from the expected amounts***

Our complex business operations are subject to various tax laws. The adoption of new tax laws, or regulations or rules thereunder, or changes thereto or in the interpretation thereof, could result in higher tax rates, new taxes or other adverse tax implications. In addition, while we believe that we have adequately provided for all income and commodity taxes based on all of the information that is currently available, the calculation of income taxes and the applicability of commodity taxes in many cases require significant judgment in interpreting tax rules and regulations. Our tax filings are subject to government audits that could result in material changes to the amount of current and deferred income tax assets and liabilities and other liabilities and could, in certain circumstances, result in an assessment of interest and penalties.

***The failure to reduce costs as well as unexpected increases in costs could adversely affect our ability to achieve our strategic imperatives and financial guidance***

Our objectives for targeted cost reductions continue to be aggressive but there is no assurance that we will be successful in reducing costs, especially since incremental cost savings are more difficult to achieve on an ongoing basis. Examples of risks to our ability to reduce costs or limit potential cost increases include the following:

- Increased inflation could result in higher input costs for equipment, products and services, and create increased pressure for wage increases
- Increased costs related to the COVID-19 pandemic could continue for an undetermined period of time
- Our cost reduction objectives require aggressive negotiations with our suppliers and there can be no assurance that such negotiations will be successful or that replacement products or services provided will not lead to operational issues
- As suppliers continue to shorten software lifecycles, the cost of seeking to maintain adequate information security increases
- Achieving timely cost reductions while moving to an IP-based network is dependent on disciplined network decommissioning, which can be delayed by customer contractual commitments, regulatory considerations and other unforeseen obstacles
- Failure to contain growing operational costs related to network sites, network performance, footprint expansion, spectrum licences, insurance and content and equipment acquisition could have a negative effect on our financial performance
- Fluctuations in energy prices are partly influenced by government policies to address climate change such as carbon pricing which, combined with growing data demand that increases our energy requirements, could increase our energy costs beyond our current expectations
- Failure to successfully deliver on our contractual commitments, whether due to security events, operational challenges or other reasons, may result in financial penalties and loss of revenues

*The failure to evolve practices to effectively monitor and control fraudulent activities could result in financial loss and brand degradation*

As a public company with a range of desirable and valuable products and services and a large number of employees, BCE requires a disciplined program covering governance, exposure identification and assessment, prevention, detection and reporting that considers corruption, misappropriation of assets and intentional manipulation of financial statements by employees and/or external parties. Fraud events can result in financial loss and brand degradation.

Specific examples relevant to us include:

- Copyright theft and other forms of unauthorized use that undermine the exclusivity of Bell Media's content offerings, which could potentially divert users to unlicensed or otherwise illegitimate platforms, thus impacting our ability to derive distribution and advertising revenues
- Subscription fraud on accounts established with a false identity or paid with a stolen credit card
- Fraudulent (unauthorized) access to, and manipulation of, customer accounts, including through sim-swap and port out fraud
- Network usage fraud such as call/sell operations using our wireline or wireless networks
- Ongoing efforts to steal the services of TV distributors, including Bell Canada and ExpressVu, through compromise or circumvention of signal security systems, causing revenue loss

*Economic conditions and changing customer behaviour could lead to further impairment charges and changes to estimates*

As a result of the ongoing COVID-19 pandemic, in the second quarter of 2021, we recorded an impairment charge in our Bell Media segment relating to certain assets for our radio services. It is possible that the estimates currently recorded in our financial results for the year ended December 31, 2021 could change again in the future. This may include valuations and estimates related to allowance for doubtful accounts and impairment of contract assets, both of which take into account current economic conditions, as well as historical and forward-looking information, inventory valuation reserves, impairment of non-financial assets, derivative financial instruments, post-employment benefit plans and other provisions.

*The economic environment, pension rules or ineffective governance could have an adverse effect on our pension obligations, and we may be required to increase contributions to our post-employment benefit plans*

With a large pension plan membership and DB pension plans that are subject to the pressures of the global economic environment and changing regulatory and reporting requirements, our pension obligations are exposed to potential volatility. Failure to recognize and manage economic exposure and pension rule changes, or to ensure that effective governance is in place for the management and funding of pension plan assets and obligations, could have an adverse impact on our liquidity and financial performance.

The funding requirements of our post-employment benefit plans, based on valuations of plan assets and obligations, depend on a number of factors, including actual returns on post-employment benefit plan assets, long-term interest rates, plan demographics, and applicable regulations and actuarial standards. Changes in these factors, including changes caused by the COVID-19 pandemic, could cause future contributions to significantly differ from our current estimates, require us to increase contributions to our post-employment benefit plans in the future and, therefore, have a negative effect on our liquidity and financial performance.

There is no assurance that the assets of our post-employment benefit plans will earn their assumed rate of return. A substantial portion of our post-employment benefit plans' assets is invested in public and private equity and debt securities. As a result, the ability of our post-employment benefit plans' assets to earn the rate of return that we have assumed depends significantly on the performance of capital markets. Market conditions also impact the discount rate used to calculate our pension plan solvency obligations and could therefore also significantly affect our cash funding requirements.

## LITIGATION, LEGAL OBLIGATIONS AND GOVERNANCE

*Legal proceedings, changes in applicable laws and the failure to proactively address our legal and regulatory obligations could have an adverse effect on our business, financial performance and reputation*

We become involved in various claims and legal proceedings as part of our business. Plaintiffs are able to launch and obtain certification of class actions on behalf of a large group of people with increasing ease, and securities laws facilitate the introduction of class action lawsuits by secondary market investors against public companies for alleged misrepresentations in public disclosure documents and oral statements. Changes in laws or regulations, or in how they are interpreted, and the adoption of new laws or regulations, as well as pending or future litigation, including an increase in certified class actions which, by their nature, could result in sizeable damage awards and costs relating to litigation, could have an adverse effect on our business, financial performance and reputation.

The increase in laws and regulations around customer interactions and the technological evolution of our business create an environment of complex compliance requirements that must be adequately managed. The failure to comply with legal or regulatory obligations applicable to us could expose us to litigation, significant fines and penalties, as well as result in reputational harm. Heightened focus on consumer protection through provincial legislation and regulatory consumer codes, as well as increased legal and regulatory pressure in areas of privacy, accessibility, data governance and other ESG topics, require enhanced compliance frameworks and could further increase the company's exposure to investigations, litigation, sanctions, fines and reputational harm.

For a description of important legal proceedings involving us, please see the section entitled *Legal proceedings* contained in the BCE 2021 AIF.

*There can be no assurance that our corporate governance practices will be sufficient to prevent violations of legal and ethical standards*

Our employees, officers, Board members, suppliers and other business partners are expected to comply with applicable legal and ethical standards including, without limitation, anti-bribery laws, as well as with our governance policies and contractual obligations. Failure to comply with such laws, policies and contractual obligations could expose us to litigation and significant fines and penalties, and result in reputational harm or being disqualified from bidding on contracts. While we have developed and implemented strong corporate governance practices, including through our Code of Business Conduct which is updated regularly and subject to an annual review by our team members, there can be no assurance that such practices and measures will be sufficient to prevent violations of legal and ethical standards. Any such failure or violation could have an adverse effect on our business, financial performance and reputation. Effective ethical business conduct is also a component of good ESG practices, which are considered an increasingly important measure of corporate performance and value creation.

## ENVIRONMENTAL AND SOCIAL RISK

*Environmental concerns, including climate change, could have an adverse effect on our business*

We face risks related to environmental events, including climate-related events, which could impact our operations, service performance, reputation and business continuity, cost of insurance, and more generally have an adverse effect on our business, financial performance and reputation. In particular, climate change poses potential risks to our business, our employees, our customers, our suppliers and outsourcers, and the communities we operate in.

In alignment with the recommendations of the TCFD, we categorize climate-related risks into physical and transition risks:

- Physical risks are associated with the physical impacts from a changing climate and can either be event-driven (acute) or longer-term (chronic) shifts in climate patterns. Global climate change could exacerbate certain of the threats facing our business, including the frequency and severity of weather-related events such as ice, snow and wind storms, wildfires, flooding, extended heat waves, hurricanes, tornadoes and tsunamis. These events could have a destructive impact on our telecommunications network infrastructure, which could affect our ability to deliver communications services that are critical to our customers and society. In addition, rising mean temperatures and extended heat waves could increase the need for cooling or heating capacity in our network infrastructure, thus increasing our energy consumption and associated costs. In order to enhance our resiliency to these increasing or decreasing temperatures, we may need to increase our investments in our infrastructure, which would lead to increased operational costs.
- Transition risks are associated with a transition to a lower-carbon economy, which may include extensive regulatory, technology and market changes to address mitigation and adaptation requirements related to climate change. These risks may include increased operational costs driven by the rising price of energy due to carbon pricing regulations and the shifting supply and demand for energy, increased operational costs related to e-waste treatment programs and management systems, reputation risks related to our management of climate-related issues as well as to our level of disclosure related to such matters. There is also a reputational risk of not demonstrating our proactive behaviour towards climate change, which could affect customer perception and the cost and availability of funding that has the potential to be increasingly tied to the quality of our ESG practices and related disclosed metrics, all of which could have negative financial outcomes.

Furthermore, climate-related events could also impact our suppliers, which in turn could impact our business. Given that some of our third-party suppliers and outsourcers are located in foreign countries, localized natural disasters in such countries could further negatively impact our business.

In addition, several areas of our operations also raise environmental considerations, such as fuel storage, GHG emissions and energy consumption reduction, waste management, disposal of hazardous residual materials, and recovery and recycling of end-of-life electronic products we sell or lease.

Our team members, customers, investors and governments expect that we regard environmental protection as an integral part of doing business and that we seek to minimize the negative environmental impacts of our operations and create positive impacts where possible. Failure to recognize and adequately respond to their evolving expectations, to take action to reduce our negative impacts on the environment, to achieve our environmental commitments and to effectively report on environmental matters, could result in fines, and could harm our brand, reputation and competitiveness, as well as lead to other negative business, financial, legal and regulatory consequences for the company.

*Pandemics, epidemics and other health risks, including health concerns about radiofrequency emissions from wireless communications devices and equipment, could have an adverse effect on our business*

In addition to risks related to the COVID-19 pandemic, other pandemics, epidemics and other health risks could occur, which could adversely affect our ability to maintain operational networks and provide products and services to our customers, as well as the ability of our suppliers to provide us with products and services we need to operate our business. Any such pandemics, epidemics and other health risks could also have an adverse effect on the economy and financial markets resulting in a declining level of retail and commercial activity, which could have a negative impact on the demand for, and prices of, our products and services.

Many studies have been performed or are ongoing to assess whether mobile communications devices, such as smartphones, as well as wireless networks and towers pose a potential health risk. While some studies suggest links to certain conditions, others conclude there is no established causation between mobile phone usage and adverse health effects. In 2011, the International Agency for Research on Cancer (IARC) of the World Health Organization classified radiofrequency electromagnetic fields from wireless phones as possibly carcinogenic to humans, but also indicated that chance, bias or confounding could not be ruled out with reasonable confidence. The IARC also called for additional research into long-term heavy use of mobile phones.

ISED is responsible for approving radiofrequency equipment and performing compliance assessments and has chosen Health Canada's Safety Code 6, which sets the limits for safe exposure to radiofrequency emissions at home or at work, as its exposure standard. This code also outlines safety requirements for the installation and operation of devices that emit radiofrequency fields such as mobile communications devices, Wi-Fi technologies and base station antennas. ISED has made compliance to Safety Code 6 mandatory for all proponents and operators of radio installations.

Our business is heavily dependent on radiofrequency technologies, which could present significant challenges to our business and financial performance, such as the following:

- We may face lawsuits relating to alleged adverse health effects on customers, as well as relating to our marketing and disclosure practices in connection therewith, and the likely outcome of such potential lawsuits is unpredictable and could change over time
- Changes in scientific evidence and/or public perceptions could lead to additional government regulations and costs for retrofitting infrastructure and handsets to achieve compliance
- Public concerns could result in a slower deployment of, or in our inability to deploy, infrastructure necessary to maintain and/or expand our wireless network as required by market evolution

Any of these events could have an adverse effect on our business and financial performance.

### *Various social issues, if not adequately managed, could have an adverse effect on our business*

Inadequate management of social issues associated with our company and our business, as well as our suppliers and other stakeholders, could also adversely affect our business, financial condition, liquidity, financial results or reputation. This may include social elements discussed elsewhere in this MD&A such as DEI, employees' well-being, health and safety, responsible procurement, as well as other social issues such as human rights, including Indigenous peoples' rights and consultation, and community acceptance and engagement. Effective management of social risk is a component of good ESG practices, which are an important measure of corporate performance and value creation. Failure to sufficiently report on our management of social issues and to achieve our social commitments could harm our brand and reputation, and could lead to negative business, financial, legal and regulatory consequences for the company.

### *Various factors could negatively impact our ability to achieve our ESG targets*

We have set a number of ambitious ESG targets to monitor our ESG performance and align our strategic imperatives. However, our ability to achieve these targets depends on many factors and is subject to many risks that could cause our assumptions or estimates to be inaccurate and cause actual results or events to differ materially from those expressed in, or implied by, these targets. Failure to sufficiently address evolving employee, customer, investor and other stakeholder expectations through achievement of our ESG targets could harm our brand, reputation and competitiveness, as well as lead to other negative business, financial, legal and regulatory consequences for the company.

Important risk factors that could affect certain of our key ESG targets are set out below.

#### GHG EMISSIONS REDUCTION TARGETS

Our GHG emissions reduction targets rely in large part on our ability to implement sufficient corporate and business initiatives in order to reduce GHG emissions to the desired levels as reflected in such targets. Failure to implement such initiatives according to planned schedules due to changes in business plans, our inability to implement requisite operational or technological changes, unavailability of capital, technologies or employees, cost allocations, actual costs exceeding anticipated costs, or other factors, or the failure of such initiatives, including of new technologies, to generate anticipated GHG emissions reductions, could negatively affect our ability to achieve our GHG emissions reduction targets. In addition, future corporate initiatives, such as business acquisitions and organic growth, could negatively affect our ability to achieve our targets, as would the adoption of new technologies that are carbon enablers or do not generate the anticipated energy savings.

The achievement of our target to be carbon neutral for our operational GHG emissions starting in 2025 and of our SBTs may require that we purchase carbon credits and/or renewable energy certificates, as applicable. Should a sufficient quantity of credible credits or certificates be unavailable, should their cost of acquisition be considered too onerous, or should regulations, applicable standards, public perception or other factors limit the number of credits or certificates that we can purchase, the achievement of our GHG emission reduction targets could be negatively impacted.

A refinement in or modifications to international standards or to the methodology we use for the calculation of GHG emissions that would result in an increase in our GHG emissions could further impact our ability to achieve our targets. In addition, as it relates to our SBTs specifically, the SBTi requires the recalculation of our targets upon the occurrence of certain events, such as business acquisitions, or to conform to evolving SBTi methodology or standards. A recalculation resulting in the introduction of more ambitious targets could challenge our ability to achieve such updated targets.

The achievement of our SBTs relating to purchased goods and services could be negatively impacted should we fail to achieve the required level of engagement from our suppliers over which we have no control, despite the engagement measures that we may implement.

In addition, we have much less control over the reduction of our scope 3 GHG emissions than over our scope 1 and scope 2 GHG emissions given that we must rely on the engagement and collaboration of our suppliers and partners in reducing their own GHG emissions. Accordingly, failure to obtain our suppliers and partners' engagement and collaboration could adversely affect our ability to meet our scope 3 GHG emissions reduction target.

#### DIVERSITY, EQUITY AND INCLUSION TARGETS

Failure to attract and retain a certain level of diverse talent across the organization could negatively affect our ability to meet our DEI targets and objectives. In addition, our ability to achieve such targets and objectives could also be challenged by reduced labour market availability or restricted access to a diverse talent pool.

# 10 Accounting policies

**This section discusses key estimates and assumptions that management has made and how they affect the amounts reported in the financial statements and notes. It also describes key changes in accounting standards and our accounting policies, and how they affect our financial statements.**

**We have prepared our consolidated financial statements using IFRS. Other significant accounting policies, not involving the same level of measurement uncertainty as those discussed in this section, are nevertheless important to an understanding of our financial statements. See Note 2, *Significant accounting policies*, in BCE's 2021 consolidated financial statements for more information about the accounting principles we used to prepare our consolidated financial statements.**

## CRITICAL ACCOUNTING ESTIMATES AND KEY JUDGMENTS

When preparing the financial statements, management makes estimates and judgments relating to:

- reported amounts of revenues and expenses
- reported amounts of assets and liabilities
- disclosure of contingent assets and liabilities

We base our estimates on a number of factors, including historical experience, current events, including but not limited to the COVID-19 pandemic, and actions that the company may undertake in the future, as well as other assumptions that we believe are reasonable under the circumstances. By their nature, these estimates and judgments are subject to measurement uncertainty and actual results could differ.

We consider the estimates and judgments described in this section to be an important part of understanding our financial statements because they require management to make assumptions about matters that were highly uncertain at the time the estimates and judgments were made, and changes to these estimates and judgments could have a material impact on our financial statements and our segments.

Our senior management has reviewed the development and selection of the critical accounting estimates and judgments described in this section with the Audit Committee of the BCE Board.

Any sensitivity analysis included in this section should be used with caution as the changes are hypothetical and the impact of changes in each key assumption may not be linear.

Our more significant estimates and judgments are described below.

### ESTIMATES

#### *USEFUL LIVES OF PROPERTY, PLANT AND EQUIPMENT AND FINITE-LIFE INTANGIBLE ASSETS*

We review our estimates of the useful lives of property, plant and equipment and finite-life intangible assets on an annual basis and adjust depreciation or amortization on a prospective basis, as required.

Property, plant and equipment represent a significant proportion of our total assets. Changes in technology or our intended use of these assets, as well as changes in business prospects or economic and industry factors, may cause the estimated useful lives of these assets to change.

The estimated useful lives of property, plant and equipment and finite-life intangible assets are determined by internal asset life studies, which take into account actual and expected future usage, physical wear and tear, replacement history and assumptions about technology evolution. When factors indicate that assets' useful lives are different from the prior assessment, we depreciate or amortize the remaining carrying value prospectively over the adjusted estimated useful lives.

#### *POST-EMPLOYMENT BENEFIT PLANS*

The amounts reported in the financial statements relating to DB pension plans and OPEBs are determined using actuarial calculations that are based on several assumptions.

Our actuaries perform a valuation at least every three years to determine the actuarial present value of the accrued DB pension plan and OPEB obligations. The actuarial valuation uses management's assumptions for, among other things, the discount rate, life expectancy, the rate of compensation increase, trends in healthcare costs and expected average remaining years of service of employees.

While we believe that these assumptions are reasonable, differences in actual results or changes in assumptions could materially affect post-employment benefit obligations and future net post-employment benefit plans cost.

We account for differences between actual and expected results in benefit obligations and plan performance in OCI, which are then recognized immediately in the deficit.

The most significant assumptions used to calculate the net post-employment benefit plans cost are the discount rate and life expectancy.

A discount rate is used to determine the present value of the future cash flows that we expect will be needed to settle post-employment benefit obligations.

The discount rate is based on the yield on long-term, high-quality corporate fixed income investments, with maturities matching the estimated cash flows of the post-employment benefit plans. Life expectancy is based on publicly available Canadian mortality tables and is adjusted for the company's specific experience.

A lower discount rate and a higher life expectancy result in a higher net post-employment benefit obligation and a higher current service cost.

The following table shows a sensitivity analysis of key assumptions used to measure the net post-employment benefit obligations and the net post-employment benefit plans cost for our DB pension plans and OPEB plans.

| | | IMPACT ON NET POST-EMPLOYMENT BENEFIT PLANS COST FOR 2021 – INCREASE/(DECREASE) | | IMPACT ON POST-EMPLOYMENT BENEFIT OBLIGATIONS AT DECEMBER 31, 2021 – INCREASE/(DECREASE) | |
|---|---|---|---|---|---|
| | CHANGE IN ASSUMPTION | INCREASE IN ASSUMPTION | DECREASE IN ASSUMPTION | INCREASE IN ASSUMPTION | DECREASE IN ASSUMPTION |
| Discount rate | 0.5% | (68) | 57 | (1,612) | 1,794 |
| Life expectancy at age 65 | 1 year | 32 | (32) | 936 | (962) |

*REVENUE FROM CONTRACTS WITH CUSTOMERS*

We are required to make estimates that affect the amount of revenue from contracts with customers, including estimating the stand-alone selling prices of products and services.

For bundled arrangements, we account for individual products and services when they are separately identifiable and the customer can benefit from the product or service on its own or with other readily available resources. The total arrangement consideration is allocated to each product or service included in the contract with the customer based on its stand-alone selling price. We generally determine stand-alone selling prices based on the observable prices at which we sell products separately without a service contract and prices for non-bundled service offers with the same range of services, adjusted for market conditions and other factors, as appropriate. When similar products and services are not sold separately, we use the expected cost plus margin approach to determine stand-alone selling prices. Products and services purchased by a customer in excess of those included in the bundled arrangement are accounted for separately.

*IMPAIRMENT OF NON-FINANCIAL ASSETS*

Goodwill and indefinite-life intangible assets are tested for impairment annually or when there is an indication that the asset may be impaired. Property, plant and equipment and finite-life intangible assets are tested for impairment if events or changes in circumstances, assessed at each reporting period, indicate that their carrying amount may not be recoverable. For the purpose of impairment testing, assets other than goodwill are grouped at the lowest level for which there are separately identifiable cash inflows.

Impairment losses are recognized and measured as the excess of the carrying value of the assets over their recoverable amount. An asset's recoverable amount is the higher of its fair value less costs of disposal and its value in use. Previously recognized impairment losses, other than those attributable to goodwill, are reviewed for possible reversal at each reporting date and, if the asset's recoverable amount has increased, all or a portion of the impairment is reversed.

We make a number of estimates when calculating recoverable amounts using discounted future cash flows or other valuation methods to test for impairment. These estimates include the assumed growth rates for future cash flows, the number of years used in the cash flow model and the discount rate. When impairment charges occur they are recorded in *Impairment of assets*.

During the second quarter of 2021, we identified indicators of impairment for our Bell Media radio markets, notably a decline in advertising revenue and an increase in the discount rate resulting from the impact of the ongoing COVID-19 pandemic. Accordingly, impairment testing was required for our group of radio CGUs.

During Q2 2021, we recognized $163 million of impairment charges for various radio markets within our Bell Media segment. These charges included $150 million allocated to indefinite-life intangible assets for broadcast licences, and $13 million to property, plant and equipment mainly for buildings and network infrastructure and equipment. They were determined by comparing the carrying value of the CGUs to their fair value less cost of disposal. We estimated the fair value of the CGUs using both discounted cash flows and market-based valuation models, which include five-year cash flow projections derived from business plans reviewed by senior management for the period of July 1, 2021 to December 31, 2026, using a discount rate of 8.5% and a perpetuity growth rate of (2.0%) as well as market multiple data from public companies and market transactions. After impairments, the carrying value of our group of radio CGUs was $235 million.

During the second quarter of 2020, we identified indicators of impairment for certain of our Bell Media TV services and radio markets, notably declines in advertising revenues, lower subscriber revenues and overall increases in discount rates resulting from the economic impact of the COVID-19 pandemic. Accordingly, impairment testing was required for certain groups of CGUs as well as for goodwill.

During Q2 2020, we recognized $452 million of impairment charges for our English and French TV services as well as various radio markets within our Bell Media segment. These charges included $291 million allocated to indefinite-life intangible assets for broadcast licences, $146 million allocated to finite-life intangible assets, mainly for program and feature film rights, and $15 million to property, plant and equipment for network and infrastructure and equipment. They were determined by comparing the carrying value of the CGUs to their fair value less cost of disposal. We estimated the fair value of the CGUs using both discounted cash flows and market-based valuation models, which include five-year cash flow projections derived from business plans reviewed by senior management for the period of July 1, 2020 to December 31, 2025, using discount rates of 8.0% to 9.5% and a perpetuity growth rate of (1.0%) to nil, as well as market multiple data from public companies and market transactions. After impairments, the carrying value of these CGUs was $942 million.

*GOODWILL IMPAIRMENT TESTING*

We perform an annual test for goodwill impairment in the fourth quarter for each of our CGUs or groups of CGUs to which goodwill is allocated, and whenever there is an indication that goodwill might be impaired.

A CGU is the smallest identifiable group of assets that generates cash inflows that are independent of the cash inflows from other assets or groups of assets.

We identify any potential impairment by comparing the carrying value of a CGU or group of CGUs to its recoverable amount. The recoverable amount of a CGU or group of CGUs is the higher of its fair value less costs of disposal and its value in use. Both fair value less costs of disposal and value in use are based on estimates of discounted future cash flows or other valuation methods. Cash flows are projected based on past experience, actual operating results and business plans. When the recoverable amount of a CGU or group of CGUs is less than its carrying value, the recoverable amount is determined for its identifiable assets and liabilities. The excess of the recoverable amount of the CGU or group of CGUs over the total of the amounts assigned to its assets and liabilities is the recoverable amount of goodwill.

An impairment charge is recognized in *Impairment of assets* in the income statements for any excess of the carrying value of goodwill over its recoverable amount. For purposes of impairment testing of goodwill, our CGUs or groups of CGUs correspond to our reporting segments as disclosed in Note 3, *Segmented information*, in BCE's 2021 consolidated financial statements.

Any significant change in each of the estimates used could have a material impact on the calculation of the recoverable amount and resulting impairment charge. As a result, we are unable to reasonably quantify the changes in our overall financial performance if we had used different assumptions.

We cannot predict whether an event that triggers impairment will occur, when it will occur or how it will affect the asset values we have reported.

We believe that any reasonable possible change in the key assumptions on which the estimates of recoverable amounts of our groups of CGUs are based would not cause their carrying amounts to exceed their recoverable amounts.

During the second quarter of 2020, we identified indicators that goodwill for our Bell Media group of CGUs may be impaired as a result of the economic impact of the COVID-19 pandemic, notably declines in advertising revenues, lower subscriber revenues and increases in discount rates. Impairment testing of goodwill during 2020 for the Bell Media group of CGUs did not result in an impairment of goodwill.

There were no goodwill impairment charges in 2021 or 2020.

#### *DEFERRED TAXES*

Deferred tax assets and liabilities are calculated at the tax rates that are expected to apply when the asset or liability is recovered or settled. Both our current and deferred tax assets and liabilities are calculated using tax rates that have been enacted or substantively enacted at the reporting date.

Deferred taxes are provided on temporary differences arising from investments in subsidiaries, joint arrangements and associates, except where we control the timing of the reversal of the temporary difference and it is probable that the temporary difference will not reverse in the foreseeable future.

The amounts of deferred tax assets and liabilities are estimated with consideration given to the timing, sources and amounts of future taxable income.

#### *LEASES*

The application of IFRS 16 requires us to make estimates that affect the measurement of right-of-use assets and liabilities, including determining the appropriate discount rate used to measure lease liabilities. Lease liabilities are initially measured at the present value of the lease payments that are not paid at the commencement date, discounted using our incremental borrowing rate, unless the rate implicit in the lease is readily determinable. Our incremental borrowing rate is derived from publicly available risk-free interest rates, adjusted for applicable credit spreads and lease terms. We apply a single incremental borrowing rate to a portfolio of leases with similar characteristics.

#### *FAIR VALUE OF FINANCIAL INSTRUMENTS*

Certain financial instruments, such as investments in equity securities, derivative financial instruments and certain elements of borrowings, are carried in the statements of financial position at fair value, with changes in fair value reflected in the income statements and the statements of comprehensive income. Fair values are estimated by reference to published price quotations or by using other valuation techniques that may include inputs that are not based on observable market data, such as discounted cash flows and earnings multiples.

#### *CONTINGENCIES*

In the ordinary course of business, we become involved in various claims and legal proceedings seeking monetary damages and other relief. Pending claims and legal proceedings represent a potential cost to our business. We estimate the amount of a loss by analyzing potential outcomes and assuming various litigation and settlement strategies, based on information that is available at the time.

If the final resolution of a legal or regulatory matter results in a judgment against us or requires us to pay a large settlement, it could have a material adverse effect on our consolidated financial statements in the period in which the judgment or settlement occurs.

#### *ONEROUS CONTRACTS*

A provision for onerous contracts is recognized when the unavoidable costs of meeting our obligations under a contract exceed the expected benefits to be received under the contract. The provision is measured at the present value of the lower of the expected cost of terminating the contract and the expected net cost of completing the contract.

### JUDGMENTS

#### *POST-EMPLOYMENT BENEFIT PLANS*

The determination of the discount rate used to value our post-employment benefit obligations requires judgment. The rate is set by reference to market yields of long-term, high-quality corporate fixed income investments at the beginning of each fiscal year. Significant judgment is required when setting the criteria for fixed income investments to be included in the population from which the yield curve is derived. The most significant criteria considered for the selection of investments include the size of the issue and credit quality, along with the identification of outliers, which are excluded.

*INCOME TAXES*

The calculation of income taxes requires judgment in interpreting tax rules and regulations. There are transactions and calculations for which the ultimate tax determination is uncertain. Our tax filings are also subject to audits, the outcome of which could change the amount of current and deferred tax assets and liabilities. Management believes that it has sufficient amounts accrued for outstanding tax matters based on information that currently is available.

Management judgment is used to determine the amounts of deferred tax assets and liabilities to be recognized. In particular, judgment is required when assessing the timing of the reversal of temporary differences to which future income tax rates are applied.

*LEASES*

The application of IFRS 16 requires us to make judgments that affect the measurement of right-of-use assets and liabilities. A lease contract conveys the right to control the use of an identified asset for a period of time in exchange for consideration. At inception of the contract, we assess whether the contract contains an identified asset, whether we have the right to obtain substantially all of the economic benefits from use of the asset and whether we have the right to direct how and for what purpose the asset is used. In determining the lease term, we include periods covered by renewal options when we are reasonably certain to exercise those options. Similarly, we include periods covered by termination options when we are reasonably certain not to exercise those options. To assess if we are reasonably certain to exercise an option, we consider all facts and circumstances that create an economic incentive to exercise renewal options (or not exercise termination options). Economic incentives include the costs related to the termination of the lease, the significance of any leasehold improvements and the importance of the underlying assets to our operations.

*REVENUE FROM CONTRACTS WITH CUSTOMERS*

The identification of performance obligations within a contract and the timing of satisfaction of performance obligations under long-term contracts requires judgment. For bundled arrangements, we account for individual products and services when they are separately identifiable and the customer can benefit from the product or service on its own or with other readily available resources. When our right to consideration from a customer corresponds directly with the value to the customer of the products and services transferred to date, we recognize revenue in the amount to which we have a right to invoice. We recognize product revenues from the sale of wireless handsets and devices and wireline equipment when a customer takes possession of the product. We recognize service revenues over time, as the services are provided. Revenues on certain long-term contracts are recognized using output methods based on products delivered, performance completed to date, time elapsed or milestones met.

Additionally, the determination of costs to obtain a contract, including the identification of incremental costs, also requires judgment. Incremental costs of obtaining a contract with a customer, principally comprised of sales commissions, and prepaid contract fulfillment costs are included in contract costs in the statements of financial position, except where the amortization period is one year or less, in which case costs of obtaining a contract are immediately expensed. Capitalized costs are amortized on a systematic basis that is consistent with the period and pattern of transfer to the customer of the related products or services.

*CGUs*

The determination of CGUs or groups of CGUs for the purpose of impairment testing requires judgment.

*CONTINGENCIES*

The determination of whether a loss is probable from claims and legal proceedings and whether an outflow of resources is likely requires judgment.

We accrue a potential loss if we believe a loss is probable and an outflow of resources is likely and can be reasonably estimated, based on information that is available at the time. Any accrual would be charged to earnings and included in *Trade payables and other liabilities* or *Other non-current liabilities*. Any payment as a result of a judgment or cash settlement would be deducted from cash from operating activities. We estimate the amount of a loss by analyzing potential outcomes and assuming various litigation and settlement strategies.

## FUTURE CHANGES TO ACCOUNTING STANDARDS

The following amended accounting standards issued by the IASB have an effective date after December 31, 2021 and have not yet been adopted by BCE.

| STANDARD | DESCRIPTION | IMPACT | EFFECTIVE DATE |
|---|---|---|---|
| Onerous Contracts – Cost of Fulfilling a Contract, Amendments to IAS 37 – Provisions, Contingent Liabilities and Contingent Assets | These amendments clarify which costs should be included in determining the cost of fulfilling a contract when assessing whether a contract is onerous. | These amendments will not have a significant impact on our financial statements. | Effective for annual reporting periods beginning on or after January 1, 2022. |
| Disclosure of Accounting Policies – Amendments to IAS 1 – Presentation of Financial Statements | These amendments require that entities disclose material accounting policies, as defined, instead of significant accounting policies. | We are currently assessing the impact of these amendments on the disclosure of our accounting policies. | Effective for annual reporting periods beginning on or after January 1, 2023. Early application is permitted. |

# 11 Non-GAAP financial measures, other financial measures and key performance indicators (KPIs)

BCE uses various financial measures to assess its business performance. Certain of these measures are calculated in accordance with International Financial Reporting Standards (IFRS or GAAP) while certain other measures do not have a standardized meaning under GAAP. We believe that our GAAP financial measures, read together with adjusted non-GAAP financial measures, provide readers with a better understanding of how management assesses BCE's performance.

National Instrument 52-112, *Non-GAAP and Other Financial Measures Disclosure*, prescribes disclosure requirements that apply to the following specified financial measures:

- Non-GAAP financial measures;
- Non-GAAP ratios;
- Total of segments measures;
- Capital management measures; and
- Supplementary financial measures.

This section provides a description and classification of the specified financial measures contemplated by NI 52-112 that we use in this MD&A to explain our financial results except that, for supplementary financial measures, an explanation of such measures is provided where they are first referred to in this MD&A if the supplementary financial measures' labelling is not sufficiently descriptive.

## 11.1 Non-GAAP financial measures

A non-GAAP financial measure is a financial measure used to depict our historical or expected future financial performance, financial position or cash flow and, with respect to its composition, either excludes an amount that is included in, or includes an amount that is excluded from, the composition of the most directly comparable financial measure disclosed in BCE's consolidated primary financial statements. We believe that non-GAAP financial measures are more reflective of our on-going operating results and provide readers with a better understanding of management's perspective on and analysis of our performance.

Below are descriptions of the non-GAAP financial measures that we use in this MD&A to explain our results as well as reconciliations to the most comparable IFRS financial measures.

### ADJUSTED NET EARNINGS

The term adjusted net earnings does not have any standardized meaning under IFRS. Therefore, it is unlikely to be comparable to similar measures presented by other issuers.

We define adjusted net earnings as net earnings attributable to common shareholders before severance, acquisition and other costs, net mark-to-market losses (gains) on derivatives used to economically hedge equity settled share-based compensation plans, net equity losses (gains) on investments in associates and joint ventures, net losses (gains) on investments, early debt redemption costs, impairment of assets and discontinued operations, net of tax and NCI.

We use adjusted net earnings and we believe that certain investors and analysts use this measure, among other ones, to assess the performance of our businesses without the effects of severance, acquisition and other costs, net mark-to-market losses (gains) on derivatives used to economically hedge equity settled share-based compensation plans, net equity losses (gains) on investments in associates and joint ventures, net losses (gains) on investments, early debt redemption costs, impairment of assets and discontinued operations, net of tax and NCI. We exclude these items because they affect the comparability of our financial results and could potentially distort the analysis of trends in business performance. Excluding these items does not imply they are non-recurring.

The most directly comparable IFRS financial measure is net earnings attributable to common shareholders.

The following table is a reconciliation of net earnings attributable to common shareholders to adjusted net earnings on a consolidated basis.

| | Q4 2021 | Q4 2020 | 2021 | 2020 |
|---|---|---|---|---|
| Net earnings attributable to common shareholders | 625 | 889 | 2,709 | 2,498 |
| Reconciling items: | | | | |
| Severance, acquisition and other costs | 63 | 52 | 209 | 116 |
| Net mark-to-market (gains) losses on derivatives used to economically hedge equity settled share-based compensation plans | (57) | 1 | (278) | 51 |
| Net equity losses (gains) on investments in associates and joint ventures | 35 | – | 49 | (43) |
| Net losses (gains) on investments | 6 | (3) | 6 | (3) |
| Early debt redemption costs | – | 12 | 53 | 50 |
| Impairment of assets | 30 | 12 | 197 | 472 |
| Income taxes for the above reconciling items | (9) | (21) | (48) | (185) |
| NCI for the above reconciling items | (1) | – | (2) | – |
| Net earnings from discontinued operations (net of income taxes) | – | (211) | – | (226) |
| **Adjusted net earnings** | 692 | 731 | 2,895 | 2,730 |

## ADJUSTED NET INTEREST EXPENSE

The term adjusted net interest expense does not have any standardized meaning under IFRS. Therefore, it is unlikely to be comparable to similar measures presented by other issuers.

We define adjusted net interest expense as twelve-month trailing net interest expense as shown in our consolidated statements of cash flows, plus 50% of twelve-month trailing net earnings attributable to preferred shareholders as shown in our consolidated income statements.

We use adjusted net interest expense as a component in the calculation of the adjusted EBITDA to adjusted net interest expense ratio, which is a capital management measure. For further details on the adjusted EBITDA to adjusted net interest expense ratio, see section 11.4 – *Capital management measures*. We use, and believe that certain investors and analysts use, the adjusted EBITDA to adjusted net interest expense ratio, among other measures, to evaluate the financial health of the company.

The most directly comparable IFRS financial measure is net interest expense. The following table is a reconciliation of net interest expense to adjusted net interest expense on a consolidated basis.

| | 2021 | 2020 |
|---|---|---|
| Net interest expense | 1,063 | 1,087 |
| 50% of net earnings attributable to preferred shareholders | 66 | 68 |
| **Adjusted net interest expense** | 1,129 | 1,155 |

## AVAILABLE LIQUIDITY

The term available liquidity does not have any standardized meaning under IFRS. Therefore, it is unlikely to be comparable to similar measures presented by other issuers.

We define available liquidity as cash, cash equivalents and amounts available under our securitized trade receivable program and our committed bank credit facilities.

We consider available liquidity to be an important indicator of the financial strength and performance of our businesses because it shows the funds available to meet our cash requirements, including for, but not limited to, capital expenditures, post-employment benefit plans funding, dividend payments, the payment of contractual obligations, maturing debt, on-going operations, the acquisition of spectrum, and other cash requirements. We believe that certain investors and analysts use available liquidity to evaluate the financial strength and performance of our businesses. The most directly comparable IFRS financial measure is cash.

The following table is a reconciliation of cash to available liquidity on a consolidated basis.

| | DECEMBER 31, 2021 | DECEMBER 31, 2020 |
|---|---|---|
| Cash | 207 | 224 |
| Cash equivalents | – | – |
| Amounts available under our securitized trade receivables program [1] | 400 | 400 |
| Amounts available under our committed bank credit facilities [2] | 2,789 | 3,151 |
| **Available liquidity** | 3,396 | 3,775 |

(1) *At December 31, 2021 and December 31, 2020, respectively, $400 million was available under our securitized trade receivables program, under which we borrowed $900 million and $1,050 million as at December 31, 2021 and December 31, 2020, respectively. Loans secured by trade receivables are included in* Debt due within one year *in our consolidated financial statements.*

(2) *At December 31, 2021 and December 31, 2020, respectively, $2,789 million and $3,151 million were available under our committed bank credit facilities, given outstanding commercial paper of $561 million in U.S. dollars ($711 million in Canadian dollars) and $274 million in U.S. dollars ($349 million in Canadian dollars) as at December 31, 2021 and December 31, 2020, respectively. Commercial paper outstanding is included in* Debt due within one year *in our consolidated financial statements.*

## FREE CASH FLOW AND EXCESS FREE CASH FLOW

The terms free cash flow and excess free cash flow do not have any standardized meaning under IFRS. Therefore, they are unlikely to be comparable to similar measures presented by other issuers.

We define free cash flow as cash flows from operating activities, excluding cash from discontinued operations, acquisition and other costs paid (which include significant litigation costs) and voluntary pension funding, less capital expenditures, preferred share dividends and dividends paid by subsidiaries to NCI. We exclude cash from discontinued operations, acquisition and other costs paid and voluntary pension funding because they affect the comparability of our financial results and could potentially distort the analysis of trends in business performance. Excluding these items does not imply they are non-recurring.

We define excess free cash flow as free cash flow less dividends paid on common shares.

We consider free cash flow and excess free cash flow to be important indicators of the financial strength and performance of our businesses. Free cash flow shows how much cash is available to pay dividends on common shares, repay debt and reinvest in our company. Excess free cash flow shows how much cash is available to repay debt and reinvest in our company, after the payment of dividends on common shares. We believe that certain investors and analysts use free cash flow and excess free cash flow to value a business and its underlying assets and to evaluate the financial strength and performance of our businesses. The most directly comparable IFRS financial measure is cash flows from operating activities.

The following table is a reconciliation of cash flows from operating activities to free cash flow and excess free cash flow on a consolidated basis.

| | Q4 2021 | Q4 2020 | 2021 | 2020 |
|---|---|---|---|---|
| Cash flows from operating activities | 1,743 | 1,631 | 8,008 | 7,754 |
| Capital expenditures | (1,459) | (1,494) | (4,837) | (4,202) |
| Cash dividends paid on preferred shares | (32) | (31) | (125) | (132) |
| Cash dividends paid by subsidiaries to NCI | (45) | (16) | (86) | (53) |
| Acquisition and other costs paid | 29 | 2 | 35 | 35 |
| Cash from discontinued operations (included in cash flows from operating activities) | – | – | – | (54) |
| **Free cash flow** | 236 | 92 | 2,995 | 3,348 |
| Dividends paid on common shares | (795) | (753) | (3,132) | (2,975) |
| **Excess free cash flow** | (559) | (661) | (137) | 373 |

## NET DEBT

The term net debt does not have any standardized meaning under IFRS. Therefore, it is unlikely to be comparable to similar measures presented by other issuers.

We define net debt as debt due within one year plus long-term debt and 50% of preferred shares, less cash and cash equivalents, as shown in BCE's consolidated statements of financial position. We include 50% of outstanding preferred shares in our net debt as it is consistent with the treatment by certain credit rating agencies.

We consider net debt to be an important indicator of the company's financial leverage because it represents the amount of debt that is not covered by available cash and cash equivalents. We believe that certain investors and analysts use net debt to determine a company's financial leverage.

Net debt is calculated using several asset and liability categories from the statements of financial position. The most directly comparable IFRS financial measure is long-term debt. The following table is a reconciliation of long-term debt to net debt on a consolidated basis.

| | DECEMBER 31, 2021 | DECEMBER 31, 2020 |
|---|---|---|
| Long-term debt | 27,048 | 23,906 |
| Debt due within one year | 2,625 | 2,417 |
| 50% of outstanding preferred shares | 2,002 | 2,002 |
| Cash | (207) | (224) |
| Cash equivalents | – | – |
| **Net debt** | 31,468 | 28,101 |

# 11.2 Non-GAAP ratios

A non-GAAP ratio is a financial measure disclosed in the form of a ratio, fraction, percentage or similar representation and that has a non-GAAP financial measure as one or more of its components.

## ADJUSTED EPS

The term adjusted EPS does not have any standardized meaning under IFRS. Therefore, it is unlikely to be comparable to similar measures presented by other issuers.

We define adjusted EPS as adjusted net earnings per BCE common share. Adjusted net earnings is a non-GAAP financial measure. For further details on adjusted net earnings, see section 11.1 – *Non-GAAP financial measures*.

We use adjusted EPS, and we believe that certain investors and analysts use this measure, among other ones, to assess the performance of our businesses without the effects of severance, acquisition and other costs, net mark-to-market losses (gains) on derivatives used to economically hedge equity settled share-based compensation plans, net equity losses (gains) on investments in associates and joint ventures, net losses (gains) on investments, early debt redemption costs, impairment of assets and discontinued operations, net of tax and NCI. We exclude these items because they affect the comparability of our financial results and could potentially distort the analysis of trends in business performance. Excluding these items does not imply they are non-recurring.

### DIVIDEND PAYOUT RATIO

The term dividend payout ratio does not have any standardized meaning under IFRS. Therefore, it is unlikely to be comparable to similar measures presented by other issuers.

We define dividend payout ratio as dividends paid on common shares divided by free cash flow. Free cash flow is a non-GAAP financial measure. For further details on free cash flow, see section 11.1 – *Non-GAAP financial measures*.

We consider dividend payout ratio to be an important indicator of the financial strength and performance of our businesses because it shows the sustainability of the company's dividend payments.

## 11.3 Total of segments measures

A total of segments measure is a financial measure that is a subtotal or total of 2 or more reportable segments and is disclosed within the Notes to BCE's consolidated primary financial statements.

### ADJUSTED EBITDA

We define adjusted EBITDA as operating revenues less operating costs as shown in BCE's consolidated income statements.

The most directly comparable IFRS financial measure is net earnings. The following table is a reconciliation of net earnings to adjusted EBITDA on a consolidated basis.

| | Q4 2021 | Q4 2020 | 2021 | 2020 |
|---|---|---|---|---|
| Net earnings | 658 | 932 | 2,892 | 2,699 |
| Severance, acquisition and other costs | 63 | 52 | 209 | 116 |
| Depreciation | 925 | 872 | 3,627 | 3,475 |
| Amortization | 251 | 233 | 982 | 929 |
| Finance costs | | | | |
| Interest expense | 275 | 274 | 1,082 | 1,110 |
| Interest on post-employment benefit obligations | 5 | 11 | 20 | 46 |
| Impairment of assets | 30 | 12 | 197 | 472 |
| Other (income) expense | (26) | 38 | (160) | 194 |
| Income taxes | 249 | 191 | 1,044 | 792 |
| Net earnings from discontinued operations (net of income taxes) | – | (211) | – | (226) |
| Adjusted EBITDA | 2,430 | 2,404 | 9,893 | 9,607 |

## 11.4 Capital management measures

A capital management measure is a financial measure that is intended to enable a reader to evaluate our objectives, policies and processes for managing our capital and is disclosed within the Notes to BCE's consolidated financial statements.

The financial reporting framework used to prepare the financial statements requires disclosure that helps readers assess the company's capital management objectives, policies, and processes, as set out in IFRS in IAS 1 – *Presentation of Financial Statements*. BCE has its own methods for managing capital and liquidity, and IFRS does not prescribe any particular calculation method.

### ADJUSTED EBITDA TO ADJUSTED NET INTEREST EXPENSE RATIO

The adjusted EBITDA to adjusted net interest expense ratio represents adjusted EBITDA divided by adjusted net interest expense. For the purposes of calculating our adjusted EBITDA to adjusted net interest expense ratio, adjusted EBITDA is twelve-month trailing adjusted EBITDA. Adjusted net interest expense used in the calculation of the adjusted EBITDA to adjusted net interest expense ratio is a non-GAAP financial measure defined as twelve-month trailing net interest expense as shown in our consolidated statements of cash flows, plus 50% of twelve-month trailing net earnings attributable to preferred shareholders as shown in our consolidated income statements. For further details on adjusted net interest expense, see section 11.1, *Non-GAAP financial measures*.

We use, and believe that certain investors and analysts use, the adjusted EBITDA to adjusted net interest expense ratio, among other measures, to evaluate the financial health of the company.

### NET DEBT LEVERAGE RATIO

The net debt leverage ratio represents net debt divided by adjusted EBITDA. Net debt used in the calculation of the net debt leverage ratio is a non-GAAP financial measure. For further details on net debt, see section 11.1, *Non-GAAP financial measures*. For the purposes of calculating our net debt leverage ratio, adjusted EBITDA is twelve-month trailing adjusted EBITDA.

We use, and believe that certain investors and analysts use, the net debt leverage ratio as a measure of financial leverage.

## 11.5 Supplementary financial measures

A supplementary financial measure is a financial measure that is not reported in BCE's consolidated financial statements, and is, or is intended to be, reported periodically to represent historical or expected future financial performance, financial position, or cash flows.

An explanation of such measures is provided where they are first referred to in this MD&A if the supplementary financial measures' labelling is not sufficiently descriptive.

## 11.6 KPIs

In addition to the non-GAAP financial measures and other financial measures described previously, we use the following KPIs to measure the success of our strategic imperatives. These KPIs are not accounting measures and may not be comparable to similar measures presented by other issuers.

| KPI | DEFINITION |
|---|---|
| Adjusted EBITDA margin | Adjusted EBITDA margin is defined as adjusted EBITDA divided by operating revenues. |
| ARPU | Mobile phone blended ARPU is calculated by dividing wireless operating service revenues by the average mobile phone subscriber base for the specified period and is expressed as a dollar unit per month. |
| Capital intensity | Capital intensity is defined as capital expenditures divided by operating revenues. |
| Churn | Mobile phone churn is the rate at which existing mobile phone subscribers cancel their services. It is a measure of our ability to retain our customers. Mobile phone churn is calculated by dividing the number of mobile phone deactivations during a given period by the average number of mobile phone subscribers in the base for the specified period and is expressed as a percentage per month. |
| Subscriber unit | Wireless subscriber unit is comprised of an active revenue-generating unit (e.g. mobile device, tablet or wireless Internet products), with a unique identifier (typically International Mobile Equipment Identity (IMEI) number), that has access to our wireless networks. We report wireless subscriber units in two categories: postpaid and prepaid. Prepaid subscriber units are considered active for a period of 90 days following the expiry of the subscriber's prepaid balance.<br>Wireline subscriber unit consists of an active revenue-generating unit with access to our services, including retail Internet, satellite TV, IPTV, and/or NAS. A subscriber is included in our subscriber base when the service has been installed and is operational at the customer premise and a billing relationship has been established.<br>• Retail Internet, IPTV and satellite TV subscribers have access to stand-alone services, and are primarily represented by a dwelling unit<br>• Retail NAS subscribers are based on a line count and are represented by a unique telephone number |

# 12 Effectiveness of internal controls

## DISCLOSURE CONTROLS AND PROCEDURES

Our disclosure controls and procedures are designed to provide reasonable assurance that information required to be disclosed by us in reports filed or submitted under Canadian and U.S. securities laws is recorded, processed, summarized and reported within the time periods specified under those laws, and include controls and procedures that are designed to ensure that the information is accumulated and communicated to management, including BCE's President and CEO and Executive Vice-President and Chief Financial Officer (CFO), to allow timely decisions regarding required disclosure.

As at December 31, 2021, management evaluated, under the supervision of and with the participation of the CEO and the CFO, the effectiveness of our disclosure controls and procedures, as defined in Rule 13a-15(e) under the U.S. *Securities Exchange Act of 1934*, as amended, and under National Instrument 52-109 – *Certification of Disclosure in Issuers' Annual and Interim Filings*.

Based on that evaluation, the CEO and CFO concluded that our disclosure controls and procedures were effective as at December 31, 2021.

## INTERNAL CONTROL OVER FINANCIAL REPORTING

Management is responsible for establishing and maintaining adequate internal control over financial reporting, as defined in Rule 13a-15(f) under the U.S. *Securities Exchange Act of 1934*, as amended, and under National Instrument 52-109. Our internal control over financial reporting is a process designed under the supervision of the CEO and CFO, and effected by the Board, management and other personnel of BCE, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with IFRS as issued by the IASB. However, because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements on a timely basis.

Management evaluated, under the supervision of and with the participation of the CEO and the CFO, the effectiveness of our internal control over financial reporting as at December 31, 2021, based on the criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

Based on that evaluation, the CEO and CFO concluded that our internal control over financial reporting was effective as at December 31, 2021.

## CHANGES IN INTERNAL CONTROL OVER FINANCIAL REPORTING

No changes were made in our internal control over financial reporting during the year ended December 31, 2021 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

# Reports on internal controls

## MANAGEMENT'S REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING

The management of BCE Inc. (BCE) is responsible for establishing and maintaining adequate internal control over financial reporting. Our internal control over financial reporting is a process designed under the supervision of the President and Chief Executive Officer and the Executive Vice-President and Chief Financial Officer and effected by the board of directors, management and other personnel of BCE, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with International Financial Reporting Standards (IFRS) as issued by the International Accounting Standards Board (IASB).

Due to its inherent limitations, internal control over financial reporting may not prevent or detect misstatements on a timely basis. Also, projections of any evaluation of the effectiveness of internal control over financial reporting to future periods are subject to the risk that the controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Management evaluated, under the supervision of and with the participation of the President and Chief Executive Officer and the Executive Vice-President and Chief Financial Officer, the effectiveness of our internal control over financial reporting as at December 31, 2021, based on the criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

Based on that evaluation, the President and Chief Executive Officer and the Executive Vice-President and Chief Financial Officer concluded that our internal control over financial reporting was effective as at December 31, 2021. There were no material weaknesses that have been identified by BCE's management in internal control over financial reporting as at December 31, 2021.

Our internal control over financial reporting as at December 31, 2021 has been audited by Deloitte LLP, independent registered public accounting firm, who also audited our consolidated financial statements for the year ended December 31, 2021. Deloitte LLP issued an unqualified opinion on the effectiveness of our internal control over financial reporting as at December 31, 2021.

(signed) Mirko Bibic
*President and Chief Executive Officer*

(signed) Glen LeBlanc
*Executive Vice-President and Chief Financial Officer*

(signed) Thierry Chaumont
*Senior Vice-President, Controller and Tax*

March 3, 2022

# REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Shareholders and the Board of Directors of BCE Inc.

## OPINION ON INTERNAL CONTROL OVER FINANCIAL REPORTING

We have audited the internal control over financial reporting of BCE Inc. and subsidiaries (the "Company") as of December 31, 2021, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2021, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by COSO.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated financial statements as at and for the year ended December 31, 2021, of the Company and our report dated March 3, 2022, expressed an unqualified opinion on those financial statements.

## BASIS FOR OPINION

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management's Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

## DEFINITION AND LIMITATIONS OF INTERNAL CONTROL OVER FINANCIAL REPORTING

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ Deloitte LLP
Chartered Professional Accountants

Montréal, Canada
March 3, 2022

We have served as the Company's auditor since 1880.

## MANAGEMENT'S RESPONSIBILITY FOR FINANCIAL REPORTING

These financial statements form the basis for all of the financial information that appears in this annual report.

The financial statements and all of the information in this annual report are the responsibility of the management of BCE Inc. (BCE) and have been reviewed and approved by the board of directors. The board of directors is responsible for ensuring that management fulfills its financial reporting responsibilities. Deloitte LLP, Independent Registered Public Accounting Firm, have audited the financial statements.

Management has prepared the financial statements in accordance with International Financial Reporting Standards (IFRS) as issued by the International Accounting Standards Board. Under these principles, management has made certain estimates and assumptions that are reflected in the financial statements and notes. Management believes that these financial statements fairly present BCE's consolidated financial position, results of operations and cash flows.

Management has a system of internal controls designed to provide reasonable assurance that the financial statements are accurate and complete in all material respects. This is supported by an internal audit group that reports to the Audit Committee, and includes communication with employees about policies for ethical business conduct. Management believes that the internal controls provide reasonable assurance that our financial records are reliable and form a proper basis for preparing the financial statements, and that our assets are properly accounted for and safeguarded.

The board of directors has appointed an Audit Committee, which is made up of unrelated and independent directors. The Audit Committee's responsibilities include reviewing the financial statements and other information in this annual report, and recommending them to the board of directors for approval. You will find a description of the Audit Committee's other responsibilities on page 178 of this annual report. The internal auditors and the shareholders' auditors have free and independent access to the Audit Committee.

(signed) Mirko Bibic
*President and Chief Executive Officer*

(signed) Glen LeBlanc
*Executive Vice-President and Chief Financial Officer*

(signed) Thierry Chaumont
*Senior Vice-President, Controller and Tax*

March 3, 2022

# REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Shareholders and the Board of Directors of BCE Inc.

## OPINION ON THE FINANCIAL STATEMENTS

We have audited the accompanying consolidated statements of financial position of BCE Inc. and subsidiaries (the "Company") as at December 31, 2021 and 2020, the related consolidated income statements, statements of comprehensive income, changes in equity, and cash flows, for each of the two years in the period ended December 31, 2021, and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as at December 31, 2021 and 2020, and its financial performance and its cash flows for each of the two years in the period ended December 31, 2021, in conformity with International Financial Reporting Standards as issued by the International Accounting Standards Board.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2021, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission and our report dated March 3, 2022, expressed an unqualified opinion on the Company's internal control over financial reporting.

## BASIS FOR OPINION

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

## CRITICAL AUDIT MATTER

The critical audit matter communicated below is a matter arising from the current-period audit of the financial statements that was communicated or required to be communicated to the audit committee and that (1) relates to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing a separate opinion on the critical audit matter or on the accounts or disclosures to which it relates.

### *Goodwill and Intangible Assets – Bell Media Group – Refer to Notes 7, 19 and 22 to the financial statements*

#### *CRITICAL AUDIT MATTER DESCRIPTION*

Goodwill and indefinite-life intangible assets (specifically broadcast licenses) for the Bell Media group of cash generating units ("Bell Media") are tested annually or when there is an indication that the asset may be impaired. During the second quarter of 2021, Bell Media identified declines in radio advertising revenue and increase in discount rates as indicators that certain assets may be impaired. As a result of the second quarter and annual assessments of impairment of goodwill and intangible assets for Bell Media, management has determined that there was no impairment of goodwill and there was an impairment for intangible assets.

When testing goodwill and intangible assets for Bell Media, while there are several assumptions that are required to determine the recoverable amount, the judgments with the highest degree of subjectivity and impact, are the forecasts of future operating performance, and the determination of discount rates and perpetuity growth rates. Changes in these assumptions could have a significant impact on the recoverable amounts of Bell Media, resulting in an impairment charge to goodwill and/or intangible assets as required. Given the significant judgments made by management, regarding the forecasts of future operating performance, determination of discount rates and perpetuity growth rates, a high degree of auditor judgment was required and resulted in an increased extent of audit effort, which included the need to involve fair value specialists.

#### *HOW THE CRITICAL AUDIT MATTER WAS ADDRESSED IN THE AUDIT*

Our audit procedures related to forecasts of future operating performance, the determination of discount rates and perpetuity growth rates used by management to determine the recoverable amounts for Bell Media included the following, among others:

- Evaluated the effectiveness of controls over the assessment of goodwill and intangible assets for impairment, including those over the forecasts of future operating performance and the determination of the discount rates and perpetuity growth rates.
- Evaluated management's ability to accurately forecast future operating performance by comparing actual results to management's historical forecasts.
- Evaluated the reasonableness of management's forecasts of future operating performance by comparing the forecasts to:
  - Historical operating performance;
  - Analyst and industry reports for the Company and certain of its peer companies, and other relevant publicly available information;
  - Known changes in Bell Media's operations or the industry in which it operates, including the impact of the COVID-19 pandemic and anticipated recovery, which are expected to impact future operating performance;
  - Internal communications to management and the Board of Directors.
- With the assistance of fair value specialists, evaluated the reasonableness of the (1) discount rates, and (2) perpetuity growth rates by:
  - Testing the source information underlying the determination of the discount rates;
  - Reviewing relevant internal and external information, including analyst and industry reports, to assess the reasonability of the selected discount rates and perpetuity growth rates;
  - Developing a range of independent estimates and comparing those to the discount rates and perpetuity growth rates selected by management.

/s/ Deloitte LLP
Chartered Professional Accountants

Montréal, Canada
March 3, 2022

We have served as the Company's auditor since 1880.

# CONSOLIDATED INCOME STATEMENTS

| FOR THE YEAR ENDED DECEMBER 31<br>(IN MILLIONS OF CANADIAN DOLLARS, EXCEPT SHARE AMOUNTS) | NOTE | 2021 | 2020 |
|---|---|---|---|
| Operating revenues | 3 | 23,449 | 22,883 |
| Operating costs | 3, 4 | (13,556) | (13,276) |
| Severance, acquisition and other costs | 5 | (209) | (116) |
| Depreciation | 17 | (3,627) | (3,475) |
| Amortization | 19 | (982) | (929) |
| Finance costs | | | |
| Interest expense | 6 | (1,082) | (1,110) |
| Interest on post-employment benefit obligations | 27 | (20) | (46) |
| Impairment of assets | 7, 17, 19 | (197) | (472) |
| Other income (expense) | 8 | 160 | (194) |
| Income taxes | 9 | (1,044) | (792) |
| **Net earnings from continuing operations** | | **2,892** | 2,473 |
| **Net earnings from discontinued operations** | 37 | **–** | 226 |
| **Net earnings** | | **2,892** | 2,699 |
| **Net earnings from continuing operations attributable to:** | | | |
| Common shareholders | | **2,709** | 2,272 |
| Preferred shareholders | | **131** | 136 |
| Non-controlling interest | | **52** | 65 |
| **Net earnings from continuing operations** | | **2,892** | 2,473 |
| **Net earnings attributable to:** | | | |
| Common shareholders | | **2,709** | 2,498 |
| Preferred shareholders | | **131** | 136 |
| Non-controlling interest | 36 | **52** | 65 |
| **Net earnings** | | **2,892** | 2,699 |
| **Net earnings per common share – basic and diluted** | 10 | | |
| Continuing operations | | **2.99** | 2.51 |
| Discontinued operations | 37 | **–** | 0.25 |
| **Net earnings per common share – basic and diluted** | | **2.99** | 2.76 |
| **Weighted average number of common shares outstanding – basic (millions)** | | **906.3** | 904.3 |

# CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME

| FOR THE YEAR ENDED DECEMBER 31<br>(IN MILLIONS OF CANADIAN DOLLARS) | NOTE | 2021 | 2020 |
|---|---|---|---|
| Net earnings from continuing operations | | 2,892 | 2,473 |
| Other comprehensive income from continuing operations, net of income taxes | | | |
| Items that will be subsequently reclassified to net earnings | | | |
| Net change in value of publicly-traded and privately-held investments, net of income taxes of nil for 2021 and 2020 | | 24 | (15) |
| Net change in value of derivatives designated as cash flow hedges, net of income taxes of ($23) million and $12 million for 2021 and 2020, respectively | | 63 | (33) |
| Items that will not be reclassified to net earnings | | | |
| Actuarial gains on post-employment benefit plans, net of income taxes of ($653) million and ($184) million for 2021 and 2020, respectively | 27 | 1,780 | 503 |
| Net change in value of derivatives designated as cash flow hedges, net of income taxes of ($1) million and nil for 2021 and 2020, respectively | | 4 | (1) |
| Other comprehensive income from continuing operations | | 1,871 | 454 |
| Net earnings from discontinued operations attributable to common shareholders | | – | 226 |
| Total comprehensive income | | 4,763 | 3,153 |
| Total comprehensive income attributable to: | | | |
| Common shareholders | | 4,578 | 2,953 |
| Preferred shareholders | | 131 | 136 |
| Non-controlling interest | 36 | 54 | 64 |
| Total comprehensive income | | 4,763 | 3,153 |

Consolidated financial statements

# CONSOLIDATED STATEMENTS OF FINANCIAL POSITION

| (IN MILLIONS OF CANADIAN DOLLARS) | NOTE | DECEMBER 31, 2021 | DECEMBER 31, 2020 |
|---|---|---|---|
| **ASSETS** | | | |
| **Current assets** | | | |
| Cash | | 207 | 224 |
| Trade and other receivables | 11 | 3,949 | 3,528 |
| Inventory | 12 | 482 | 439 |
| Contract assets | 13 | 414 | 687 |
| Contract costs | 14 | 507 | 402 |
| Prepaid expenses | | 254 | 209 |
| Other current assets | 15 | 335 | 199 |
| Assets held for sale | 16 | 50 | – |
| **Total current assets** | | 6,198 | 5,688 |
| **Non-current assets** | | | |
| Contract assets | 13 | 251 | 256 |
| Contract costs | 14 | 387 | 362 |
| Property, plant and equipment | 17 | 28,235 | 27,513 |
| Intangible assets | 19 | 15,570 | 13,102 |
| Deferred tax assets | 9 | 105 | 106 |
| Investments in associates and joint ventures | 20 | 668 | 756 |
| Post-employment benefit assets | 27 | 3,472 | 1,277 |
| Other non-current assets | 21 | 1,306 | 1,001 |
| Goodwill | 22 | 10,572 | 10,604 |
| **Total non-current assets** | | 60,566 | 54,977 |
| **Total assets** | | 66,764 | 60,665 |
| **LIABILITIES** | | | |
| **Current liabilities** | | | |
| Trade payables and other liabilities | 23 | 4,455 | 3,935 |
| Contract liabilities | 13 | 799 | 717 |
| Interest payable | | 247 | 222 |
| Dividends payable | | 811 | 766 |
| Current tax liabilities | | 141 | 214 |
| Debt due within one year | 24 | 2,625 | 2,417 |
| Liabilities held for sale | 16 | 35 | – |
| **Total current liabilities** | | 9,113 | 8,271 |
| **Non-current liabilities** | | | |
| Contract liabilities | 13 | 246 | 242 |
| Long-term debt | 25 | 27,048 | 23,906 |
| Deferred tax liabilities | 9 | 4,679 | 3,810 |
| Post-employment benefit obligations | 27 | 1,734 | 1,962 |
| Other non-current liabilities | 28 | 1,003 | 1,145 |
| **Total non-current liabilities** | | 34,710 | 31,065 |
| **Total liabilities** | | 43,823 | 39,336 |
| Commitments and contingencies | 34 | | |
| **EQUITY** | | | |
| **Equity attributable to BCE shareholders** | | | |
| Preferred shares | 30 | 4,003 | 4,003 |
| Common shares | 30 | 20,662 | 20,390 |
| Contributed surplus | 30 | 1,157 | 1,174 |
| Accumulated other comprehensive income | | 213 | 103 |
| Deficit | | (3,400) | (4,681) |
| **Total equity attributable to BCE shareholders** | | 22,635 | 20,989 |
| **Non-controlling interest** | 36 | 306 | 340 |
| **Total equity** | | 22,941 | 21,329 |
| **Total liabilities and equity** | | 66,764 | 60,665 |

# CONSOLIDATED STATEMENTS OF CHANGES IN EQUITY

| FOR THE YEAR ENDED DECEMBER 31, 2021 (IN MILLIONS OF CANADIAN DOLLARS) | NOTE | ATTRIBUTABLE TO BCE SHAREHOLDERS PREFERRED SHARES | COMMON SHARES | CONTRIBUTED SURPLUS | ACCUMULATED OTHER COMPREHENSIVE INCOME | DEFICIT | TOTAL | NON-CONTROLLING INTEREST | TOTAL EQUITY |
|---|---|---|---|---|---|---|---|---|---|
| Balance at December 31, 2020 | | 4,003 | 20,390 | 1,174 | 103 | (4,681) | 20,989 | 340 | 21,329 |
| Net earnings | | – | – | – | – | 2,840 | 2,840 | 52 | 2,892 |
| Other comprehensive income from continuing operations | | – | – | – | 90 | 1,779 | 1,869 | 2 | 1,871 |
| **Total comprehensive income** | | – | – | – | 90 | 4,619 | 4,709 | 54 | 4,763 |
| Common shares issued under employee stock option plan | 30 | – | 272 | (10) | – | – | 262 | – | 262 |
| Other share-based compensation | 30 | – | – | (7) | – | (32) | (39) | – | (39) |
| Dividends declared on BCE common and preferred shares | | – | – | – | – | (3,306) | (3,306) | – | (3,306) |
| Dividends declared by subsidiaries to non-controlling interest | | – | – | – | – | – | – | (87) | (87) |
| Settlement of cash flow hedges transferred to the cost basis of hedged items | | – | – | – | 20 | – | 20 | – | 20 |
| Other | | – | – | – | – | – | – | (1) | (1) |
| **Balance at December 31, 2021** | | 4,003 | 20,662 | 1,157 | 213 | (3,400) | 22,635 | 306 | 22,941 |

| FOR THE YEAR ENDED DECEMBER 31, 2020 (IN MILLIONS OF CANADIAN DOLLARS) | NOTE | ATTRIBUTABLE TO BCE SHAREHOLDERS PREFERRED SHARES | COMMON SHARES | CONTRIBUTED SURPLUS | ACCUMULATED OTHER COMPREHENSIVE INCOME | DEFICIT | TOTAL | NON-CONTROLLING INTEREST | TOTAL EQUITY |
|---|---|---|---|---|---|---|---|---|---|
| Balance at December 31, 2019 | | 4,004 | 20,363 | 1,178 | 161 | (4,632) | 21,074 | 334 | 21,408 |
| Net earnings | | – | – | – | – | 2,634 | 2,634 | 65 | 2,699 |
| Other comprehensive (loss) income from continuing operations | | – | – | – | (48) | 503 | 455 | (1) | 454 |
| **Total comprehensive (loss) income** | | – | – | – | (48) | 3,137 | 3,089 | 64 | 3,153 |
| Common shares issued under employee stock option plan | 30 | – | 27 | (1) | – | – | 26 | – | 26 |
| Other share-based compensation | 30 | – | – | (3) | – | (35) | (38) | – | (38) |
| Repurchase of preferred shares | 30 | (1) | – | – | – | – | (1) | – | (1) |
| Dividends declared on BCE common and preferred shares | | – | – | – | – | (3,147) | (3,147) | – | (3,147) |
| Dividends declared by subsidiaries to non-controlling interest | | – | – | – | – | – | – | (53) | (53) |
| Settlement of cash flow hedges transferred to the cost basis of hedged items | | – | – | – | (10) | – | (10) | – | (10) |
| Other | | – | – | – | – | (4) | (4) | (5) | (9) |
| **Balance at December 31, 2020** | | 4,003 | 20,390 | 1,174 | 103 | (4,681) | 20,989 | 340 | 21,329 |

# CONSOLIDATED STATEMENTS OF CASH FLOWS

| FOR THE YEAR ENDED DECEMBER 31 (IN MILLIONS OF CANADIAN DOLLARS) | NOTE | 2021 | 2020 |
|---|---|---|---|
| **Cash flows from operating activities** | | | |
| Net earnings from continuing operations | | 2,892 | 2,473 |
| Adjustments to reconcile net earnings from continuing operations to cash flows from operating activities | | | |
| Severance, acquisition and other costs | 5 | 209 | 116 |
| Depreciation and amortization | 17, 19 | 4,609 | 4,404 |
| Post-employment benefit plans cost | 27 | 286 | 315 |
| Net interest expense | | 1,063 | 1,087 |
| Impairment of assets | 7 | 197 | 472 |
| Losses (gains) on investments | 8 | 6 | (3) |
| Income taxes | 9 | 1,044 | 792 |
| Contributions to post-employment benefit plans | 27 | (282) | (297) |
| Payments under other post-employment benefit plans | 27 | (65) | (61) |
| Severance and other costs paid | | (208) | (78) |
| Interest paid | | (1,080) | (1,112) |
| Income taxes paid (net of refunds) | | (913) | (846) |
| Acquisition and other costs paid | | (35) | (35) |
| Change in contract assets | 13 | 278 | 704 |
| Change in wireless device financing plan receivables | 11 | (365) | (867) |
| Net change in operating assets and liabilities | | 372 | 636 |
| Cash from discontinued operations | 37 | – | 54 |
| **Cash flows from operating activities** | | 8,008 | 7,754 |
| **Cash flows used in investing activities** | | | |
| Capital expenditures | 3 | (4,837) | (4,202) |
| Business acquisitions | | (12) | (65) |
| Acquisition of spectrum licences | 19 | (2,082) | (86) |
| Other investing activities | | (72) | (79) |
| Cash from discontinued operations | 37 | – | 892 |
| **Cash flows used in investing activities** | | (7,003) | (3,540) |
| **Cash flows used in financing activities** | | | |
| Increase (decrease) in notes payable | | 351 | (1,641) |
| Decrease in securitized trade receivables | 24 | (150) | – |
| Issue of long-term debt | 25 | 4,985 | 6,006 |
| Repayment of long-term debt | 25 | (2,751) | (5,003) |
| Issue of common shares | 30 | 261 | 26 |
| Purchase of shares for settlement of share-based payments | 31 | (297) | (263) |
| Cash dividends paid on common shares | | (3,132) | (2,975) |
| Cash dividends paid on preferred shares | | (125) | (132) |
| Cash dividends paid by subsidiaries to non-controlling interest | | (86) | (53) |
| Other financing activities | | (78) | (93) |
| Cash used in discontinued operations | 37 | – | (7) |
| **Cash flows used in financing activities** | | (1,022) | (4,135) |
| Net (decrease) increase in cash | | (17) | 83 |
| Cash at beginning of year | | 224 | 141 |
| **Cash at end of year** | | 207 | 224 |
| Net decrease in cash equivalents | | – | (4) |
| Cash equivalents at beginning of year | | – | 4 |
| **Cash equivalents at end of year** | | – | – |

# Notes to consolidated financial statements

***We, us, our, BCE*** **and** ***the company*** **mean, as the context may require, either BCE Inc. or, collectively, BCE Inc., Bell Canada, their subsidiaries, joint arrangements and associates.**

## Note 1 | Corporate information

BCE is incorporated and domiciled in Canada. BCE's head office is located at 1, Carrefour Alexander-Graham-Bell, Verdun, Québec, Canada. BCE is a telecommunications and media company providing wireless, wireline, Internet and television (TV) services to residential, business and wholesale customers in Canada. Our Bell Media segment provides conventional TV, specialty TV, pay TV, streaming services, digital media services, radio broadcasting services and out-of-home (OOH) advertising services to customers in Canada. The consolidated financial statements (financial statements) were approved by BCE's board of directors on March 3, 2022.

## Note 2 | Significant accounting policies

### A) BASIS OF PRESENTATION

The financial statements were prepared in accordance with International Financial Reporting Standards (IFRS), as issued by the International Accounting Standards Board (IASB). The financial statements have been prepared on a historical cost basis, except for certain financial instruments that are measured at fair value as described in our accounting policies.

All amounts are in millions of Canadian dollars, except where noted.

#### FUNCTIONAL CURRENCY

The financial statements are presented in Canadian dollars, the company's functional currency.

### B) BASIS OF CONSOLIDATION

We consolidate the financial statements of all of our subsidiaries. Subsidiaries are entities we control, where control is achieved when the company is exposed or has the right to variable returns from its involvement with the investee and has the current ability to direct the activities of the investee that significantly affect the investee's returns.

The results of subsidiaries acquired during the year are consolidated from the date of acquisition and the results of subsidiaries sold during the year are deconsolidated from the date of disposal. Where necessary, adjustments are made to the financial statements of acquired subsidiaries to conform their accounting policies to ours. All intercompany transactions, balances, income and expenses are eliminated on consolidation.

Changes in our ownership interest in a subsidiary that do not result in a loss of control are accounted for as equity transactions, with no effect on net earnings or on Other comprehensive income from continuing operations. Any difference between the change in the carrying amount of non-controlling interest (NCI) and the consideration paid or received is attributed to owner's equity.

### C) REVENUE FROM CONTRACTS WITH CUSTOMERS

Revenue is measured based on the value of the expected consideration in a contract with a customer and excludes sales taxes and other amounts we collect on behalf of third parties. We recognize revenue when control of a product or service is transferred to a customer. When our right to consideration from a customer corresponds directly with the value to the customer of the products and services transferred to date, we recognize revenue in the amount to which we have a right to invoice.

For bundled arrangements, we account for individual products and services when they are separately identifiable and the customer can benefit from the product or service on its own or with other readily available resources. The total arrangement consideration is allocated to each product or service included in the contract with the customer based on its stand-alone selling price. We generally determine stand-alone selling prices based on the observable prices at which we sell products separately without a service contract and prices for non-bundled service offers with the same range of services, adjusted for market conditions and other factors, as appropriate. When similar products and services are not sold separately, we use the expected cost plus margin approach to determine stand-alone selling prices. Products and services purchased by a customer in excess of those included in the bundled arrangement are accounted for separately.

We may enter into arrangements with subcontractors and others who provide services to our customers. When we act as the principal in these arrangements, we recognize revenues based on the amounts billed to our customers. Otherwise, we recognize the net amount that we retain as revenues.

A contract asset is recognized in the consolidated statements of financial position (statements of financial position) when our right to consideration from the transfer of products or services to a customer is conditional on our obligation to transfer other products or services. Contract assets are transferred to trade receivables when our right to consideration becomes conditional only as to the passage of time. A contract liability is recognized in the statements of financial position when we receive consideration in advance of the transfer of products or services to the customer. Contract assets and liabilities relating to the same contract are presented on a net basis.

Incremental costs of obtaining a contract with a customer, principally comprised of sales commissions, and prepaid contract fulfillment costs are included in contract costs in the statements of financial position, except where the amortization period is one year or less, in which case costs of obtaining a contract are immediately expensed. Capitalized costs are amortized on a systematic basis that is consistent with the period and pattern of transfer to the customer of the related products or services.

### WIRELESS SEGMENT REVENUES

Our Wireless segment principally generates revenue from providing integrated digital wireless voice and data communications products and services to residential and business customers.

We recognize product revenues from the sale of wireless handsets and devices when a customer takes possession of the product. We recognize wireless service revenues over time, as the services are provided. For bundled arrangements, stand-alone selling prices are determined using observable prices adjusted for market conditions and other factors, as appropriate.

For wireless products and services that are sold separately, customers usually pay in full at the point of sale for products and on a monthly basis for services. For wireless products and services sold in bundled arrangements, including device financing plans, customers pay monthly over a contract term of up to 24 months for residential customers and up to 36 months for business customers. If they include a significant financing component, device financing plan receivables are discounted at market rates and interest revenue is accreted over the contractual repayment period.

### WIRELINE SEGMENT REVENUES

Our Wireline segment principally generates revenue from providing data, including Internet access and Internet protocol television (IPTV), local telephone, long distance, satellite TV service and connectivity, as well as other communications services and products to residential and business customers. Our Wireline segment also includes revenues from our wholesale business, which buys and sells local telephone, long distance, data and other services from or to resellers and other carriers.

We recognize product revenues from the sale of wireline equipment when a customer takes possession of the product. We recognize service revenues over time, as the services are provided. Revenues on certain long-term contracts are recognized using output methods based on products delivered, performance completed to date, time elapsed or milestones met. For bundled arrangements, stand-alone selling prices are determined using observable prices adjusted for market conditions and other factors, as appropriate, or the expected cost plus margin approach for customized business arrangements.

For wireline customers, products are usually paid in full at the point of sale. Services are paid for on a monthly basis except where a billing schedule has been established with certain business customers under long-term contracts that can generally extend up to seven years.

### MEDIA SEGMENT REVENUES

Our Media segment principally generates revenue from conventional TV, specialty TV, digital media, radio broadcasting and OOH advertising and subscriber fees from specialty TV, pay TV and streaming services.

We recognize advertising revenue when advertisements are aired on the radio or TV, posted on our websites or appear on our advertising panels and street furniture. Revenues relating to subscriber fees are recorded on a monthly basis as the services are provided. Customer payments are due monthly as the services are provided.

## D) SHARE-BASED PAYMENTS

Our share-based payment arrangements include an employee savings plan (ESP), restricted share units (RSUs) and performance share units (PSUs), deferred share units (DSUs) and stock options.

### ESP

We recognize our ESP contributions as compensation expense in *Operating costs* in the consolidated income statements (income statements). The value of an ESP at the grant date is equal to the value of one BCE common share. We credit contributed surplus for the ESP expense recognized over the two-year vesting period, based on management's estimate of the accrued employer contributions that are expected to vest. Upon settlement of shares under the ESP, any difference between the cost of shares purchased on the open market and the amount credited to contributed surplus is reflected in the deficit.

### RSUs/PSUs

For each RSU/PSU granted, we recognize compensation expense in *Operating costs* in the income statements based on the number of RSUs/PSUs expected to vest, recognized over the term of the vesting period, with a corresponding credit to contributed surplus. The value of a RSU at the grant date is equal to the value of one BCE common share. The value of a PSU at the grant date is equal to the value of one BCE common share or the value estimated using a Monte Carlo simulation for PSUs that include relative total shareholder return as a performance condition. Additional RSUs/PSUs are issued to reflect dividends declared on the common shares.

Compensation expense is adjusted for subsequent changes in management's estimate of the number of RSUs/PSUs that are expected to vest. The effect of these changes is recognized in the period of the change. Upon settlement of the RSUs/PSUs, any difference between the cost of shares purchased on the open market and the amount credited to contributed surplus is reflected in the deficit. Vested RSUs/PSUs are settled in BCE common shares, DSUs, or a combination thereof.

### DSUs

If compensation is elected to be taken in DSUs, we issue DSUs equal to the fair value of the services received. Additional DSUs are issued to reflect dividends declared on the common shares. DSUs are settled in BCE common shares purchased on the open market following the cessation of employment or when a director leaves the board. We credit contributed surplus for the fair value of DSUs at the issue date. Upon settlement of the DSUs, any difference between the cost of shares purchased on the open market and the amount credited to contributed surplus is reflected in the deficit.

### STOCK OPTIONS

We use a fair value-based method to measure the cost of our employee stock options. The fair value of options granted is determined using a variation of a binomial option pricing model that takes into account factors specific to the stock option plan. We recognize compensation expense in *Operating costs* in the income statements, based on the number of stock options that are expected to vest. Compensation expense is adjusted for subsequent changes in management's estimate of the number of stock options that are expected to vest.

We credit contributed surplus for stock option expense recognized over the vesting period. When stock options are exercised, we credit share capital for the amount received and the amounts previously credited to contributed surplus.

## E) INCOME AND OTHER TAXES

Current and deferred income tax expense is recognized in the income statements, except to the extent that the expense relates to items recognized in Other comprehensive income from continuing operations or directly in equity.

A current or non-current tax asset (liability) is the estimated tax receivable (payable) on taxable earnings (loss) for the current or past periods.

We use the liability method to account for deferred tax assets and liabilities, which arise from:

- temporary differences between the carrying amount of assets and liabilities recognized in the statements of financial position and their corresponding tax bases
- the carryforward of unused tax losses and credits, to the extent they can be used in the future

Deferred tax assets and liabilities are calculated at the tax rates that are expected to apply when the asset or liability is recovered or settled. Both our current and deferred tax assets and liabilities are calculated using tax rates that have been enacted or substantively enacted at the reporting date.

Deferred taxes are provided on temporary differences arising from investments in subsidiaries, joint arrangements and associates, except where we control the timing of the reversal of the temporary difference and it is probable that the temporary difference will not reverse in the foreseeable future.

Tax liabilities are, where permitted, offset against tax assets within the same taxable entity and tax jurisdiction.

### INVESTMENT TAX CREDITS (ITCs), OTHER TAX CREDITS AND GOVERNMENT GRANTS

We recognize ITCs, other tax credits and government grants given on eligible expenditures when it is reasonably assured that they will be realized. They are presented as part of *Trade and other receivables* and *Other current assets* in the statements of financial position when they are expected to be utilized in the next year. We use the cost reduction method to account for ITCs and government grants, under which the credits are applied against the expense or asset to which the ITC or government grant relates.

## F) CASH EQUIVALENTS

Cash equivalents are comprised of highly liquid investments with original maturities of three months or less from the date of purchase and are measured at amortized cost.

## G) SECURITIZATION OF TRADE RECEIVABLES

Proceeds on the securitization of trade receivables are recognized as a collateralized borrowing as we do not transfer control and substantially all the risks and rewards of ownership to another entity.

## H) INVENTORY

We measure inventory at the lower of cost and net realizable value. Inventory includes all costs to purchase, convert and bring the inventories to their present location and condition. We determine cost using specific identification for major equipment held for resale and the weighted average cost formula for all other inventory. We maintain inventory valuation reserves for inventory that is slow-moving or potentially obsolete, calculated using an inventory aging analysis.

## I) PROPERTY, PLANT AND EQUIPMENT

We record property, plant and equipment at historical cost. Historical cost includes expenditures that are attributable directly to the acquisition or construction of the asset, including the purchase cost, and labour.

Borrowing costs are capitalized for qualifying assets, if the time to build or develop is in excess of one year, at a rate that is based on our weighted average interest rate on outstanding long-term debt. Gains or losses on the sale or retirement of property, plant and equipment are recorded in *Other income (expense)* in the income statements.

### LEASES

We enter into leases for network infrastructure and equipment, land and buildings in the normal course of business. Lease contracts are typically made for fixed periods but may include purchase, renewal or termination options. Leases are negotiated on an individual basis and contain a wide range of different terms and conditions.

We adopted IFRS 16 – Leases as of January 1, 2019. Certain finance leases entered into prior to 2019 were initially measured under IAS 17 – Leases, as permitted by the transition provisions of IFRS 16.

*IFRS 16*

We assess whether a contract contains a lease at inception of the contract. A lease contract conveys the right to control the use of an identified asset for a period in exchange for consideration. We recognize lease liabilities with corresponding right-of-use assets for all lease agreements, except for short-term leases and leases of low value assets, which are expensed on a straight-line basis over the lease term. Consideration in a contract is allocated to lease and non-lease components on a relative stand-alone value basis. We generally account for lease components and any associated non-lease components as a single lease component.

Lease liabilities are initially measured at the present value of the lease payments that are not paid at the commencement date, discounted using our incremental borrowing rate, unless the rate implicit in the lease is readily determinable. We apply a single incremental borrowing rate to a portfolio of leases with similar characteristics. Lease payments included in the measurement of the lease liability comprise:

- fixed (and in-substance fixed) lease payments, less any lease incentives
- variable lease payments that depend on an index or rate
- payments expected under residual value guarantees and payments relating to purchase options and renewal option periods that are reasonably certain to be exercised (or periods subject to termination options that are not reasonably certain to be exercised)

Lease liabilities are subsequently measured at amortized cost using the effective interest method. Lease liabilities are remeasured, with a corresponding adjustment to the related right-of-use assets, when there is a change in variable lease payments arising from a change in an index or rate, or when we change our assessment of whether purchase, renewal or termination options will be exercised.

Right-of-use assets are measured at cost, and are comprised of the initial measurement of the corresponding lease liabilities, lease payments made at or before the commencement date and any initial direct costs. They are subsequently depreciated on a straight-line basis and reduced by impairment losses, if any. Right-of-use assets may also be adjusted to reflect the remeasurement of related lease liabilities. If we obtain ownership of the leased asset by the end of the lease term or the cost of the right-of-use asset reflects the exercise of a purchase option, we depreciate the right-of-use asset from the lease commencement date to the end of the useful life of the underlying asset. Otherwise, we depreciate the right-of-use asset from the commencement date to the earlier of the end of the useful life of the underlying asset or the end of the lease term.

Variable lease payments that do not depend on an index or rate are not included in the measurement of lease liabilities and right-of-use assets. The related payments are expensed in *Operating costs* in the period in which the event or condition that triggers those payments occurs.

### IAS 17

Under IAS 17, leases of property, plant and equipment are recognized as finance leases when we obtain substantially all the risks and rewards of ownership of the underlying assets. At the inception of the lease, we record an asset together with a corresponding long-term lease liability, at the lower of the fair value of the leased asset or the present value of the minimum future lease payments, excluding non-lease components.

### ASSET RETIREMENT OBLIGATIONS (AROs)

We initially measure and record AROs at management's best estimate using a present value methodology, adjusted subsequently for any changes in the timing or amount of cash flows and changes in discount rates. We capitalize asset retirement costs as part of the related assets and amortize them into earnings over time. We also increase the ARO and record a corresponding amount in interest expense to reflect the passage of time.

## J) INTANGIBLE ASSETS

### FINITE-LIFE INTANGIBLE ASSETS

Finite-life intangible assets are recorded at cost less accumulated amortization and accumulated impairment losses, if any.

*SOFTWARE*

We record internal-use software at historical cost. Cost includes expenditures that are attributable directly to the acquisition or development of the software, including the purchase cost and labour.

Software development costs are capitalized when all the following conditions are met:

- technical feasibility can be demonstrated
- management has the intent and the ability to complete the asset for use or sale
- it is probable that economic benefits will be generated
- costs attributable to the asset can be measured reliably

*CUSTOMER RELATIONSHIPS*

Customer relationship assets are acquired through business combinations and are recorded at fair value at the date of acquisition.

*PROGRAM AND FEATURE FILM RIGHTS*

We account for program and feature film rights as intangible assets when these assets are acquired for the purpose of broadcasting. Program and feature film rights, which include producer advances and licence fees paid in advance of receipt of the program or film, are stated at acquisition cost less accumulated amortization and accumulated impairment losses, if any. Programs and feature films under licence agreements are recorded as assets for rights acquired and liabilities for obligations incurred when:

- we receive a broadcast master and the cost is known or reasonably determinable for new program and feature film licences; or
- the licence term commences for licence period extensions or syndicated programs

Related liabilities of programs and feature films are classified as current or non-current, based on the payment terms. Amortization of program and feature film rights is recorded in *Operating costs* in the income statements.

### INDEFINITE-LIFE INTANGIBLE ASSETS

Brand assets, mainly comprised of the Bell, Bell Media and Bell MTS brands, and broadcast licences are acquired through business combinations and are recorded at fair value at the date of acquisition, less accumulated impairment losses, if any. Wireless spectrum licences are recorded at acquisition cost, including borrowing costs when the time to build or develop the related network is in excess of one year. Borrowing costs are calculated at a rate that is based on our weighted average interest rate on outstanding long-term debt.

Currently, there are no legal, regulatory, competitive or other factors that limit the useful lives of our brands or spectrum licences.

## K) DEPRECIATION AND AMORTIZATION

We depreciate property, plant and equipment and amortize finite-life intangible assets on a straight-line basis over their estimated useful lives. We review our estimates of useful lives on an annual basis and adjust depreciation and amortization on a prospective basis, as required. Land and assets under construction or development are not depreciated.

| | ESTIMATED USEFUL LIFE |
|---|---|
| Property, plant and equipment | |
| Network infrastructure and equipment | 2 to 50 years |
| Buildings | 5 to 50 years |
| Finite-life intangible assets | |
| Software | 2 to 12 years |
| Customer relationships | 2 to 26 years |
| Program and feature film rights | Up to 5 years |

## L) INVESTMENTS IN ASSOCIATES AND JOINT ARRANGEMENTS

Our financial statements incorporate our share of the results of our associates and joint ventures using the equity method of accounting, except when the investment is classified as held for sale. Equity income from investments is recorded in *Other income (expense)* in the income statements.

Investments in associates and joint ventures are recognized initially at cost and adjusted thereafter to include the company's share of income or loss and comprehensive income or loss on an after-tax basis.

Investments are reviewed for impairment at each reporting period and we compare their recoverable amount to their carrying amount when there is an indication of impairment.

We recognize our share of the assets, liabilities, revenues and expenses of joint operations in accordance with the related contractual agreements.

## M) BUSINESS COMBINATIONS AND GOODWILL

Business combinations are accounted for using the acquisition method. The consideration transferred in a business combination is measured at fair value at the date of acquisition. Acquisition-related transaction costs are expensed as incurred and recorded in *Severance, acquisition and other costs* in the income statements.

Identifiable assets and liabilities, including intangible assets, of acquired businesses are recorded at their fair values at the date of acquisition. When we acquire control of a business, any previously-held equity interest is remeasured to fair value and any gain or loss on remeasurement is recognized in *Other income (expense)* in the income statements. The excess of the purchase consideration and any previously-held equity interest over the fair value of identifiable net assets acquired is recorded as *Goodwill* in the statements of financial position. If the fair value of identifiable net assets acquired exceeds the purchase consideration and any previously-held equity interest, the difference is recognized in *Other income (expense)* in the income statements immediately as a bargain purchase gain.

## N) IMPAIRMENT OF NON-FINANCIAL ASSETS

Goodwill and indefinite-life intangible assets are tested for impairment annually or when there is an indication that the asset may be impaired. Property, plant and equipment and finite-life intangible assets are tested for impairment if events or changes in circumstances, assessed at each reporting period, indicate that their carrying amount may not be recoverable. For the purpose of impairment testing, assets other than goodwill are grouped at the lowest level for which there are separately identifiable cash inflows.

Impairment losses are recognized and measured as the excess of the carrying value of the assets over their recoverable amount. An asset's recoverable amount is the higher of its fair value less costs of disposal and its value in use. Previously recognized impairment losses, other than those attributable to goodwill, are reviewed for possible reversal at each reporting date and, if the asset's recoverable amount has increased, all or a portion of the impairment is reversed.

### GOODWILL IMPAIRMENT TESTING

We perform an annual test for goodwill impairment in the fourth quarter for each of our cash generating units (CGUs) or groups of CGUs to which goodwill is allocated, and whenever there is an indication that goodwill might be impaired.

A CGU is the smallest identifiable group of assets that generates cash inflows that are independent of the cash inflows from other assets or groups of assets.

We identify any potential impairment by comparing the carrying value of a CGU or group of CGUs to its recoverable amount. The recoverable amount of a CGU or group of CGUs is the higher of its fair value less costs of disposal and its value in use. Both fair value less costs of disposal and value in use are based on estimates of discounted future cash flows or other valuation methods. Cash flows are projected based on past experience, actual operating results and business plans. When the recoverable amount of a CGU or group of CGUs is less than its carrying value, the recoverable amount is determined for its identifiable assets and liabilities. The excess of the recoverable amount of the CGU or group of CGUs over the total of the amounts assigned to its assets and liabilities is the recoverable amount of goodwill.

An impairment charge is recognized in the income statements for any excess of the carrying value of goodwill over its recoverable amount. For purposes of impairment testing of goodwill, our CGUs or groups of CGUs correspond to our reporting segments as disclosed in Note 3, *Segmented information*.

## O) FINANCIAL INSTRUMENTS AND CONTRACT ASSETS

We measure trade and other receivables, including wireless device financing plan receivables, at amortized cost using the effective interest method, net of any allowance for doubtful accounts.

Our portfolio investments in equity securities are classified as fair value through other comprehensive income and are presented in our statements of financial position as *Other non-current assets*. These securities are recorded at fair value on the date of acquisition, including related transaction costs, and are adjusted to fair value at each reporting date. The corresponding unrealized gains and losses are recorded in *Other comprehensive income from continuing operations* in the consolidated statements of comprehensive income (statements of comprehensive income) and are reclassified from *Accumulated other comprehensive income* to the deficit in the statements of financial position when realized.

Other financial liabilities, which include trade payables and accruals, compensation payable, obligations imposed by the Canadian Radio-television and Telecommunications Commission (CRTC), interest payable and long-term debt, are recorded at amortized cost using the effective interest method.

We measure the allowance for doubtful accounts and impairment of contract assets based on an expected credit loss (ECL) model, which takes into account current economic conditions, historical information, and forward-looking information. We use the simplified approach for measuring losses based on the lifetime ECL for trade and other receivables and contract assets. Amounts considered uncollectible are written off and recognized in *Operating costs* in the income statements.

The cost of issuing debt is included as part of long-term debt and is accounted for at amortized cost using the effective interest method. The cost of issuing equity is reflected in the consolidated statements of changes in equity as a charge to the deficit.

## P) DERIVATIVE FINANCIAL INSTRUMENTS

We use derivative financial instruments to manage risks related to changes in interest rates, foreign currency rates, commodity prices and cash flow exposures related to share-based payment plans, capital expenditures, long-term debt instruments and operating revenues and expenses. We do not use derivative financial instruments for speculative or trading purposes.

Derivatives that mature within one year are included in *Other current assets* or *Trade payables and other liabilities* in the statements of financial position, whereas derivatives that have a maturity of more than one year are included in *Other non-current assets* or *Other non-current liabilities*.

### HEDGE ACCOUNTING

To qualify for hedge accounting, we document the relationship between the derivative and the related identified risk exposure, and our risk management objective and strategy. This includes associating each derivative to a specific asset or liability, commitment, or anticipated transaction.

We assess the effectiveness of a derivative in managing an identified risk exposure when hedge accounting is initially applied, and on an ongoing basis thereafter. If a hedging relationship ceases to meet the qualifying criteria, we discontinue hedge accounting prospectively.

#### *FAIR VALUE HEDGES*

We use cross currency interest rate swaps to manage foreign currency and interest rate risk on certain U.S. dollar long-term debt. Changes in the fair value of these derivatives and the related debt are recognized in *Other income (expense)* in the income statements and offset each other, except for any ineffective portion of the hedging relationship.

#### *CASH FLOW HEDGES*

We use foreign currency forward contracts and options to manage foreign currency risk relating to anticipated purchases denominated in foreign currencies. Changes in the fair value of these derivatives are recognized in our statements of comprehensive income, except for any ineffective portion of the hedging relationship, which is recognized in *Other income (expense)* in the income statements. Realized gains and losses in *Accumulated other comprehensive income* are reclassified to the income statements or to the initial cost of the non-financial asset in the same periods as the corresponding hedged transactions are recognized.

We use foreign currency forward contracts to manage foreign currency risk relating to our U.S. dollar debt under our committed credit facilities and commercial paper program. Changes in the fair value of these derivatives are recognized in *Other income (expense)* in the income statements and offset the foreign currency translation adjustment on the related debt, except for any portion of the hedging relationship which is ineffective.

We use cross currency interest rate swaps to manage foreign currency and interest rate risk related to certain U.S. dollar long-term debt. Changes in the fair value of these derivatives are recognized in our statements of comprehensive income, except for amounts recorded in *Other income (expense)* in the income statements to offset the foreign currency translation adjustment on the related debt and any portion of the hedging relationship which is ineffective.

We use forward starting interest rate swaps to manage interest rate risk related to certain future debt issuances. Changes in the fair value of these derivatives are recognized in our statements of comprehensive income, except for any ineffective portion of the hedging relationship, which is recognized in *Other income (expense)* in the income statements. Realized gains and losses in *Accumulated other comprehensive income* are reclassified to *Interest expense* in the income statements over the term of the related debt.

### DERIVATIVES USED AS ECONOMIC HEDGES

We use derivatives to manage cash flow exposures related to equity settled share-based payment plans and anticipated purchases in foreign currencies, interest rate risk related to preferred share dividend rate resets, interest rate risk related to anticipated debt issuances and commodity price risk related to the purchase cost of fuel. As these derivatives do not qualify for hedge accounting, the changes in their fair value are recorded in the income statements in *Other income (expense)*.

## Q) POST-EMPLOYMENT BENEFIT PLANS

### DEFINED BENEFIT (DB) AND OTHER POST-EMPLOYMENT BENEFIT (OPEB) PLANS

We maintain DB pension plans that provide pension benefits for certain employees and retirees. Benefits are based on the employee's length of service and average rate of pay during the highest paid consecutive five years of service. Most employees are not required to contribute to the plans. Certain plans provide cost of living adjustments to help protect the income of retired employees against inflation.

We are responsible for adequately funding our DB pension plans. We make contributions to them based on various actuarial cost methods permitted by pension regulatory bodies. Contributions reflect actuarial assumptions about future investment returns, salary projections, future service and life expectancy.

We provide OPEBs to some of our employees, including:

- health care and life insurance benefits during retirement, which have been phased out for new retirees since December 31, 2016. Most of these OPEB plans are unfunded and benefits are paid when incurred.
- other benefits, including workers' compensation and medical benefits to former or inactive employees, their beneficiaries and dependants, from the time their employment ends until their retirement starts, under certain circumstances

We accrue our obligations and related costs under post-employment benefit plans, net of the fair value of the benefit plan assets. Pension and OPEB costs are determined using:

- the projected unit credit method, prorated on years of service, which takes into account future pay levels
- a discount rate based on market interest rates of high-quality corporate fixed income investments with maturities that match the timing of benefits expected to be paid under the plans
- management's best estimate of pay increases, retirement ages of employees, expected healthcare costs and life expectancy

We value post-employment benefit plan assets at fair value using current market values.

Post-employment benefit plans current service cost is included in *Operating costs* in the income statements. Interest on our post-employment benefit plan assets and obligations is recognized in *Finance costs* in the income statements and represents the accretion of interest on the assets and obligations under our post-employment benefit plans. The interest rate is based on market conditions that existed at the beginning of the year. Actuarial gains and losses for all post-employment benefit plans are recorded in *Other comprehensive income from continuing operations* in the statements of comprehensive income in the period in which they occur and are recognized immediately in the deficit.

December 31 is the measurement date for our significant post-employment benefit plans. Our actuaries perform a valuation based on management's assumptions at least every three years to determine the actuarial present value of the accrued DB pension plans and OPEB obligations. The most recent actuarial valuation of our significant pension plans was as at December 31, 2020.

### DEFINED CONTRIBUTION (DC) PENSION PLANS

We maintain DC pension plans that provide certain employees with benefits. Under these plans, we are responsible for contributing a predetermined amount to an employee's retirement savings, based on a percentage of the employee's salary.

We recognize a post-employment benefit plans service cost for DC pension plans when the employee provides service to the company, essentially coinciding with our cash contributions.

When eligible, new employees can only participate in the DC pension plans.

## R) PROVISIONS

Provisions are recognized when all the following conditions are met:

- the company has a present legal or constructive obligation based on past events
- it is probable that an outflow of economic resources will be required to settle the obligation
- the amount can be reasonably estimated

Provisions are measured at the present value of the estimated expenditures expected to settle the obligation, if the effect of the time value of money is material. The present value is determined using current market assessments of the discount rate and risks specific to the obligation. The obligation increases as a result of the passage of time, resulting in interest expense which is recognized in *Finance costs* in the income statements.

## S) ESTIMATES AND KEY JUDGMENTS

When preparing the financial statements, management makes estimates and judgments relating to:

- reported amounts of revenues and expenses
- reported amounts of assets and liabilities
- disclosure of contingent assets and liabilities

We base our estimates on a number of factors, including historical experience, current events, including but not limited to the COVID-19 pandemic, and actions that the company may undertake in the future, as well as other assumptions that we believe are reasonable under the circumstances. By their nature, these estimates and judgments are subject to measurement uncertainty and actual results could differ. Our more significant estimates and judgments are described below.

### ESTIMATES

#### *USEFUL LIVES OF PROPERTY, PLANT AND EQUIPMENT AND FINITE-LIFE INTANGIBLE ASSETS*

Property, plant and equipment represent a significant proportion of our total assets. Changes in technology or our intended use of these assets, as well as changes in business prospects or economic and industry factors, may cause the estimated useful lives of these assets to change.

#### *POST-EMPLOYMENT BENEFIT PLANS*

The amounts reported in the financial statements relating to DB pension plans and OPEBs are determined using actuarial calculations that are based on several assumptions.

The actuarial valuation uses management's assumptions for, among other things, the discount rate, life expectancy, the rate of compensation increase, trends in healthcare costs and expected average remaining years of service of employees.

The most significant assumptions used to calculate the net post-employment benefit plans cost are the discount rate and life expectancy.

The discount rate is based on the yield on long-term, high-quality corporate fixed income investments, with maturities matching the estimated cash flows of the post-employment benefit plans. Life expectancy is based on publicly available Canadian mortality tables and is adjusted for the company's specific experience.

#### *REVENUE FROM CONTRACTS WITH CUSTOMERS*

We are required to make estimates that affect the amount of revenue from contracts with customers, including estimating the stand-alone selling prices of products and services.

#### *IMPAIRMENT OF NON-FINANCIAL ASSETS*

We make a number of estimates when calculating recoverable amounts using discounted future cash flows or other valuation methods to test for impairment. These estimates include the assumed growth rates for future cash flows, the number of years used in the cash flow model and the discount rate.

#### *DEFERRED TAXES*

The amounts of deferred tax assets and liabilities are estimated with consideration given to the timing, sources and amounts of future taxable income.

#### *LEASES*

The application of IFRS 16 requires us to make estimates that affect the measurement of right-of-use assets and liabilities, including determining the appropriate discount rate used to measure lease liabilities. Lease liabilities are initially measured at the present value of the lease payments that are not paid at the commencement date, discounted using our incremental borrowing rate, unless the rate implicit in the lease is readily determinable. Our incremental borrowing rate is derived from publicly available risk-free interest rates, adjusted for applicable credit spreads and lease terms. We apply a single incremental borrowing rate to a portfolio of leases with similar characteristics.

#### *FAIR VALUE OF FINANCIAL INSTRUMENTS*

Certain financial instruments, such as investments in equity securities, derivative financial instruments and certain elements of borrowings, are carried in the statements of financial position at fair value, with changes in fair value reflected in the income statements and the statements of comprehensive income. Fair values are estimated by reference to published price quotations or by using other valuation techniques that may include inputs that are not based on observable market data, such as discounted cash flows and earnings multiples.

*CONTINGENCIES*

In the ordinary course of business, we become involved in various claims and legal proceedings seeking monetary damages and other relief. Pending claims and legal proceedings represent a potential cost to our business. We estimate the amount of a loss by analyzing potential outcomes and assuming various litigation and settlement strategies, based on information that is available at the time.

*ONEROUS CONTRACTS*

A provision for onerous contracts is recognized when the unavoidable costs of meeting our obligations under a contract exceed the expected benefits to be received under the contract. The provision is measured at the present value of the lower of the expected cost of terminating the contract and the expected net cost of completing the contract.

### JUDGMENTS

*POST-EMPLOYMENT BENEFIT PLANS*

The determination of the discount rate used to value our post-employment benefit obligations requires judgment. The rate is set by reference to market yields of long-term, high-quality corporate fixed income investments at the beginning of each fiscal year. Significant judgment is required when setting the criteria for fixed income investments to be included in the population from which the yield curve is derived. The most significant criteria considered for the selection of investments include the size of the issue and credit quality, along with the identification of outliers, which are excluded.

*INCOME TAXES*

The calculation of income taxes requires judgment in interpreting tax rules and regulations. There are transactions and calculations for which the ultimate tax determination is uncertain. Our tax filings are also subject to audits, the outcome of which could change the amount of current and deferred tax assets and liabilities.

Management judgment is used to determine the amounts of deferred tax assets and liabilities to be recognized. In particular, judgment is required when assessing the timing of the reversal of temporary differences to which future income tax rates are applied.

*LEASES*

The application of IFRS 16 requires us to make judgments that affect the measurement of right-of-use assets and liabilities. A lease contract conveys the right to control the use of an identified asset for a period of time in exchange for consideration. At inception of the contract, we assess whether the contract contains an identified asset, whether we have the right to obtain substantially all of the economic benefits from use of the asset and whether we have the right to direct how and for what purpose the asset is used. In determining the lease term, we include periods covered by renewal options when we are reasonably certain to exercise those options. Similarly, we include periods covered by termination options when we are reasonably certain not to exercise those options. To assess if we are reasonably certain to exercise an option, we consider all facts and circumstances that create an economic incentive to exercise renewal options (or not exercise termination options). Economic incentives include the costs related to the termination of the lease, the significance of any leasehold improvements and the importance of the underlying assets to our operations.

*REVENUE FROM CONTRACTS WITH CUSTOMERS*

The identification of performance obligations within a contract and the timing of satisfaction of performance obligations under long-term contracts requires judgment. Additionally, the determination of costs to obtain a contract, including the identification of incremental costs, also requires judgment.

*CGUs*

The determination of CGUs or groups of CGUs for the purpose of impairment testing requires judgment.

*CONTINGENCIES*

The determination of whether a loss is probable from claims and legal proceedings and whether an outflow of resources is likely requires judgment.

## T) FUTURE CHANGES TO ACCOUNTING STANDARDS

The following amended accounting standards issued by the IASB have an effective date after December 31, 2021 and have not yet been adopted by BCE.

| STANDARD | DESCRIPTION | IMPACT | EFFECTIVE DATE |
|---|---|---|---|
| **Onerous Contracts – Cost of Fulfilling a Contract, Amendments to IAS 37 – Provisions, Contingent Liabilities and Contingent Assets** | These amendments clarify which costs should be included in determining the cost of fulfilling a contract when assessing whether a contract is onerous. | These amendments will not have a significant impact on our financial statements. | Effective for annual reporting periods beginning on or after January 1, 2022. |
| **Disclosure of Accounting Policies – Amendments to IAS 1 – Presentation of Financial Statements** | These amendments require that entities disclose material accounting policies, as defined, instead of significant accounting policies. | We are currently assessing the impact of these amendments on the disclosure of our accounting policies. | Effective for annual reporting periods beginning on or after January 1, 2023. Early application is permitted. |

# Note 3 | Segmented information

The accounting policies used in our segment reporting are the same as those we describe in Note 2, *Significant accounting policies*. Our results are reported in three segments: Bell Wireless, Bell Wireline and Bell Media. Our segments reflect how we manage our business and how we classify our operations for planning and measuring performance. Accordingly, we operate and manage our segments as strategic business units organized by products and services. Segments negotiate sales with each other as if they were unrelated parties.

We measure the performance of each segment based on adjusted EBITDA, which is equal to operating revenues less operating costs for the segment. Substantially all of our severance, acquisition and other costs, depreciation and amortization, finance costs and other expense are managed on a corporate basis and, accordingly, are not reflected in segment results.

Substantially all of our operations and assets are located in Canada.

Our Bell Wireless segment provides wireless voice and data communication products and services to our residential, small and medium-sized business and large enterprise customers as well as consumer electronics products across Canada.

Our Bell Wireline segment provides data, including Internet access and IPTV, local telephone, long distance, as well as other communication services and products to our residential, small and medium-sized business and large enterprise customers primarily in Ontario, Québec, the Atlantic provinces and Manitoba, while satellite TV service and connectivity to business customers are available nationally across Canada. In addition, this segment includes our wholesale business, which buys and sells local telephone, long distance, data and other services from or to resellers and other carriers.

Our Bell Media segment provides conventional TV, specialty TV, pay TV, streaming services, digital media services, radio broadcasting services and OOH advertising services to customers nationally across Canada.

## SEGMENTED INFORMATION

| FOR THE YEAR ENDED DECEMBER 31, 2021 | NOTE | BELL WIRELESS | BELL WIRELINE | BELL MEDIA | INTER-SEGMENT ELIMINATIONS | BCE |
|---|---|---|---|---|---|---|
| Operating revenues | | | | | | |
| External service revenues | | 6,355 | 11,314 | 2,681 | – | 20,350 |
| Inter-segment service revenues | | 45 | 358 | 355 | (758) | – |
| **Operating service revenues** | | 6,400 | 11,672 | 3,036 | (758) | 20,350 |
| External product revenues | | 2,593 | 506 | – | – | 3,099 |
| Inter-segment product revenues | | 6 | – | – | (6) | – |
| **Operating product revenues** | | 2,599 | 506 | – | (6) | 3,099 |
| Total external revenues | | 8,948 | 11,820 | 2,681 | – | 23,449 |
| Total inter-segment revenues | | 51 | 358 | 355 | (764) | – |
| **Total operating revenues** | | 8,999 | 12,178 | 3,036 | (764) | 23,449 |
| Operating costs | 4 | (5,146) | (6,863) | (2,311) | 764 | (13,556) |
| **Adjusted EBITDA** [(1)] | | 3,853 | 5,315 | 725 | – | 9,893 |
| Severance, acquisition and other costs | 5 | | | | | (209) |
| Depreciation and amortization | 17, 19 | | | | | (4,609) |
| Finance costs | | | | | | |
| Interest expense | 6 | | | | | (1,082) |
| Interest on post-employment benefit obligations | 27 | | | | | (20) |
| Impairment of assets | 7 | | | | | (197) |
| Other income | 8 | | | | | 160 |
| Income taxes | 9 | | | | | (1,044) |
| **Net earnings** | | | | | | 2,892 |
| Goodwill | 22 | 3,046 | 4,580 | 2,946 | – | 10,572 |
| Indefinite-life intangible assets | 19 | 6,148 | 1,692 | 1,935 | – | 9,775 |
| Capital expenditures | | 1,120 | 3,597 | 120 | – | 4,837 |

(1) *The chief operating decision maker uses primarily one measure of profit to make decisions and assess performance, being operating revenues less operating costs.*

| FOR THE YEAR ENDED DECEMBER 31, 2020 | NOTE | BELL WIRELESS | BELL WIRELINE | BELL MEDIA | INTER-SEGMENT ELIMINATIONS | BCE |
|---|---|---|---|---|---|---|
| Operating revenues | | | | | | |
| External service revenues | | 6,122 | 11,341 | 2,369 | – | 19,832 |
| Inter-segment service revenues | | 47 | 321 | 381 | (749) | – |
| **Operating service revenues** | | 6,169 | 11,662 | 2,750 | (749) | 19,832 |
| External product revenues | | 2,508 | 543 | – | – | 3,051 |
| Inter-segment product revenues | | 6 | 1 | – | (7) | – |
| **Operating product revenues** | | 2,514 | 544 | – | (7) | 3,051 |
| Total external revenues | | 8,630 | 11,884 | 2,369 | – | 22,883 |
| Total inter-segment revenues | | 53 | 322 | 381 | (756) | – |
| **Total operating revenues** | | 8,683 | 12,206 | 2,750 | (756) | 22,883 |
| Operating costs | 4 | (5,017) | (6,960) | (2,055) | 756 | (13,276) |
| **Adjusted EBITDA** [1] | | 3,666 | 5,246 | 695 | – | 9,607 |
| Severance, acquisition and other costs | 5 | | | | | (116) |
| Depreciation and amortization | 17, 19 | | | | | (4,404) |
| Finance costs | | | | | | |
| Interest expense | 6 | | | | | (1,110) |
| Interest on post-employment benefit obligations | 27 | | | | | (46) |
| Impairment of assets | 7 | | | | | (472) |
| Other expense | 8 | | | | | (194) |
| Income taxes | 9 | | | | | (792) |
| **Net earnings from continuing operations** | | | | | | 2,473 |
| **Net earnings from discontinued operations** | 37 | | | | | 226 |
| **Net earnings** | | | | | | 2,699 |
| Goodwill | 22 | 3,046 | 4,612 | 2,946 | – | 10,604 |
| Indefinite-life intangible assets | 19 | 4,063 | 1,692 | 2,085 | – | 7,840 |
| Capital expenditures | | 916 | 3,161 | 125 | – | 4,202 |

(1) *The chief operating decision maker uses primarily one measure of profit to make decisions and assess performance, being operating revenues less operating costs.*

## REVENUES BY SERVICES AND PRODUCTS

The following table presents our revenues disaggregated by type of services and products.

| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 |
|---|---|---|
| Services [1] | | |
| Wireless | **6,355** | 6,122 |
| Wireline data | **7,871** | 7,691 |
| Wireline voice | **3,154** | 3,402 |
| Media | **2,681** | 2,369 |
| Other wireline services | **289** | 248 |
| **Total services** | **20,350** | 19,832 |
| Products [2] | | |
| Wireless | **2,593** | 2,508 |
| Wireline data | **463** | 494 |
| Wireline equipment and other | **43** | 49 |
| **Total products** | **3,099** | 3,051 |
| **Total operating revenues** | **23,449** | 22,883 |

(1) *Our service revenues are generally recognized over time.*
(2) *Our product revenues are generally recognized at a point in time.*

# Note 4 | Operating costs

| FOR THE YEAR ENDED DECEMBER 31 | NOTE | 2021 | 2020 |
|---|---|---|---|
| Labour costs | | | |
| Wages, salaries and related taxes and benefits [1] | | (4,236) | (4,108) |
| Post-employment benefit plans service cost (net of capitalized amounts) | 27 | (266) | (269) |
| Other labour costs [2] | | (990) | (975) |
| Less: | | | |
| Capitalized labour | | 1,068 | 1,007 |
| **Total labour costs** | | (4,424) | (4,345) |
| Cost of revenues [3] | | (7,290) | (6,967) |
| Other operating costs [4] | | (1,842) | (1,964) |
| **Total operating costs** | | (13,556) | (13,276) |

(1) *Costs reported in 2020 are net of amounts from the Canada Emergency Wage Subsidy, a wage subsidy program offered by the federal government to eligible employers as a result of the COVID-19 pandemic.*

(2) *Other labour costs include contractor and outsourcing costs.*

(3) *Cost of revenues includes costs of wireless devices and other equipment sold, network and content costs, and payments to other carriers.*

(4) *Other operating costs include marketing, advertising and sales commission costs, bad debt expense, taxes other than income taxes, information technology costs, professional service fees and rent.*

Research and development expenses of $57 million and $47 million are included in operating costs for 2021 and 2020, respectively.

# Note 5 | Severance, acquisition and other costs

| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 |
|---|---|---|
| Severance | (171) | (35) |
| Acquisition and other | (38) | (81) |
| **Total severance, acquisition and other costs** | (209) | (116) |

## SEVERANCE COSTS

Severance costs consist of charges related to involuntary and voluntary employee terminations.

## ACQUISITION AND OTHER COSTS

Acquisition and other costs consist of transaction costs, such as legal and financial advisory fees, related to completed or potential acquisitions, employee severance costs related to the purchase of a business, the costs to integrate acquired companies into our operations, costs relating to litigation and regulatory decisions, when they are significant, and other costs.

# Note 6 | Interest expense

| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 |
|---|---|---|
| Interest expense on long-term debt | (1,088) | (1,072) |
| Interest expense on other debt | (57) | (87) |
| Capitalized interest | 63 | 49 |
| **Total interest expense** | (1,082) | (1,110) |

Included in interest expense on long-term debt is interest on lease liabilities of $177 million and $199 million for 2021 and 2020, respectively.

Capitalized interest was calculated using an average rate of 3.83% and 3.95% for 2021 and 2020, respectively, which represents the weighted average interest rate on our outstanding long-term debt.

# Note 7 | Impairment of assets

## 2021

During the second quarter of 2021, we identified indicators of impairment for our Bell Media radio markets, notably a decline in advertising revenue and an increase in the discount rate resulting from the impact of the ongoing COVID-19 pandemic. Accordingly, impairment testing was required for our group of radio CGUs.

During Q2 2021, we recognized $163 million of impairment charges for various radio markets within our Bell Media segment. These charges included $150 million allocated to indefinite-life intangible assets for broadcast licences, and $13 million to property, plant and equipment mainly for buildings and network infrastructure and equipment. They were determined by comparing the carrying value of the CGUs to their fair value less cost of disposal. We estimated the fair value of the CGUs using both discounted cash flows and market-based valuation models, which include five-year cash flow projections derived from business plans reviewed by senior management for the period of July 1, 2021 to December 31, 2026, using a discount rate of 8.5% and a perpetuity growth rate of (2.0%), as well as market multiple data from public companies and market transactions. After impairments, the carrying value of our group of radio CGUs was $235 million.

There was no impairment of Bell Media goodwill. See Note 22, *Goodwill*, for further details.

## 2020

During the second quarter of 2020, we identified indicators of impairment for certain of our Bell Media TV services and radio markets, notably declines in advertising revenues, lower subscriber revenues and overall increases in discount rates resulting from the economic impact of the COVID-19 pandemic. Accordingly, impairment testing was required for certain groups of CGUs as well as for goodwill.

During Q2 2020, we recognized $452 million of impairment charges for our English and French TV services as well as various radio markets within our Bell Media segment. These charges included $291 million allocated to indefinite-life intangible assets for broadcast licences, $146 million allocated to finite-life intangible assets, mainly for program and feature film rights, and $15 million to property, plant and equipment for network and infrastructure and equipment. They were determined by comparing the carrying value of the CGUs to their fair value less cost of disposal. We estimated the fair value of the CGUs using both discounted cash flows and market-based valuation models, which include five-year cash flow projections derived from business plans reviewed by senior management for the period of July 1, 2020 to December 31, 2025, using discount rates of 8.0% to 9.5% and a perpetuity growth rate of (1.0%) to nil, as well as market multiple data from public companies and market transactions. After impairments, the carrying value of these CGUs was $942 million.

There was no impairment of Bell Media goodwill. See Note 22, *Goodwill*, for further details.

# Note 8 | Other income (expense)

| FOR THE YEAR ENDED DECEMBER 31 | NOTE | 2021 | 2020 |
|---|---|---|---|
| Net mark-to-market gains (losses) on derivatives used to economically hedge equity settled share-based compensation plans | | 278 | (51) |
| Early debt redemption costs | 25 | (53) | (50) |
| Equity (losses) gains from investments in associates and joint ventures | 20 | | |
| (Loss) gain on investment | | (49) | 43 |
| Operations | | (46) | (38) |
| Losses on retirements and disposals of property, plant and equipment and intangible assets | | (24) | (83) |
| (Losses) gains on investments | | (6) | 3 |
| Other | | 60 | (18) |
| **Total other income (expense)** | | 160 | (194) |

## EQUITY (LOSSES) GAINS FROM INVESTMENTS IN ASSOCIATES AND JOINT VENTURES

We recorded a (loss) gain on investment of ($49 million) and $43 million in 2021 and 2020, respectively, related to equity (losses) gains on our share of an obligation to repurchase at fair value the minority interest in one of BCE's joint ventures. The obligation is marked to market each reporting period and the gain or loss on investment is recorded as equity gains or losses from investments in associates and joint ventures.

## LOSSES ON RETIREMENTS AND DISPOSALS OF PROPERTY, PLANT AND EQUIPMENT AND INTANGIBLE ASSETS

In 2020, we recorded a loss of $45 million due to a change in strategic direction related to the ongoing development of some of our TV platform assets under construction.

# Note 9 | Income taxes

The following table shows the significant components of income taxes deducted from net earnings from continuing operations.

| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 |
|---|---|---|
| Current taxes | | |
| Current taxes | (872) | (776) |
| Uncertain tax positions | 12 | 26 |
| Change in estimate relating to prior periods | 42 | 32 |
| Previously unrecognized tax benefits | – | 40 |
| Deferred taxes | | |
| Deferred taxes relating to the origination and reversal of temporary differences | (184) | (107) |
| Change in estimate relating to prior periods | (40) | (26) |
| Recognition and utilization of loss carryforwards | (21) | 15 |
| Previously unrecognized tax benefits | 15 | – |
| Effect of change in provincial corporate tax rate | – | 9 |
| Uncertain tax positions | 4 | (5) |
| **Total income taxes** | **(1,044)** | (792) |

The following table reconciles the amount of reported income taxes in the income statements with income taxes calculated at a statutory income tax rate of 26.8% for 2021 and 26.9% for 2020.

| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 |
|---|---|---|
| Net earnings from continuing operations | 2,892 | 2,473 |
| Add back income taxes | 1,044 | 792 |
| Earnings from continuing operations before income taxes | 3,936 | 3,265 |
| Applicable statutory tax rate | 26.8% | 26.9% |
| Income taxes computed at applicable statutory rates | (1,055) | (878) |
| Non-taxable portion of (losses) gains on investments | (1) | 1 |
| Uncertain tax positions | 16 | 21 |
| Effect of change in provincial corporate tax rate | – | 9 |
| Change in estimate relating to prior periods | 2 | 6 |
| Non-taxable portion of equity (losses) gains | (26) | 2 |
| Previously unrecognized tax benefits | 15 | 47 |
| Other | 5 | – |
| **Total income taxes from continuing operations** | **(1,044)** | (792) |
| **Average effective tax rate** | **26.5%** | 24.3% |

The following table shows aggregate current and deferred taxes relating to items recognized outside the income statements.

| | 2021 | | 2020 | |
|---|---|---|---|---|
| FOR THE YEAR ENDED DECEMBER 31 | OTHER COMPREHENSIVE INCOME | DEFICIT | OTHER COMPREHENSIVE INCOME | DEFICIT |
| Current taxes | – | 1 | – | 14 |
| Deferred taxes | (677) | 30 | (172) | (20) |
| **Total income taxes (expense) recovery** | **(677)** | **31** | (172) | (6) |

Notes to consolidated financial statements

The following table shows deferred taxes resulting from temporary differences between the carrying amounts of assets and liabilities recognized in the statements of financial position and their corresponding tax basis, as well as tax loss carryforwards.

| NET DEFERRED TAX LIABILITY | NON-CAPITAL LOSS CARRY-FORWARDS | POST-EMPLOYMENT BENEFIT PLANS | INDEFINITE-LIFE INTANGIBLE ASSETS | PROPERTY, PLANT AND EQUIPMENT AND FINITE-LIFE INTANGIBLE ASSETS | CRTC TANGIBLE BENEFITS | OTHER | TOTAL |
|---|---|---|---|---|---|---|---|
| **January 1, 2020** | 31 | 364 | (1,763) | (1,779) | 7 | (323) | (3,463) |
| Income statement | 13 | 5 | 46 | (426) | (7) | 255 | (114) |
| Business acquisitions | 25 | – | – | – | – | 1 | 26 |
| Other comprehensive income | – | (184) | – | – | – | 12 | (172) |
| Deficit | – | – | – | – | – | (20) | (20) |
| Discontinued operations | – | – | – | 30 | – | – | 30 |
| Other | – | – | – | – | – | 9 | 9 |
| **December 31, 2020** | 69 | 185 | (1,717) | (2,175) | – | (66) | (3,704) |
| Income statement | (10) | 2 | 16 | (253) | – | 19 | (226) |
| Business acquisitions | 4 | – | – | (9) | – | 1 | (4) |
| Other comprehensive income | – | (653) | – | – | – | (24) | (677) |
| Deficit | – | – | – | 16 | – | 14 | 30 |
| Reclassified to liabilities held for sale | – | – | – | 4 | – | 1 | 5 |
| Other | – | – | – | – | – | 2 | 2 |
| **December 31, 2021** | 63 | (466) | (1,701) | (2,417) | – | (53) | (4,574) |

At December 31, 2021, BCE had $266 million of non-capital loss carryforwards. We:

- recognized a deferred tax asset of $63 million for $249 million of the non-capital loss carryforwards. These non-capital loss carryforwards expire in varying annual amounts from 2024 to 2041.
- did not recognize a deferred tax asset for $17 million of non-capital loss carryforwards. This balance expires in varying annual amounts from 2023 to 2041.

At December 31, 2021, BCE had $69 million of unrecognized capital loss carryforwards, which can be carried forward indefinitely.

At December 31, 2020, BCE had $357 million of non-capital loss carryforwards. We:

- recognized a deferred tax asset of $69 million for $263 million of the non-capital loss carryforwards. These non-capital loss carryforwards expire in varying annual amounts from 2025 to 2040.
- did not recognize a deferred tax asset for $94 million of non-capital loss carryforwards. This balance expires in varying annual amounts from 2024 to 2038.

At December 31, 2020, BCE had $64 million of unrecognized capital loss carryforwards, which can be carried forward indefinitely.

## Note 10 | Earnings per share

The following table shows the components used in the calculation of basic and diluted net earnings per common share for earnings attributable to common shareholders.

| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 |
|---|---|---|
| Net earnings from continuing operations attributable to common shareholders – basic | 2,709 | 2,272 |
| Net earnings from discontinued operations attributable to common shareholders – basic | – | 226 |
| **Net earnings attributable to common shareholders – basic** | 2,709 | 2,498 |
| Dividends declared per common share (in dollars) | 3.50 | 3.33 |
| **Weighted average number of common shares outstanding (in millions)** | | |
| Weighted average number of common shares outstanding – basic | 906.3 | 904.3 |
| Assumed exercise of stock options [(1)] | 0.4 | 0.1 |
| **Weighted average number of common shares outstanding – diluted (in millions)** | 906.7 | 904.4 |

(1) *The calculation of the assumed exercise of stock options includes the effect of the average unrecognized future compensation cost of dilutive options. It excludes options for which the exercise price is higher than the average market value of a BCE common share. The number of excluded options was 3,302,850 in 2021 and 10,783,936 in 2020.*

# Note 11 | Trade and other receivables

| FOR THE YEAR ENDED DECEMBER 31 | NOTE | 2021 | 2020 |
|---|---|---|---|
| Trade receivables [1] | | 3,843 | 3,414 |
| Allowance for revenue adjustments | | (169) | (185) |
| Allowance for doubtful accounts | 29 | (136) | (149) |
| Current tax receivable | | 121 | 92 |
| Commodity taxes receivable | | 102 | 122 |
| Other accounts receivable | | 188 | 234 |
| **Total trade and other receivables** | | 3,949 | 3,528 |

(1) *The details of securitized trade receivables are set out in Note 24,* Debt due within one year.

## WIRELESS DEVICE FINANCING PLAN RECEIVABLES

Wireless device financing plan receivables represent amounts owed to us under financing agreements that have not yet been billed. The current portion of these balances is included in *Trade receivables* within the *Trade and other receivables* line item on our statements of financial position and the long-term portion is included within the *Other non-current assets* line item on our statements of financial position.

The following table summarizes our wireless device financing plan receivables at December 31, 2021.

| FOR THE YEAR ENDED DECEMBER 31 | NOTE | 2021 | 2020 |
|---|---|---|---|
| Current | | 1,040 | 649 |
| Non-current | 21 | 387 | 399 |
| **Total wireless device financing plan receivables** [1] | | 1,427 | 1,048 |

(1) *Excludes allowance for doubtful accounts and allowance for revenue adjustments on the current portion of $44 million and $28 million at December 31, 2021 and December 31, 2020, respectively, and allowance for doubtful accounts and allowance for revenue adjustments on the non-current portion of $15 million and $17 million at December 31, 2021 and December 31, 2020, respectively.*

# Note 12 | Inventory

| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 |
|---|---|---|
| Wireless devices and accessories | 189 | 189 |
| Merchandise and other | 293 | 250 |
| **Total inventory** | 482 | 439 |

The total amount of inventory subsequently recognized as an expense in cost of revenues was $3,080 million and $2,927 million for 2021 and 2020, respectively.

# Note 13 | Contract assets and liabilities

The table below provides a reconciliation of the significant changes in the contract assets and the contract liabilities balances.

| FOR THE YEAR ENDED DECEMBER 31 | NOTE | CONTRACT ASSETS [1] 2021 | CONTRACT ASSETS [1] 2020 | CONTRACT LIABILITIES 2021 | CONTRACT LIABILITIES 2020 |
|---|---|---|---|---|---|
| Opening balance, January 1 | | 943 | 1,644 | 959 | 890 |
| Revenue recognized included in contract liabilities at the beginning of the year | | – | – | (678) | (643) |
| Revenue recognized from contract liabilities included in contract assets at the beginning of the year | | 141 | 188 | – | – |
| Increase in contract liabilities during the year | | – | – | 752 | 688 |
| Increase in contract liabilities included in contract assets during the year | | (115) | (186) | – | – |
| Increase in contract assets from revenue recognized during the year | | 664 | 834 | – | – |
| Contract assets transferred to trade receivables | | (859) | (1,376) | 50 | 51 |
| Acquisitions | | – | – | 13 | – |
| Contract terminations transferred to trade receivables | | (89) | (145) | 4 | 19 |
| Discontinued operations | 37 | – | (1) | – | – |
| Reclassified to liabilities held for sale | 16 | – | – | (7) | – |
| Other | | (20) | (15) | (48) | (46) |
| **Ending balance, December 31** | | 665 | 943 | 1,045 | 959 |

(1) *Net of allowance for doubtful accounts of $20 million and $59 million at December 31, 2021 and December 31, 2020, respectively. See Note 29,* Financial and capital management, *for additional details.*

# Note 14 | Contract costs

The table below provides a reconciliation of the contract costs balance.

| FOR THE YEAR ENDED DECEMBER 31 | NOTE | 2021 | 2020 |
|---|---|---|---|
| Opening balance, January 1 | | 764 | 783 |
| Incremental costs of obtaining a contract and contract fulfillment costs | | 635 | 535 |
| Amortization included in operating costs | | (504) | (552) |
| Acquisitions | | 3 | – |
| Reclassified to assets held for sale | 16 | (4) | – |
| Discontinued operations | 37 | – | (2) |
| **Ending balance, December 31** | | 894 | 764 |

Contract costs are amortized over periods ranging from 12 to 84 months.

# Note 15 | Restricted cash

In Q1 2021, we entered into a $107 million subsidy agreement with the Government of Québec to facilitate the deployment of high-speed Internet in certain areas of the province of Québec by September 2022. In 2021, we received $97 million of the total committed funding, with the remainder expected upon completion of the project.

As a result, we recorded $82 million in *Other current assets* as restricted cash with a corresponding liability in *Trade payables and other liabilities* on the statement of financial position at December 31, 2021. Additionally, we recorded $15 million as a reduction of capital expenditures on the consolidated statements of cash flows (statements of cash flows).

# Note 16 | Assets held for sale

On January 13, 2022, the execution of an agreement to sell BCE's wholly-owned subsidiary 6362222 Canada Inc. (Createch) was announced by the purchaser. Createch carries on a consulting business included in our Bell Wireline segment that specializes in the optimization of business processes and implementation of technological solutions. The sale is for cash proceeds of $55 million.

As a result, we have presented the assets and liabilities of Createch as held for sale in our statement of financial position at December 31, 2021, measured at their carrying amount, which is lower than the estimated fair value less costs to sell. Property, plant and equipment and intangible assets included in assets held for sale are no longer depreciated or amortized effective December 2021.

Our results for the years ended December 31, 2021 and 2020 included $64 million and $61 million of revenue and $5 million and $2 million of net earnings, respectively, related to the assets held for sale.

The following table summarizes the carrying value of the assets and liabilities that are classified as held for sale at December 31, 2021.

| | 2021 |
|---|---|
| Trade and other receivables | 29 |
| Contract costs | 4 |
| Prepaid expenses | 1 |
| Property, plant and equipment | 2 |
| Intangible assets | 1 |
| Other non-current assets | 7 |
| Goodwill | 6 |
| **Total assets held for sale** | 50 |
| Trade payables and other liabilities | 18 |
| Contract liabilities | 7 |
| Deferred tax liabilities | 5 |
| Other non-current liabilities | 5 |
| **Total liabilities held for sale** | 35 |
| **Net assets held for sale** | 15 |

Subsequent to year end, on March 1, 2022, we completed the sale for cash proceeds of $55 million and expect to record a gain on sale of approximately $37 million (net of taxes of $3 million) in Q1 2022.

# Note 17 | Property, plant and equipment

| FOR THE YEAR ENDED DECEMBER 31, 2021 | NOTE | NETWORK INFRASTRUCTURE AND EQUIPMENT [1] | LAND AND BUILDINGS [1] | ASSETS UNDER CONSTRUCTION | TOTAL |
|---|---|---|---|---|---|
| **COST** | | | | | |
| January 1, 2021 | | 69,477 | 7,832 | 1,889 | 79,198 |
| Additions | | 2,643 | 326 | 2,515 | 5,484 |
| Acquired through business combinations | | 2 | 12 | – | 14 |
| Transfers | | 358 | 771 | (2,163) | (1,034) |
| Retirements and disposals | | (1,550) | (37) | – | (1,587) |
| Impairment losses recognized in earnings | 7 | (4) | (15) | – | (19) |
| Reclassified to assets held for sale | 16 | (3) | – | – | (3) |
| **December 31, 2021** | | 70,923 | 8,889 | 2,241 | 82,053 |
| **ACCUMULATED DEPRECIATION** | | | | | |
| January 1, 2021 | | 47,563 | 4,122 | – | 51,685 |
| Depreciation | | 3,220 | 407 | – | 3,627 |
| Retirements and disposals | | (1,515) | (27) | – | (1,542) |
| Transfers | | (95) | 191 | – | 96 |
| Reclassified to assets held for sale | 16 | (1) | – | – | (1) |
| Other | | (50) | 3 | – | (47) |
| **December 31, 2021** | | 49,122 | 4,696 | – | 53,818 |
| **NET CARRYING AMOUNT** | | | | | |
| January 1, 2021 | | 21,914 | 3,710 | 1,889 | 27,513 |
| December 31, 2021 | | 21,801 | 4,193 | 2,241 | 28,235 |

(1) *Includes right-of-use assets. See Note 18,* Leases, *for additional details.*

| FOR THE YEAR ENDED DECEMBER 31, 2020 | NOTE | NETWORK INFRASTRUCTURE AND EQUIPMENT [(1)] | LAND AND BUILDINGS [(1)] | ASSETS UNDER CONSTRUCTION | TOTAL |
|---|---|---|---|---|---|
| **COST** | | | | | |
| January 1, 2020 | | 67,597 | 8,079 | 1,687 | 77,363 |
| Additions | | 2,414 | 247 | 2,071 | 4,732 |
| Acquired through business combinations | | 2 | 5 | – | 7 |
| Transfers | | 964 | 49 | (1,825) | (812) |
| Retirements and disposals | | (1,348) | (54) | (32) | (1,434) |
| Impairment losses recognized in earnings | 7 | (17) | (9) | (1) | (27) |
| Discontinued operations | 37 | (135) | (485) | (11) | (631) |
| **December 31, 2020** | | 69,477 | 7,832 | 1,889 | 79,198 |
| **ACCUMULATED DEPRECIATION** | | | | | |
| January 1, 2020 | | 45,914 | 3,813 | – | 49,727 |
| Depreciation | | 3,035 | 440 | – | 3,475 |
| Retirements and disposals | | (1,268) | (54) | – | (1,322) |
| Discontinued operations | 37 | (70) | (77) | – | (147) |
| Other | | (48) | – | – | (48) |
| **December 31, 2020** | | 47,563 | 4,122 | – | 51,685 |
| **NET CARRYING AMOUNT** | | | | | |
| January 1, 2020 | | 21,683 | 4,266 | 1,687 | 27,636 |
| December 31, 2020 | | 21,914 | 3,710 | 1,889 | 27,513 |

(1) *Includes right-of-use assets. See Note 18,* Leases, *for additional details.*

# Note 18 | Leases

## RIGHT-OF-USE ASSETS

BCE's significant right-of-use assets under leases are satellites, office premises, land, cellular tower sites, retail outlets and OOH advertising spaces. Right-of-use assets are presented in *Property, plant and equipment* in the statements of financial position.

| FOR THE YEAR ENDED DECEMBER 31, 2021 | NOTE | NETWORK INFRASTRUCTURE AND EQUIPMENT | LAND AND BUILDINGS | TOTAL |
|---|---|---|---|---|
| **COST** | | | | |
| January 1, 2021 | | 3,690 | 2,995 | 6,685 |
| Additions | | 574 | 214 | 788 |
| Transfers | | (977) | 722 | (255) |
| Acquired through business combinations | | – | 12 | 12 |
| Lease terminations | | (47) | (6) | (53) |
| Impairment losses recognized in earnings | 7 | – | (6) | (6) |
| **December 31, 2021** | | 3,240 | 3,931 | 7,171 |
| **ACCUMULATED DEPRECIATION** | | | | |
| January 1, 2021 | | 1,473 | 1,086 | 2,559 |
| Depreciation | | 419 | 275 | 694 |
| Transfers | | (310) | 177 | (133) |
| Lease terminations | | (28) | – | (28) |
| **December 31, 2021** | | 1,554 | 1,538 | 3,092 |
| **NET CARRYING AMOUNT** | | | | |
| January 1, 2021 | | 2,217 | 1,909 | 4,126 |
| December 31, 2021 | | 1,686 | 2,393 | 4,079 |

| FOR THE YEAR ENDED DECEMBER 31, 2020 | NOTE | NETWORK INFRASTRUCTURE AND EQUIPMENT | LAND AND BUILDINGS | TOTAL |
|---|---|---|---|---|
| **COST** | | | | |
| January 1, 2020 | | 3,609 | 2,933 | 6,542 |
| Additions | | 470 | 200 | 670 |
| Transfers | | (360) | (2) | (362) |
| Acquired through business combinations | | – | 4 | 4 |
| Lease terminations | | (20) | (10) | (30) |
| Impairment losses recognized in earnings | 7 | (1) | (9) | (10) |
| Discontinued operations | 37 | (8) | (121) | (129) |
| **December 31, 2020** | | 3,690 | 2,995 | 6,685 |
| **ACCUMULATED DEPRECIATION** | | | | |
| January 1, 2020 | | 1,301 | 817 | 2,118 |
| Depreciation | | 377 | 294 | 671 |
| Transfers | | (199) | – | (199) |
| Lease terminations | | (2) | (6) | (8) |
| Discontinued operations | 37 | (4) | (19) | (23) |
| **December 31, 2020** | | 1,473 | 1,086 | 2,559 |
| **NET CARRYING AMOUNT** | | | | |
| January 1, 2020 | | 2,308 | 2,116 | 4,424 |
| December 31, 2020 | | 2,217 | 1,909 | 4,126 |

## LEASES IN NET EARNINGS FROM CONTINUING OPERATIONS

The following table provides the expenses related to leases recognized in net earnings from continuing operations.

| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 |
|---|---|---|
| Interest expense on lease liabilities | **177** | 199 |
| Variable lease payment expenses not included in the measurement of lease liabilities | **122** | 150 |
| Expenses for leases of low value assets | **60** | 60 |
| Expenses for short-term leases | **31** | 31 |

## LEASES IN THE STATEMENTS OF CASH FLOWS

Total cash outflow related to leases was $1,202 million and $1,219 million for the period ended December 31, 2021 and December 31, 2020, respectively.

## ADDITIONAL DISCLOSURES

See Note 24, *Debt due within one year*, and Note 25, *Long-term debt*, for lease liabilities balances included in the statements of financial position.

See Note 29, *Financial and capital management*, for a maturity analysis of lease liabilities.

See Note 34, *Commitments and contingencies*, for leases committed but not yet commenced as at December 31, 2021.

# Note 19 | Intangible assets

| FOR THE YEAR ENDED DECEMBER 31, 2021 | NOTE | FINITE-LIFE | | | | | INDEFINITE-LIFE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SOFTWARE | CUSTOMER RELATION-SHIPS | PROGRAM AND FEATURE FILM RIGHTS | OTHER | TOTAL | BRANDS | SPECTRUM AND OTHER LICENCES [(1)] | BROADCAST LICENCES | TOTAL | TOTAL INTANGIBLE ASSETS |
| **COST** | | | | | | | | | | | |
| January 1, 2021 | | 9,169 | 1,736 | 645 | 469 | 12,019 | 2,409 | 3,701 | 1,730 | 7,840 | 19,859 |
| Additions | | 361 | – | 1,034 | 19 | 1,414 | – | 2,085 | – | 2,085 | 3,499 |
| Acquired through business combinations | | – | – | – | 52 | 52 | – | – | – | – | 52 |
| Transfers | | 1,154 | – | – | (125) | 1,029 | – | – | – | – | 1,029 |
| Retirements and disposals | | (1,089) | – | – | (11) | (1,100) | – | – | – | – | (1,100) |
| Impairment losses recognized in earnings | 7 | (28) | – | – | – | (28) | – | – | (150) | (150) | (178) |
| Amortization included in operating costs | | – | – | (1,048) | – | (1,048) | – | – | – | – | (1,048) |
| Reclassified to assets held for sale | 16 | (2) | – | – | – | (2) | – | – | – | – | (2) |
| **December 31, 2021** | | 9,565 | 1,736 | 631 | 404 | 12,336 | 2,409 | 5,786 | 1,580 | 9,775 | 22,111 |
| **ACCUMULATED AMORTIZATION** | | | | | | | | | | | |
| January 1, 2021 | | 5,644 | 878 | – | 235 | 6,757 | – | – | – | – | 6,757 |
| Amortization | | 851 | 91 | – | 40 | 982 | – | – | – | – | 982 |
| Retirements and disposals | | (1,087) | – | – | (11) | (1,098) | – | – | – | – | (1,098) |
| Transfers | | – | – | – | (99) | (99) | – | – | – | – | (99) |
| Reclassified to assets held for sale | 16 | (1) | – | – | – | (1) | – | – | – | – | (1) |
| **December 31, 2021** | | 5,407 | 969 | – | 165 | 6,541 | – | – | – | – | 6,541 |
| **NET CARRYING AMOUNT** | | | | | | | | | | | |
| January 1, 2021 | | 3,525 | 858 | 645 | 234 | 5,262 | 2,409 | 3,701 | 1,730 | 7,840 | 13,102 |
| December 31, 2021 | | 4,158 | 767 | 631 | 239 | 5,795 | 2,409 | 5,786 | 1,580 | 9,775 | 15,570 |

(1) *On December 17, 2021, Bell Mobility Inc. (Bell Mobility) acquired 271 licences in a number of urban and rural markets for 678 million megahertz per population (MHz-Pop) of 3500 MHz spectrum for $2.07 billion.*

| FOR THE YEAR ENDED DECEMBER 31, 2020 | NOTE | FINITE-LIFE | | | | | INDEFINITE-LIFE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SOFTWARE | CUSTOMER RELATION-SHIPS | PROGRAM AND FEATURE FILM RIGHTS | OTHER | TOTAL | BRANDS | SPECTRUM AND OTHER LICENCES | BROADCAST LICENCES | TOTAL | TOTAL INTANGIBLE ASSETS |
| **COST** | | | | | | | | | | | |
| January 1, 2020 | | 10,522 | 2,017 | 716 | 489 | 13,744 | 2,409 | 3,586 | 2,026 | 8,021 | 21,765 |
| Additions | | 344 | – | 874 | 41 | 1,259 | – | 116 | – | 116 | 1,375 |
| Acquired through business combinations | | 1 | – | 10 | – | 11 | – | – | – | – | 11 |
| Transfers | | 810 | – | – | – | 810 | – | – | – | – | 810 |
| Retirements and disposals | | (2,479) | – | – | (36) | (2,515) | – | – | – | – | (2,515) |
| Impairment losses recognized in earnings | 7 | (13) | – | (110) | (25) | (148) | – | (1) | (296) | (297) | (445) |
| Amortization included in operating costs | | – | – | (845) | – | (845) | – | – | – | – | (845) |
| Discontinued operations | 37 | (16) | (281) | – | – | (297) | – | – | – | – | (297) |
| **December 31, 2020** | | 9,169 | 1,736 | 645 | 469 | 12,019 | 2,409 | 3,701 | 1,730 | 7,840 | 19,859 |
| **ACCUMULATED AMORTIZATION** | | | | | | | | | | | |
| January 1, 2020 | | 7,345 | 839 | – | 229 | 8,413 | – | – | – | – | 8,413 |
| Amortization | | 787 | 99 | – | 43 | 929 | – | – | – | – | 929 |
| Retirements and disposals | | (2,480) | – | – | (37) | (2,517) | – | – | – | – | (2,517) |
| Discontinued operations | 37 | (8) | (60) | – | – | (68) | – | – | – | – | (68) |
| **December 31, 2020** | | 5,644 | 878 | – | 235 | 6,757 | – | – | – | – | 6,757 |
| **NET CARRYING AMOUNT** | | | | | | | | | | | |
| January 1, 2020 | | 3,177 | 1,178 | 716 | 260 | 5,331 | 2,409 | 3,586 | 2,026 | 8,021 | 13,352 |
| December 31, 2020 | | 3,525 | 858 | 645 | 234 | 5,262 | 2,409 | 3,701 | 1,730 | 7,840 | 13,102 |

# Note 20 | Investments in associates and joint ventures

The following tables provide summarized financial information with respect to BCE's associates and joint ventures. For more details on our associates and joint ventures, see Note 35, *Related party transactions*.

## STATEMENTS OF FINANCIAL POSITION

| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 |
|---|---|---|
| Assets | 3,852 | 3,953 |
| Liabilities | (2,523) | (2,448) |
| **Total net assets** | **1,329** | 1,505 |
| **BCE's share of net assets** | **668** | 756 |

## INCOME STATEMENTS

| FOR THE YEAR ENDED DECEMBER 31 | NOTE | 2021 | 2020 |
|---|---|---|---|
| Revenues | | 1,855 | 1,359 |
| Expenses | | (2,047) | (1,351) |
| **Total net (losses) income** | | **(192)** | 8 |
| **BCE's share of net (losses) income** | 8 | **(95)** | 5 |

# Note 21 | Other non-current assets

| FOR THE YEAR ENDED DECEMBER 31 | NOTE | 2021 | 2020 |
|---|---|---|---|
| Long-term wireless device financing plan receivables | 11 | 387 | 399 |
| Derivative assets | 29 | 274 | 92 |
| Long-term receivables | | 221 | 128 |
| Investments [(1)] | 29 | 185 | 167 |
| Publicly-traded and privately-held investments | 29 | 183 | 126 |
| Other | | 56 | 89 |
| **Total other non-current assets** | | **1,306** | 1,001 |

(1) *These amounts have been pledged as security related to obligations for certain employee benefits and are not available for general use.*

# Note 22 | Goodwill

The following table provides details about the changes in the carrying amounts of goodwill for the years ended December 31, 2021 and 2020. BCE's groups of CGUs for purposes of goodwill impairment testing correspond to our reporting segments.

| | NOTE | BELL WIRELESS | BELL WIRELINE | BELL MEDIA | BCE |
|---|---|---|---|---|---|
| **Balance at January 1, 2020** | | 3,046 | 4,675 | 2,946 | 10,667 |
| Acquisitions and other | | – | 52 | – | 52 |
| Discontinued operations | 37 | – | (115) | – | (115) |
| **Balance at December 31, 2020** | | 3,046 | 4,612 | 2,946 | 10,604 |
| Acquisitions and other | | – | (26) | – | (26) |
| Reclassified to assets held for sale | 16 | – | (6) | – | (6) |
| **Balance at December 31, 2021** | | 3,046 | 4,580 | 2,946 | 10,572 |

Notes to consolidated financial statements

## IMPAIRMENT TESTING

As described in Note 2, *Significant accounting policies*, goodwill is tested annually for impairment or when there is an indication that goodwill may be impaired, by comparing the carrying value of a CGU or group of CGUs to the recoverable amount, where the recoverable amount is the higher of fair value less costs of disposal or value in use.

During the second quarter of 2020, we identified indicators that goodwill for our Bell Media group of CGUs may be impaired as a result of the economic impact of the COVID-19 pandemic, notably declines in advertising revenues, lower subscriber revenues and increases in discount rates. Impairment testing of goodwill during 2020 for the Bell Media group of CGUs did not result in an impairment of goodwill.

### RECOVERABLE AMOUNT

The recoverable amount for each of the Bell Wireless and Bell Wireline groups of CGUs is its value in use. The recoverable amount for the Bell Media group of CGUs is its fair value less costs of disposal.

The recoverable amount for our groups of CGUs is determined by discounting five-year cash flow projections derived from business plans reviewed by senior management. The projections reflect management's expectations of revenue, adjusted EBITDA, capital expenditures, working capital and operating cash flows, based on past experience and future expectations of operating performance. Revenue and cost projections for the Bell Media group of CGUs also reflect market participant assumptions.

Cash flows beyond the five-year period are extrapolated using perpetuity growth rates. None of the perpetuity growth rates exceed the long-term historical growth rates for the markets in which we operate.

The discount rates are applied to the cash flow projections and are derived from the weighted average cost of capital for each CGU or group of CGUs.

The following table shows the key assumptions used to estimate the recoverable amounts of our groups of CGUs.

| | ASSUMPTIONS USED | |
|---|---|---|
| GROUPS OF CGUs | PERPETUITY GROWTH RATE | DISCOUNT RATE |
| Bell Wireless | 0.8% | 9.1% |
| Bell Wireline | 1.0% | 6.0% |
| Bell Media | 1.0% | 8.7% |

The recoverable amounts determined in a prior year for the Bell Wireless and Bell Wireline groups of CGUs exceed their corresponding current carrying values by a substantial margin and have been carried forward and used in the impairment test for the current year.

We believe that any reasonable possible change in the key assumptions on which the estimates of recoverable amounts of our groups of CGUs are based would not cause their carrying amounts to exceed their recoverable amounts.

# Note 23 | Trade payables and other liabilities

| FOR THE YEAR ENDED DECEMBER 31 | NOTE | 2021 | 2020 |
|---|---|---|---|
| Trade payables and accruals | | 2,931 | 2,595 |
| Compensation payable | | 622 | 592 |
| Maple Leaf Sports and Entertainment Ltd. (MLSE) financial liability (1) | 29 | 149 | 149 |
| Provisions | 26 | 81 | 53 |
| Derivative liabilities | 29 | 40 | 69 |
| Severance and other costs payable | | 32 | 23 |
| Commodity taxes payable | | 31 | 33 |
| CRTC deferral account obligation | 29 | 23 | 13 |
| Other current liabilities (2) | | 546 | 408 |
| **Total trade payables and other liabilities** | | 4,455 | 3,935 |

(1) *Represents BCE's obligation to repurchase the BCE Master Trust Fund's (Master Trust Fund) 9% interest in MLSE at a price not less than an agreed minimum price should the Master Trust Fund exercise its put option. The obligation to repurchase is marked to market each reporting period and the gain or loss is recorded in* Other income (expense) *in the income statements.*

(2) *Includes an $82 million liability related to committed funding from the Government of Québec. See Note 15,* Restricted cash, *for additional details.*

# Note 24 | Debt due within one year

| FOR THE YEAR ENDED DECEMBER 31 | NOTE | WEIGHTED AVERAGE INTEREST RATE AT DECEMBER 31, 2021 | 2021 | 2020 |
|---|---|---|---|---|
| Notes payable [1] | 29 | 0.07% | 735 | 392 |
| Loans secured by trade receivables | 29 | 1.10% | 900 | 1,050 |
| Long-term debt due within one year [2] | 25 | 4.01% | 990 | 975 |
| **Total debt due within one year** | | | **2,625** | 2,417 |

(1) *Includes commercial paper of $561 million in U.S. dollars ($711 million in Canadian dollars) and $274 million in U.S. dollars ($349 million in Canadian dollars) as at December 31, 2021 and December 31, 2020, respectively, which were issued under our U.S. commercial paper program and have been hedged for foreign currency fluctuations through forward currency contracts. See Note 29,* Financial and capital management, *for additional details.*

(2) *Included in long-term debt due within one year is the current portion of lease liabilities of $864 million and $754 million as at December 31, 2021 and December 31, 2020, respectively.*

## SECURITIZED TRADE RECEIVABLES

Our securitized trade receivables programs are recorded as floating rate revolving loans secured by certain trade receivables.

The following table provides further details on our securitized trade receivables programs during 2021 and 2020.

| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 |
|---|---|---|
| Average interest rate throughout the year | 1.07% | 1.58% |
| Securitized trade receivables | 1,701 | 2,007 |

In 2021, we terminated one of our securitized trade receivables programs and repaid the $150 million balance outstanding under the program.

We continue to service trade receivables under our securitized trade receivables program expiring on December 1, 2022. The buyer's interest in the collection of these trade receivables ranks ahead of our interests, which means that we are exposed to certain risks of default on the amounts securitized.

We have provided various credit enhancements in the form of overcollateralization and subordination of our retained interests.

The buyer will reinvest the amounts collected by buying additional interests in our trade receivables until the securitized trade receivables agreement expires or is terminated. The buyer and its investors have no further claim on our other assets if customers do not pay the amounts owed.

## CREDIT FACILITIES

Bell Canada may issue notes under its Canadian and U.S. commercial paper programs up to the maximum aggregate principal amount of $3 billion in either Canadian or U.S. currency provided that at no time shall such maximum amount of notes exceed $3.5 billion in Canadian currency which equals the aggregate amount available under Bell Canada's committed supporting revolving and expansion credit facilities as at December 31, 2021. The total amount of the net available committed revolving and expansion credit facilities may be drawn at any time.

The table below is a summary of our total bank credit facilities at December 31, 2021.

| | TOTAL AVAILABLE | DRAWN | LETTERS OF CREDIT | COMMERCIAL PAPER OUTSTANDING | NET AVAILABLE |
|---|---|---|---|---|---|
| **Committed credit facilities** | | | | | |
| Unsecured revolving and expansion credit facilities [1] [2] | 3,500 | – | – | 711 | 2,789 |
| Other | 106 | – | 106 | – | – |
| **Total committed credit facilities** | 3,606 | – | 106 | 711 | 2,789 |
| **Total non-committed credit facilities** | 1,939 | – | 1,060 | – | 879 |
| **Total committed and non-committed credit facilities** | 5,545 | – | 1,166 | 711 | 3,668 |

(1) *Bell Canada's $2.5 billion committed revolving credit facility expires in May 2026 and its $1 billion committed expansion credit facility expires in May 2024.*

(2) *As of December 31, 2021, Bell Canada's outstanding commercial paper included $561 million in U.S. dollars ($711 million in Canadian dollars). All of Bell Canada's commercial paper outstanding is included in* Debt due within one year.

## RESTRICTIONS

Some of our credit agreements:

- require us to meet specific financial ratios
- require us to offer to repay and cancel the credit agreement upon a change of control of BCE or Bell Canada

We are in compliance with all conditions and restrictions under such credit agreements.

# Note 25 | Long-term debt

| FOR THE YEAR ENDED DECEMBER 31 | NOTE | WEIGHTED AVERAGE INTEREST RATE AT DECEMBER 31, 2021 | MATURITY | 2021 | 2020 |
|---|---|---|---|---|---|
| Debt securities | | | | | |
| 1997 trust indenture | | 3.67% | 2023–2051 | **16,750** | 16,400 |
| 1976 trust indenture | | 9.38% | 2027–2054 | **975** | 1,100 |
| 2011 trust indenture | | 4.00% | 2024 | **225** | 225 |
| 2016 U.S. trust indenture (1) | | 3.26% | 2024–2052 | **5,188** | 2,228 |
| 1996 trust indenture (subordinated) | | 8.21% | 2026–2031 | **275** | 275 |
| Lease liabilities | | 4.13% | 2022–2065 | **4,309** | 4,356 |
| Other | | | | **438** | 386 |
| **Total debt** | | | | **28,160** | 24,970 |
| Net unamortized discount | | | | **(26)** | (19) |
| Unamortized debt issuance costs | | | | **(96)** | (70) |
| Less: | | | | | |
| Amount due within one year | 24 | | | **(990)** | (975) |
| **Total long-term debt** | | | | **27,048** | 23,906 |

(1) *At December 31, 2021 and 2020, notes issued under the 2016 U.S. trust indenture totaled $4,100 million and $1,750 million in U.S. dollars, respectively, and have been hedged for foreign currency fluctuations through cross currency interest rate swaps. See Note 29,* Financial and capital management, *for additional details.*

Bell Canada's debt securities have been issued in Canadian dollars with the exception of debt securities issued under the 2016 U.S. trust indenture, which have been issued in U.S. dollars. All debt securities bear a fixed interest rate.

## RESTRICTIONS

Some of our debt agreements:

- impose covenants and new issue tests
- require us to make an offer to repurchase certain series of debt securities upon the occurrence of a change of control event as defined in the relevant debt agreements

We are in compliance with all conditions and restrictions under such debt agreements.

In Q4 2021, Bell Canada successfully completed a proxy solicitation and obtained the necessary approval from debenture holders to make certain amendments under its 1976 trust indenture, including the deletion of covenants that require Bell Canada to meet certain financial ratio tests when issuing long-term debt.

All outstanding debt securities have been issued under trust indentures, are unsecured and have been guaranteed by BCE. All debt securities have been issued in series and certain series are redeemable at Bell Canada's option prior to maturity at the prices, times and conditions specified for each series.

### 2021

On August 12, 2021, Bell Canada issued, under its 2016 trust indenture, 2.15% Series US-5 Notes, with a principal amount of $600 million in U.S. dollars ($755 million in Canadian dollars), which mature on February 15, 2032, and 3.20% Series US-6 Notes, with a principal amount of $650 million in U.S. dollars ($818 million in Canadian dollars), which mature on February 15, 2052.

On May 28, 2021, Bell Canada issued, under its 1997 trust indenture, 2.20% Series M-56 medium term note (MTN) debentures, with a principal amount of $500 million, which mature on May 29, 2028. This issue constitutes Bell Canada's first sustainability bond offering.

On April 19, 2021, Bell Canada redeemed, prior to maturity, its 3.00% Series M-40 MTN debentures, having an outstanding principal amount of $1.7 billion, which were due on October 3, 2022.

On March 17, 2021, Bell Canada issued, under its 1997 trust indenture, 3.00% Series M-54 MTN debentures, with a principal amount of $1 billion, which mature on March 17, 2031, and 4.05% Series M-55 MTN debentures, with a principal amount of $550 million, which mature on March 17, 2051.

Additionally, on March 17, 2021, Bell Canada issued, under its 2016 trust indenture, 0.75% Series US-3 Notes, with a principal amount of $600 million in U.S. dollars ($747 million in Canadian dollars), which mature on March 17, 2024, and 3.65% Series US-4 Notes, with a principal amount of $500 million in U.S. dollars ($623 million in Canadian dollars), which mature on March 17, 2051.

The Series US-3, Series US-4, Series US-5 and Series US-6 Notes (collectively, the Notes) have been hedged for foreign currency fluctuations through cross currency interest rate swaps. See Note 29, *Financial and capital management*, for additional details.

For the year ended December 31, 2021, we recognized early debt redemption costs of $53 million, which were recorded in *Other income (expense)* in the income statement.

Subsequent to year end, on February 11, 2022, Bell Canada issued, under its 2016 trust indenture, 3.65% Series US-7 Notes, with a principal amount of $750 million in U.S. dollars ($954 million in canadian dollars), which mature on August 15, 2052. The Series US-7 Notes have been hedged for foreign currency fluctuations through cross currency interest rate swaps.

Additionally, subsequent to year end, on February 14, 2022, Bell Canada announced it will redeem, on March 16, 2022, prior to maturity, its 3.35% Series M-26 MTN debentures, having an outstanding principal amount of $1 billion, which were due on March 22, 2023. We expect to incur early debt redemption charges of $18 million.

### 2020

On November 6, 2020, Bell Canada redeemed, prior to maturity, its 2.00% Series M-42 MTN debentures, having an outstanding principal amount of $850 million, which were due on October 1, 2021.

On September 14, 2020, Bell Canada redeemed, prior to maturity, its 3.15% Series M-30 MTN debentures, having an outstanding principal amount of $750 million, which were due on September 29, 2021.

On August 14, 2020, Bell Canada issued 1.65% Series M-53 MTN debentures under its 1997 trust indenture, with a principal amount of $750 million, which mature on August 16, 2027.

On May 14, 2020, Bell Canada issued 2.50% Series M-52 MTN debentures under its 1997 trust indenture, with a principal amount of $1 billion, which mature on May 14, 2030.

On May 14, 2020 and February 13, 2020, Bell Canada issued 3.50% Series M-51 MTN debentures under its 1997 trust indenture, with a principal amount of $500 million and $750 million, respectively, which mature on September 30, 2050.

On March 25, 2020, Bell Canada issued 3.35% Series M-47 MTN debentures under its 1997 trust indenture, with a principal amount of $1 billion, which mature on March 12, 2025.

On March 16, 2020, Bell Canada redeemed, prior to maturity, its 4.95% Series M-24 MTN debentures, having an outstanding principal amount of $500 million, which were due on May 19, 2021.

During the first half of 2020, Bell Canada drew $1,450 million in U.S. dollars ($2,035 million in Canadian dollars) under its committed credit facilities. In Q2 2020, Bell Canada repaid all of the U.S. dollar borrowings under such facilities. The borrowings, which were included in long-term debt, were hedged for foreign currency fluctuations through foreign exchange forward contracts. Accordingly, in Q2 2020, the forward contracts used to hedge these borrowings were settled. See Note 29, *Financial and capital management*, for additional details.

For the year ended December 31, 2020, we recognized early debt redemption costs of $50 million, which were recorded in *Other income (expense)* in the income statement.

## Note 26 | Provisions

| FOR THE YEAR ENDED DECEMBER 31 | NOTE | AROs | OTHER (1) | TOTAL |
|---|---|---|---|---|
| January 1, 2021 | | 202 | 206 | 408 |
| Additions | | 7 | 54 | 61 |
| Usage | | (7) | (28) | (35) |
| Reversals | | (20) | (6) | (26) |
| **December 31, 2021** | | 182 | 226 | 408 |
| Current | 23 | 22 | 59 | 81 |
| Non-current | 28 | 160 | 167 | 327 |
| **December 31, 2021** | | 182 | 226 | 408 |

(1) *Other includes environmental, legal, vacant space and other provisions.*

AROs reflect management's best estimates of expected future costs to restore current leased premises to their original condition prior to lease inception. Cash outflows associated with our ARO liabilities are generally expected to occur at the restoration dates of the assets to which they relate, which are long-term in nature. The timing and extent of restoration work that will be ultimately required for these sites is uncertain.

## Note 27 | Post-employment benefit plans

### POST-EMPLOYMENT BENEFIT PLANS COST

We provide pension and other benefits for most of our employees. These include DB pension plans, DC pension plans and OPEBs.

We operate our DB and DC pension plans under applicable Canadian and provincial pension legislation, which prescribes minimum and maximum DB funding requirements. Plan assets are held in trust, and the oversight of governance of the plans, including investment decisions, contributions to DB plans and the selection of the DC plans investment options offered to plan participants, lies with the Risk and Pension Fund Committee, a committee of our board of directors.

The interest rate risk is managed using a liability matching approach, which reduces the exposure of the DB plans to a mismatch between investment growth and obligation growth.

The longevity risk is managed using a longevity swap, which reduces the exposure of the DB plans to an increase in life expectancy.

## COMPONENTS OF POST-EMPLOYMENT BENEFIT PLANS SERVICE COST

| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 |
|---|---|---|
| DB pension | (223) | (219) |
| DC pension | (113) | (113) |
| OPEBs | (2) | (2) |
| Less: | | |
| Capitalized benefit plans cost | 72 | 65 |
| **Total post-employment benefit plans service cost** | (266) | (269) |

## COMPONENTS OF POST-EMPLOYMENT BENEFIT PLANS FINANCING COST

| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 |
|---|---|---|
| DB pension | 11 | (10) |
| OPEBs | (31) | (36) |
| **Total interest on post-employment benefit obligations** | (20) | (46) |

The statements of comprehensive income include the following amounts before income taxes.

| | 2021 | 2020 |
|---|---|---|
| Cumulative losses recognized directly in equity, January 1 | (2,014) | (2,701) |
| Actuarial gains in *other comprehensive income from continuing operations* (1) | 3,020 | 732 |
| Increase in the effect of the asset limit in *other comprehensive income from continuing operations* (2) | (587) | (45) |
| **Cumulative gains (losses) recognized directly in equity, December 31** | 419 | (2,014) |

(1) *The cumulative actuarial gains recognized in the statement of comprehensive income are $805 million in 2021.*

(2) *The cumulative increase in the effect of the asset limit recognized in the statement of comprehensive income is $386 million in 2021.*

## COMPONENTS OF POST-EMPLOYMENT BENEFIT (OBLIGATIONS) ASSETS

The following table shows the change in post-employment benefit obligations and the fair value of plan assets.

| | DB PENSION PLANS | | OPEB PLANS | | TOTAL | |
|---|---|---|---|---|---|---|
| | 2021 | 2020 | 2021 | 2020 | 2021 | 2020 |
| Post-employment benefit obligations, January 1 | (27,149) | (25,650) | (1,600) | (1,529) | (28,749) | (27,179) |
| Current service cost | (223) | (219) | (2) | (2) | (225) | (221) |
| Interest on obligations | (697) | (782) | (39) | (46) | (736) | (828) |
| Actuarial gains (losses) (1) | 2,137 | (1,830) | 113 | (90) | 2,250 | (1,920) |
| Benefit payments | 1,396 | 1,342 | 71 | 67 | 1,467 | 1,409 |
| Employee contributions | (9) | (10) | – | – | (9) | (10) |
| Other | 1 | – | – | – | 1 | – |
| **Post-employment benefit obligations, December 31** | (24,544) | (27,149) | (1,457) | (1,600) | (26,001) | (28,749) |
| Fair value of plan assets, January 1 | 27,785 | 25,530 | 344 | 320 | 28,129 | 25,850 |
| Expected return on plan assets (2) | 708 | 772 | 8 | 10 | 716 | 782 |
| Actuarial gains (1) | 766 | 2,632 | 4 | 20 | 770 | 2,652 |
| Benefit payments | (1,396) | (1,342) | (71) | (67) | (1,467) | (1,409) |
| Employer contributions | 168 | 183 | 65 | 61 | 233 | 244 |
| Employee contributions | 9 | 10 | – | – | 9 | 10 |
| Other | – | – | 1 | – | 1 | – |
| **Fair value of plan assets, December 31** | 28,040 | 27,785 | 351 | 344 | 28,391 | 28,129 |
| Plan asset (deficit) | 3,496 | 636 | (1,106) | (1,256) | 2,390 | (620) |
| Effect of asset limit | (652) | (65) | – | – | (652) | (65) |
| **Post-employment benefit asset (liability), December 31** | 2,844 | 571 | (1,106) | (1,256) | 1,738 | (685) |
| Post-employment benefit assets | 3,472 | 1,277 | – | – | 3,472 | 1,277 |
| Post-employment benefit obligations | (628) | (706) | (1,106) | (1,256) | (1,734) | (1,962) |

(1) *Actuarial gains (losses) include experience gains of $907 million in 2021 and $2,613 million in 2020.*

(2) *The actual return on plan assets was $1,486 million or 5.7% in 2021 and $3,434 million or 13.7% in 2020.*

## FUNDED STATUS OF POST-EMPLOYMENT BENEFIT PLANS COST

The following table shows the funded status of our post-employment benefit obligations.

| | FUNDED | | PARTIALLY FUNDED (1) | | UNFUNDED (2) | | TOTAL | |
|---|---|---|---|---|---|---|---|---|
| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 | 2021 | 2020 | 2021 | 2020 | 2021 | 2020 |
| Present value of post-employment benefit obligations | (23,872) | (26,421) | (1,840) | (2,011) | (289) | (317) | (26,001) | (28,749) |
| Fair value of plan assets | 27,979 | 27,727 | 412 | 402 | – | – | 28,391 | 28,129 |
| Plan surplus (deficit) | 4,107 | 1,306 | (1,428) | (1,609) | (289) | (317) | 2,390 | (620) |

(1) *The partially funded plans consist of supplementary executive retirement plans (SERPs) for eligible employees and certain OPEBs. The company partially funds the SERPs through letters of credit and a retirement compensation arrangement account with Canada Revenue Agency. Certain paid-up life insurance benefits are funded through life insurance contracts.*

(2) *Our unfunded plans consist of certain OPEBs, which are paid as claims are incurred.*

## SIGNIFICANT ASSUMPTIONS

We used the following key assumptions to measure the post-employment benefit obligations and the net benefit plans cost for the DB pension plans and OPEB plans. These assumptions are long-term, which is consistent with the nature of post-employment benefit plans.

| | DB PENSION PLANS AND OPEB PLANS | |
|---|---|---|
| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 |
| Post-employment benefit obligations | | |
| Discount rate | 3.2% | 2.6% |
| Rate of compensation increase | 2.25% | 2.25% |
| Cost of living indexation rate (1) | 1.6% | 1.6% |
| Life expectancy at age 65 (years) | 23.3 | 23.2 |

(1) *Cost of living indexation rate is only applicable to DB pension plans.*

| | DB PENSION PLANS AND OPEB PLANS | |
|---|---|---|
| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 |
| Net post-employment benefit plans cost | | |
| Discount rate | 2.9% | 3.2% |
| Rate of compensation increase | 2.25% | 2.25% |
| Cost of living indexation rate (1) | 1.6% | 1.6% |
| Life expectancy at age 65 (years) | 23.2 | 23.2 |

(1) *Cost of living indexation rate is only applicable to DB pension plans.*

The weighted average duration of the post-employment benefit obligation is 14 years.

We assumed the following trend rates in healthcare costs:

- an annual increase in the cost of medication of 6.5% for 2021 decreasing to 4.0% over 20 years
- an annual increase in the cost of covered dental benefits of 4%
- an annual increase in the cost of covered hospital benefits of 3.7%
- an annual increase in the cost of other covered healthcare benefits of 4%

Assumed trend rates in healthcare costs have a significant effect on the amounts reported for the healthcare plans.

The following table shows the effect of a 1% change in the assumed trend rates in healthcare costs.

| EFFECT ON POST-EMPLOYMENT BENEFITS – INCREASE/(DECREASE) | 1% INCREASE | 1% DECREASE |
|---|---|---|
| Total service and interest cost | 3 | (2) |
| Post-employment benefit obligations | 101 | (86) |

### *SENSITIVITY ANALYSIS*

The following table shows a sensitivity analysis of key assumptions used to measure the net post-employment benefit obligations and the net post-employment benefit plans cost for our DB pension plans and OPEB plans.

| | | IMPACT ON NET POST-EMPLOYMENT BENEFIT PLANS COST FOR 2021 – INCREASE/(DECREASE) | | IMPACT ON POST-EMPLOYMENT BENEFIT OBLIGATIONS AT DECEMBER 31, 2021 – INCREASE/(DECREASE) | |
|---|---|---|---|---|---|
| | CHANGE IN ASSUMPTION | INCREASE IN ASSUMPTION | DECREASE IN ASSUMPTION | INCREASE IN ASSUMPTION | DECREASE IN ASSUMPTION |
| Discount rate | 0.5% | (68) | 57 | (1,612) | 1,794 |
| Life expectancy at age 65 | 1 year | 32 | (32) | 936 | (962) |

## POST-EMPLOYMENT BENEFIT PLAN ASSETS

The investment strategy for the post-employment benefit plan assets is to maintain a diversified portfolio of assets invested in a prudent manner to maintain the security of benefits.

The following table shows the target allocations for 2021 and the allocation of our post-employment benefit plan assets at December 31, 2021 and 2020.

| | WEIGHTED AVERAGE TARGET ALLOCATION | TOTAL PLAN ASSETS FAIR VALUE | |
|---|---|---|---|
| ASSET CATEGORY | 2021 | DECEMBER 31, 2021 | DECEMBER 31, 2020 |
| Equity securities | 0%–40% | 16% | 23% |
| Debt securities | 60%–100% | 64% | 60% |
| Alternative investments | 0%–50% | 20% | 17% |
| Total | | 100% | 100% |

The following table shows the fair value of the DB pension plan assets for each category.

| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 |
|---|---|---|
| Observable markets data | | |
| Equity securities | | |
| Canadian | 952 | 1,027 |
| Foreign | 3,436 | 5,242 |
| Debt securities | | |
| Canadian | 13,643 | 13,361 |
| Foreign | 2,728 | 2,913 |
| Money market | 1,466 | 369 |
| Non-observable markets inputs | | |
| Alternative investments | | |
| Private equities | 3,123 | 2,564 |
| Hedge funds | 1,208 | 1,200 |
| Real estate | 1,429 | 1,033 |
| Other | 55 | 76 |
| Total | 28,040 | 27,785 |

Equity securities included approximately $3 million of BCE common shares, or 0.01% of total plan assets, at December 31, 2021 and December 31, 2020, respectively.

Debt securities included approximately $85 million of Bell Canada debentures, or 0.30% of total plan assets, at December 31, 2021 and approximately $141 million of Bell Canada debentures, or 0.51% of total plan assets, at December 31, 2020.

Alternative investments included an investment in MLSE of $149 million, or 0.53% of total plan assets, at December 31, 2021 and $149 million, or 0.54% of total plan assets, at December 31, 2020.

The Bell Canada pension plan has an investment arrangement which hedges part of its exposure to potential increases in longevity, which covers approximately $4 billion of post-employment benefit obligations. The fair value of the arrangement is included within other alternative investments.

## CASH FLOWS

We are responsible for adequately funding our DB pension plans. We make contributions to them based on various actuarial cost methods that are permitted by pension regulatory authorities. Contributions reflect actuarial assumptions about future investment returns, salary projections and future service benefits. Changes in these factors could cause actual future contributions to differ from our current estimates and could require us to increase contributions to our post-employment benefit plans in the future, which could have a negative effect on our liquidity and financial performance.

We contribute to the DC pension plans as employees provide service.

The following table shows the amounts we contributed to the DB and DC pension plans and the payments made to beneficiaries under OPEB plans.

| | DB PLANS | | DC PLANS | | OPEB PLANS | |
|---|---|---|---|---|---|---|
| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 | 2021 | 2020 | 2021 | 2020 |
| Contributions/payments | (168) | (183) | (114) | (114) | (65) | (61) |

We expect to contribute approximately $90 million to our DB pension plans in 2022, subject to actuarial valuations being completed. We expect to contribute approximately $110 million to the DC pension plans and to pay approximately $75 million to beneficiaries under OPEB plans in 2022.

# Note 28 | Other non-current liabilities

| FOR THE YEAR ENDED DECEMBER 31 | NOTE | 2021 | 2020 |
|---|---|---|---|
| Long-term disability benefits obligation | | 327 | 361 |
| Provisions | 26 | 327 | 355 |
| Derivative liabilities | 29 | 43 | 98 |
| CRTC deferral account obligation | 29 | 43 | 69 |
| Other | | 263 | 262 |
| **Total other non-current liabilities** | | 1,003 | 1,145 |

# Note 29 | Financial and capital management

## FINANCIAL MANAGEMENT

Management's objectives are to protect BCE and its subsidiaries on a consolidated basis against material economic exposures and variability of results from various financial risks, including credit risk, liquidity risk, foreign currency risk, interest rate risk, commodity price risk and equity price risk.

### DERIVATIVES

We use derivative instruments to manage our exposure to foreign currency risk, interest rate risk, commodity price risk and changes in the price of BCE common shares.

### FAIR VALUE

Fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.

Certain fair value estimates are affected by assumptions we make about the amount and timing of future cash flows and discount rates, all of which reflect varying degrees of risk. Income taxes and other expenses that may be incurred on disposition of financial instruments are not reflected in the fair values. As a result, the fair values may not be the net amounts that would be realized if these instruments were settled.

The carrying values of our cash and cash equivalents, trade and other receivables, dividends payable, trade payables and accruals, compensation payable, severance and other costs payable, interest payable, notes payable and loans secured by trade receivables approximate fair value as they are short-term. The carrying value of wireless device financing plan receivables approximates fair value given that their average remaining duration is short and the carrying value is reduced by an allowance for doubtful accounts and an allowance for revenue adjustments.

The following table provides the fair value details of other financial instruments measured at amortized cost in the statements of financial position.

| | | | | DECEMBER 31, 2021 | | DECEMBER 31, 2020 | |
|---|---|---|---|---|---|---|---|
| | CLASSIFICATION | FAIR VALUE METHODOLOGY | NOTE | CARRYING VALUE | FAIR VALUE | CARRYING VALUE | FAIR VALUE |
| CRTC deferral account obligation | Trade payables and other liabilities and other non-current liabilities | Present value of estimated future cash flows discounted using observable market interest rates | 23, 28 | 66 | 67 | 82 | 86 |
| Debt securities and other debt | Debt due within one year and long-term debt | Quoted market price of debt | 24, 25 | 23,729 | 26,354 | 20,525 | 24,366 |

The following table provides the fair value details of financial instruments measured at fair value in the statements of financial position.

| | CLASSIFICATION | NOTE | CARRYING VALUE | FAIR VALUE: QUOTED PRICES IN ACTIVE MARKETS FOR IDENTICAL ASSETS (LEVEL 1) | FAIR VALUE: OBSERVABLE MARKET DATA (LEVEL 2) (1) | FAIR VALUE: NON-OBSERVABLE MARKET INPUTS (LEVEL 3) (2) |
|---|---|---|---|---|---|---|
| **December 31, 2021** | | | | | | |
| Publicly-traded and privately-held investments (3) | Other non-current assets | 21 | 183 | 24 | – | 159 |
| Derivative financial instruments | Other current assets, trade payables and other liabilities, other non-current assets and liabilities | | 279 | – | 279 | – |
| MLSE financial liability (4) | Trade payables and other liabilities | 23 | (149) | – | – | (149) |
| Other | Other non-current assets and liabilities | | 122 | – | 185 | (63) |
| **December 31, 2020** | | | | | | |
| Publicly-traded and privately-held investments (3) | Other non-current assets | 21 | 126 | 3 | – | 123 |
| Derivative financial instruments | Other current assets, trade payables and other liabilities, other non-current assets and liabilities | | (51) | – | (51) | – |
| MLSE financial liability (4) | Trade payables and other liabilities | 23 | (149) | – | – | (149) |
| Other | Other non-current assets and liabilities | | 109 | – | 167 | (58) |

(1) *Observable market data such as equity prices, interest rates, swap rate curves and foreign currency exchange rates.*

(2) *Non-observable market inputs such as discounted cash flows and earnings multiples. A reasonable change in our assumptions would not result in a significant increase (decrease) to our level 3 financial instruments.*

(3) *Unrealized gains and losses are recorded in* Other comprehensive income from continuing operations *in the statements of comprehensive income and are reclassified from* Accumulated other comprehensive income *to the deficit in the statements of financial position when realized.*

(4) *Represents BCE's obligation to repurchase the Master Trust Fund's 9% interest in MLSE at a price not less than an agreed minimum price, should the Master Trust Fund exercise its put option. The obligation to repurchase is marked to market each reporting period and the gain or loss is recognized in* Other income (expense) *in the income statements.*

## CREDIT RISK

We are exposed to credit risk from operating activities and certain financing activities, the maximum exposure of which is represented by the carrying amounts reported in the statements of financial position.

We are exposed to credit risk if counterparties to our trade receivables, including wireless device financing plan receivables, and derivative instruments are unable to meet their obligations. The concentration of credit risk from our customers is minimized because we have a large and diverse customer base. There was minimal credit risk relating to derivative instruments at December 31, 2021 and 2020. We deal with institutions that have investment-grade credit ratings and we expect that they will be able to meet their obligations. We regularly monitor our credit risk and credit exposure.

The following table provides the change in allowance for doubtful accounts for trade receivables, including the current portion of wireless device financing plan receivables.

| | NOTE | 2021 | 2020 |
|---|---|---|---|
| Balance, January 1 | | (149) | (62) |
| Additions | | (83) | (134) |
| Usage and reversals | | 96 | 47 |
| **Balance, December 31** | 11 | (136) | (149) |

In many instances, trade receivables are written off directly to bad debt expense if the account has not been collected after a predetermined period of time.

The following table provides further details on trade receivables, net of allowance for doubtful accounts.

| AT DECEMBER 31 | 2021 | 2020 |
|---|---|---|
| Trade receivables not past due | 2,958 | 2,574 |
| Trade receivables past due | | |
| Under 60 days | 420 | 432 |
| 60 to 120 days | 284 | 214 |
| Over 120 days | 45 | 45 |
| **Trade receivables, net of allowance for doubtful accounts** | 3,707 | 3,265 |

The following table provides the change in allowance for doubtful accounts for contract assets.

| | NOTE | 2021 | 2020 |
|---|---|---|---|
| Balance, January 1 | | (59) | (68) |
| Additions | | (9) | (31) |
| Usage and reversals | | 48 | 40 |
| **Balance, December 31** | | (20) | (59) |
| **Current** | | (6) | (29) |
| **Non-current** | | (14) | (30) |
| **Balance, December 31** | 13 | (20) | (59) |

## LIQUIDITY RISK

Our cash and cash equivalents, cash flows from operations and possible capital markets financing are expected to be sufficient to fund our operations and fulfill our obligations as they become due. Should our cash requirements exceed the above sources of cash, we would expect to cover such a shortfall by drawing on existing committed bank facilities and new ones, to the extent available.

The following table is a maturity analysis for recognized financial liabilities at December 31, 2021 for each of the next five years and thereafter.

| AT DECEMBER 31, 2021 | NOTE | 2022 | 2023 | 2024 | 2025 | 2026 | THERE-AFTER | TOTAL |
|---|---|---|---|---|---|---|---|---|
| Long-term debt | 25 | 156 | 1,632 | 2,060 | 2,153 | 1,561 | 16,289 | 23,851 |
| Notes payable | 24 | 735 | – | – | – | – | – | 735 |
| Lease liabilities [1] | | 1,009 | 833 | 541 | 439 | 406 | 1,922 | 5,150 |
| Loan secured by trade receivables | 24 | 900 | – | – | – | – | – | 900 |
| Interest payable on long-term debt, notes payable and loan secured by trade receivables | | 918 | 890 | 825 | 770 | 718 | 9,068 | 13,189 |
| Net payments (receipts) on cross currency interest rate swaps | | 11 | 12 | (2) | 12 | 12 | 314 | 359 |
| MLSE financial liability | 23 | 149 | – | – | – | – | – | 149 |
| Total | | 3,878 | 3,367 | 3,424 | 3,374 | 2,697 | 27,593 | 44,333 |

(1) *Includes imputed interest of $841 million.*

We are also exposed to liquidity risk for financial liabilities due within one year as shown in the statements of financial position.

## MARKET RISK

### *CURRENCY EXPOSURES*

We use forward contracts, options and cross currency interest rate swaps to manage foreign currency risk related to anticipated purchases and certain foreign currency debt.

At December 31, 2021, we had entered into cross currency interest rate swaps with a total notional amount of $3,500 million in U.S. dollars ($4,511 million in Canadian dollars) to hedge the U.S. currency exposure of our U.S. Notes maturing from 2032 to 2052. See Note 25, *Long-term debt*, for additional details.

In the first half of 2020, we entered into foreign currency forward contracts with a notional amount of $1,453 million in U.S. dollars ($2,039 million in Canadian dollars) to hedge the foreign currency risk associated with amounts drawn under our committed credit facilities. These foreign currency forward contracts matured in Q2 2020 and a loss of $14 million was recognized in *Other income (expense)* in the income statements, which offsets the foreign currency gain on the repayment of drawdowns under the credit facilities.

A 10% depreciation (appreciation) in the value of the Canadian dollar relative to the U.S. dollar would result in a loss of $7 million (loss of $20 million) recognized in net earnings from continuing operations at December 31, 2021 and a gain of $241 million (loss of $221 million) recognized in *Other comprehensive income from continuing operations* at December 31, 2021, with all other variables held constant.

A 10% depreciation (appreciation) in the value of the Canadian dollar relative to the Philippine peso would result in a gain (loss) of $4 million recognized in *Other comprehensive income from continuing operations* at December 31, 2021, with all other variables held constant.

The following table provides further details on our outstanding foreign currency forward contracts and options as at December 31, 2021.

| TYPE OF HEDGE | BUY CURRENCY | AMOUNT TO RECEIVE | SELL CURRENCY | AMOUNT TO PAY | MATURITY | HEDGED ITEM |
|---|---|---|---|---|---|---|
| Cash flow | USD | 561 | CAD | 721 | 2022 | Commercial paper |
| Cash flow | PHP | 2,270 | CAD | 58 | 2022 | Anticipated purchases |
| Cash flow | USD | 568 | CAD | 723 | 2022 | Anticipated purchases |
| Cash flow | USD | 550 | CAD | 678 | 2023 | Anticipated purchases |
| Cash flow – call options | USD | 212 | CAD | 275 | 2022 | Anticipated purchases |
| Cash flow – put options | USD | 212 | CAD | 272 | 2022 | Anticipated purchases |
| Economic | USD | 40 | CAD | 50 | 2022 | Anticipated purchases |
| Economic – put options | USD | 99 | CAD | 123 | 2022 | Anticipated purchases |
| Economic – call options | USD | 150 | CAD | 178 | 2022 | Anticipated purchases |
| Economic – call options | CAD | 190 | USD | 150 | 2022 | Anticipated purchases |
| Economic – put options | USD | 240 | CAD | 290 | 2023 | Anticipated purchases |

### INTEREST RATE EXPOSURES

In 2021, we entered into cross currency interest rate swaps with a notional amount of $600 million in U.S. dollars ($748 million in Canadian dollars) to hedge the interest exposure of our U.S. Notes maturing in 2024. See Note 25, *Long-term debt*, for additional details.

In 2021, we entered into forward starting interest rate swaps with a notional amount of $127 million to hedge the interest rate exposure on future debt issuances. In 2021, we also entered into cross currency basis rate swaps with a notional amount of $127 million to hedge economically the basis rate exposure on future debt issuances. The fair value of these cross currency basis rate swaps at December 31, 2021 was an asset of $1 million recognized in *Other current assets* in the statements of financial position. A gain of $1 million is recognized in *Other income (expense)* in the income statements.

In 2020, we entered into leveraged interest rate options to hedge economically the dividend rate resets on $582 million of our preferred shares having varying reset dates in 2021 for the periods ending in 2026. The fair value of these leveraged interest rate options at December 31, 2021 and December 31, 2020 was a net liability of $2 million and $6 million, respectively, recognized in *Other current assets*, *Trade payables and other liabilities*, *Other non-current assets* and *Other non-current liabilities* in the statements of financial position. A gain (loss) of $15 million and ($6 million) for the year ended December 31, 2021 and December 31, 2020, respectively, relating to these leveraged interest rate options is recognized in *Other income (expense)* in the income statements.

A 1% increase (decrease) in interest rates would result in a loss of $4 million (gain of $3 million) in net earnings from continuing operations at December 31, 2021 and a gain of $18 million (loss of $25 million) recognized in *Other comprehensive income from continuing operations* at December 31, 2021, with all other variables held constant.

### EQUITY PRICE EXPOSURES

We use equity forward contracts on BCE's common shares to hedge economically the cash flow exposure related to the settlement of equity settled share-based compensation plans. See Note 31, *Share-based payments*, for details on our share-based payment arrangements. The fair value of our equity forward contracts at December 31, 2021 and December 31, 2020 was a net asset of $130 million and a net liability of $82 million, respectively, recognized in *Other current assets*, *Trade payables and other liabilities*, *Other non-current assets* and *Other non-current liabilities* in the statements of financial position. A gain (loss) of $278 million and ($51 million) for the year ended December 31, 2021 and 2020, respectively, relating to these equity forward contracts is recognized in *Other income (expense)* in the income statements.

A 5% increase (decrease) in the market price of BCE's common shares at December 31, 2021 would result in a gain (loss) of $43 million recognized in net earnings from continuing operations, with all other variables held constant.

### COMMODITY PRICE EXPOSURES

In 2020, we entered into fuel swaps to hedge economically the purchase cost of fuel in 2020 and 2021. These fuel swaps have matured and a gain of $6 million and $3 million for the year ended December 31, 2021 and 2020, respectively, is recognized in *Other income (expense)* in the income statements.

## CAPITAL MANAGEMENT

We have various capital policies, procedures and processes which are utilized to achieve our objectives for capital management. These include optimizing our cost of capital and maximizing shareholder return while balancing the interests of our stakeholders.

Our definition of capital includes equity attributable to BCE shareholders, debt, and cash and cash equivalents.

The key ratios that we use to monitor and manage our capital structure are a net debt leverage ratio [(1)] and an adjusted EBITDA to adjusted net interest expense ratio [(2)]. In 2021 and 2020, our net debt leverage ratio target range was 2.0 to 2.5 times adjusted EBITDA and our adjusted EBITDA to adjusted net interest expense ratio target was greater than 7.5 times. At December 31, 2021, we had exceeded the limit of our internal net debt leverage ratio target range by 0.68.

We use, and believe that certain investors and analysts use, our net debt leverage ratio and adjusted EBITDA to adjusted net interest expense ratio as measures of financial leverage and health of the company.

The following table provides a summary of our key ratios.

| AT DECEMBER 31 | 2021 | 2020 |
|---|---|---|
| Net debt leverage ratio | **3.18** | 2.93 |
| Adjusted EBITDA to adjusted net interest expense ratio | **8.77** | 8.32 |

On February 2, 2022, the board of directors of BCE approved an increase of 5.1% in the annual dividend on BCE's common shares, from $3.50 to $3.68 per common share. In addition, the board of directors of BCE declared a quarterly dividend of $0.92 per common share payable on April 15, 2022 to the shareholders of record at March 15, 2022.

On February 3, 2021, the board of directors of BCE approved an increase of 5.1% in the annual dividend on BCE's common shares, from $3.33 to $3.50 per common share.

In Q4 2021, BCE renewed its normal course issuer bid program (NCIB) with respect to its First Preferred Shares. See Note 30, *Share capital*, for additional details.



(1) *Our net debt leverage ratio represents net debt divided by adjusted EBITDA. We define net debt as debt due within one year plus long-term debt and 50% of preferred shares, less cash and cash equivalents, as shown in our statements of financial position. For the purposes of calculating our net debt leverage ratio, adjusted EBITDA is twelve-month trailing adjusted EBITDA.*

(2) *Our adjusted EBITDA to adjusted net interest expense ratio represents adjusted EBITDA divided by adjusted net interest expense. We define adjusted net interest expense as twelve-month trailing net interest expense as shown in our statements of cash flows plus 50% of twelve-month trailing net earnings attributable to preferred shareholders as shown in our income statements. For the purposes of calculating our adjusted EBITDA to adjusted net interest expense ratio, adjusted EBITDA is twelve-month trailing adjusted EBITDA.*

# Note 30 | Share capital

## PREFERRED SHARES

BCE's articles of amalgamation, as amended, provide for an unlimited number of First Preferred Shares and Second Preferred Shares, all without par value. The terms set out in the articles authorize BCE's directors to issue the shares in one or more series and to set the number of shares and the conditions for each series.

The following table provides a summary of the principal terms of BCE's First Preferred Shares as at December 31, 2021. There were no Second Preferred Shares issued and outstanding at December 31, 2021. BCE's articles of amalgamation, as amended, describe the terms and conditions of these shares in detail.

| | | | | | | NUMBER OF SHARES | | STATED CAPITAL | |
|---|---|---|---|---|---|---|---|---|---|
| SERIES | ANNUAL DIVIDEND RATE | CONVERTIBLE INTO | CONVERSION DATE | REDEMPTION DATE | REDEMPTION PRICE | AUTHORIZED | ISSUED AND OUTSTANDING | DECEMBER 31, 2021 | DECEMBER 31, 2020 |
| Q | floating | Series R | December 1, 2030 | | $25.50 | 8,000,000 | – | – | – |
| R [1] | 3.018% | Series Q | December 1, 2025 | December 1, 2025 | $25.00 | 8,000,000 | 7,998,900 | 200 | 200 |
| S | floating | Series T | November 1, 2026 | At any time | $25.50 | 8,000,000 | 2,128,267 | 53 | 88 |
| T [1] | 4.99% | Series S | November 1, 2026 | November 1, 2026 | $25.00 | 8,000,000 | 5,870,133 | 147 | 112 |
| Y | floating | Series Z | December 1, 2022 | At any time | $25.50 | 10,000,000 | 8,079,291 | 202 | 202 |
| Z [1] | 3.904% | Series Y | December 1, 2022 | December 1, 2022 | $25.00 | 10,000,000 | 1,918,509 | 48 | 48 |
| AA [1] | 3.61% | Series AB | September 1, 2022 | September 1, 2022 | $25.00 | 20,000,000 | 11,397,196 | 291 | 291 |
| AB | floating | Series AA | September 1, 2022 | At any time | $25.50 | 20,000,000 | 8,599,204 | 219 | 219 |
| AC [1] | 4.38% | Series AD | March 1, 2023 | March 1, 2023 | $25.00 | 20,000,000 | 10,027,991 | 256 | 256 |
| AD | floating | Series AC | March 1, 2023 | At any time | $25.50 | 20,000,000 | 9,963,209 | 254 | 254 |
| AE | floating | Series AF | February 1, 2025 | At any time | $25.50 | 24,000,000 | 6,512,913 | 163 | 163 |
| AF [1] | 3.865% | Series AE | February 1, 2025 | February 1, 2025 | $25.00 | 24,000,000 | 9,481,487 | 237 | 237 |
| AG [1] | 3.37% | Series AH | May 1, 2026 | May 1, 2026 | $25.00 | 22,000,000 | 8,979,530 | 224 | 125 |
| AH | floating | Series AG | May 1, 2026 | At any time | $25.50 | 22,000,000 | 5,017,570 | 125 | 225 |
| AI [1] | 3.39% | Series AJ | August 1, 2026 | August 1, 2026 | $25.00 | 22,000,000 | 9,535,040 | 238 | 149 |
| AJ | floating | Series AI | August 1, 2026 | At any time | $25.50 | 22,000,000 | 4,464,960 | 112 | 201 |
| AK [1] | 3.306% | Series AL | December 31, 2026 | December 31, 2026 | $25.00 | 25,000,000 | 23,190,312 | 580 | 568 |
| AL [2] | floating | Series AK | December 31, 2026 | At any time | | 25,000,000 | 1,799,388 | 45 | 56 |
| AM [1] | 2.939% | Series AN | March 31, 2026 | March 31, 2026 | $25.00 | 30,000,000 | 10,439,978 | 239 | 218 |
| AN [2] | floating | Series AM | March 31, 2026 | At any time | | 30,000,000 | 1,054,722 | 24 | 45 |
| AO [1] | 4.26% | Series AP | March 31, 2022 | March 31, 2022 | $25.00 | 30,000,000 | 4,600,000 | 118 | 118 |
| AP [3] | floating | Series AO | March 31, 2027 | | | 30,000,000 | – | – | – |
| AQ [1] | 4.812% | Series AR | September 30, 2023 | September 30, 2023 | $25.00 | 30,000,000 | 9,200,000 | 228 | 228 |
| AR [3] | floating | Series AQ | September 30, 2028 | | | 30,000,000 | – | – | – |
| | | | | | | | | 4,003 | 4,003 |

(1) *BCE may redeem each of these series of First Preferred Shares on the applicable redemption date and every five years thereafter.*

(2) *BCE may redeem Series AL and AN First Preferred Shares at $25.00 per share on December 31, 2026 and March 31, 2026, respectively, and every five years thereafter (each, a Series conversion date). Alternatively, BCE may redeem Series AL or AN First Preferred Shares at $25.50 per share on any date which is not a Series conversion date for the applicable series of First Preferred Shares.*

(3) *If Series AP or AR First Preferred Shares are issued on March 31, 2022 and September 30, 2023, respectively, BCE may redeem such shares at $25.00 per share on March 31, 2027 and September 30, 2028, respectively, and every five years thereafter (each, a Series conversion date). Alternatively, BCE may redeem Series AP or AR First Preferred Shares at $25.50 per share on any date which is not a Series conversion date for the applicable series of First Preferred Shares.*



## NORMAL COURSE ISSUER BID FOR BCE FIRST PREFERRED SHARES

On November 4, 2021, BCE renewed its NCIB to purchase for cancellation up to 10% of the public float of each series of BCE's outstanding First Preferred Shares that are listed on the Toronto Stock Exchange. The NCIB will extend up to November 8, 2022, or an earlier date should BCE complete its purchases under the NCIB.

## VOTING RIGHTS

All of the issued and outstanding First Preferred Shares at December 31, 2021 are non-voting, except under special circumstances when the holders are entitled to one vote per share.

## PRIORITY AND ENTITLEMENT TO DIVIDENDS

The First Preferred Shares of all series rank at parity with each other and in priority to all other shares of BCE with respect to payment of dividends and with respect to distribution of assets in the event of liquidation, dissolution or winding up of BCE.

Holders of Series R, T, Z, AA, AC, AF, AG, AI, AK, AM, AO and AQ First Preferred Shares are entitled to fixed cumulative quarterly dividends. The dividend rate on these shares is reset every five years, as set out in BCE's articles of amalgamation, as amended.

Holders of Series S, Y, AB, AD, AE, AH and AJ First Preferred Shares are entitled to floating adjustable cumulative monthly dividends. The floating dividend rate on these shares is calculated every month, as set out in BCE's articles of amalgamation, as amended.

Holders of Series AL and AN First Preferred Shares are entitled to floating cumulative quarterly dividends. The floating dividend rate on these shares is calculated every quarter, as set out in BCE's articles of amalgamation, as amended.

Dividends on all series of First Preferred Shares are paid as and when declared by the board of directors of BCE.

### CONVERSION FEATURES

All of the issued and outstanding First Preferred Shares at December 31, 2021 are convertible at the holder's option into another associated series of First Preferred Shares on a one-for-one basis according to the terms set out in BCE's articles of amalgamation, as amended.

### REDEMPTION OF SERIES AO PREFERRED SHARES

Subsequent to year end, on February 24, 2022, BCE announced it will redeem, on March 31, 2022, its 4,600,000 issued and outstanding Series AO Preferred Shares at $25 per share for a total amount of $115 million.

## COMMON SHARES AND CLASS B SHARES

BCE's articles of amalgamation provide for an unlimited number of voting common shares and non-voting Class B shares, all without par value. The common shares and the Class B shares rank equally in the payment of dividends and in the distribution of assets if BCE is liquidated, dissolved or wound up, after payments due to the holders of preferred shares. No Class B shares were outstanding at December 31, 2021 and 2020.

The following table provides details about the outstanding common shares of BCE.

| | | 2021 | | 2020 | |
|---|---|---|---|---|---|
| | NOTE | NUMBER OF SHARES | STATED CAPITAL | NUMBER OF SHARES | STATED CAPITAL |
| Outstanding, January 1 | | 904,415,010 | 20,390 | 903,908,182 | 20,363 |
| Shares issued under employee stock option plan | 31 | 4,603,861 | 272 | 506,828 | 27 |
| **Outstanding, December 31** | | 909,018,871 | 20,662 | 904,415,010 | 20,390 |

### CONTRIBUTED SURPLUS

Contributed surplus in 2021 and 2020 includes premiums in excess of par value upon the issuance of BCE common shares and share-based compensation expense net of settlements.

# Note 31 | Share-based payments

The following share-based payment amounts are included in the income statements as operating costs.

| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 |
|---|---|---|
| ESP | (30) | (31) |
| RSUs/PSUs | (59) | (51) |
| Other [1] | (6) | (9) |
| **Total share-based payments** | (95) | (91) |

(1) *Includes DSUs and stock options.*

## DESCRIPTION OF THE PLANS

### ESP

The ESP is designed to encourage employees of BCE and its participating subsidiaries to own shares of BCE. Employees can choose to have up to 12% of their eligible annual earnings withheld through regular payroll deductions for the purchase of BCE common shares. In some cases, the employer also contributes up to 2% of the employee's eligible annual earnings to the plan. Dividends are credited to the participant's account on each dividend payment date and are equivalent in value to the dividends paid on BCE common shares. Employer contributions to the ESP and related dividends are subject to employees holding their shares for a two-year vesting period.

The trustee of the ESP buys BCE common shares for the participants on the open market, by private purchase or from treasury. BCE determines the method the trustee uses to buy the shares.

At December 31, 2021, 4,360,087 common shares were authorized for issuance from treasury under the ESP. At December 31, 2021 and 2020 there were 1,108,211 and 1,146,980 unvested employer ESP contributions, respectively.

### RSUs/PSUs

RSUs/PSUs are granted to executives and other eligible employees. Dividends in the form of additional RSUs/PSUs are credited to the participant's account on each dividend payment date and are equivalent in value to the dividends paid on BCE common shares. Executives and other eligible employees are granted a specific number of RSUs/PSUs for a given performance period based mainly on their level and position. RSUs/PSUs vest fully after three years of continuous employment from the date of grant and if performance objectives are met for certain PSUs, as determined by the board of directors.

The following table summarizes RSUs/PSUs outstanding at December 31, 2021 and 2020.

| NUMBER OF RSUs/PSUs | 2021 | 2020 |
|---|---|---|
| Outstanding, January 1 | **2,973,393** | 2,915,118 |
| Granted [(1)] | **1,178,794** | 866,127 |
| Dividends credited | **175,516** | 165,435 |
| Settled | **(1,135,128)** | (935,117) |
| Forfeited | **(106,908)** | (38,170) |
| **Outstanding, December 31** | **3,085,667** | 2,973,393 |
| **Vested, December 31** [(2)] | **1,000,394** | 1,065,454 |

(1) *The weighted average fair value of the RSUs/PSUs granted was $60 in 2021 and $63 in 2020.*
(2) *The RSUs/PSUs vested on December 31, 2021 were fully settled in February 2022 with BCE common shares and/or DSUs.*

## DSUs

Eligible bonuses and RSUs/PSUs may be paid in the form of DSUs when executives or other eligible employees elect or are required to participate in the plan. The value of a DSU at the issuance date is equal to the value of one BCE common share. For non-management directors, compensation is paid in DSUs until the minimum share ownership requirement is met; thereafter, at least 50% of their compensation is paid in DSUs. There are no vesting requirements relating to DSUs. Dividends in the form of additional DSUs are credited to the participant's account on each dividend payment date and are equivalent in value to the dividends paid on BCE common shares. DSUs are settled when the holder leaves the company.

At December 31, 2021 and 2020 there were 3,365,433 and 4,230,672 DSUs outstanding, respectively.

## STOCK OPTIONS

Under BCE's long-term incentive plans, BCE may grant options to executives to buy BCE common shares. The subscription price of a grant is based on the higher of:

- the volume-weighted average of the trading price on the trading day immediately prior to the effective date of the grant
- the volume-weighted average of the trading price for the last five consecutive trading days ending on the trading day immediately prior to the effective date of the grant

At December 31, 2021, in addition to the stock options outstanding, 4,461,019 common shares were authorized for issuance under these plans. Options vest fully after three years of continuous employment from the date of grant. All options become exercisable when they vest and can be exercised for a period of seven years from the date of grant for options granted prior to 2019 and ten years from the date of grant for options granted since 2019.

The following table summarizes stock options outstanding at December 31, 2021 and 2020.

| | | 2021 | | 2020 | |
|---|---|---|---|---|---|
| | NOTE | NUMBER OF OPTIONS | WEIGHTED AVERAGE EXERCISE PRICE ($) | NUMBER OF OPTIONS | WEIGHTED AVERAGE EXERCISE PRICE ($) |
| Outstanding, January 1 | | **15,650,234** | **59** | 12,825,541 | 57 |
| Granted | | **–** | **–** | 3,420,407 | 65 |
| Exercised [(1)] | 30 | **(4,603,861)** | **57** | (506,828) | 52 |
| Forfeited or expired | | **(267,649)** | **60** | (88,886) | 61 |
| **Outstanding, December 31** | | **10,778,724** | **60** | 15,650,234 | 59 |
| **Exercisable, December 31** | | **4,316,424** | **58** | 5,186,600 | 58 |

(1) *The weighted average market share price for options exercised was $64 in 2021 and $63 in 2020.*

The following table provides additional information about BCE's stock option plans at December 31, 2021 and 2020.

| | STOCK OPTIONS OUTSTANDING | | | | | |
|---|---|---|---|---|---|---|
| | 2021 | | | 2020 | | |
| RANGE OF EXERCISE PRICES | NUMBER | WEIGHTED AVERAGE REMAINING LIFE (YEARS) | WEIGHTED AVERAGE EXERCISE PRICE ($) | NUMBER | WEIGHTED AVERAGE REMAINING LIFE (YEARS) | WEIGHTED AVERAGE EXERCISE PRICE ($) |
| $40–$49 | **–** | **–** | **–** | 187,744 | – [(1)] | 48 |
| $50–$59 | **7,442,442** | **4** | **58** | 11,998,200 | 5 | 58 |
| $60 & above | **3,336,282** | **8** | **65** | 3,464,290 | 9 | 65 |
| | **10,778,724** | **6** | **60** | 15,650,234 | 7 | 59 |

(1) *Stock options outstanding expired in February 2021.*

# Note 32 | Additional cash flow information

The following table provides a reconciliation of changes in liabilities arising from financing activities.

| | NOTE | DEBT DUE WITHIN ONE YEAR AND LONG-TERM DEBT | DERIVATIVE TO HEDGE FOREIGN CURRENCY ON DEBT [1] | DIVIDENDS PAYABLE | OTHER LIABILITIES | TOTAL |
|---|---|---|---|---|---|---|
| January 1, 2021 | | 26,323 | 66 | 766 | – | 27,155 |
| Cash flows from (used in) financing activities | | | | | | |
| Increase (decrease) in notes payable | | 378 | (27) | – | – | 351 |
| Issue of long-term debt | | 4,985 | – | – | – | 4,985 |
| Repayment of long-term debt | | (2,751) | – | – | – | (2,751) |
| Cash dividends paid on common and preferred shares | | – | – | (3,257) | – | (3,257) |
| Cash dividends paid by subsidiaries to non-controlling interests | 36 | – | – | (86) | – | (86) |
| Decrease in securitized trade receivables | | (150) | – | – | – | (150) |
| Other financing activities | | (36) | 13 | – | (55) | (78) |
| **Total cash flows from (used in) financing activities excluding equity** | | 2,426 | (14) | (3,343) | (55) | (986) |
| Non-cash changes arising from | | | | | | |
| Increase in lease liabilities | | 787 | – | – | – | 787 |
| Dividends declared on common and preferred shares | | – | – | 3,306 | – | 3,306 |
| Dividends declared by subsidiaries to non-controlling interests | | – | – | 87 | – | 87 |
| Effect of changes in foreign exchange rates | | (23) | 23 | – | – | – |
| Business acquisitions | | 12 | – | – | – | 12 |
| Other | | 148 | 4 | (5) | 55 | 202 |
| **Total non-cash changes** | | 924 | 27 | 3,388 | 55 | 4,394 |
| **December 31, 2021** | | 29,673 | 79 | 811 | – | 30,563 |

(1) *Included in* Other current assets, Other non-current assets *and* Trade payables and other liabilities *in the statement of financial position.*

| | NOTE | DEBT DUE WITHIN ONE YEAR AND LONG-TERM DEBT | DERIVATIVE TO HEDGE FOREIGN CURRENCY ON DEBT [1] | DIVIDENDS PAYABLE | OTHER LIABILITIES | TOTAL |
|---|---|---|---|---|---|---|
| January 1, 2020 | | 26,296 | 56 | 729 | – | 27,081 |
| Cash flows (used in) from financing activities | | | | | | |
| (Decrease) increase in notes payable | | (1,810) | 169 | – | – | (1,641) |
| Issue of long-term debt | | 6,006 | – | – | – | 6,006 |
| Repayment of long-term debt | | (5,003) | – | – | – | (5,003) |
| Cash dividends paid on common and preferred shares | | – | – | (3,107) | – | (3,107) |
| Cash dividends paid by subsidiaries to non-controlling interests | 36 | – | – | (53) | – | (53) |
| Discontinued operations | 37 | (7) | – | – | – | (7) |
| Other financing activities | | (31) | – | – | (52) | (83) |
| **Total cash flows (used in) from financing activities excluding equity** | | (845) | 169 | (3,160) | (52) | (3,888) |
| Non-cash changes arising from | | | | | | |
| Increase in lease liabilities | | 675 | – | – | – | 675 |
| Dividends declared on common and preferred shares | | – | – | 3,147 | – | 3,147 |
| Dividends declared by subsidiaries to non-controlling interests | | – | – | 53 | – | 53 |
| Effect of changes in foreign exchange rates | | 159 | (159) | – | – | – |
| Business acquisitions | | 7 | – | – | – | 7 |
| Discontinued operations | 37 | (106) | – | – | – | (106) |
| Other | | 137 | – | (3) | 52 | 186 |
| **Total non-cash changes** | | 872 | (159) | 3,197 | 52 | 3,962 |
| **December 31, 2020** | | 26,323 | 66 | 766 | – | 27,155 |

(1) *Included in* Other current assets, Other non-current assets *and* Trade payables and other liabilities *in the statement of financial position.*

# Note 33 | Remaining performance obligations

The following table shows revenues expected to be recognized in the future related to performance obligations that are unsatisfied (or partially unsatisfied) as at December 31, 2021.

| | 2022 | 2023 | 2024 | 2025 | 2026 | THERE-AFTER | TOTAL |
|---|---|---|---|---|---|---|---|
| Wireline | 1,295 | 946 | 712 | 473 | 215 | 548 | 4,189 |
| Wireless | 1,416 | 561 | 40 | 1 | 1 | – | 2,019 |
| **Total** | **2,711** | **1,507** | **752** | **474** | **216** | **548** | **6,208** |

When estimating minimum transaction prices allocated to the remaining unfulfilled, or partially unfulfilled, performance obligations, BCE applied the practical expedient to not disclose information about remaining performance obligations that have an original expected duration of one year or less and for those contracts where we bill the same value as that which is transferred to the customer.

# Note 34 | Commitments and contingencies

## COMMITMENTS

The following table is a summary of our contractual obligations at December 31, 2021 that are due in each of the next five years and thereafter.

| | 2022 | 2023 | 2024 | 2025 | 2026 | THERE-AFTER | TOTAL |
|---|---|---|---|---|---|---|---|
| Commitments for property, plant and equipment and intangible assets | 1,104 | 757 | 461 | 334 | 219 | 161 | 3,036 |
| Purchase obligations | 542 | 380 | 245 | 210 | 292 | 221 | 1,890 |
| Leases committed not yet commenced | 7 | 2 | 6 | 1 | – | – | 16 |
| **Total** | **1,653** | **1,139** | **712** | **545** | **511** | **382** | **4,942** |

Our commitments for property, plant and equipment and intangible assets include program and feature film rights and investments to expand and update our networks to meet customer demand.

Purchase obligations consist of contractual obligations under service and product contracts for operating expenditures and other purchase obligations.

Our commitments for leases not yet commenced include OOH advertising spaces, fibre use and real estate. These leases are non-cancellable.

Subsequent to year end, in February 2022, Bell acquired a business that provides Internet, telephone and television services to consumers and businesses in Québec and parts of Ontario. The acquisition is expected to accelerate growth in Bell's residential and small business customers. The results of the acquired business will be included in our Bell Wireline segment.

Additionally, subsequent to year end, we entered into new commitments for property, plant and equipment and intangible assets totaling approximately $1.4 billion, which is payable between 2022 and 2033.

## CONTINGENCIES

As part of its ongoing review of wholesale Internet rates, on October 6, 2016, the CRTC significantly reduced, on an interim basis, some of the wholesale rates that Bell Canada and other major providers charge for access by third-party Internet resellers to fibre-to-the-node (FTTN) or cable networks, as applicable. On August 15, 2019, the CRTC further reduced the wholesale rates that Internet resellers pay to access network infrastructure built by facilities-based providers like Bell Canada, with retroactive effect back to March 2016.

The August 2019 decision was stayed, first by the Federal Court of Appeal and then by the CRTC, with the result that it never came into effect. In response to review and vary applications filed by each of Bell Canada, five major cable carriers (Cogeco Communications Inc., Bragg Communications Inc. (Eastlink), Rogers Communications Inc., Shaw Communications Inc. and Videotron Ltée) and Telus Communications Inc., the CRTC issued Decision 2021-182 on May 27, 2021, which mostly reinstated the rates prevailing prior to August 2019 with some reductions to the Bell Canada rates with retroactive effect to March 2016. As a result, in Q2 2021, we recorded a reduction in revenue of $44 million in our income statement.

While there remains a requirement to refund monies to third-party Internet resellers, the establishment of final wholesale rates that are similar to those prevailing since 2019 reduces the impact of the CRTC's long-running review of wholesale Internet rates and ensures a better climate for much-needed investment in advanced networks. The decision is being challenged by at least one reseller, TekSavvy Solutions Inc. (TekSavvy), before the Federal Court of Appeal, where TekSavvy obtained leave to appeal the decision, and in three petitions brought by TekSavvy, the Canadian Network Operators Consortium Inc. and National Capital Freenet before Cabinet to overturn the decision.

In the ordinary course of business, we become involved in various claims and legal proceedings seeking monetary damages and other relief. In particular, because of the nature of our consumer-facing business, we are exposed to class actions pursuant to which substantial monetary damages may be claimed. Due to the inherent risks and uncertainties of the litigation process, we cannot predict the final outcome or timing of claims and legal proceedings. Subject to the foregoing, and based on information currently available and management's assessment of the merits of the claims and legal proceedings pending at March 3, 2022, management believes that the ultimate resolution of these claims and legal proceedings is unlikely to have a material and negative effect on our financial statements. We believe that we have strong defences and we intend to vigorously defend our positions.

# Note 35 | Related party transactions

## SUBSIDIARIES

The following table shows BCE's significant subsidiaries at December 31, 2021. BCE has other subsidiaries which have not been included in the table as each represents less than 10% individually and less than 20% in aggregate of total consolidated revenues.

All of these significant subsidiaries are incorporated in Canada and provide services to each other in the normal course of operations. The value of these transactions is eliminated on consolidation.

| | OWNERSHIP PERCENTAGE | |
|---|---|---|
| SUBSIDIARY | 2021 | 2020 |
| Bell Canada | **100%** | 100% |
| Bell Mobility Inc. | **100%** | 100% |
| Bell Media Inc. | **100%** | 100% |

## TRANSACTIONS WITH JOINT ARRANGEMENTS AND ASSOCIATES

During 2021 and 2020, BCE provided communication services and received programming content and other services in the normal course of business on an arm's length basis to and from its joint arrangements and associates. Our joint arrangements and associates include MLSE, Glentel Inc. and Dome Productions Partnership. From time to time, BCE may be required to make capital contributions in its investments.

In 2021, BCE recognized revenues and incurred expenses with our joint arrangements and associates of $10 million (2020 – $14 million) and $178 million (2020 – $133 million), respectively.

## BCE MASTER TRUST FUND

Bimcor Inc. (Bimcor), a wholly-owned subsidiary of Bell Canada, is the administrator of the Master Trust Fund. Bimcor recognized management fees of $13 million from the Master Trust Fund for 2021 and 2020, respectively. The details of BCE's post-employment benefit plans are set out in Note 27, *Post-employment benefit plans*.

## COMPENSATION OF KEY MANAGEMENT PERSONNEL

The following table includes compensation of key management personnel for the years ended December 31, 2021 and 2020 included in our income statements. Key management personnel has the authority and responsibility for overseeing, planning, directing and controlling our business activities and consists of our Board of Directors and our Executive Leadership Team.

| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 |
|---|---|---|
| Wages, salaries, fees and related taxes and benefits | **(23)** | (30) |
| Post-employment benefit plans and OPEBs cost | **(3)** | (3) |
| Share-based compensation | **(21)** | (26) |
| **Key management personnel compensation expense** | **(47)** | (59) |

Notes to consolidated financial statements

# Note 36 | Significant partly-owned subsidiary

The following tables show summarized financial information for our subsidiary with significant non-controlling interest (NCI).

## SUMMARIZED STATEMENTS OF FINANCIAL POSITION

| | CTV SPECIALTY (1) (2) | |
|---|---|---|
| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 |
| Current assets | 329 | 357 |
| Non-current assets | 1,010 | 1,032 |
| **Total assets** | **1,339** | 1,389 |
| Current liabilities | 220 | 159 |
| Non-current liabilities | 226 | 227 |
| **Total liabilities** | **446** | 386 |
| **Total equity attributable to BCE shareholders** | **622** | 699 |
| **NCI** | **271** | 304 |

(1) *At December 31, 2021 and 2020, the ownership interest held by NCI in CTV Specialty Television Inc. (CTV Specialty) was 29.9%. CTV Specialty was incorporated and operated in Canada as at such dates.*

(2) *CTV Specialty's net assets at December 31, 2021 and 2020 include $5 million and $6 million, respectively, directly attributable to NCI.*

## SELECTED INCOME AND CASH FLOW INFORMATION

| | CTV SPECIALTY (1) | |
|---|---|---|
| FOR THE YEAR ENDED DECEMBER 31 | 2021 | 2020 |
| Operating revenues | 879 | 754 |
| Net earnings | 158 | 202 |
| Net earnings attributable to NCI | 51 | 64 |
| **Total comprehensive income** | **164** | 200 |
| Total comprehensive income attributable to NCI | 53 | 63 |
| **Cash dividends paid to NCI** | **86** | 53 |

(1) *CTV Specialty's net earnings and total comprehensive income include $5 million directly attributable to NCI for 2021 and 2020, respectively.*

# Note 37 | Discontinued operations

On June 1, 2020, BCE announced that it had entered into an agreement to sell substantially all of its data centre operations in an all-cash transaction valued at $1.04 billion.

In Q4 2020, we completed the sale for proceeds of $933 million (net of debt and other items) and recorded a gain on sale, net of taxes, of $211 million. The capital gain as a result of the sale is mainly offset by the recognition of previously unrecognized capital loss carryforwards.

The data centre operations that were sold were presented as a discontinued operation in our 2020 income statement and statement of cash flows. Property, plant and equipment and intangible assets that were sold were no longer depreciated or amortized effective June 1, 2020.

The following table summarizes the carrying value of the assets and liabilities sold:

| | 2020 |
|---|---|
| Contract assets | 1 |
| Contract costs | 2 |
| Property, plant and equipment | 484 |
| Intangible assets | 227 |
| Goodwill | 115 |
| **Total assets sold** | 829 |
| Long-term debt | 113 |
| Deferred tax liability | 37 |
| Other non-current liabilities | 9 |
| **Total liabilities sold** | 159 |
| **Net assets sold** | 670 |

The following tables summarize the income statement and statement of cash flows of our discontinued operations up to the point of sale.

| FOR THE YEAR ENDED DECEMBER 31 | 2020 |
|---|---|
| Operating revenues | 118 |
| Operating costs | (57) |
| Depreciation | (18) |
| Amortization | (7) |
| Interest expense | (6) |
| Other expense | (8) |
| Income taxes | (7) |
| Net earnings attributable to common shareholders before gain on sale | 15 |
| Gain on sale (net of taxes of $3 million) | 211 |
| **Net earnings attributable to common shareholders** | 226 |

| FOR THE YEAR ENDED DECEMBER 31 | 2020 |
|---|---|
| Cash flows from operating activities | 54 |
| Cash flows from investing activities | 892 |
| Cash flows used in financing activities | (7) |
| **Net increase in cash** | 939 |

## Note 38 | COVID-19

Our financial and operating performance saw a steady improvement in 2021 despite the continued adverse impacts of the COVID-19 pandemic experienced throughout the year, due to our operational execution and the easing of government restrictions in the second half of the year. The impacts of the COVID-19 pandemic, although moderated, continued to unfavourably affect Bell Wireless product and roaming revenues, Bell Media advertising revenues, as well as Bell Wireline business market equipment revenues, due to reduced commercial activity as a result of the government restrictions put in place to combat the pandemic, particularly in the first half of the year, and the global supply chain challenges experienced in the second half of the year.

Due to uncertainties relating to the severity and duration of the COVID-19 pandemic and possible resurgences in the number of COVID-19 cases, including as a result of the potential emergence of other variants, and various potential outcomes, it is difficult at this time to estimate the impacts of the COVID-19 pandemic on our business or future financial results and related assumptions. Our business and financial results could continue to be unfavourably impacted, and could again become more significantly and negatively impacted, in future periods, including, among others, as a result of global supply chain challenges adversely affecting our wireless and wireline product revenues.

# Board of directors

AS OF MARCH 3, 2022

**Gordon M. Nixon**
ONTARIO, CANADA
Corporate Director
Chair of the Board,
BCE Inc. and Bell Canada
*Director since November 2014*

**Mirko Bibic**
ONTARIO, CANADA [(1)]
President and
Chief Executive Officer,
BCE Inc. and Bell Canada
*Director since January 2020*

**David F. Denison,**
FCPA, FCA
ONTARIO, CANADA
Corporate Director
*Director since October 2012*

**Robert P. Dexter**
NOVA SCOTIA, CANADA
Chair and
Chief Executive Officer,
Maritime Travel Inc.
*Director since November 2014*

**Katherine Lee**
ONTARIO, CANADA
Corporate Director
*Director since August 2015*

**Monique F. Leroux,**
C.M., O.Q., FCPA, FCA
QUÉBEC, CANADA
Corporate Director
*Director since April 2016*

**Sheila A. Murray**
ONTARIO, CANADA
Corporate Director
*Director since May 2020*

**Louis P. Pagnutti,**
FCPA, FCA
ONTARIO, CANADA
Corporate Director
*Director since November 2020*

**Calin Rovinescu**
ONTARIO, CANADA [(1)]
Corporate Director
*Director since April 2016*

**Karen Sheriff**
ONTARIO, CANADA
Corporate Director
*Director since April 2017*

**Robert C. Simmonds**
ONTARIO, CANADA
Chair,
Lenbrook Corporation
*Director since May 2011*

**Jennifer Tory**
ONTARIO, CANADA
Corporate Director
*Director since April 2021*

**Cornell Wright**
ONTARIO, CANADA
President,
Wittington Investments, Limited
*Director since April 2021*

(1) *Also maintains a residence in the province of Québec.*

## COMMITTEES OF THE BOARD

### AUDIT COMMITTEE

**L.P. Pagnutti *(Chair)*, K. Lee, M.F. Leroux, J. Tory, C. Wright**

The audit committee assists the Board in the oversight of:

- the integrity of BCE's financial statements and related information
- BCE's compliance with applicable legal and regulatory requirements
- the independence, qualifications and appointment of the external auditors
- the performance of both the external and internal auditors
- management's responsibility for assessing and reporting on the effectiveness of internal controls
- BCE's risks as they relate to financial reporting.

### CORPORATE GOVERNANCE COMMITTEE

**M.F. Leroux *(Chair)*, D.F. Denison, K. Lee, K. Sheriff, R.C. Simmonds, C. Wright**

The CGC assists the Board to:

- develop and implement BCE's corporate governance policies and guidelines
- identify individuals qualified to become members of the Board
- determine the composition of the Board and its committees
- determine the directors' compensation for Board and committee service
- develop and oversee a process to assess the Board, committees of the Board, the Chair of the Board, Chairs of committees, and individual directors
- review and recommend for Board approval, BCE's policies concerning business conduct, ethics, public disclosure of material information and other matters
- review BCE's ESG strategy and disclosure.

### MANAGEMENT RESOURCES AND COMPENSATION COMMITTEE

**D.F. Denison *(Chair)*, R.P. Dexter, S.A. Murray, C. Rovinescu, J. Tory**

The MRCC assists the Board in the oversight of:

- compensation, nomination, evaluation and succession of officers and other management personnel
- BCE's workplace policies and practices (including health and safety policies, policies ensuring a respectful workplace free from harassment and policies ensuring a diverse and inclusive workplace).

### RISK AND PENSION FUND COMMITTEE

**C. Rovinescu *(Chair)*, R.P. Dexter, S.A. Murray, L.P. Pagnutti, K. Sheriff, R.C. Simmonds**

The RPFC assists the Board in the oversight of:

- BCE's enterprise risk governance framework and the policies, procedures and controls management uses to evaluate and manage key risks to which BCE is exposed
- BCE's exposure to key risks, except for risks that remain the primary responsibility of another committee of the Board
- the administration, funding and investment of BCE's pension plans and funds
- the unitized pooled funds sponsored by BCE for the collective investment of the funds and the participant subsidiaries' pension funds.

# Executives

AS OF MARCH 3, 2022

**Mirko Bibic**
President and Chief Executive Officer,
BCE Inc. and Bell Canada

**Michael Cole**
Executive Vice-President and Chief Information Officer,
Bell Canada

**Stephen Howe**
Chief Technology and Information Officer,
Bell Canada

**Claire Gillies**
Executive Vice-President & President, Consumer Marketing,
Bell Canada

**Blaik Kirby**
Group President, Consumer and
Small & Medium Business (SMB),
Bell Canada

**Glen LeBlanc**
Executive Vice-President and Chief Financial Officer,
BCE Inc. and Bell Canada

**Devorah Lithwick**
Senior Vice-President and Chief Brand Officer,
Bell Canada

**Thomas Little**
President, Bell Business Markets,
Bell Canada

**Robert Malcolmson**
Executive Vice-President and
Chief Legal & Regulatory Officer,
BCE Inc. and Bell Canada

**Nikki Moffat**
Chief Human Resources Officer and Executive Vice-President,
Corporate Services,
BCE Inc. and Bell Canada

**Karine Moses**
Vice Chair, Québec and Senior Vice-President,
Content Development and News,
Bell Canada

**Wade Oosterman**
President, Bell Media and Vice Chair,
Bell Canada and BCE Inc.

**John Watson**
Group President, Customer Experience,
Bell Canada

# Investor information

## SHARE FACTS

### SYMBOL
BCE

### LISTINGS
**TSX and NYSE stock exchanges**
You will find a summary of the differences between our governance practices and the NYSE corporate governance rules in the Governance section of our website at BCE.ca.

### COMMON SHARES OUTSTANDING
December 31, 2021 – 909,018,871

### QUARTERLY DIVIDEND*
$0.92 per common share

### 2022 DIVIDEND SCHEDULE*

| Record date | Payment date** |
|---|---|
| March 15, 2022 | April 15, 2022 |
| June 15, 2022 | July 15, 2022 |
| September 15, 2022 | October 15, 2022 |
| December 15, 2022 | January 15, 2023 |

* *Subject to dividends being declared by the board of directors*
** *When a dividend payment date falls on a weekend, the payment is made on the following business day*

### 2022 QUARTERLY EARNINGS RELEASE DATES

| | |
|---|---|
| First quarter | May 5, 2022 |
| Second quarter | August 4, 2022 |
| Third quarter | November 3, 2022 |
| Fourth quarter | February 2, 2023 |

Quarterly and annual reports as well as other corporate documents can be found on our website. Copies can be requested from the Investor Relations group.

## TAX ASPECTS

Shareholders are required to pay tax on dividends received as well as on capital gains they realize, if any, when they sell their shares or are deemed to have sold them.

### THE SALE OR DISPOSITION OF YOUR SHARES COULD TRIGGER A CAPITAL GAIN

IMPORTANT: If you received Nortel Networks common shares in May 2000 and/or Bell Aliant Regional Communications Income Fund units in July 2006, you should contact the Investor Relations group to learn more about the tax implications of these plans of arrangement and the impact on the calculation of your cost, or visit BCE.ca.

### DIVIDENDS

Since January 1, 2006 and unless stated otherwise, dividends paid by BCE Inc. to Canadian residents are eligible dividends as per the Canadian *Income Tax Act*. Since March 24, 2006 and unless stated otherwise, dividends paid by BCE Inc. to Québec residents also qualify as eligible dividends.

#### *NON-RESIDENTS OF CANADA*

Dividends paid or credited to non-residents of Canada are subject to a 25% withholding tax unless reduced by a tax treaty. Under current tax treaties, U.S. and U.K. residents are subject to a 15% withholding tax.

Beginning in 2012, the Canada Revenue Agency introduced new rules requiring residents of any country with which Canada has a tax treaty to certify that they reside in that country and are eligible to have Canadian non-resident tax withheld on the payment of their dividends at the tax treaty rate. Registered shareholders should have completed the Declaration of Eligibility for Benefits under a Tax Treaty for a Non-Resident Taxpayer and returned it to the transfer agent.

#### *U.S. RESIDENTS*

In addition to the Declaration of Eligibility for Benefits under a Tax Treaty for a Non-Resident Taxpayer mentioned above, we are required to solicit taxpayer identification numbers and Internal Revenue Service (IRS) Form W-9 certifications of residency from certain U.S. residents. If these have not been received, we may be required to deduct the IRS's specified backup withholding tax. For more information, please contact the transfer agent or the Investor Relations group.

## SHAREHOLDER SERVICES

### DIVIDEND REINVESTMENT AND STOCK PURCHASE PLAN

A convenient method for eligible shareholders to reinvest their dividends and make optional cash contributions to purchase additional common shares without brokerage costs.

### DIVIDEND DIRECT DEPOSIT SERVICE

Avoid postal delays and trips to the bank by subscribing to the dividend direct deposit service.

### DIRECT REGISTRATION (DRS)

*HOLDING YOUR SHARES ELECTRONICALLY IN LIEU OF SHARE CERTIFICATES*

Holdings are represented by a statement issued when establishing or subsequently modifying your DRS balance. This option removes the risks of holding share certificates, including their safekeeping, and, most importantly, eases the replacement process. Note that there is a cost to replace lost or stolen certificates as well as certificates mailed and never received by the shareholder (if claimed two years after mailing). Generally, this cost is a percentage of the value of the shares represented.

### E-DELIVERY SERVICE

Enrol in the e-delivery service to receive the proxy material, the annual report and/or quarterly reports by e-mail. By doing so, you will receive your documents faster and in an environmentally friendly manner while helping your company reduce its costs.

### DUPLICATE MAILINGS

Eliminate duplicate mailings by consolidating your accounts.

### MANAGE YOUR SHAREHOLDER ACCOUNT

Enrol in *Investor Central* at tsxtrust.com/issuer-investor-login and benefit from a wide variety of self-service tools to help track and manage your shares.

For more details on any of these services, registered shareholders (shares are registered under your name) must contact the transfer agent. Non-registered shareholders must contact their brokers.

## CONTACT INFORMATION

### TRANSFER AGENT AND REGISTRAR

For information on shareholder services or any other inquiries regarding your account (including stock transfer, address change, lost certificates and tax forms), contact:

TSX Trust Company
1 Toronto Street, Suite 1200
Toronto, Ontario M5C 2V6

e-mail bce@tmx.com

tel 416 682-3861 or 1 800 561-0934
(toll free in Canada and the U.S.)

fax 514 985-8843 or 1 888 249-6189
(toll free in Canada and the U.S.)

website tsxtrust.com

### INVESTOR RELATIONS

**For financial inquiries**:

Building A, 8th Floor
1 Carrefour Alexander-Graham-Bell
Verdun, Québec H3E 3B3

e-mail investor.relations@bce.ca

tel 1 800 339-6353

fax 514 786-3970

or visit the Investors section of our website at BCE.ca

This is **Exhibit "85"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

# The power of **our purpose**

TELUS

2021 ANNUAL REPORT

# Powered by purpose

TELUS is a dynamic, world-leading communications technology company with $17 billion in annual revenue and 17 million customer connections spanning wireless, data, IP, voice, television, entertainment, video and security over our award-winning networks. We leverage our global-leading technology and compassion to drive social change and enable remarkable human outcomes. Our long-standing commitment to putting our customers first fuels every aspect of our business, making us a distinct leader in customer service excellence and loyalty.

TELUS Health is Canada's leader in digital health technology, improving access to health and wellness services; TELUS Agriculture provides innovative digital solutions throughout the agriculture value chain, supporting better food outcomes; and TELUS International is a leading digital customer experience innovator that designs, builds and delivers next-generation solutions for global brands across high-growth industry verticals.

We are driven by our vision to connect all citizens for good, and our deeply meaningful and enduring philosophy to give where we live has inspired TELUS, our team members and retirees to contribute more than $900 million in cash, in-kind contributions, time and programs and 1.8 million days of service since 2000. This unprecedented generosity and unparalleled volunteerism have made TELUS the most giving company in the world. Together, let's make the future friendly.



**Land acknowledgment**
The TELUS team acknowledges that our work spans many Territories and Treaty areas and we are grateful for the traditional Knowledge Keepers and Elders who are with us today, those who have gone before us and the youth that inspire us. We recognize the land and the benefits it provides all of us, as an act of Reconciliation, as recommended by the Truth and Reconciliation Commission's (TRC) 94 Calls to Action, and express gratitude to those whose territory we reside on, work on or are visiting.

Many photos within this report were taken prior to the COVID-19 pandemic. For those photos taken during 2021, all necessary precautions were strictly followed. TELUS is committed to ensuring the health and safety of our team members, customers and communities.

# Creating meaningful change through the power of our purpose

Social capitalism is at the core of who we are and what we do. To us, doing well in business and doing good in our communities are mutually inclusive. As the global leader in social capitalism, we are committed to leveraging our innovative technology and human ingenuity to drive social change, create meaningful outcomes for customers, investors, citizens, communities and team members, and help address the world's most pressing social issues.

# We're making the future friendly by...

## Connecting citizens for good

We are committed to ensuring that all Canadians have access to the technology they need to stay connected to the people, information and opportunities that matter most. Our Connecting for Good® programs are bridging digital divides and helping people access the vital tools and resources they need to live fulfilling lives.


## Innovating in healthcare

We are helping Canadians live healthier lives with innovative technologies that are transforming access to healthcare. Our focus is on improving digital and virtual access to quality healthcare and delivering better health outcomes for all Canadians, including our most vulnerable citizens.

At TELUS, we are leveraging our global-leading technology and compassion to drive social change and enable remarkable human outcomes. By reinvesting approximately five per cent of our 2021 pre-tax profits back into our communities, connecting Canadians in need and committing to become a zero-waste, net carbon neutral company by 2030, we hope to make the world a better place. Let's make the future friendly™, together.

Read more at telus.com/purpose

## Caring for the environment

By actively focusing on sustainable solutions across our business, we are helping to build a more sustainable world for future generations. Our investments in leading-edge technology are enabling us to reduce our impact on the environment, switch to renewable energy and digitally transform food production.

## Giving back to communities

Our team is passionate about giving back and providing support in the communities where we live and work, ensuring that the most vulnerable among us are not left behind. Guided by our philosophy – we give where we live® – we are dedicated to driving positive social outcomes and helping to build stronger, healthier communities.

2021 performance at a glance

# Delivering strong results through the power of our purpose

## Operations

**+9.8%**
Operating revenues
**2021: $16.8 billion**
2020: $15.3 billion

**+35%**
Net income
**2021: $1.7 billion**
2020: $1.3 billion

**+6.4%**
Adjusted EBITDA[1]
**2021: $6.1 billion**
2020: $5.7 billion

**+30%**
Basic earnings per share (EPS)
**2021: $1.23**
2020: $0.95

**+0.9%**
Adjusted basic EPS[1]
**2021: $1.07**
2020: $1.06

**+7.3%**
Dividends declared per share
**2021: $1.2710**
2020: $1.18495

## Financial resources

**+11%**
Total assets
**2021: $48.0 billion**
2020: $43.3 billion

**−4.1%**
Cash from operations
**2021: $4.4 billion**
2020: $4.6 billion

**−46%**
Free cash flow[1]
**2021: $0.8 billion**
2020: $1.4 billion

**+26%**
Capital expenditures (excluding spectrum licences)
**2021: $3.5 billion**
2020: $2.8 billion

**+2 pts**
Capital expenditure intensity
**2021: 20%**
2020: 18%

**+1.5 pts**
Return on common equity[2]
**2021: 11.6%**
2020: 10.1%

## Customer and health connections[3]

**+367,000**
Mobile phone subscribers
**2021: 9.29 million**
2020: 8.92 million

**+338,000**
Connected device subscribers
**2021: 2.13 million**
2020: 1.80 million

**+133,000**
Internet subscribers
**2021: 2.27 million**
2020: 2.14 million

**+50,000**
TV subscribers
**2021: 1.27 million**
2020: 1.22 million

**+97,000**
Security subscribers
**2021: 804,000**
2020: 707,000

**+3.7 million**
Healthcare lives covered
**2021: 20.6 million**
2020: 16.9 million

## New reportable segments

Effective January 1, 2021, we transitioned to our new reportable segments: TELUS technology solutions (TTech) and digitally-led customer experiences – TELUS International (DLCX). For more information, see Sections 1.1 and 5.1 of Management's discussion and analysis (MD&A) in this report.

# 2021 financial and operating highlights

| ($ in millions except per share amounts) | 2021 | 2020 | % change |
| --- | --- | --- | --- |
| **Operations** | | | |
| Operating revenues | **$ 16,838** | $ 15,341 | 9.8 |
| Operating income | **$ 3,074** | $ 2,482 | 23.9 |
| Net income | **$ 1,698** | $ 1,260 | 34.8 |
| Earnings before interest, taxes, depreciation and amortization (EBITDA)[1] | **$ 6,290** | $ 5,494 | 14.5 |
| Adjusted EBITDA[1] | **$ 6,069** | $ 5,701 | 6.4 |
| Adjusted EBITDA margin[1] (%) | **36.0** | 37.0 | – |
| Basic EPS | **$ 1.23** | $ 0.95 | 29.5 |
| Adjusted basic EPS[1] | **$ 1.07** | $ 1.06 | 0.9 |
| Dividends declared per share | **$ 1.2710** | $ 1.18495 | 7.3 |
| **TTech segment** | | | |
| Operating revenues | **$ 14,528** | $ 13,604 | 6.8 |
| Adjusted EBITDA | **$ 5,476** | $ 5,177 | 5.7 |
| Adjusted EBITDA margin[1] (%) | **37.6** | 37.9 | – |
| **DLCX segment** | | | |
| Operating revenues | **$ 2,310** | $ 1,737 | 33.0 |
| Adjusted EBITDA | **$ 593** | $ 524 | 13.2 |
| Adjusted EBITDA margin[1] (%) | **21.6** | 24.0 | – |
| **Financial position** | | | |
| Total assets | **$ 47,994** | $ 43,273 | 10.9 |
| Long-term debt | **$ 20,852** | $ 20,288 | 2.8 |
| Net debt[1] | **$ 20,535** | $ 19,826 | 3.6 |
| Return on common equity[2] (%) | **11.6** | 10.1 | – |
| **Liquidity and capital resources** | | | |
| Cash from operations | **$ 4,388** | $ 4,574 | (4.1) |
| Capital expenditures (excluding spectrum licences) | **$ 3,498** | $ 2,775 | 26.1 |
| Capital expenditure intensity (%) | **20** | 18 | – |
| Free cash flow[1] | **$ 777** | $ 1,435 | (45.9) |
| Net debt to EBITDA – excluding restructuring and other costs[1] | **3.17** | 3.45 | – |
| **Customer and health connections[3]** (thousands) | | | |
| Mobile phone subscribers | **9,290** | 8,923 | 4.1 |
| Connected device subscribers | **2,134** | 1,796 | 18.8 |
| Internet subscribers | **2,271** | 2,138 | 6.2 |
| TV subscribers | **1,265** | 1,215 | 4.1 |
| Residential voice subscribers | **1,123** | 1,164 | (3.5) |
| Security subscribers | **804** | 707 | 13.7 |
| Healthcare lives covered | **20,600** | 16,900 | 21.9 |

1 These are non-GAAP and other specified financial measures, which do not have standardized meanings under IFRS-IASB and might not be comparable to those presented by other issuers. For more information, see Section 11.1 of the MD&A.
2 Net income attributed to equity shares for a 12-month trailing period, divided by the average common equity for the 12-month period.
3 Certain customer connections have been adjusted effective January 1, 2021. For details, see Section 1.3 of the MD&A.

Note: Certain comparative information has been restated to conform with the 2021 presentation.

# Harnessing our purpose to achieve outstanding performance

| | 2021 targets | 2021 results | Achieved |
|---|---|---|---|
| Revenues and other income[1] | Growth of 8 to 10% | Growth of 12% | ✓ |
| Net income[2] | n/a | Growth of 35% | n/a |
| Adjusted EBITDA[3] | Growth of 6 to 8% | Growth of 6.4% | ✓ |
| Cash from operations[2] | n/a | $4.39 billion | n/a |
| Free cash flow[3,4] | ~ $750 million | $777 million | ✓ |
| Capital expenditures (excluding spectrum licences)[4] | ~ $3.50 billion | $3.50 billion | ✓ |

1 2021 results include the fourth quarter 2021 gain of $410 million on the disposition of our financial solutions business. Excluding the gain, 2021 revenues and other income increased by nine per cent.
2 As a result of applying National Instrument 52–112, these measures are presented as the most directly comparable financial measures to Adjusted EBITDA and free cash flow, respectively, and were not part of our targets for 2021.
3 These are other specified financial measures. Refer to Section 11.1 of the MD&A for further information.
4 Our targets for free cash flow and capital expenditures were revised in May 2021 to account for our decision to accelerate our broadband capital investments.

## 2021 results

At TELUS, we believe in setting annual financial targets to provide clarity for investors and to help drive our performance. In 2021, we achieved all four of our consolidated financial targets. Our financial results reflected strong mobile and fixed customer growth and improved margins within mobility and fixed data services, along with a larger contribution from DLCX, while we continued to invest strategically to enhance our network leadership position and digitization strategy. See Section 1.4 in the MD&A for a detailed description of our results.

**Caution regarding forward-looking statements summary**
This annual report contains forward-looking statements including statements relating to our 2022 targets, environmental and sustainability targets, expected performance and plans for powering our success, including expected financial results of TELUS Agriculture, and multi-year dividend growth program. By their nature, forward-looking statements do not refer to historical facts and require the Company to make assumptions and predictions, and are subject to inherent risks. There is significant risk that the forward-looking statements will not prove to be accurate and there can be no assurance that TELUS will achieve its targets or performance goals or maintain its multi-year dividend growth program. Readers are cautioned not to place undue reliance on forward-looking statements, as a number of factors (such as the COVID-19 pandemic, regulatory developments and government decisions, the competitive environment, technological substitution, supply chain disruption and dependence on a limited number of suppliers, economic performance in Canada, our earnings and free cash flow, and our capital expenditures) could cause actual future performance and events to differ materially from those expressed in the forward-looking statements. Accordingly, this document is subject to the disclaimer and qualified by the assumptions (including assumptions on which our 2022 annual targets and guidance are based and regarding semi-annual dividend increases through 2022), qualifications and risk factors as set out in Management's discussion and analysis in this report, especially Sections 9 and 10, and in other TELUS public disclosure documents and filings with securities commissions in Canada (on SEDAR at **sedar.com**) and in the United States (on EDGAR at **sec.gov**). Except as required by law, TELUS disclaims any intention or obligation to update or revise forward-looking statements, and reserves the right to change, at any time at its sole discretion, its current practice of updating annual targets and guidance. Statements regarding our 2022 targets are presented for the purpose of assisting our investors and others in understanding certain key elements of our expected 2022 financial results, as well as our objectives, strategic priorities and business outlook. Such information may not be appropriate for other purposes.

| | 2022 targets |
|---|---|
| Operating revenues[1] | Growth of 8 to 10% |
| Adjusted EBITDA[2] | Growth of 8 to 10% |
| Free cash flow[2] | $1.0 billion to $1.2 billion |
| Capital expenditures (excluding spectrum licences) | ~ $3.4 billion |

1 For 2022, we are guiding on operating revenues, which exclude other income. Operating revenues for 2021 were $16,838 million.
2 These are other specified financial measures. Refer to Section 11.1 of the MD&A for further information.

## 2022 targets

We are guided by a number of long-term financial objectives, policies and guidelines, which are detailed in Section 4.3 of the MD&A. With these policies in mind, our consolidated financial targets for 2022, as presented in the table, reflect our expectations for continued strong subscriber growth across mobile and fixed, as well as benefits from our significant ongoing investments in our leading PureFibre network and continued 5G deployment, strengthened by our accelerated broadband build program.

Supporting our growth profile in 2022 are our unique and diversified growth assets – TELUS International, TELUS Health and TELUS Agriculture. Our growth profile is underpinned by a team member culture focused on delivering customer service excellence and our ongoing pursuit of operational efficiency and effectiveness.

For more information and a complete set of 2022 financial targets and the assumptions on which they are based, see our fourth quarter 2021 results and 2022 targets news release issued on February 10, 2022.

# The power of our purpose

In a year unlike most we have shared together, your Company once again led the world in social capitalism. Exemplifying the power of our purpose, we continued to put our customers first, earning us the trust and loyalty of millions of citizens and promoting the economic prosperity that enabled us to serve our communities, support our investors and inspire our high-performing team that epitomizes our award-winning culture so beautifully.

## Engaging the power of our purpose to put our customers and communities first

Throughout 2021, our TELUS team demonstrated our social purpose in action by supporting our customers, our communities and each other. Even as we experienced more relaxed public health measures, our innovative digital My TELUS app, virtual call centres and touchless install, repair and fulfilment processes remained our primary means of interacting with customers. Similarly, our business clients capitalized on our expertise in digital connectivity to enable the productivity of their employees. In addition, we shared best practices for supporting the mental wellness of their teams and ensuring their own customers could do business safely. Moreover, through our #StandWithOwners campaign, we invited Canadians to support local entrepreneurs and celebrate small business heroes as they worked to sustain their companies through the pandemic.

Importantly, our team assisted with COVID-19 vaccine efforts in Quebec, Ontario, Alberta and British Columbia. Your Company enabled the largest vaccine roll-out program in B.C.'s history, booking seven million vaccination appointments while accelerating the province's timelines and ensuring our most vulnerable citizens were given access to vaccines expeditiously. At the same time, our team offered support to citizens across the country facing other challenges, including flooding and wildfires, reinforcing that when things are at their worst, our customers and communities can count on TELUS to be at our best.

## Accelerating investments in our world-leading broadband networks

Our team is driven by our collective desire to leverage our technological and human innovation to enable vital connectivity for Canadians. Since 2000, TELUS has invested $220 billion in network infrastructure, operations and spectrum to expand and evolve our networks and technology. Our world-leading wireless and PureFibre networks have earned consistent, multi-year recognition for speed, reliability, user experience and expansiveness from independent reports, including U.K.-based Opensignal, U.S.-based Ookla, PCMag and J.D. Power, and Canada's Tutela. These acknowledgments reaffirm our belief that strong, reliable networks are the backbone of Canada's digital economy, enabling positive outcomes for our fellow citizens.

We are proud of the many ways in which our wireless and PureFibre networks, with their global-best speeds, reliability and reach, are driving economic growth, innovation and job creation. Moreover, our world-leading broadband networks and technology are improving the lives of Canadians by enabling online healthcare, education and teleworking flexibility during the pandemic; and accelerating Canada's digital economy and society for heightened productivity, competitiveness and human welfare outcomes in the post-pandemic period.

Our broadband technology is supporting critical, transformational change in respect of: remediating the environmental state of our planet by bridging time and distance through technology virtualization; advancing agriculture efficiency and effectiveness and food quality production through data analytics; and bridging socio-economic and geographic divides so every member of our society has access to the technology that yields the opportunity to realize their full potential. These aforementioned objectives for our economy and society reflect TELUS' responsibilities to progress the growth of skilled jobs, the physical and mental well-being of our citizens and the uplifting of marginalized constituencies as embodied by our brand promise, *Let's make the future friendly*.

As a demonstration of our commitment to connect communities from coast to coast, following a successful equity offering in March 2021, your Company announced an acceleration of investments in our broadband networks. These efforts are further expanding our PureFibre network in B.C., Alberta and Eastern Quebec, expediting the roll-out of our national 5G network across urban and rural Canada, and enhancing our digital capabilities to bolster the customer experience and drive additional efficiencies within our business.

## Bridging digital divides and enabling vital connections for underserved communities

At a time when the human connection has never been more important, TELUS remains dedicated to ensuring all Canadians can stay connected to the people and information that matter the most. Our sustained network leadership powers our purpose, as evidenced by the connectivity your Company provides to millions of underserved Canadians through our Connecting for Good programs.

Notably, TELUS Internet for Good offers low-cost, high-speed internet to qualified low-income families, seniors and people living with disabilities. Through TELUS Mobility for Good, we offer a free smartphone and fully subsidized data plan to youth transitioning out of foster care, eligible low-income senior citizens and Indigenous women at risk or surviving violence. TELUS Tech for Good provides differently abled Canadians facing challenges using smartphones and tablets with assistive technology and training that help them live more independently. Lastly, TELUS Health for Good enables TELUS mobile health clinics to bring primary healthcare to people in need and living on the streets across Canada.

## Building meaningful relationships with Indigenous communities and organizations

We continue to focus on connecting Indigenous communities to our PureFibre network. Indeed, we have invested more than $75 million, alongside our co-funding partners, to connect 91 Indigenous communities and 151 Indigenous lands, with 48 Indigenous lands enabled in 2021 alone. Altogether, we are providing more than 80,000 people living in Indigenous communities with vital access to our PureFibre network.

Small businesses have been especially hard hit by the pandemic, and our team was proud to be able to support entrepreneurs like Nicole and Paulo of Gourmet Girl Cafe + Catering through our #StandWithOwners program.

In 2021, we launched our Indigenous Reconciliation and Connectivity Report detailing the many ways your Company is working collaboratively with Indigenous partners to support long-term prosperity in communities around the country. Building on our long-standing, respectful and productive relationships with Indigenous Peoples, we engaged Elders, leaders and TELUS team members to create our Reconciliation Commitment and five-year Indigenous Reconciliation Action Plan.

Central to our Reconciliation Commitment is the desire to support the diverse needs of Indigenous Peoples to build relationships between Indigenous and non-Indigenous businesses, helping to grow the economy and enabling prosperity for Indigenous Peoples. In this regard, we were proud to stand in solidarity with residential school survivors and their families through our $8 million commitment in 2021 toward Indigenous-led entrepreneurs, projects and initiatives. This includes a $1 million gift to digitize, promote and distribute the Witness Blanket (see sidebar), as well as investments from the TELUS Pollinator Fund in Indigenous-led businesses, and grants from the TELUS Community Boards and TELUS Friendly Future Foundation (TFFF).

## Taking accountability to invest in sustainable businesses and charitable organizations

The TELUS Pollinator Fund – one of the world's largest social impact investing funds – celebrated its first


CMHR, Aaron Cohen

## Digitizing the Witness Blanket

As part of our $1 million leadership commitment, we are working alongside Indigenous artist Carey Newman (Hayalthkin'geme) and the Canadian Museum for Human Rights to digitize and amplify the reach of the Witness Blanket, created to pay homage to the children and families affected by Canada's residential school system and recognize the intergenerational impacts that continue to be felt today. We will help ensure the Witness Blanket has a lasting and powerful impact, standing as a national monument to recognize the atrocities of the residential school era.

anniversary in 2021, as it continued to invest in startups that are both enabling better social outcomes and achieving strong financial returns. Throughout the year, the Fund invested nearly $20 million to help scale socially responsible and innovative startups, of which 40 per cent are women-led and 50 per cent are led by Indigenous or racialized founders. These businesses are focused on social innovation that drives better health outcomes, sustainable food systems, inclusive communities and a greener planet.

Likewise, the TFFF marked its third year and, in 2021, committed more than $8.7 million in cash donations to 500 charitable organizations, while fundraising more than $3 million. The TFFF has contributed over $25 million to our communities since its inception, supporting the incredible work of our TELUS Community Boards. Notably, since 2005, TELUS' Community Boards have invested $91 million in cash donations to nearly 7,800 initiatives, providing support for underserved citizens, especially young people, around the world.

## Improving human and social outcomes, thanks to the most engaged team on the planet

Your Company's ability to support our customers and communities in a meaningful way is owing to the dedication, spirited teamwork and grit of the best team on the planet. Indeed, as the pandemic continued throughout 2021, we remained committed to the health and mental wellness of our team members. In alignment with the National Standard for Psychological Health and Safety in the Workplace, we introduced our TELUS Mental Health Commitment to reinforce the role we all play in promoting healthy practices and offer meaningful solutions and support to colleagues. These included the creation of our team member-led mental health first aid network and a customized training program to help team members identify and address potential mental health issues.

In 2021, your Company again earned a world-leading team member engagement score of 84 per cent, placing TELUS in the top 10 per cent of all employers globally. This result, which would be impressive in a normal year, was extraordinary considering the highly dynamic environment that characterized 2021.

In keeping with our belief that a diverse work environment facilitates a broader exchange of ideas and elasticity of thought, helping us to better understand and support the needs of our stakeholders, your Company progressed our diversity and inclusion strategy across our TELUS family. This included launching a new TELUS Resource Group to support Black team members, and implementing an enhanced Board diversity policy that has enabled us to achieve 46 per cent female representation and 23 per cent of independent directors who represent a visible minority or are Indigenous.

## Exemplifying the symbiotic relationship between doing good in our communities and doing well in business

Undeniably, our culture of caring was displayed throughout 2021 as our highly engaged team offered its support to those who needed us most. Through our TELUS Days of Giving, more than 55,000 members of our TELUS family contributed 1.3 million volunteer hours in communities worldwide. TELUS, our team members and retirees contributed $90 million in cash, in-kind contributions, time and programs to charitable and community organizations, representing approximately five per cent of our pre-tax profits. Since 2000, our extended TELUS family has gifted $1.4 billion, including $900 million and 1.8 million days of volunteerism, to make the world a better place.

Increasingly, citizens are choosing to do business with organizations that share their values. In this regard, our team's dedication to our customers, communities and one another, drove our leading operational and financial results in 2021. Your Company, once again, led our industry in customer growth across our mobile and fixed portfolios, supported by world-leading customer loyalty and an unprecedented churn rate of less than one per cent within mobile phone, internet, Optik TV, security and voice.

## Driving industry-leading business and financial results

We achieved strong financial results across our business as evidenced by operating revenues, net income and Adjusted EBITDA increasing by 9.8, 35 and 6.4 per cent, respectively. Across TELUS technology solutions (TTech), we generated industry-leading results in 2021. Overall, TTech revenue was $15 billion, while Adjusted EBITDA was $5.5 billion. Our team drove leading operational and financial results in our fixed portfolio, including data services revenue growth of more than 12 per cent.

These results were bolstered by our highly differentiated and potent asset mix geared towards high-growth, technology-oriented verticals, including TELUS International (TI), TELUS Health and TELUS Agriculture (TAG). When looking at TELUS' two-year performance through the pandemic period, from 2019 to 2021, our total revenue and EBITDA growth of close to 18 and seven per cent, respectively, as well as our more than 1.7 million net new total customer additions, represented industry-leading performance by a substantial margin and demonstrates the significant economic value we are creating through our superior product portfolio.

TI continues to generate strong, double-digit revenue, net income and Adjusted EBITDA growth, concluding their first year as a public company with impressive results that surpassed their financial targets for 2021. These robust results reinforce TI's position as the partner of choice for premier digital customer experiences, as clients around the world look to TI to design, build and deliver end-to-end next-generation digital solutions and services, including a unique and unparalleled mix of content moderation and artificial intelligence capabilities.

Similarly, TELUS Business Solutions contributed to TELUS' strong performance and is expected to continue delivering robust outcomes with the expansion of 5G, Internet of Things and new industry-based solutions. For example, we launched a strategic alliance with GM Canada, the first of its kind in Canada, leveraging our world-leading 5G network to enable an unparalleled experience to keep millions of citizens safe and connected.

## Welcoming a historic number of new mobile and fixed customers

In 2021, TELUS' operational excellence was again characterized by the consistent combination of industry-leading and profitable customer growth, with an all-time record 960,000 total new client additions – ranking TELUS number one in the industry for new customer growth, driven by industry-best mobile and fixed wireline additions.

In mobile, TELUS achieved industry-leading customer growth of 705,000 net additions. This included 367,000 mobile phone and 338,000 connected device net new customers, representing an all-time record high for connected devices for your Company. Mobile network revenue increased three per cent, reflective of our focus on high-quality customer growth, underpinned by an exceptional service experience, leading customer loyalty and strong base management. Moreover, postpaid mobile churn of 0.74 per cent improved by four basis points over 2020, representing our eighth consecutive year of industry-leading customer loyalty, with postpaid churn below one per cent.

Notably, we earned a record 255,000 new TV, internet, voice and security customers, reflecting the potency of our expansive PureFibre network capabilities, as well as our superior bundled offerings and success in driving higher product intensity with our customers. Indeed, during a year fraught with anxiety and ambiguity, TELUS SmartHome Security and TELUS Secure Business provided increased peace of mind for consumers and businesses. As a result, we welcomed our 800,000th security client by the end of 2021, reflecting our innovation in virtual and do-it-yourself installations, and capacity for acquiring and integrating new assets, nationally.

## Answering the world's most pressing social challenges in healthcare and agriculture

Our leading results were supported by our high-growth verticals, which once again reflected the strength of our digital capabilities. TELUS Health continued to deliver improved health outcomes for citizens, driving double-digit year-over-year health services revenue growth. Indeed, our rebranded virtual care services, TELUS Health MyCare for consumers and our employer-subscribed TELUS Health Virtual Care, as well as our Home Health Monitoring and Virtual Visit services, enabled healthcare providers to safely support patients virtually throughout the pandemic. Similarly, our team launched TELUS Health LivingWell Companion on Apple Watch, becoming the first company in Canada to offer personal emergency response service through Apple Watch. This service enables Canadians with health issues or who may be at risk of falling with improved safety and peace of mind with 24/7 emergency monitoring. Notably, by year-end 2021, we covered more than 20 million lives through our health solutions, an increase of nearly 22 per cent, year-over-year, completed over 550 million digital health transactions and earned more than one million new virtual healthcare members, representing a 65 per cent increase over 2020. Impressively, TELUS Health MyCare is now the number one virtual care brand in respect of familiarity and usage across all of the markets in which we operate. Moreover, in early 2022, our team launched TELUS Health Virtual Pharmacy, providing Canadians with fast and reliable online access to prescription medications and refills.

Furthermore, through our ongoing efforts to scale and integrate our unique TAG business, we generated double-digit revenue growth across our three lines of business – agribusiness; food, beverage and consumer goods; and animal health – concluding the year with annual revenue of over $400 million. These results are illustrative of the efforts of our skilled team of innovators at TAG who are working diligently toward the creation of a fully connected producer-to-consumer value chain, improving the quality, safety, distribution and sustainability of food and consumer goods. As one of the largest agriculture technology companies globally, TAG has more than 1,500 team members in 10 countries serving customers in over 50 countries, including nine of the 10 top agriculture companies in the world.

## Fuelling consistently industry-leading results for the benefit of the stakeholders we serve

Our industry-leading financial returns reflect the collective efforts of our team, delivering on a proven and sustainable growth strategy that generates rewards for all stakeholders, including you, our investors. Throughout another challenging year, your Company returned significant capital to shareholders, while maintaining a robust balance sheet and making ongoing generational investments in innovative broadband technologies.

Indeed, through our accelerated broadband investment program, we advanced approximately $1.5 billion of incremental capital expenditures into 2021 and 2022. Investing from a position of strength and leadership, these transformational investments bolster TELUS' superior competitive position, including connecting thousands of additional homes and businesses to our PureFibre network, enhancing the speed and coverage of our 5G capabilities and amplifying the digital customer experience. Furthermore, as part of this accelerated broadband build, we are advancing our copper-to-fibre migration program. In this regard, our team exceeded our copper-to-fibre migration target in 2021 and is on track to substantially complete the migration by the end of 2022.

Importantly, these generational investments, combined with the accelerated decommissioning of legacy copper infrastructure, will fuel enhanced customer growth and improved connectivity, alongside significant operating efficiencies and positive cash flow benefits as our expedited broadband build nears completion. By advancing our world-leading networks, we are generating improved social and economic outcomes in the communities we serve.

Additionally, as a result of the pull-forward of our broadband investments, commencing in 2023, we are targeting a significant decline in our annual capital expenditures to $2.5 billion, or less. Free cash flow will be strengthened by the expected capex decline of approximately $1 billion over 2022, in addition to strong ongoing EBITDA expansion. Importantly, this initiative will support the sustained advancement of our operational and financial performance well into the future, strengthening our confidence in the robust outlook for our business, amplified by strong anticipated future growth in our emerging growth businesses.

Our consistently strong results, supported by transformational investments in communities across Canada, underpin your Company's ability to create unparalleled long-term value for our shareholders. Since the beginning of 2000 through December 31, 2021, TELUS has generated a total shareholder return of 700 per cent. This result is 357 points higher than the return for the Toronto Stock Exchange's S&P/TSX Composite Index (TSX) of 343 per cent and 694 percentage points higher than the return from the MSCI World Telecom Services Index of six per cent. Moreover, over the past five, 10 and 15 years, TELUS has surpassed the TSX return by an average of 87 percentage points.

## Building value for Canadians through our industry-leading dividend growth program

Importantly, we anticipate that our accelerated broadband investment initiative, coupled with your Company's ongoing, leading operational and financial performance, will augment the long-term sustainability of our industry-leading dividend growth program, now in its 12th year. In 2021, we announced our 21st dividend increase, raising our annual dividends declared by 7.3 per cent over 2020. Notably, since 2004, TELUS has returned $21 billion to shareholders, including $15.7 billion in dividends and $5.2 billion in share purchases, representing over $15 per share.

Through individual holdings, mutual funds and pension plans, as well as our own TELUS team members who collectively represent our fourth largest shareholder, TELUS investors are our neighbours, friends and colleagues. Undeniably, when our team puts our customers and communities first, the resulting prosperity enables us to improve the outcomes of Canadian families, retirees and pensioners who invest in TELUS.

## Taking accountability to improve the health of our planet and embrace tax morality

Your Company further demonstrated the power of our purpose through the issuance of our inaugural sustainability-linked bond in 2021 – the first in Canada – raising $750 million of 10-year notes. This sustainable financing structure ties the effective interest rate to the achievement of our long-term, impactful operational greenhouse gas (GHG) reduction target, specifically, a 46 per cent reduction in scope 1 and 2 GHG emissions over 2019 levels by 2030, in addition to becoming net carbon neutral in our operations by 2030 or sooner.

Similarly, embracing tax morality is a means of investing in our communities. Since 2000, your Company has paid circa $51 billion in total tax and spectrum remittances to our federal, provincial and municipal governments in Canada, consisting of corporate income taxes, sales taxes, property taxes, employer portion of payroll taxes and various regulatory fees. These funds support public works projects, education, healthcare, cultural pursuits and other initiatives that improve the social and economic well-being of our communities.

## Evolving our brand promise to Let's make the future friendly

For 20 years, we have been guided by our brand promise, the future is friendly, as we leverage the power of technology to create positive experiences and meaningful social outcomes for people around the world. The pandemic and social injustices have prompted us to reflect on what is truly important, including the values we hold dear. Our refreshed brand promise, *Let's make the future friendly*, welcomes everyone to join us as we strive to make the world a better place.

Your Company was recognized as one of Strategy Magazine's 2021 Brands of the Year for our leadership in social capitalism. We meaningfully integrated purpose into marketing communications across all customer touchpoints, increasing socially responsible perceptions of TELUS by 30 per cent and reaching more than 10 million customers. In addition, TELUS enabled our team members to share our social purpose messaging on their own social networks.

## Taking leadership in 2022 through inspiring social and financial targets

Leveraging the momentum gained over the long term, in concert with the power of our globally leading networks, our high-performing team anticipates an equally successful 2022, as exemplified through our new community giving, social impact and financial targets.

As we continue to empower citizens to lead healthier, safer, more connected lives, our social impact and giving targets for 2022 include: inspiring our TELUS family to contribute 1.4 million hours of volunteerism, improving the economic and health outcomes for a cumulative 320,000 low-income Canadians through our Connecting for Good programs, contributing $90 million to charitable and community organizations, inspiring $3.3 million in fundraising and stewardship for the TFFF and launching a new signature national student bursary program, and investing $20 million to support new socially responsible businesses through our TELUS Pollinator social impact investment fund.

In terms of our sustainability goals, we anticipate that 100 per cent of our electricity requirements will come from renewable or low-emitting sources by 2025, our operations will be net carbon neutral by 2030 or earlier, we will become a zero waste company by 2030, and energy efficiency will improve by 50 per cent over 2019 levels by 2030. As signatories to the United Nations Global Compact, we take action and share progress in respect of human rights, labour, environment and anti-corruption practices, reinforcing our commitment to creating stronger, more sustainable communities.

Financially, our targets for 2022 include growth in both revenue and Adjusted EBITDA of eight to 10 per cent, capital expenditures of approximately $3.4 billion, and robust free cash flow of $1 billion to $1.2 billion. Notably, when compared to 2019, our targets for 2022 represent 25 to 27 per cent revenue growth, and 15 to 17 per cent EBITDA growth, versus the pre-pandemic period.

## Thanking you for your ongoing support

In 2021, our TELUS family passionately demonstrated the power of our purpose, driving positive outcomes for the many stakeholders we serve. Throughout 2022, you can count on our 100,000 TELUS team members and retirees, globally, to leverage that same passion and purpose to put our customers first and to drive the operational and financial results that allow us to invest in our philanthropy, the expansion of our networks and the success of our team, our communities, and you, our shareholders.

Together, we are making the future friendly and I remain grateful for your ongoing support.

Darren

Darren Entwistle
Proud member of the TELUS team
for more than two decades
February 18, 2022

# Powered by our social purpose

At TELUS, we are guided by our social purpose – to leverage our global-leading technology and compassion to drive social change and enable remarkable human outcomes. With our purpose leading the way, we are focused on environmental, social and governance initiatives that positively impact our stakeholders.

## Leading with our social purpose

As a company powered by our social purpose, we are using our core business to serve a greater purpose that benefits all our stakeholders. Together, we are empowering Canadians with connectivity, transforming healthcare, caring for the planet, enabling responsible agriculture and giving back to our communities. Visit **telus.com/purpose** for more information.

### Connecting those who need us most

In 2021, we continued to extend our Mobility for Good® program, offering free or subsidized mobile phone rate plans and devices to all youth aging out of foster care and to low-income seniors across Canada. During the year, we added 7,000 Canadians to the program, helping them stay connected to vital support networks and resources. Importantly, more than 28,000 Canadians have benefited since the program began in 2017.

In October, we launched Mobility for Good for Indigenous Women at Risk, providing free smartphones and data plans to Indigenous women at risk of or surviving violence. In partnership with grassroots Indigenous-led organizations, the program offers a vital lifeline to the critical services and resources they need for their health, safety and wellness.

In May, we expanded Tech for Good™ nationally through a partnership with March of Dimes Canada. Launched in 2019, this newly expanded program will empower more Canadians living with disabilities to use their smartphones and tablets independently and improve their quality of life with customized support, training and assistive technology. At the end of 2021, more than 4,600 Canadians had participated in the program and/or benefited from the TELUS accessibility discount for people living with disabilities.

Our Internet for Good® program also continued to grow in 2021, providing close to 12,000 low-income families, youth aging out of foster care and people living with disabilities with vital access to low-cost, high-speed internet service. By the end of 2021, 106,000 Canadians had benefited from low-cost internet since the program began in 2016.

## Driving better health outcomes

We expanded Health for Good® during the year with the launch of four new mobile health clinics in Victoria, Vancouver, Toronto and the Niagara Region of Ontario. The program provides primary care, mental health and addiction support services to individuals experiencing homelessness in 14 communities across the country. Through our mobile health clinics, we supported 35,000 patient visits in 2021 and administered more than 9,000 COVID-19 vaccinations.

Our innovative virtual care offerings also continued to grow to meet the increasing demand and evolving healthcare needs of Canadians. In April, we introduced TELUS Health Virtual Care and became the first digital health provider in Canada to integrate an employer-focused virtual care platform with electronic medical records (EMRs). With TELUS Health Virtual Care, critical patient health information from virtual care sessions can be shared securely, with consent, with any of the 34,000 health professionals who are using our EMR solutions across Canada.

In June, we expanded TELUS Health MyCare to provide Canadians with a robust suite of physical and mental health and well-being services, including in-person clinics and advanced digital health tools, as well as greater access to physicians, counsellors and dietitians. TELUS Health MyCare is now available to millions of Canadians in multiple languages.

## Enabling stronger, healthier communities

Our team is passionate about making a positive difference in our communities across Canada and internationally.

In 2021, the TELUS Friendly Future Foundation® and TELUS Community Boards contributed more than $8.7 million to 500 Canadian registered charities that promote mental health and well-being for youth through virtual counselling, mentoring and peer support, tutoring and other programs enabled by technology.

**1.3 million**
hours of giving by our team members, retirees, family and friends

**230,000**
Canadians positively impacted by our Connecting for Good programs

**$90 million**
contributed to charitable and community organizations

**nearly $20 million**
invested by the TELUS Pollinator Fund for Good


## Helping communities in need

When support is needed most, our team responds with passion and purpose. As one example, when massive flooding hit B.C. in November, our team sprang into action. In Hope, team members quickly reached out to impacted communities to ensure they had access to vital supplies. Our team leveraged our resources and relationships with local vendors to deliver, by boat, more than 3,500 pounds of essential supplies to five First Nations and other communities severely affected by the floods.

The Foundation connects youth to a world of opportunities so they can learn, be creative, innovate and stay healthy.

During our 16th annual TELUS Days of Giving, more than 55,000 team members, retirees, friends and family were inspired to give back with TELUS, contributing to 1.3 million hours of service around the world. Additionally, in 2021, TELUS, our team members and retirees provided $90 million in cash, in-kind contributions, time and programs to charitable and community organizations.

## Investing in a world of good

During its first year, the TELUS Pollinator Fund for Good™ invested nearly $20 million in debt and equity securities of 10 new purpose-driven for-profit companies that are dedicated to driving social innovation and making a difference in communities. As one of the largest impact funds in the world, the Fund invests in early-stage socially responsible companies that are driven by both profit and purpose, and helps scale socially innovative ideas and initiatives to ensure they have greater impact.

## Powered by our environmental focus

Environmental sustainability is foundational to our leadership in social capitalism and to our long-standing efforts to help preserve and protect the planet. We remain dedicated to exploring new and innovative ways to lessen our impact on the global environment. Visit **telus.com/sustainability** for more details.

### Caring for our planet

We are on track to achieve our ambitious environmental and sustainability targets and reduce our impact on the environment. After achieving our 2020 targets one year early, we set new targets, which include:

- Effectively procuring 100 per cent of our electricity requirements from renewable or low-emitting sources by 2025
- Improving energy efficiency by 50 per cent over 2019 levels by 2030
- Achieving net carbon neutrality for our operations by 2030
- Achieving our Science Based Targets initiative (SBTi)-approved scope 1, 2 and 3 greenhouse gas (GHG) emissions reduction targets by 2030.

### Powering our operations from wind and solar energy

Investing in renewable energy helps us grow our core business sustainably while powering our networks from cleaner electricity sources. With this in mind, we have entered into four power purchase agreements in Alberta that will enable the development of new solar and wind power facilities. When these facilities become operational in 2022, in effect, 100 per cent of our electricity needs in Alberta will be met by wind or solar sources.

### Linking financing to achieving sustainability targets

We issued Canada's first sustainability-linked bond in June 2021, linking financing to our environmental performance. The bond uniquely ties our cost of borrowing to TELUS achieving a target to reduce scope 1 and 2 GHG emissions by 46 per cent over 2019 levels by 2030. If we miss the target, interest payable will increase by one per cent in the final year of maturity. This target was approved by the SBTi, demonstrating our global leadership in sustainability and the world's fight against climate change.

### Using resources responsibly

In our efforts to become a zero-waste company, we continually look for ways to apply circular economy principles with the goal being to reuse, refurbish or recycle as much as possible. As an example, we have enhanced our Bring-It-Back® device program, enabling customers to receive credit for returning used mobile devices. We then use those devices to support programs like Mobility for Good, which ensures connectivity for vulnerable citizens. Since the start of the COVID-19 pandemic, we have donated more than 14,000 refurbished mobile devices and free rate plans to help isolated seniors, hospital patients and vulnerable Canadians stay connected.

## Committed to good governance

We are strongly committed to high standards in corporate governance. Our ongoing efforts to enhance our practices enable us to pursue greater transparency and ensure integrity in all our actions. Visit **telus.com/governance** for more information.

### Cultivating diversity

We are dedicated to fostering and celebrating diversity and inclusion within our team, our Company and our communities. We recognize that, in all areas of our business, different perspectives and experiences bring innovative ways of thinking that enable us to deliver better insights, decisions and solutions.

In late 2020, we updated our Board diversity targets, establishing specific goals of having women and men each represent at least one-third of independent directors and at least two directors who represent a visible minority or are Indigenous by the annual meeting in 2023. In May 2021, we surpassed these targets two years early, with our Board including six independent directors (46 per cent) who are women and three directors who represent a visible minority or are Indigenous.

In 2021, we launched our sixth TELUS resource group (TRG), called Reach, to advance diverse representation in decision-making and to shine light on systemic issues that disproportionately and uniquely affect the Black community. The other five TRGs have been established over time to support women, Indigenous team members, team members with varying abilities, new immigrants and multicultural team members, and lesbian, gay, bisexual, transgender, queer and Two-Spirit (LGBTQ2+) team members. Since the first group was launched in 2006, our TRGs have grown to more than 7,000 members worldwide.

We appreciate and celebrate every team member's unique talents, voice and abilities, and encourage everyone to always bring their whole selves to work. To measure our progress in cultivating an inclusive culture, we introduced an inclusion index in 2021 as part of our annual engagement survey and achieved a score of 85 per cent, indicating a strong sense of inclusion and belonging among team members.

### Reinforcing our commitment to Indigenous Peoples

Building on our long-standing commitment to foster respectful relationships with Indigenous Peoples, we formalized our commitment to reconciliation in 2021 and launched a five-year Indigenous Reconciliation Action Plan that sets out how we will bring our commitment to life. Developed with guidance from Indigenous voices and Indigenous-led frameworks of reconciliation, the Plan is based on four pillars where we believe we can drive meaningful change – connectivity, enabling social outcomes, cultural responsiveness and relationships, and economic reconciliation. For more information, visit **telus.com/reconciliation**.

We continue to collaborate with Indigenous governments and organizations to deliver advanced broadband connectivity to Indigenous communities within our servicing area. In 2021, we connected 48 Indigenous lands to our advanced broadband networks and enabled 382 Indigenous lands with 5G technology.

### Enhancing data literacy

As the digital world evolves, more possibilities for data innovation arise, bringing new challenges and opportunities. To ensure we continue to manage data responsibly while also protecting the privacy of Canadians, we implemented a comprehensive data literacy campaign for team members in 2021. The initiative provides them with enhanced knowledge and the tools they need to effectively and responsibly unlock the value of data in a way that continues to protect the privacy and maintain the trust of Canadians.

### Sustaining a culture of trust and integrity

Integrity is a cornerstone of our culture at TELUS and is incorporated into everything we do. Building and sustaining a strong ethical culture is the shared commitment and responsibility of all team members and ensures decisions are made with the highest level of integrity and respect.

In 2021, we created a new version of our mandatory online Integrity course, which brings to life the policies and guidelines that inform the way we work and help us make sound decisions. The course is narrated and translated in 11 languages and is available to approximately 90,000 team members around the world.

We continue to provide an EthicsLine for anonymous and confidential questions or complaints on internal control and other issues related to integrity. Calls are handled by an independent agency, offering multi-language services to internal and external callers 24 hours a day. For the 19th consecutive year, none of the calls reported to the Ethics Office in 2021 involved officers or team members with a significant role in internal control over financial reporting.

## Best practices in corporate governance

- Say-on-pay vote
- Majority voting policy
- Clawback policy
- Board diversity policy
- Shareholder engagement policy
- Insider trading policy
- Code of ethics and conduct and EthicsLine
- Privacy management program framework
- Enterprise risk governance and oversight
- Board recruitment process and orientation programs
- Mandatory education sessions for the Board
- Board and committee succession planning
- CEO succession planning
- Independent third-party evaluations of the Board
- Director term limits
- Share ownership guidelines for directors and executives
- Extensive and transparent disclosure.

# Putting our customers first through the power of our purpose

Combining outstanding customer service with our high-performance team culture, underpinned by our world-leading network and innovative technology, TELUS has consistently achieved strong operational and financial results. Building on our track record of excellence, in 2021, we realized many positive outcomes for our customers and communities across our diversified and high-growth operations.

## TELUS technology solutions: Providing diverse solutions

Within TELUS technology solutions (TTech), we offer a diverse set of solutions across mobile and fixed, which includes home and business, as well as the emerging high-growth areas of health and agriculture.

### Mobile: Keeping customers connected

Backed by our world-leading network, we continued to provide reliable high-speed mobility services across the country, ensuring Canadians stayed connected, informed and entertained. Once again, we led our industry in customer loyalty in 2021, with a mobile phone churn rate of 0.91 per cent, driven by our long-standing focus on putting customers first. Additionally, we welcomed 705,000 new mobile phone and connected device customers, and 1.24 million over the last two years.

We were again recognized for our superior network, earning the top spot in major independent awards.

**+4.1%**
**Mobile phone subscribers**
**2021: 9.29 million**
2020: 8.92 million

**+19%**
**Connected device subscribers**
**2021: 2.13 million**
2020: 1.80 million

**5 bps improvement**
**Mobile phone churn**
**2021: 0.91%**
2020: 0.96%

**+3.0%**
**Mobile network revenue**
**2021: $6.21 billion**
2020: $6.03 billion

During the year, we expanded our next-generation 5G network to reach 70 per cent of Canada's population. Importantly, our expanded 5G coverage is bringing transformational connectivity to Canadians, ensuring they have the necessary reliability, speed and low latency to realize positive outcomes in an increasingly digital world.

**Advancing our mobile strategy:**

- Enhancing our award-winning network through the deployment of newly acquired spectrum, offering a world-leading 5G experience across Canada
- Elevating our customers' experience with our best-in-class customer service, world-leading network and advanced digital capabilities, supported by the technology-focused expertise of TELUS International
- Sustaining our focus on high-quality, profitable customer growth by offering simplified rate plans with easier access to the latest smartphones through affordability initiatives,

such as our TELUS Easy Payment® device financing, Bring-It-Back and Certified Pre-Owned device programs
- Strengthening our business and public service offerings with tailored services and solutions, as evidenced by TELUS being named GM Canada's 5G network provider for its connected vehicle service
- Continuing our unwavering commitment to putting customers first, reflected by TELUS receiving the fewest customer complaints of any national carrier for the 10th consecutive year in the annual Commission for Complaints for Telecom-television Services report
- Enabling equal access to mobile technology and better community outcomes by expanding our Mobility for Good program to Indigenous women at risk.

## Fixed: Driving innovation for homes and businesses

The ongoing expansion of our TELUS PureFibre® network resulted in another strong year for our fixed solutions. We saw robust demand for high-speed internet and added 149,000 new internet customers in 2021, and 306,000 over the last two years. As a part of our generational investments in fibre, we continue to migrate a significant number of customers from our legacy copper network to our next-generation fibre network, paving the way for the future decommissioning of our copper infrastructure within our fibre footprint – a notable feat on a global basis.

We grew our TV subscriber base in 2021 with the addition of 50,000 new TV customers, as they continued to respond positively to our broad content lineup and innovative bundled offerings. With a growing emphasis on staying safe in person and online, we added 97,000 security and automation customers in 2021 and realized an important milestone by welcoming our 800,000th customer, establishing our position as Canada's top security service provider.

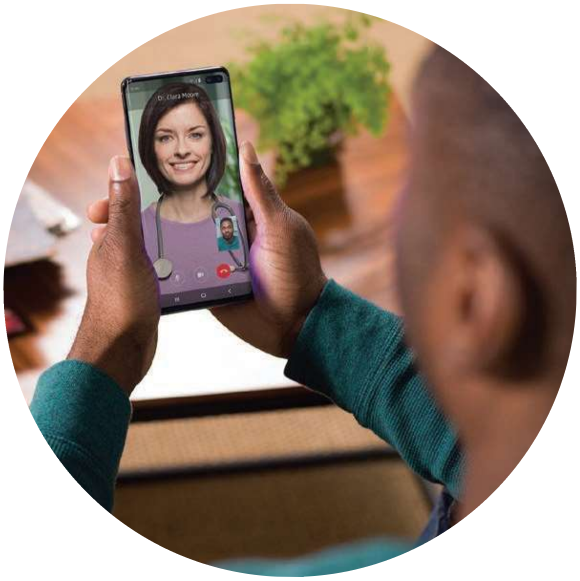
As businesses work to keep pace with new and emerging technology, we are providing tailored, next-generation solutions to businesses large and small, making significant progress toward our goal of becoming the digital-first technology provider of choice within the evolving business market.

| | |
|---|---|
| **+6.2%** Internet subscribers<br>2021: 2.27 million<br>2020: 2.14 million | **+4.1%** TV subscribers<br>2021: 1.27 million<br>2020: 1.22 million |
| **+14%** Security subscribers<br>2021: 804,000<br>2020: 707,000 | **+12%** Fixed data revenue<br>2021: $4.42 billion<br>2020: $3.94 billion |

**Advancing our home and business solutions strategy:**
- Expanding our TELUS PureFibre network and enhancing its capabilities, speed and reliability to strengthen our network leadership position
- Growing our internet, TV and security customer base through superior bundled product offerings and our targeted mobile and home go-to-market strategy
- Demonstrating our customer loyalty leadership, with customer churn rates of less than one per cent for TELUS PureFibre internet, Optik TV®, security and voice services, reflecting our team's relentless focus on our customers first priority
- Protecting our customers by offering virtual installations and repairs, leveraging innovative tools and approaches to keep our customers and team members safe and connected
- Driving growth within our business offerings by enabling customers' digital transformation through next-generation services and applications
- Leveraging our leading PureFibre and 5G networks to enable meaningful outcomes for business through our Internet of Things, security and cloud-based solutions
- Providing low-cost, high-speed internet access to more Canadians in need through our Internet for Good program, ensuring all Canadians have the connectivity required to participate in our digital world.

## Fixed: Enabling healthier communities

Leveraging technology to create better health outcomes, we strengthened our leadership position across the primary healthcare continuum. In 2021, we completed 551 million digital healthcare transactions, illustrating the significant scope and scale of our healthcare offerings. These transactions span across TELUS Health's wide range of services, such as health benefits management, electronic medical records (EMRs), virtual care services and virtual pharmacy. Importantly,



TELUS Health facilitates the integration of electronic health records from the home to the doctor's office to the hospital, making critical health information available to healthcare providers over our world-leading network.

Demand for virtual offerings remained strong as we continued to see the adoption of our consumer-focused TELUS Health MyCare application, as well as our employer-subscribed TELUS Health Virtual Care services. Within our physical TELUS Health Care Centres, in-person patient activity resumed as Canadians emerged from restrictions related to the COVID-19 pandemic.

### Advancing our healthcare strategy:

- Leveraging technological innovation, artificial intelligence (AI) and human ingenuity to create better healthcare outcomes and empower people to live healthier lives
- Ensuring healthcare professionals have the right tools to focus on what matters most as Canada's leading EMR provider, with more than 34,000 Canadian healthcare professionals using a TELUS Health EMR solution
- Enhancing our healthcare offerings with the launch of our national network of care centres and virtual care services, helping patients access healthcare resources in a safe and convenient way
- Facilitating the online renewal of prescriptions and e-prescribing services through TELUS Health Virtual Pharmacy
- Helping individuals, companies and industry professionals cope with mental health challenges through our state-of-the-art mental health practices, virtual care services and custom industry tools and resources
- Building healthier communities through our Health for Good program, providing primary care, mental health and addiction support services to marginalized Canadians.

**+16%**
**Health services revenue**
**2021: $521 million**
2020: $448 million

**+22%**
**Healthcare lives covered**
**2021: 20.6 million**
2020: 16.9 million

**+65%**
**Virtual care members**
**2021: 2.8 million**
2020: 1.7 million

**+3.0%**
**Digital health transactions**
**2021: 551.1 million**
2020: 534.9 million

## **Fixed:** Progressing agriculture on a global basis

On a mission to help the agriculture industry produce and deliver food in a more efficient, safe and sustainable manner, TELUS Agriculture made strong progress in 2021. Through solid execution, innovative technology and continued expansion of our operations, we advanced our position as one of the largest agriculture technology companies, globally, serving customers across the agriculture value chain in over 50 countries. Augmenting TELUS Agriculture's growth profile, we acquired Conservis, a leading farm management system platform company, and Blacksmith Applications, a trade promotions management, optimization and analytics company, further advancing our growth strategy within the agriculture value chain.

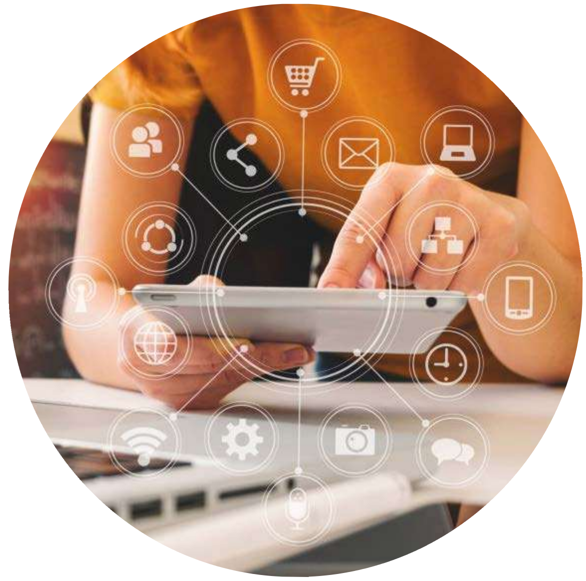
With TELUS committed to providing world-class connectivity to rural Canadians, TELUS Agriculture is using 5G technology to enable a more autonomous and intelligent future for farming. Backed by more than 1,500 team members, TELUS Agriculture is well-positioned to continue leveraging technology to digitally enhance food quality and security, with the goal of increasing food availability for communities around the globe.

### Advancing our agriculture strategy:

- Continuing on our path towards digitally connecting the agriculture industry by delivering data insights and innovative technology to reduce food waste, increase efficiency and mitigate risk
- Integrating and optimizing recent acquisitions under one unified brand

**50+**
**Countries served**

**1,500+**
**Agriculture team members**



- Providing integrated data solutions to the global consumer goods industry, helping companies become more agile and efficient and make more informed decisions
- Offering connected solutions for farm management that optimize operations and improve data insights to enable more accurate and timely farming decisions, in turn helping farmers and ranchers to maximize their profitability
- Creating better food outcomes by tackling one of the most significant social challenges of our generation, feeding the world, while improving the quality and safety of our food by leveraging technology innovation and human compassion.

## TELUS International: Delivering exceptional digital experiences

TELUS International (TI) completed its highly anticipated initial public offering (IPO) in early 2021, debuting on both the New York Stock Exchange and the Toronto Stock Exchange. Following this historic event, TI continued to deliver impressive financial and operational results throughout the year, reflected by strong double-digit revenue and Adjusted EBITDA growth. These results, as reported in our digitally-led customer experiences (DLCX) segment, demonstrate TI's position as the partner of choice for clients around the world looking for end-to-end, next-generation solutions to power a differentiated customer experience.

With its focus on higher-value digital customer experience solutions, TI completed the acquisition of Playment, a leader in data annotation and computer vision tools and services. Importantly, TI also remains a pivotal partner for TELUS, playing an essential role in our world-leading customer service excellence and advancing our digitization strategy.

### Advancing our DLCX strategy:

- Achieving the right balance of leading technology and authentic, empathetic human interaction to design, build and deliver next-generation solutions for more than 600 global and disruptive brands
- Attracting and retaining top global talent by leaning on TI's caring culture as a sustainable competitive advantage
- Realizing strong financial outcomes through a strategic focus on fast-growing offerings, including AI services and content moderation, as well as technology-driven efficiency gains
- Maintaining a strong balance sheet to enable strategic growth opportunities within TI's comprehensive acquisition pipeline
- Raising TI's profile in the financial markets following its IPO, including efforts such as TI's successful secondary offering of subordinate voting shares in September, which generated significant institutional investor interest
- Making meaningful differences in global communities with TI team members volunteering 70,000 hours in 2021, demonstrating the resiliency of their caring culture.

**+33%**
**DLCX operating revenues**
**2021: $2.31 billion**
2020: $1.74 billion

**+13%**
**DLCX Adjusted EBITDA**
**2021: $593 million**
2020: $524 million

**600+**
**Global clients**

**62,000+**
**TI team members**

# Leading with purpose and enabling positive outcomes

We asked some of our senior leaders for their thoughts on how TELUS is adapting to an ever-changing competitive landscape while developing new areas of our business, keeping our customers connected and bringing our social purpose to life.

Sandy McIntosh
Executive Vice-president (EVP), People and Culture, and Chief Human Resources Officer

Tony Geheran
EVP and Chief Operations Officer

Zainul Mawji
EVP and President, Home Solutions and Customer Excellence

Navin Arora
EVP and President, TELUS Business Solutions

John Raines
President, TELUS Agriculture

## How does TELUS' early adoption of a hybrid work model enhance and shape its world-leading culture and engagement?

### Sandy

We anticipated the mobile work trend in 2006 and established our Work Styles® program to transform our organizational experience for sustained competitive advantage. Nothing served as a more effective test of our flexible work culture than the global health pandemic. While we were ahead of the curve, it accelerated how we enable genuine connections anytime, anywhere.

Moving forward, approximately 90 per cent of our team will continue to work virtually. Unlike many companies with prescribed three to five days per week or 9 a.m. to 5 p.m. in the office constructs, we will offer true flexibility and use the office to collaborate and connect when and how often it makes sense. The choice will be with team members and their leader. It's a partnership grounded in trust, and it supports productivity and well-being.

Human connection will remain a cornerstone of our culture, and we are transforming our office spaces to promote collaboration, innovation, connection and well-being. We are also continuing to invest in best-in-class technology to provide a seamless and intuitive virtual experience whenever and wherever our team members work.

> We anticipated the mobile work trend in 2006 and established our Work Styles program to transform our organizational experience for sustained competitive advantage.

Over the years, Work Styles has helped drive exceptional results, including our world-leading engagement scores. It has also helped reduce our environmental impact as we work toward our goal of achieving net carbon neutrality by 2030.

## Why is TELUS' network leadership key to putting customers first?

### Tony

Our TELUS team is driven by a shared commitment to offer the very best products and services, keep our customers connected on our world-class networks and support Canadians when they need us most.

> The unrivalled resiliency of our PureFibre network meant that it was able to withstand the demands of the pandemic and extreme weather events, such as last year's devastating wildfires and flooding in British Columbia.

Building on our long history of operating the fastest, most reliable networks and delivering award-winning, industry-leading customer experiences, we continued to expand our reach in 2021, providing essential connectivity during these challenging times. Our blazing-fast 5G network now covers 70 per cent of the Canadian population, from urban to rural, including 382 Indigenous lands. Meanwhile, our gigabit TELUS PureFibre network brings reliable, high-speed connectivity to more than 2.7 million premises, enabling Canadians to work, learn and socialize safely from home.

The unrivalled resiliency of our PureFibre network meant that it was able to withstand the demands of the pandemic and extreme weather events, such as last year's devastating wildfires and flooding in British Columbia. TELUS PureFibre is reliable and sustainable and it provides a much better experience for our customers. That's why, where our networks overlap, we are actively migrating customers off our legacy copper network, unlocking the many benefits of TELUS PureFibre and driving higher product intensity within the home.

Together, our expanded and enhanced broadband network technologies will continue to enable improved health and educational outcomes, unleash human potential and productivity, bridge the socio-economic divide and drive economic growth that will be felt for generations to come.

## How does TELUS' focus on the whole home create more connected communities?

### Zainul

As the global health pandemic evolved, our homes became our offices, classrooms, gyms, virtual clinics and so much more. In an increasingly digital world, TELUS has continued to provide a differentiated and industry-leading suite of products and services on our globally unmatched TELUS PureFibre network, facilitating essential human connections in homes and communities across the country.

Through lockdowns and re-openings, we have supported Canadians every step of the way. In 2021, our customers watched more than 200 million hours of video a month – and we were right there, providing award-winning entertainment, leading multicultural and live content from around the world, and over-the-top platforms like Netflix and Amazon Prime. We are continuing to enhance an already diverse collection of content across entertainment, education, fitness and health, providing our customers with an unrivalled selection of programming.

> Ultimately, our homes are where we feel the most safe and secure. We are committed to providing what matters most to our customers and driving remarkable social outcomes by bringing world-leading speeds, reliability and expansive coverage to every aspect of their lives.

When more and more Canadians turn to digital tools to foster human connections, it can create openings for cyberattacks. That's why, in addition to our integrated smart security and automation solutions, we offer online security options to ensure they remain protected, no matter where they are.

Ultimately, our homes are where we feel the most safe and secure. We are committed to providing what matters most to our customers and driving remarkable social outcomes by bringing world-leading speeds, reliability and expansive coverage to every aspect of their lives.

## What will 5G technology unlock for your targeted areas of focus?

### Navin

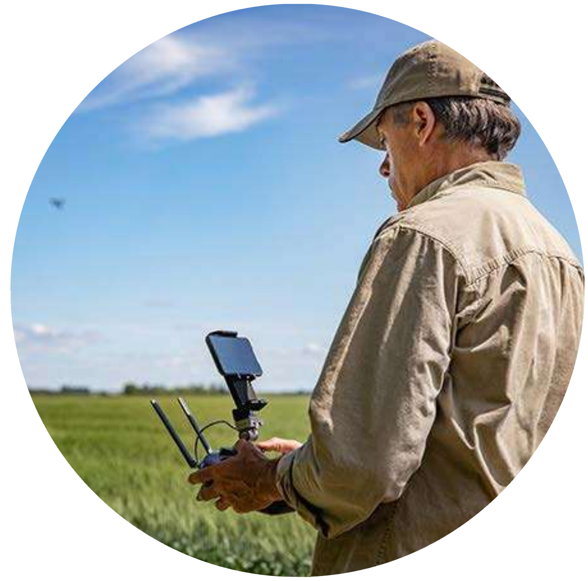
The expansion of 5G is coming at such an opportune time as it will underpin the future of work and how we use technology to drive meaningful outcomes for business. Businesses can run more efficiently using artificial intelligence or virtual reality applications to manage inventory, cities can become smarter and more sustainable with environmental and transportation sensors, and workplaces can become safer with connected devices that monitor a plant or work environment.

5G is also transformative for society as a whole. A great example is with GM Canada, which recently selected TELUS as its first-ever domestic provider to power millions of connected vehicles on TELUS' world-leading 5G network, to enable an unparalleled experience that will keep Canadians safe and connected.

In healthcare, we are harnessing 5G to help create better, more connected experiences, such as enabling virtual healthcare with augmented and virtual reality applications, which will revolutionize real-time care and communications between medical experts and their patients.

In agriculture, we are exploring 5G and Internet of Things applications to digitally transform the global food system. For example, in our partnership with Olds College in Alberta, we are working to develop innovations in food production and drive better yields, efficiency and sustainability by testing new solutions for rural connectivity, keeping farmers connected across vast acreages.

Given the importance of connectivity and bridging digital divides, in 2021, we expanded our award-winning



5G network and will continue to enhance the 5G experience in the years ahead as we operationalize spectrum and new technologies so we can drive better outcomes for Canadians and enhance Canada's leadership in a digital world.

> The expansion of 5G is coming at such an opportune time as it will underpin the future of work and how we use technology to drive meaningful outcomes for business.

### How is TELUS' innovative technology helping to protect and improve the global food system?

John
Following the launch of TELUS Agriculture in November 2020, our team took important steps to increase agility and focus by integrating eight distinct entities into one unified team in 2021. We have also welcomed three new companies to our family this year: Conservis, Herdtrax and Blacksmith Applications. Today, more than 1,500 team members collaborate across four continents. With over 6,600 customers across more than 50 countries, including six of the 10 top food and beverage suppliers and nine of the 10 top agriculture companies in the world, we are well positioned to be the largest global independent provider of digital technologies and data insights, connecting producers to consumers across the agricultural products, food and packaged goods industries.

As climate change and the pandemic continue to wreak havoc on global food supplies, finding solutions to achieve greater food security has never been more important. At TELUS, we believe in using our technology for good, and there is no better way to improve social outcomes than by enabling sustainable food production and distribution. By investing in new technologies, especially applications supported by 5G, TELUS plans to optimize production by better monitoring environmental factors and crop conditions. Additionally, our solutions for food service, retail execution and delivery, trade promotion and optimization can help offset the rising cost of food, 70 per cent of which is related to transportation.

> At TELUS, we believe in using our technology for good, and there is no better way to improve social outcomes than by enabling sustainable food production and distribution.

Solving complex data management challenges by linking systems together in new ways helps connect the agriculture value chain and offers convenient solutions that incentivize producers to shift to digital solutions, driving industry-wide profitability and better human outcomes.

# Executive Team

Our Executive Team has a long-standing commitment to help improve our communities. Here are their thoughts about the importance of our social purpose, with photos that show some of the ways they have given back over the years.

**Navin Arora**
Executive Vice-president (EVP) and President, TELUS Business Solutions
**Location:** Calgary, AB
**Joined TELUS:** 1999
**TELUS shareholdings:** 261,422

It is very special how we are united by our purpose, and to me, it is about championing entrepreneurs, businesses and organizations with technology so we can all do our part in creating positive and lasting changes in our society.

**Doug French**
EVP and Chief Financial Officer
**Location:** Whitby, ON
**Joined TELUS:** 2000 (Clearnet: 1996)
**TELUS shareholdings:** 326,433

I am proud of our team's industry-leading commitment to ESG initiatives and our leadership in delivering amazing human and social outcomes through the power of our technology. With our sustainability-linked bond framework, we are demonstrating our dedication to environmental sustainability.

**Tony Geheran**
EVP and Chief Operations Officer
**Location:** Vancouver, B.C.
**Joined TELUS:** 2001
**TELUS shareholdings:** 331,507

Through our shared commitment to bridging the digital divide and supporting those in need, we are building stronger, healthier communities and driving change that will be felt by generations to come.

**Zainul Mawji**
EVP and President, Home Solutions and Customer Excellence
**Location:** Edmonton, AB
**Joined TELUS:** 2001
**TELUS shareholdings:** 202,575

Our mission is to connect, protect and support all Canadians, no matter who they are or where they live. It is at the heart of everything we do.

**Sandy McIntosh**
EVP, People and Culture, and Chief Human Resources Officer
**Location:** Toronto, ON
**Joined TELUS:** 2007
**TELUS shareholdings:** 252,868

There is a positive correlation between purpose and well-being, and I am reminded of the value when I think about our team. By engaging in purpose-filled acts, our team is enabling better human outcomes; and science shows it benefits our health. To me, it is a vital investment of time and energy.

**Jeffrey Puritt**
TELUS EVP and TELUS International President and Chief Executive Officer
**Location:** Las Vegas, NV
**Joined TELUS:** 2001

Our social purpose drives meaningful change around the world as we spread a spirit of volunteerism. The impact is awe-inspiring for team members, customers and investors, especially in developing countries where needs are significant.

**John Raines**
President,
TELUS Agriculture
**Location:** St. Louis, MO
**Joined TELUS:** 2021

A key pillar of our social purpose is caring for our planet by enabling responsible agriculture. I am proud to lead our work at TELUS Agriculture, improving the quality, safety, distribution and sustainability of food and consumer goods globally.

**Jill Schnarr**
Chief Communications Officer
**Location:** Vancouver, B.C.
**Joined TELUS:** 1992
**TELUS shareholdings:** 71,813

As a business, and as a leader at TELUS, we have an obligation to make the world a better place. Our social purpose connects our expertise, passion and compassion to action – addressing the world's most pressing social issues.


**Jim Senko**
EVP and President,
Mobility Solutions
**Location:** Toronto, ON
**Joined TELUS:** 2001
**TELUS shareholdings:** 192,556

Reflecting on another year that has amplified the importance of human connection, I am proud to say that at TELUS we're creating the infrastructure, products and services that enable all Canadians to stay connected with each other. It is our priority in making the future friendly for all.

**Andrea Wood**
Chief Legal and Governance Officer
**Location:** Toronto, ON
**Joined TELUS:** 2013
**TELUS shareholdings:** 131,301

Our social purpose is embedded throughout our organization's strategic business plan, something I believe is essential to driving meaningful change. It gives me a great sense of purpose and pride to be part of a team and organization dedicated to improving the lives of individuals and the communities where we live and serve.

**Darren Entwistle**
President and Chief Executive Officer
More information can be found on page 28.

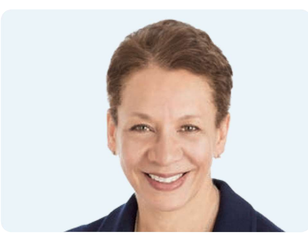
TELUS shareholdings represent the total common shares and restricted share units held as at December 31, 2021. Jeffrey Puritt's shareholdings are not listed as he primarily holds shares in TELUS International. Shareholdings for John Raines are not listed as he joined TELUS in late 2021.

For more information, visit telus.com/**executive**

# Board of Directors

**R.H. (Dick) Auchinleck, TELUS Chair**
**Director since:** 2003
**TELUS shareholdings:** 541,879

**Raymond T. Chan**
**Director since:** 2013
**TELUS Committees:**
Human Resources and Compensation; and Chair, Pension
**TELUS shareholdings:** 107,911



**Hazel Claxton**
**Director since:** 2021
**TELUS Committee:** Audit
**TELUS shareholdings:** 9,973

**Lisa de Wilde**
**Director since:** 2015
**TELUS Committees:** Pension; and Chair, Corporate Governance
**TELUS shareholdings:** 61,421

**Darren Entwistle**
**Director since:** 2000
**TELUS shareholdings:** 1,265,719

**Thomas E. Flynn**
**Director since:** 2020
**TELUS Committee:** Audit
**TELUS shareholdings:** 28,535

**Mary Jo Haddad**
**Director since:** 2014
**TELUS Committees:** Corporate Governance; and Chair, Human Resources and Compensation
**TELUS shareholdings:** 85,093

**Kathy Kinloch**
**Director since:** 2017
**TELUS Committees:** Corporate Governance, and Human Resources and Compensation
**TELUS shareholdings:** 52,923

**Christine Magee**
**Director since:** 2018
**TELUS Committees:** Human Resources and Compensation, and Pension
**TELUS shareholdings:** 38,237

**John Manley**
**Director since:** 2012
**TELUS Committees:** Corporate Governance, and Human Resources and Compensation
**TELUS shareholdings:** 124,427

**David Mowat**
**Director since:** 2016
**TELUS Committee:** Chair, Audit
**TELUS shareholdings:** 65,890

**Marc Parent**
**Director since:** 2017
**TELUS Committees:** Human Resources and Compensation, and Pension
**TELUS shareholdings:** 51,172

**Denise Pickett**
**Director since:** 2018
**TELUS Committees:** Audit and Corporate Governance
**TELUS shareholdings:** 35,251

**W. Sean Willy**
**Director since:** 2021
**TELUS Committee:** Audit
**TELUS shareholdings:** 6,973

For further information, visit telus.com/**board**

TELUS shareholdings represent the total common shares and deferred share units (restricted share units for Darren Entwistle) held as at December 31, 2021.

# Financial review

## What's inside



# Driving sustainable value through the power of our purpose

In 2021, our team delivered outstanding financial and operational results, accelerated our strategic investments, and demonstrated our unique ability to achieve sustainable growth and shareholder value while also advancing our environmental, social and governance commitments.

## Investing in a sustainable future

Building on the foundation of social capitalism, we continue to progress our track record of delivering sustainable value creation for our investors by driving positive social, economic and health outcomes for Canadians. Our team's ability to connect our customers and build healthier communities is fundamental to our success. In 2021, we again demonstrated our long-standing leadership position on environmental sustainability when we introduced the first sustainability-linked bond (SLB) framework in Canada and then successfully issued our inaugural SLB – also a Canadian first – linking our cost of borrowing directly to our environmental performance.

## Putting customers first through network leadership and digitization

We continued our pursuit of network excellence by investing strategically to accelerate our broadband build program, which includes the expansion of our PureFibre and 5G networks in 2021 and through 2022. Indeed, in 2021 we invested $3.5 billion strengthening our competitive position, driving strong profitable customer growth and operating efficiencies, and delivering sustainable cash flow benefits. Our intensive focus on reliability and accessibility is ensuring all Canadians can benefit from the social, environmental and economic opportunities that our leading broadband networks unlock.

Our dedicated team remains committed to putting customers first and delivering exceptional customer experiences. In addition, as more of our customers look for a convenient way to connect with us online, we have simplified and enhanced our digital and self-serve capabilities. The success of this strategy, combined with our award-winning mobile and fixed broadband networks, allows us to realize more efficient service delivery and has earned us the highest customer loyalty results in our industry.

## A differentiated approach

With our unique technology-oriented asset mix, including TELUS International (TI), TELUS Health (TH) and TELUS Agriculture (TAG), we are demonstrating to our customers and investors that our consistent pursuit of strategic diversification has positioned us to accelerate growth and to anticipate and deliver on the needs of citizens around the world, today and into the future.

Our intensive focus on reliability and accessibility is ensuring all Canadians can benefit from the social, environmental and economic opportunities that our leading broadband networks unlock.

Following TI's very successful initial public offering in February 2021, it continues to achieve strong growth despite the ongoing COVID-19 pandemic, generating double-digit growth in revenue and Adjusted EBITDA in 2021. This growth illustrates the long-term financial and strategic advantages we are realizing from this unique and diversified digital revenue stream.

In TH, our team is achieving important milestones as we continue to build significant scale in our health operations. In 2021, we completed 551 million digital health transactions and added 1.1 million new virtual healthcare members to reach nearly three million members now using our virtual care solutions. Indeed, these positive trends supported strong health services revenue growth of 16 per cent. In 2022 and beyond, we will continue to leverage our leading position in healthcare technology solutions to provide access to better health information and deliver improved health outcomes for citizens.

In 2021, TAG continued to build breadth and scale as a global leader in agriculture technology solutions while delivering strong revenue growth, more than doubling its 2020 performance. We expect this business to be a meaningful growth engine for TELUS, contributing double-digit annual increases in revenue and EBITDA in the coming years. Our strategic objectives for TAG involve connecting the entire agricultural value chain with smart, secure, end-to-end technology and software solutions that will deliver a safer and more nutritious food supply for people around the world.

## Leadership in customer loyalty

In 2021, we continued to experience strong growth in our customer base. Impressively, we added a record 960,000 total new customer connections across our mobility and fixed product portfolios, highlighting the success of our bundled offerings and our leading customer loyalty. Notably, customer churn rates across our mobile phone and fixed products were all less than one per cent in 2021. Our ongoing pursuit of network excellence and our superior bundled offerings ensure that our customers continue to have reliable access to our trusted services to stay safe and connected in today's digital society and economy.

## Delivering strong financial results

Our continued commitment to social capitalism and leading execution cadence is driving our consistent, long-term financial success. In 2021, operating revenue grew by 9.8 per cent, while net income increased by 35 per cent and Adjusted EBITDA increased by 6.4 per cent. Notably, our strong annual results were in line with our 2021 financial targets.

Our track record of delivering on our shareholder-friendly initiatives is unmatched, and we continue to generate significant value for our investors. In 2021, our strong financial performance allowed us to announce two dividend increases as part of our multi-year dividend growth program, and to return approximately $1.7 billion to shareholders in dividends. In December, we surfaced value with the sale of our financial solutions business for $500 million, with proceeds used to support strategic investments and debt repayment. Our continued strong operational and financial performance, alongside maintaining a healthy balance sheet and robust liquidity position, will enable us to continue investing strategically and delivering on our targeted seven to 10 per cent annual dividend growth program through the end of 2022.

## Building on our momentum

Looking ahead, we will continue to build on our strong track record of operational and financial execution excellence by further advancing our unique growth strategy and delivering on our efficiency and effectiveness commitments. We are energized and ready to achieve the ambitious

Doug French volunteered alongside his dad, Don French (1931 to 2021), at the Dr. Peter Centre for people living with HIV, exemplifying his dedication to giving back to our communities.

2022 consolidated financial targets we have set for ourselves, including growth in both operating revenue and Adjusted EBITDA of eight to 10 per cent, capital expenditures of approximately $3.4 billion, and free cash flow of $1 billion to $1.2 billion. As the global leader in social capitalism, we will continue bringing our social purpose to life, delivering exceptional experiences that deepen customer loyalty and drive economic growth. Thank you for your continued support, I look forward to another successful year ahead.

Best regards,

Doug

Doug French
Executive Vice-president and Chief Financial Officer
February 18, 2022

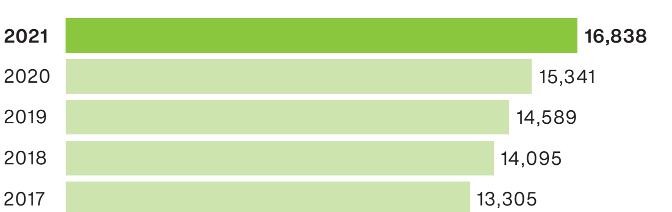
# Annual consolidated financial information

| Statement of income (millions) | Applying IFRS 16 2021 | 2020 | 2019 | Excluding IFRS 16 2018 | 2017 |
|---|---|---|---|---|---|
| Operating revenues | $ 16,838 | $ 15,341 | $ 14,589 | $ 14,095 | $ 13,305 |
| Other income[1,2] | 420 | 122 | 69 | 273 | 103 |
| Operating revenues and other income[1,2] | $ 17,258 | $ 15,463 | $ 14,658 | $ 14,368 | $ 13,408 |
| Goods and services purchased | 6,699 | 6,268 | 6,070 | 6,368 | 5,904 |
| Employee benefits expense | 4,269 | 3,701 | 3,034 | 2,896 | 2,594 |
| Depreciation and amortization | 3,216 | 3,012 | 2,577 | 2,267 | 2,169 |
| Operating income[1,2] | $ 3,074 | $ 2,482 | $ 2,977 | $ 2,837 | $ 2,741 |
| Financing costs before long-term debt prepayment premium | 786 | 753 | 705 | 627 | 573 |
| Long-term debt prepayment premium | 10 | 18 | 28 | 34 | – |
| Income before income taxes[1,2] | $ 2,278 | $ 1,711 | $ 2,244 | $ 2,176 | $ 2,168 |
| Income taxes | 580 | 451 | 468 | 552 | 590 |
| Net income[1,2] | $ 1,698 | $ 1,260 | $ 1,776 | $ 1,624 | $ 1,578 |
| Net income attributable to common shares[1,2] | $ 1,655 | $ 1,207 | $ 1,746 | $ 1,600 | $ 1,559 |
| EBITDA[1,2,3] | $ 6,290 | $ 5,494 | $ 5,554 | $ 5,104 | $ 4,910 |
| Adjusted EBITDA[3] | $ 6,069 | $ 5,701 | $ 5,693 | $ 5,250 | $ 5,005 |

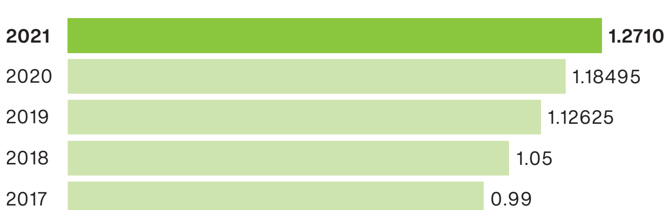
| Share information[4] | 2021 | 2020 | 2019 | 2018 | 2017 |
|---|---|---|---|---|---|
| Basic total weighted average shares outstanding (millions) | 1,346 | 1,275 | 1,204 | 1,193 | 1,186 |
| Year-end shares outstanding (millions) | 1,370 | 1,291 | 1,209 | 1,197 | 1,189 |
| Basic earnings per share (EPS)[1,2] | $ 1.23 | $ 0.95 | $ 1.45 | $ 1.34 | $ 1.31 |
| Dividends declared per share | 1.2710 | 1.18495 | 1.12625 | 1.05 | 0.99 |

| Financial position (millions) | 2021 | 2020 | 2019 | 2018 | 2017 |
|---|---|---|---|---|---|
| Total assets | $ 47,994 | $ 43,273 | $ 37,985 | $ 33,057 | $ 31,053 |
| Long-term debt (includes current maturities) | 20,852 | 20,288 | 18,474 | 14,101 | 13,660 |
| Net debt[3] | 20,535 | 19,826 | 18,199 | 13,770 | 13,422 |
| Owners' equity | 16,059 | 12,568 | 10,659 | 10,341 | 9,458 |

Operating revenues ($ millions)




Dividends declared per share[4] ($)



# Quarterly consolidated financial information

| | Applying IFRS 16 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Statement of income** (millions) | Q4 2021 | Q3 2021 | Q2 2021 | Q1 2021 | Q4 2020 | Q3 2020 | Q2 2020 | Q1 2020 |
| Operating revenues | $ 4,461 | $ 4,246 | $ 4,109 | $ 4,022 | $ 4,061 | $ 3,961 | $ 3,656 | $ 3,663 |
| Other income (loss)[1] | 411 | 5 | 2 | 2 | (1) | 20 | 72 | 31 |
| Operating revenues and other income[1] | $ 4,872 | $ 4,251 | $ 4,111 | $ 4,024 | $ 4,060 | $ 3,981 | $ 3,728 | $ 3,694 |
| Goods and services purchased | 1,882 | 1,660 | 1,609 | 1,548 | 1,766 | 1,632 | 1,458 | 1,412 |
| Employee benefits expense | 1,108 | 1,095 | 1,051 | 1,015 | 958 | 959 | 911 | 873 |
| Depreciation and amortization | 830 | 804 | 793 | 789 | 789 | 773 | 725 | 725 |
| Operating income[1] | $ 1,052 | $ 692 | $ 658 | $ 672 | $ 547 | $ 617 | $ 634 | $ 684 |
| Financing costs before long-term debt prepayment premium | 192 | 184 | 203 | 207 | 190 | 187 | 184 | 192 |
| Long-term debt prepayment premium | – | 10 | – | – | – | – | 18 | – |
| Income before income taxes[1] | $ 860 | $ 498 | $ 455 | $ 465 | $ 357 | $ 430 | $ 432 | $ 492 |
| Income taxes | 197 | 140 | 111 | 132 | 86 | 109 | 117 | 139 |
| Net income[1] | $ 663 | $ 358 | $ 344 | $ 333 | $ 271 | $ 321 | $ 315 | $ 353 |
| Net income attributable to common shares[1] | $ 644 | $ 345 | $ 335 | $ 331 | $ 260 | $ 307 | $ 290 | $ 350 |
| EBITDA[1,3] | $ 1,882 | $ 1,496 | $ 1,451 | $ 1,461 | $ 1,336 | $ 1,390 | $ 1,359 | $ 1,409 |
| Adjusted EBITDA[3] | $ 1,517 | $ 1,559 | $ 1,490 | $ 1,503 | $ 1,409 | $ 1,456 | $ 1,361 | $ 1,475 |

| **Share information**[4] | Q4 2021 | Q3 2021 | Q2 2021 | Q1 2021 | Q4 2020 | Q3 2020 | Q2 2020 | Q1 2020 |
|---|---|---|---|---|---|---|---|---|
| Basic total weighted average shares outstanding (millions) | 1,368 | 1,361 | 1,355 | 1,298 | 1,291 | 1,284 | 1,278 | 1,248 |
| Period-end shares outstanding (millions) | 1,370 | 1,361 | 1,355 | 1,349 | 1,291 | 1,284 | 1,278 | 1,272 |
| Basic EPS[1] | $ 0.47 | $ 0.25 | $ 0.25 | $ 0.25 | $ 0.20 | $ 0.24 | $ 0.23 | $ 0.28 |
| Dividends declared per share | 0.3274 | 0.3162 | 0.3162 | 0.3112 | 0.3112 | 0.29125 | 0.29125 | 0.29125 |

1 Included a pre-tax gain of $410 million on the disposition of our financial solutions business in the fourth quarter of 2021.
2 In 2018, we recorded equity income of $171 million related to real estate joint ventures arising from the sale of TELUS Garden.
3 These are non-GAAP and other specified financial measures, which do not have standardized meanings under IFRS-IASB and might not be comparable to those presented by other issuers. For more information, see Section 11.1 of Management's discussion and analysis (MD&A) in this report.
4 Adjusted to reflect the two-for-one share split effective March 17, 2020.

Note: Certain comparative information has been restated to conform with the 2021 presentation.

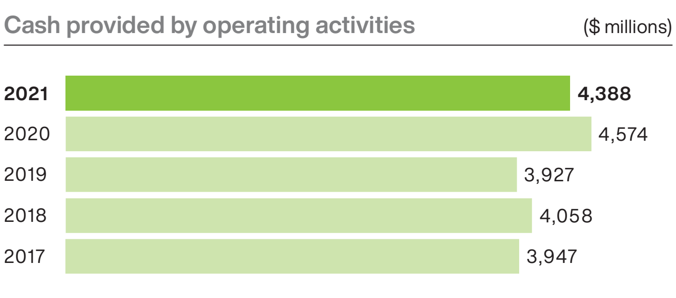
**Operating revenues** ($ millions)

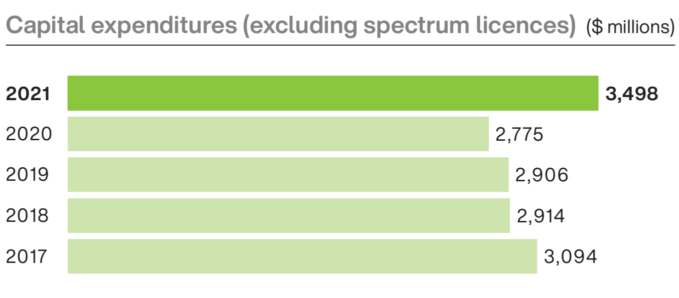

**Dividends declared per share**[4] ($)

# Annual operating statistics

| | Applying IFRS 16 | | | Excluding IFRS 16 | |
|---|---|---|---|---|---|
| | 2021 | 2020 | 2019 | 2018 | 2017 |
| **Cash flow statement information** | | | | | |
| Cash provided by operating activities (millions) | $ 4,388 | $ 4,574 | $ 3,927 | $ 4,058 | $ 3,947 |
| Cash used by investing activities (millions) | (5,466) | (6,165) | (5,044) | (2,977) | (3,643) |
| Cash provided (used) by financing activities (millions) | 953 | 1,904 | 1,238 | (1,176) | (227) |
| **Profitability ratios** | | | | | |
| Ratio of dividends declared to cash provided by operating activities less capital expenditures (excluding spectrum licences)[1] | 192% | 84% | 133% | n/a | n/a |
| Dividend payout ratio, net of dividend reinvestment plan effects[1,2] | 140% | 67% | 115% | n/a | n/a |
| Return on common equity[3] | 11.6% | 10.1% | 16.7% | 16.4% | 17.1% |
| **Debt and coverage ratios** | | | | | |
| Earnings coverage ratio | 3.9 | 3.2 | 4.0 | 4.4 | 4.6 |
| EBITDA interest coverage ratio[2] | 8.4 | 7.3 | 7.5 | 8.4 | 8.9 |
| Net debt to EBITDA – excluding restructuring and other costs[2] | 3.17 | 3.45 | 3.20 | 2.54 | 2.67 |
| **Other metrics** | | | | | |
| Free cash flow[2] (millions) | $ 777 | $ 1,435 | $ 932 | $ 1,207 | $ 966 |
| EBITDA[4] less capital expenditures (millions) | $ 2,978 | $ 2,978 | $ 2,782 | $ 2,507 | $ 1,933 |
| Capital expenditures (excluding spectrum licences) (millions) | $ 3,498 | $ 2,775 | $ 2,906 | $ 2,914 | $ 3,094 |
| Capital expenditure intensity[5] | 20% | 18% | 20% | 20% | 23% |
| Cash payments for spectrum licences (millions) | $ 2,219 | – | $ 942 | $ 1 | – |
| Total customer connections[6] (thousands) | 16,887 | 15,943 | 15,166 | 13,947 | 13,050 |
| **Employee-related information** | | | | | |
| Total salaries and benefits[4] (millions) | $ 4,775 | $ 4,200 | $ 3,493 | $ 3,254 | $ 3,036 |
| Total active employees[7] | 90,800 | 78,100 | 65,600 | 58,000 | 53,600 |
| Full-time equivalent employees | 90,000 | 77,200 | 64,600 | 56,900 | 52,900 |

n/a – not applicable



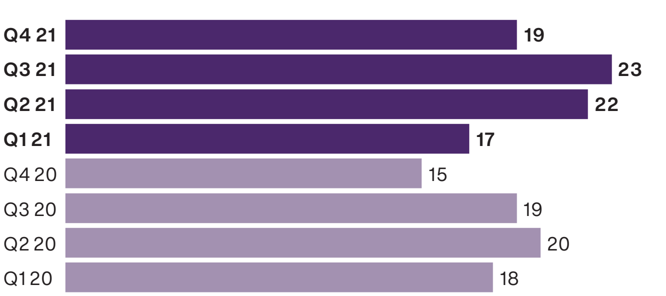
# Quarterly operating statistics

| | Applying IFRS 16 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Q4 2021** | **Q3 2021** | **Q2 2021** | **Q1 2021** | Q4 2020 | Q3 2020 | Q2 2020 | Q1 2020 |
| **Cash flow statement information** | | | | | | | | |
| Cash provided by operating activities (millions) | **$ 896** | **$ 1,309** | **$ 1,244** | **$ 939** | $ 1,033 | $ 902 | $ 1,462 | $ 1,177 |
| Cash used by investing activities (millions) | **(1,989)** | **(1,464)** | **(860)** | **(1,153)** | (2,207) | (1,176) | (823) | (1,959) |
| Cash provided (used) by financing activities (millions) | **(48)** | **(164)** | **(104)** | **1,269** | 1,401 | (76) | (726) | 1,305 |
| **Profitability ratios** | | | | | | | | |
| Ratio of dividends declared to cash provided by operating activities less capital expenditures (excluding spectrum licences) | **192%** | **126%** | **138%** | **101%** | 84% | 100% | 84% | 101% |
| Dividend payout ratio, net of dividend reinvestment plan effects[2] | **140%** | **110%** | **111%** | **80%** | 67% | 69% | 61% | 76% |
| Return on common equity[3] | **11.6%** | **9.3%** | **9.4%** | **9.3%** | 10.1% | 11.3% | 12.7% | 15.2% |
| **Debt and coverage ratios** | | | | | | | | |
| Earnings coverage ratio | **3.9** | **3.3** | **3.2** | **3.1** | 3.2 | 3.4 | 3.6 | 3.8 |
| EBITDA interest coverage ratio[2] | **8.4** | **7.6** | **7.4** | **7.3** | 7.3 | 7.4 | 7.2 | 7.3 |
| Net debt to EBITDA – excluding restructuring and other costs[2] | **3.17** | **3.19** | **3.11** | **3.15** | 3.45 | 3.21 | 3.06 | 3.13 |
| **Other metrics** | | | | | | | | |
| Free cash flow[2] (millions) | **$ 43** | **$ 203** | **$ 210** | **$ 321** | $ 218 | $ 161 | $ 511 | $ 545 |
| EBITDA[4] less capital expenditures (millions) | **$ 1,017** | **$ 568** | **$ 576** | **$ 817** | $ 794 | $ 707 | $ 673 | $ 804 |
| Capital expenditures (excluding spectrum licences) (millions) | **$ 909** | **$ 991** | **$ 913** | **$ 685** | $ 613 | $ 741 | $ 756 | $ 665 |
| Capital expenditure intensity[5] | **19%** | **23%** | **22%** | **17%** | 15% | 19% | 20% | 18% |
| Cash payments for spectrum licences (millions) | **$ 1,558** | **$ 389** | **$ 21** | **$ 251** | – | – | – | – |
| Total customer connections[6] (thousands) | **16,887** | **16,615** | **16,295** | **16,072** | 15,943 | 15,690 | 15,382 | 15,241 |
| **Employee-related information** | | | | | | | | |
| Total salaries and benefits[4] (millions) | **$ 1,230** | **$ 1,215** | **$ 1,185** | **$ 1,145** | $ 1,090 | $ 1,075 | $ 1,035 | $ 1,000 |

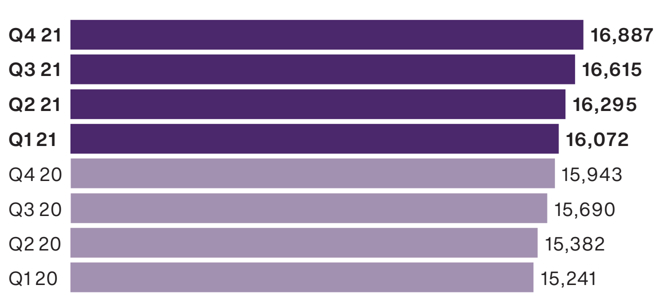
1 Commencing in 2020, we revised the methodology for calculating these metrics. Periods prior to 2019 have not been recast in accordance with these revised calculations. See Note 3 of the Consolidated financial statements.
2 These are other specified financial measures. Refer to Section 11.1 of the MD&A.
3 Net income attributed to equity shares for a 12-month trailing period, divided by the average common equity for the 12-month period.
4 Excludes restructuring and other costs.
5 Capital expenditures (excluding spectrum licences) divided by Operating revenues and other income.
6 The sum of active mobile phone subscribers, connected device subscribers, internet subscribers, residential voice subscribers, TV subscribers and security subscribers, measured at the end of the respective periods based on information in billing and other source systems. Certain customer connections have been adjusted effective January 1, 2021. For details on adjustments, see Section 1.3 of the MD&A. Total customer connections excludes 20.6 million healthcare lives covered.
7 Excluding employees in TELUS International, total active employees were 28,700 in 2021, 28,400 in 2020, 27,600 in 2019, 25,700 in 2018, and 25,700 in 2017.

Note: Certain comparative information has been restated to conform with the 2021 presentation.

Capital expenditure intensity[5] (%)




Total customer connections[6] (thousands)



# Annual segment statistics

| | Applying IFRS 16 | |
|---|---|---|
| | **2021** | 2020 |
| **TELUS technology solutions (TTech) segment[1]** | | |
| Operating revenues (millions) | **$ 14,528** | $ 13,604 |
| Other income[2] (millions) | **420** | 19 |
| Intersegment revenue (millions) | **18** | 13 |
| Operating revenues and other income[2] (millions) | **$ 14,966** | $ 13,636 |
| EBITDA[2] (millions) | **$ 5,735** | $ 4,976 |
| EBITDA margin[2] | **38.3%** | 36.5% |
| Adjusted EBITDA (millions) | **$ 5,476** | $ 5,177 |
| Adjusted EBITDA margin[3] | **37.6%** | 37.9% |
| Capital expenditures (excluding spectrum licences) (millions) | **$ 3,372** | $ 2,675 |
| Total TTech net additions (thousands) | **960** | 777 |
| Mobile phone subscribers[4] (thousands) | **9,290** | 8,923 |
| Connected device subscribers (thousands) | **2,134** | 1,796 |
| Internet subscribers[5] (thousands) | **2,271** | 2,138 |
| TV subscribers (thousands) | **1,265** | 1,215 |
| Residential voice subscribers (thousands) | **1,123** | 1,164 |
| Security subscribers (thousands) | **804** | 707 |
| Mobile phone monthly average revenue per unit (ARPU)[3,4] | **$ 57.07** | $ 57.41 |
| Mobile phone monthly churn rate[4] | **0.91%** | 0.96% |
| Virtual care members (millions) | **2.8** | 1.7 |
| Healthcare lives covered (millions) | **20.6** | 16.9 |
| Digital health transactions (millions) | **551.1** | 534.9 |
| **Digitally-led customer experiences – TELUS International (DLCX) segment[1]** | | |
| Operating revenues (millions) | **$ 2,310** | $ 1,737 |
| Other income (millions) | **–** | 103 |
| Intersegment revenue (millions) | **444** | 416 |
| Operating revenues and other income (millions) | **$ 2,754** | $ 2,256 |
| EBITDA (millions) | **$ 555** | $ 518 |
| EBITDA margin | **20.2%** | 22.9% |
| Adjusted EBITDA (millions) | **$ 593** | $ 524 |
| Adjusted EBITDA margin[3] | **21.6%** | 24.0% |
| Capital expenditures (millions) | **$ 126** | $ 100 |

**TTech Operating revenues** ($ millions)


**DLCX Operating revenues** ($ millions)

# Quarterly segment statistics

| | Q4 2021 | Q3 2021 | Q2 2021 | Q1 2021 | Q4 2020 | Q3 2020 | Q2 2020 | Q1 2020 |
|---|---|---|---|---|---|---|---|---|
| | | | | | Applying IFRS 16 | | | |
| **TTech segment**[1] | | | | | | | | |
| Operating revenues (millions) | **$ 3,823** | **$ 3,659** | **$ 3,559** | **$ 3,487** | $ 3,592 | $ 3,500 | $ 3,219 | $ 3,293 |
| Other income (loss)[2] (millions) | **411** | **5** | **2** | **2** | (1) | 20 | 1 | (1) |
| Intersegment revenue (millions) | **3** | **5** | **5** | **5** | 4 | 4 | 4 | 1 |
| Operating revenues and other income[2] (millions) | **$ 4,237** | **$ 3,669** | **$ 3,566** | **$ 3,494** | $ 3,595 | $ 3,524 | $ 3,224 | $ 3,293 |
| EBITDA[2] (millions) | **$ 1,721** | **$ 1,355** | **$ 1,323** | **$ 1,336** | $ 1,220 | $ 1,258 | $ 1,197 | $ 1,301 |
| EBITDA margin[2] | **40.6%** | **37.0%** | **37.1%** | **38.3%** | 34.0% | 35.7% | 37.1% | 39.5% |
| Adjusted EBITDA (millions) | **$ 1,348** | **$ 1,410** | **$ 1,353** | **$ 1,365** | $ 1,261 | $ 1,314 | $ 1,260 | $ 1,342 |
| Adjusted EBITDA margin[3] | **35.2%** | **38.4%** | **37.9%** | **39.1%** | 35.1% | 37.2% | 39.1% | 40.7% |
| Capital expenditures (excluding spectrum licences) (millions) | **$ 866** | **$ 962** | **$ 882** | **$ 662** | $ 588 | $ 714 | $ 727 | $ 646 |
| Total TTech net additions (thousands) | **272** | **320** | **223** | **145** | 253 | 277 | 141 | 106 |
| Mobile phone subscribers[4] (thousands) | **9,290** | **9,178** | **9,043** | **8,954** | 8,923 | 8,836 | 8,725 | 8,664 |
| Connected device subscribers (thousands) | **2,134** | **2,053** | **1,943** | **1,859** | 1,796 | 1,708 | 1,621 | 1,588 |
| Internet subscribers[5] (thousands) | **2,271** | **2,231** | **2,185** | **2,155** | 2,138 | 2,094 | 2,044 | 2,007 |
| TV subscribers (thousands) | **1,265** | **1,247** | **1,237** | **1,226** | 1,215 | 1,195 | 1,176 | 1,168 |
| Residential voice subscribers (thousands) | **1,123** | **1,133** | **1,144** | **1,154** | 1,164 | 1,173 | 1,181 | 1,191 |
| Security subscribers (thousands) | **804** | **773** | **743** | **724** | 707 | 684 | 635 | 623 |
| Mobile phone monthly ARPU[3,4] | **$ 57.45** | **$ 58.13** | **$ 56.56** | **$ 56.10** | $ 56.88 | $ 58.12 | $ 56.44 | $ 58.24 |
| Mobile phone monthly churn rate[4] | **1.04%** | **0.90%** | **0.81%** | **0.89%** | 1.09% | 0.99% | 0.80% | 0.94% |
| Virtual care members (millions) | **2.8** | **2.3** | **2.2** | **2.0** | 1.7 | 1.4 | 1.2 | 0.7 |
| Healthcare lives covered (millions) | **20.6** | **19.3** | **18.1** | **17.5** | 16.9 | 16.0 | 15.5 | 14.6 |
| Digital health transactions (millions) | **142.8** | **137.9** | **137.1** | **133.3** | 135.1 | 136.0 | 124.1 | 139.7 |
| **DLCX segment**[1] | | | | | | | | |
| Operating revenues (millions) | **$ 638** | **$ 587** | **$ 550** | **$ 535** | $ 469 | $ 461 | $ 437 | $ 370 |
| Other income (millions) | **–** | **–** | **–** | **–** | – | – | 71 | 32 |
| Intersegment revenue (millions) | **119** | **113** | **108** | **104** | 108 | 107 | 104 | 97 |
| Operating revenues and other income (millions) | **$ 757** | **$ 700** | **$ 658** | **$ 639** | $ 577 | $ 568 | $ 612 | $ 499 |
| EBITDA (millions) | **$ 161** | **$ 141** | **$ 128** | **$ 125** | $ 116 | $ 132 | $ 162 | $ 108 |
| EBITDA margin | **21.4%** | **20.0%** | **19.6%** | **19.5%** | 20.1% | 23.1% | 26.6% | 21.7% |
| Adjusted EBITDA (millions) | **$ 169** | **$ 149** | **$ 137** | **$ 138** | $ 148 | $ 142 | $ 101 | $ 133 |
| Adjusted EBITDA margin[3] | **22.5%** | **21.1%** | **20.9%** | **21.6%** | 25.8% | 24.8% | 18.6% | 26.8% |
| Capital expenditures (millions) | **$ 43** | **$ 29** | **$ 31** | **$ 23** | $ 25 | $ 27 | $ 29 | $ 19 |

1 Effective January 1, 2021, we transitioned to our new reportable segments: TTech and DLCX. For more information, see Sections 1.1 and 5.1 of the MD&A.
2 Included a gain of $410 million on the disposition of our financial solutions business in the fourth quarter of 2021.
3 These are non-GAAP and other specified financial measures, which do not have standardized meanings under IFRS-IASB and might not be comparable to those presented by other issuers. For more information, see Section 11.1 of the MD&A.
4 Effective January 1, 2021, with retrospective application to January 1, 2020, in alignment with our segment reporting changes, we made a retroactive adjustment to remove internal network service revenue and approximately 29,000 subscribers from our mobile phone subscriber base and associated operating statistics (ARPU and churn). Internal network service revenue consists of earned revenue from both our internal mobile phone and connected devices subscribers, neither of which contribute to our restated subscriber base.
5 Effective January 1, 2021, on a prospective basis, following an in-depth review of customer accounts within a legacy subscriber provisioning system to be decommissioned, we adjusted our internet subscriber base to remove 16,000 subscribers.

Note: Certain comparative information has been restated to conform with the 2021 presentation.

# Management's discussion and analysis

## Caution regarding forward-looking statements

The terms *TELUS*, the *Company*, *we*, *us* and *our* refer to TELUS Corporation and, where the context of the narrative permits or requires, its subsidiaries.

This document contains forward-looking statements about expected events and our financial and operating performance. Forward-looking statements include any statements that do not refer to historical facts. They include, but are not limited to, statements relating to our objectives and our strategies to achieve those objectives, our plans and expectations regarding the impact of the COVID-19 pandemic and responses to it, our expectations regarding trends in the telecommunications industry including demand for mobile data and ongoing internet subscriber base growth, and our financing plans including our multi-year dividend growth program. Forward-looking statements are typically identified by the words assumption, goal, guidance, objective, outlook, strategy, target and other similar expressions, or future or conditional verbs such as *aim*, *anticipate*, *believe*, *could*, *expect*, *intend*, *may*, *plan*, *predict*, *seek*, *should*, *strive* and *will*. These statements are made pursuant to the "safe harbour" provisions of applicable securities laws in Canada and the United States *Private Securities Litigation Reform Act* of 1995.

By their nature, forward-looking statements are subject to inherent risks and uncertainties and are based on assumptions, including assumptions about future economic conditions and courses of action. These assumptions may ultimately prove to have been inaccurate and, as a result, our actual results or events may differ materially from expectations expressed in or implied by the forward-looking statements. Our general outlook and assumptions for 2022 are presented in *Section 9 General trends, outlook and assumptions, and regulatory developments and proceedings* in this Management's discussion and analysis (MD&A).

Risks and uncertainties that could cause actual performance or events to differ materially from the forward-looking statements made herein and in other TELUS filings include, but are not limited to, the following:

- **The COVID-19 pandemic** including its impacts on our customers, suppliers and vendors, our team members and our communities, as well as changes resulting from the pandemic to our business and operations, including changes to the demand for and supply of the products and services that we offer and the channels through which we offer them.
- **Regulatory decisions and developments** including: changes to our regulatory regime (the timing of announcement or implementation of which are uncertain) or the outcomes of proceedings, cases or inquiries relating to its application, including but not limited to those set out in *Section 9.4 Communications industry regulatory developments and proceedings* in this MD&A, such as the potential for government to allow consolidation of competitors in our industry or conversely for government intervention intended to further increase competition, for example, through mandated wholesale access; the potential for additional government intervention on pricing, including the March 2020 announcement by the federal government targeting a 25% price reduction over a two-year period by the national mobile carriers in postpaid mobile bring-your-own-device plans using between 2 to 6 GB of data; federal and provincial consumer protection legislation and the possible re-introduction by the federal government of privacy legislation to give consumers new privacy rights and to impose new monetary penalties for non-compliance; amendments to existing federal legislation; potential threats to unitary federal regulatory authority over communications in Canada; potential threats to the CRTC's ability to enforce the *Wholesale Code*, which aims to ensure the fair treatment by vertically integrated firms of rival broadcasting distributors and programming services; regulatory action by the Competition Bureau or other regulatory agencies; spectrum and compliance with licences, including our compliance with licence conditions, changes to spectrum licence fees, spectrum policy determinations such as restrictions on the purchase, sale, subordination, use and transfer of spectrum licences, the cost and availability of spectrum and timing of spectrum allocation, and ongoing and future consultations and decisions on spectrum licensing and policy frameworks, auctions and allocation; the impact on us and other Canadian telecommunications carriers of government or regulatory actions with respect to certain countries or suppliers, including U.S. federal regulations pertaining to certain technology transactions deemed to constitute national security risks and the imposition of additional licence requirements on the export, re-export and transfer of goods, services and technology to Huawei Technologies Co. Ltd. and its non-U.S. affiliates, and decisions of other foreign governments, which could result in a general shortage of chipsets and other equipment; restrictions on non-Canadian ownership and control of the common shares of TELUS Corporation (Common Shares) and the ongoing monitoring of and compliance with such restrictions; unanticipated changes to the current copyright regime; and our ability to comply with complex and changing regulation of the healthcare and medical devices industry in the jurisdictions in which we operate, including as an operator of health clinics. The jurisdictions in which we operate, as well as the contracts that we enter into (particularly contracts entered into by TELUS International (Cda) Inc. (TELUS International or TI)), require us to comply with or facilitate our clients' compliance with numerous, complex and sometimes conflicting legal regimes, both domestically and internationally. See *TELUS International's financial performance which impacts our financial performance* below.
- **Competitive environment** including: our ability to continue to retain customers through an enhanced customer service experience that is differentiated from our competitors, including through the deployment and operation of evolving network infrastructure; intense competition, including the ability of industry competitors to successfully combine a mix of new service offerings and, in some cases, under one bundled and/or discounted monthly rate, along with their existing services; the success of new products, services and supporting systems, such as home automation, security and Internet of Things (IoT) services for internet-connected devices; continued intense competition across all services among telecommunications companies, cable companies, other communications companies and over-the-top (OTT) services, which, among other things, places pressures on current and future average billing per subscriber per month (ABPU), average revenue per subscriber per month (ARPU), cost of acquisition, cost of retention and churn rates for all services, as do market conditions, government actions, customer usage patterns, increased data bucket sizes or flat-rate pricing trends for voice and data, inclusive rate plans for voice and data and availability of Wi-Fi networks for data; consolidation, mergers and acquisitions of industry competitors; subscriber additions, losses and retention volumes; our ability to obtain and offer content on a timely basis across multiple devices on mobile and TV platforms at a reasonable cost as content costs per unit continue to grow; vertical integration in the broadcasting industry resulting in competitors owning broadcast content services, and timely and effective enforcement of related regulatory safeguards; TI's ability to compete with professional services companies that offer consulting services, information technology companies with digital capabilities, and traditional contact centre and business process outsourcing companies that are expanding their capabilities to offer higher-margin and higher-growth digital services; in our TELUS Health business, our ability to compete with other providers of electronic medical records and pharmacy management products, claims adjudicators, systems integrators and health service providers including those that own a vertically integrated mix of health services delivery, IT solutions and related services, global providers that could achieve expanded Canadian footprints, and in the provision of virtual healthcare services, preventative health services and personal emergency response services; and in our TELUS Agriculture business, our ability to compete with focused software and IoT competitors.
- **Technological substitution** including: reduced utilization and increased commoditization of traditional fixed voice services (local and long distance) resulting from impacts of OTT applications and mobile substitution; a declining overall market for TV services, including as a result of content piracy and signal theft, a rise in OTT direct-to-consumer video offerings and virtual multichannel video programming distribution platforms; the increasing number of households that have only mobile and/or internet-based telephone services; potential declines in ABPU and ARPU as a result of, among other factors, substitution by messaging and OTT applications; substitution by increasingly available Wi-Fi services; and disruptive technologies, such as OTT IP services, including software-defined networks in the business market, that may displace or cause us to reprice our existing data services, and self-installed technology solutions.
- **Challenges to our ability to deploy technology** including: high subscriber demand for data that challenges wireless networks and spectrum capacity levels and may be accompanied by increases in delivery cost; our reliance on information technology and our ability to streamline our legacy systems; the roll-out, anticipated benefits and efficiencies, and the evolution of wireless broadband technologies and systems, including video distribution platforms and telecommunications network technologies (broadband initiatives, such as fibre-to-the-premises (FTTP), wireless small-cell deployment, 5G wireless and availability of resources and our ability to build out adequate broadband capacity); our reliance on wireless network access agreements, which have facilitated our deployment of mobile technologies; our choice of suppliers and those suppliers' ability to maintain and service their product lines, which could affect the success of upgrades to, and evolution of, technology that we offer; supplier limitations and concentration and market power for products such as network equipment, TELUS TV® and mobile handsets; our expected long-term need to acquire additional spectrum capacity through future spectrum auctions and from third parties to address increasing demand for data, and our ability to utilize spectrum we acquire; deployment and operation of new fixed broadband network technologies at a reasonable cost and the availability and success of new products and services to be rolled out using such network technologies; network reliability and change management; and our deployment of self-learning tools and automation, which may change the way we interact with customers.
- **Capital expenditure levels and potential outlays for spectrum licences in auctions or purchases from third parties** affect and are affected by: our broadband initiatives, including connecting more homes and businesses directly to fibre; our ongoing deployment of newer mobile technologies, including wireless small cells to improve coverage and capacity; investments in network resiliency and reliability, including to address changes in usage resulting from restrictions imposed in response to the COVID-19 pandemic; the allocation of resources to acquisitions and future spectrum auctions held by Innovation, Science and Economic Development Canada (ISED), including the announcement of a second consultation on the auctioning of the 3800 MHz spectrum, which the Minister of Innovation, Science and Industry stated is expected to take place in 2023, and the millimetre wave spectrum auction, which is expected to commence in 2024. Our capital expenditure levels could be impacted if we do not achieve our targeted operational and financial results or by changes to our regulatory environment.
- **Operational performance and business combination risks** including: our reliance on legacy systems and our ability to implement and support new products and services and business operations in a timely manner; our ability to manage the requirements of large enterprise deals; our ability to implement effective change management for system replacements and upgrades, process redesigns and

business integrations (such as our ability in a timely manner to successfully complete and integrate acquisitions into our operations and culture, complete divestitures or establish partnerships and realize expected strategic benefits, including those following compliance with any regulatory orders); our ability to identify and manage new risks inherent in new service offerings that we may provide, including as a result of acquisitions, which could result in damage to our brand, our business in the relevant area or as a whole, and additional exposure to litigation or regulatory proceedings; and our ability to effectively manage the growth of our infrastructure and integrate new team members.

- **Data protection** including risks that malfunctions or unlawful acts could result in unauthorized access to, change, loss, or distribution of data, which may compromise the privacy of individuals and could result in financial loss and harm to our reputation and brand.
- **Security threats** including intentional damage, or unauthorized access or attempted access, to our physical assets or our IT systems and networks, or those of our customers or vendors, which could prevent us from providing reliable service or result in unauthorized access to our information or that of our customers.
- **Ability to successfully implement cost reduction initiatives and realize planned savings, net of restructuring and other costs, without losing customer service focus or negatively affecting business operations.** Examples of these initiatives are: our operating efficiency and effectiveness program to drive improvements in financial results; business integrations; business product simplification; business process automation and outsourcing; offshoring and reorganizations; procurement initiatives; and real estate rationalization.
- **Foreign operations** and our ability to successfully manage operations in foreign jurisdictions, including managing risks such as currency fluctuations and exposure to various economic, international trade, political and other risks of doing business globally. See also *TELUS International's financial performance which impacts our financial performance*.
- **Business continuity events** including: our ability to maintain customer service and operate our network in the event of human error or human-caused threats, such as cyberattacks and equipment failures that could cause various degrees of network outages; technical disruptions and infrastructure breakdowns; supply chain disruptions, delays and rising costs, including as a result of government restrictions or trade actions; natural disaster threats; extreme weather events; epidemics; pandemics (including the ongoing COVID-19 pandemic); political instability in certain international locations; information security and privacy breaches, including loss or theft of data; and the completeness and effectiveness of business continuity and disaster recovery plans and responses.
- **TELUS International's financial performance which impacts our financial performance.** Factors that may affect TI's financial performance are described in TI's public filings available on SEDAR and EDGAR and may include: intense competition from companies offering similar services; attracting and retaining qualified team members to support its operations; TI's ability to grow and maintain profitability if changes in technology or if client expectations outpace service offerings and internal tools and processes; TI maintaining its culture as it grows; effects of economic and geopolitical conditions on its clients' businesses and demand for its services; a significant portion of TI's revenue being dependent on a limited number of large clients; continued consolidation in many of the verticals in which TI offers services could result in the loss of a client; adverse impacts of the COVID-19 pandemic on TI's business and financial results; TI's business being adversely affected if certain independent contractors were classified as employees, and the costs associated with defending, settling or resolving any future lawsuits (including demands for arbitration) relating to the independent contractor classification; TI's ability to successfully identify, complete, integrate and realize the benefits of acquisitions and manage associated risks; cyberattacks or unauthorized disclosure resulting in access to sensitive or confidential information and data of its clients or their end customers, which could have a negative impact on its reputation and client confidence; TI's business not developing in ways it currently anticipates due to negative public reaction to offshore outsourcing, proposed legislation or otherwise; ability to meet client expectations regarding its content moderation services being adversely impacted due to factors beyond its control and its content moderation team members suffering adverse emotional or cognitive effects in the course of performing their work; and TI's short history operating as a separate, publicly traded company. TELUS International's primary functional and reporting currency is the U.S. dollar and the contribution to our consolidated results of positive results in our digitally-led customer experiences – TELUS International (DLCX) segment may be offset by any strengthening of the Canadian dollar (our reporting currency) compared to the U.S. dollar. The price of the subordinate voting shares of TI (TI Subordinate Voting Shares) may be volatile and is likely to fluctuate due to a number of factors beyond its control, including actual or anticipated changes in profitability; general economic, social or political developments; changes in industry conditions; changes in governance regulation; inflation; low trading volume; the general state of the securities markets; and other material events. TI may choose to publicize targets or provide other guidance regarding its business and it may not achieve such targets. Failure to do so could also result in a reduction in the trading price of the TI Subordinate Voting Shares. A reduction in the trading price of the TI Subordinate Voting Shares due to these or other factors could result in a reduction in the fair value of TI multiple voting shares held by TELUS.
- **Human resource matters** including: recruitment, retention and appropriate training in a highly competitive industry (including retention of team members leading recent acquisitions in emerging areas of our business), the level of our employee engagement and impact on engagement or other aspects of our business or any unresolved collective agreements, our ability to maintain our unique culture as we grow, the risk that certain independent contractors in our business could be classified as employees, unanticipated reaction to our COVID-19 vaccine policy or the reopening of our administrative offices and the health of our team.
- **Financing and debt requirements** including: our ability to carry out financing activities, refinance our maturing debt, lower our net debt to EBITDA ratio to our objective range given the cash demands of spectrum auctions, and/or our ability to maintain investment grade credit ratings in the range of BBB+ or the equivalent. Our business plans and growth could be negatively affected if existing financing is not sufficient to cover our funding requirements.
- **Lower than planned free cash flow could constrain our ability to invest in operations, reduce leverage or return capital to shareholders, and could affect our ability to sustain our dividend growth program through 2022 and any further dividend growth programs.** This program may be affected by factors such as the competitive environment, fluctuations in the Canadian economy or the global economy, our earnings and free cash flow, our levels of capital expenditures and spectrum licence purchases, acquisitions, the management of our capital structure, regulatory decisions and developments, and business continuity events. Quarterly dividend decisions are subject to assessment and determination by our Board of Directors based on our financial position and outlook. Common Shares may be purchased under our normal course issuer bid (NCIB) when and if we consider it opportunistic, based on our financial position and outlook, and the market price of our Common Shares. There can be no assurance that our dividend growth program or our NCIB will be maintained, unchanged and/or completed.
- **Taxation matters** including: interpretation of complex domestic and foreign tax laws by the relevant tax authorities that may differ from our interpretations; the timing and character of income and deductions, such as tax depreciation and operating expenses; tax credits or other attributes; changes in tax laws, including tax rates; tax expenses being materially different than anticipated, including the taxability of income and deductibility of tax attributes or retroactive application of new legislation; elimination of income tax deferrals through the use of different tax year-ends for operating partnerships and corporate partners; and changes to the interpretation of tax laws, including those resulting from changes to applicable accounting standards or the adoption of more aggressive auditing practices by tax authorities, tax reassessments or adverse court decisions impacting the tax payable by us.
- **Litigation and legal matters** including: our ability to successfully respond to investigations and regulatory proceedings; our ability to defend against existing and potential claims and lawsuits (including intellectual property infringement claims and class actions based on consumer claims, data, privacy or security breaches and secondary market liability), or to negotiate and exercise indemnity rights or other protections in respect of such claims and lawsuits; and the complexity of legal compliance in domestic and foreign jurisdictions, including compliance with competition, anti-bribery and foreign corrupt practices laws.
- **Health, safety and the environment** including: lost employee work time resulting from illness or injury; public concerns related to radio frequency emissions; environmental issues affecting our business, including climate-related risk (such as extreme weather events and other natural hazards), waste and waste recycling, risks relating to fuel systems on our properties, changing government and public expectations regarding environmental matters and our responses; and challenges associated with epidemics or pandemics, including the COVID-19 pandemic and our response to it, which may add to or accentuate these factors.
- **Economic growth and fluctuations** including: the state of the economy in Canada, which may be influenced by economic and other developments outside of Canada, including potential outcomes of yet unknown policies and actions of foreign governments and the ongoing COVID-19 pandemic, as well as public and private sector responses to the pandemic; expectations regarding future interest rates; inflation; unemployment levels; effects of fluctuating oil prices; effects of low business spending (such as reducing investments and cost structure); pension investment returns and factors affecting pension benefit obligations, funding and solvency discount rates; fluctuations in exchange rates of the currencies in the regions in which we operate; sovereign credit ratings and effects on the cost of borrowing; the impact of tariffs on trade between Canada and the United States; and global implications of the dynamics of trade relationships among major world economies.
- **Energy use** including: our ability to identify and implement solutions to reduce energy consumption and adopt cleaner sources of energy; our ability to identify and make suitable investments in renewable energy, including in the form of power purchase agreements; our ability to continue to realize significant absolute reductions in energy use and the resulting greenhouse gas (GHG) emissions in our operations (including as a result of programs and initiatives focused on our buildings and network); and other risks associated with achieving our goals to achieve carbon neutrality and reduce our GHG emissions by 2030.

These risks are described in additional detail in *Section 9 General trends, outlook and assumptions, and regulatory developments and proceedings* and *Section 10 Risks and risk management* in this MD&A. Those descriptions are incorporated by reference in this cautionary statement but are not intended to be a complete list of the risks that could affect the Company.

Many of these factors are beyond our control or outside of our current expectations or knowledge. Additional risks and uncertainties that are not currently known to us or that we currently deem to be immaterial may also have a material adverse effect on our financial position, financial performance, cash flows, business or reputation. Except as otherwise indicated in this document, the forward-looking statements made herein do not reflect the potential impact of any non-recurring or special items or any mergers, acquisitions, dispositions or other business combinations or transactions that may be announced or that may occur after the date of this document.

Readers are cautioned not to place undue reliance on forward-looking statements. Forward-looking statements in this document describe our expectations, and are based on our assumptions, as at the date of this document and are subject to change after this date. Except as required by law, we disclaim any intention or obligation to update or revise any forward-looking statements.

This cautionary statement qualifies all of the forward-looking statements in this MD&A.

February 10, 2022

# 1 Introduction

The forward-looking statements in this section, including, for example, statements relating to the expected impact of the COVID-19 pandemic on our operations and financial condition, are qualified by the *Caution regarding forward-looking statements* at the beginning of this Management's discussion and analysis (MD&A).

## 1.1 Preparation of the MD&A

The following sections are a discussion of our consolidated financial position and financial performance for the year ended December 31, 2021, and should be read together with our December 31, 2021 audited consolidated statements of income and other comprehensive income, statements of financial position, statements of changes in owners' equity and statements of cash flows, and the related notes (collectively referred to as the Consolidated financial statements). The generally accepted accounting principles (GAAP) that we use are International Financial Reporting Standards (IFRS) as issued by the International Accounting Standards Board (IASB) and Canadian GAAP. In this MD&A, the term IFRS refers to these standards. In our discussion, we also use certain non-GAAP and other specified financial measures to evaluate our performance, monitor compliance with debt covenants and manage our capital structure. These measures are defined, qualified and reconciled with their nearest GAAP measures, as required by National Instrument 52-112, *Non-GAAP and Other Financial Measures Disclosure*, in *Section 11.1*. All currency amounts are in Canadian dollars, unless otherwise specified.

Additional information relating to the Company, including our Annual Information Form and other filings with securities commissions or similar regulatory authorities in Canada, is available on SEDAR (**sedar.com**). Our filings with the Securities and Exchange Commission in the United States, including Form 40-F, are available on EDGAR (**sec.gov**). Additional information about our TELUS International (Cda) Inc. (TELUS International or TI) subsidiary, including discussion of its business and results, can be found in its public filings available on SEDAR and EDGAR.

Our disclosure controls and procedures are designed to provide reasonable assurance that all relevant information is gathered and reported to senior management on a timely basis, so that appropriate decisions can be made regarding public disclosure. This MD&A and the Consolidated financial statements were reviewed by our Audit Committee and authorized by our Board of Directors (Board) for issuance on February 10, 2022.

In this MD&A, unless otherwise indicated, results for the year ended December 31, 2021 are compared with results for the year ended December 31, 2020.

Effective January 1, 2021, our segmented reporting structure was retrospectively re-cast. This change arose from continually increasing technological convergence pushing the difference between mobile and fixed access further from the core network and closer to the customer point of access, the increasing significance of digitally-led customer experience services and the evolution of information regularly reported to our chief operating decision-maker for purposes of allocating capital resources and assessing performance. See *Section 5.1 General* for additional details.

## 1.2 The environment in which we operate

The success of our business and the challenges we face can best be understood with reference to the environment in which we operate, including broader economic factors that affect our customers and us, and the competitive nature of our operations.

**Est. 3%**
**2021 Canadian telecom industry growth**

**$17.3 billion**
**TELUS 2021 revenues and other income**

**16.9 million**
**TELUS subscriber connections**

**$1.7 billion**
**7.3%**
**TELUS Corporation Common Share 2021 dividends declared and growth per share**

**COVID-19**

The COVID-19 pandemic, which emerged in the first quarter of 2020, continued to have a pervasive global impact throughout 2021. Since the beginning of the pandemic, we have focused relentlessly on keeping Canadians connected and on the health, safety and well-being of our team members, customers and communities. Our Executive Team continues to be guided by advice from our Emergency Management Operating Committee (EMOC) and the TELUS Medical Advisory Council (MAC).

We expect the pandemic to continue to affect our operations until at least 2023. Whether this occurs will depend on both domestic and international factors, including rates of vaccination and the potential proliferation of COVID-19 variants of concern.

We are committed to prioritizing the health and safety of team members and customers and the significant majority of team members have continued to work remotely during the pandemic. During the third quarter of 2021, we announced our COVID-19 vaccination policy for all Canadian team members. We currently plan to reopen our Canadian administrative offices in April 2022 at the earliest, based on an assessment of the public health and safety guidance at that time. When our team members return to the office, they will have an opportunity to participate in the next evolution of our Work Styles program. Originally launched in 2006, Work Styles provides team members with flexible work options to accommodate their work preferences and the ability to connect and collaborate seamlessly no matter where they are.

With respect to TELUS International's operations, the intent is for team members to return to traditional work environments in offices when it has been deemed safe to do so by local governments and healthcare officials. However, this varies significantly by geography and each region's vaccination progress.

**Canadian telecommunications industry**

After almost two years of operating within the COVID-19 environment, the pandemic continues to highlight the essential nature of connectivity in enabling Canadians to participate in the digital economy. The telecommunications industry remains a key lifeline for Canada's economic and social survival during the pandemic, and facilities-based operators continue to invest in building additional capacity and upgrading infrastructure. We estimate that Canadian telecommunications industry revenues (including TV revenue and excluding equipment and media revenue) grew by approximately 3% in 2021, with mobile network revenue growth of approximately 2.7%. Mobile revenues continued to account for the largest portion of telecommunications sector revenues and Canadians are using ever-increasing amounts of data through both fixed internet and mobile services. We estimate that the Canadian mobile phone industry added approximately 0.9 million net new subscribers in 2021 as compared to approximately 1.1 million in 2020. With respect to fixed products and services, we estimate the Canadian consumer high-speed internet penetration rate grew by approximately 2 percentage points to 90% in 2021, and subscriber growth is expected to continue. More Canadians are subscribing to internet services, and during the pandemic, Canadians relied on their internet service for remote work, education and entertainment, and for access to news and information, while the shift from the traditional television landscape to internet-based television continued. Competitive pressures continued in both the fixed products and services consumer and business markets, while declines in higher-margin legacy voice services were ongoing, mainly attributable to technological substitution. (See *Section 9 General trends, outlook and assumptions, and regulatory developments and proceedings*, *Section 10.4 Competitive environment* and *Section 10.16 The economy*.)

**Digitally-led customer experiences – TELUS International (DLCX)**

Technology is transforming the way businesses interact with their customers at an accelerating pace and scale and, across industries, customer experience has become a critically important competitive differentiator. DLCX clients and their customers have more information and more choices than ever before and their expectations surrounding brand experiences and the speed at which companies must process and respond to customer interactions are changing rapidly. The proliferation of mobile devices, social media platforms and other methods of digital interaction has enabled customers to access information 24/7 and engage with companies through multiple digital channels. The COVID-19 pandemic has further accelerated the use of digital channels as the first, and sometimes only, points of customer interaction. Customers value a consistent and personalized experience across channels when interacting with the companies that serve them. Businesses face pressure to engage with their customers across digital and human channels, and seek to do so by combining technology with authentic human experience that is capable of demonstrating a sincere commitment to customer satisfaction.

**Economic estimates**

Our estimates regarding our environment, including economic growth, unemployment and housing starts, form an important part of the assumptions on which our targets are based. The extent of the impact these estimates will have on us and the timing of that impact will depend upon the actual experience of specific sectors of the Canadian economy.

| | Economic growth (Percentage points) | | | Unemployment (Percentage points) | | | Housing starts (000s of units) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Estimated gross domestic product (GDP) growth rates | | Our estimated GDP growth rates[1] | Unemployment rates For the month of | | Our estimated annual unemployment rates[1] | Seasonally adjusted annual rate of housing starts[2] For the month of | | Our estimated annual rate of housing starts on an unadjusted basis[1] |
| | **2022** | 2021 | **2022** | **December 2021**[3] | December 2020[3] | **2022** | **December 2021** | December 2020 | **2022** |
| Canada | **4.0**[4] | 4.6[4] | **4.3** | **5.9** | 8.6 | **6.1** | **236** | 230 | **224** |
| B.C. | **4.0**[5] | 6.0[5] | **4.2** | **5.3** | 7.2 | **5.2** | **55** | 44 | **39** |
| Alberta | **4.3**[5] | 6.7[5] | **4.4** | **7.3** | 11.0 | **7.1** | **31** | 31 | **30** |
| Ontario | **4.5**[5] | 4.3[5] | **4.5** | **6.0** | 9.5 | **6.1** | **70** | 72 | **83** |
| Quebec | **3.3**[5] | 6.5[5] | **3.7** | **4.6** | 6.7 | **5.3** | **52** | 57 | **55** |

1 Assumptions are as of September 20, 2021 and are based on a composite of estimates from Canadian banks and other sources.
2 Source: Statistics Canada. Table 34-10-0158-01 Canada Mortgage and Housing Corporation, housing starts, all areas, Canada and provinces, seasonally adjusted at annual rates, monthly (x 1,000).
3 Source: Statistics Canada Labour Force Survey, December 2021 and December 2020, respectively.
4 Source: Bank of Canada Monetary Policy Report, January 2022.
5 Source: British Columbia Ministry of Finance, First Quarterly Report, September 2021; Alberta Ministry of Treasury Board and Finance, 2021 – 22 First Quarter Fiscal Update and Economic Statement, August 2021; Ontario Ministry of Finance, 2021 Ontario Economic Outlook and Fiscal Review: Build Ontario, November 2021; and Ministère des Finances du Quebec, Update on Quebec's economic and financial situation – Fall 2021, November 2021, respectively.

## **1.3** Highlights of 2021

**TELUS International IPO**

On February 5, 2021, TELUS Corporation and TELUS International, our DLCX subsidiary, announced the closing of the upsized TI initial public offering (IPO) of 42.55 million TI subordinate voting shares at a price of US$25.00 per share, which included 5.55 million TI subordinate voting shares purchased upon the full exercise of the underwriters' over-allotment option to purchase additional TI subordinate voting shares from TELUS Corporation and Baring Private Equity Asia (Baring), the selling shareholders. The offering generated aggregate gross proceeds to TI, TELUS Corporation and Baring of approximately $1.4 billion (US$1.1 billion), including the exercise of the over-allotment option in full. The net proceeds to TI totalled approximately $0.6 billion (US$0.5 billion), which was used to repay outstanding borrowings under its revolving credit facilities. TI did not receive any proceeds from the TI subordinate voting shares sold by the selling shareholders. The TI subordinate voting shares began trading on the New York Stock Exchange (NYSE) and the Toronto Stock Exchange (TSX) on February 3, 2021 under the ticker "TIXT". The offering represented the largest tech IPO in TSX history and the fifth largest by proceeds raised at the time. TI's initial market capitalization of $8.5 billion at the time of its IPO surpassed TELUS' market capitalization in 2000. With its differentiated portfolio of integrated digital IT and customer experience (CX) solutions spanning the design, build and deliver lifecycle, TI has a strategic position in the digital transformation ecosystem and is poised to benefit from the acceleration of digital adoption across various sectors of the global economy.

**Strategic alliance with Google**

On February 9, 2021, we announced a strategic alliance with Google Cloud to co-innovate on new services and solutions that support digital transformation within key industries, including communications technology, healthcare, agriculture, security and connected home. The 10-year collaboration is intended to accelerate our IT and network modernization initiatives, enabling further operational agility and supporting improved customer experiences.

**Equity offering**

On March 25, 2021, we announced an equity offering pursuant to which a syndicate of underwriters agreed to purchase from TELUS, on a bought-deal basis, and sell to the public, 51 million common shares of TELUS Corporation (Common Shares) at a price of $25.35 per Common Share for gross proceeds of approximately $1.3 billion. On March 31, 2021, we announced the closing of the offering. Proceeds are being used to capitalize on a unique strategic opportunity to accelerate our broadband capital investment program through 2021 and 2022, including substantial advancement of the build-out of our TELUS PureFibre infrastructure in Alberta, B.C. and Eastern Quebec, as well as an accelerated roll-out of our 5G network. These planned accelerated capital investments are over and above our previous capital expenditures target originally announced on February 11, 2021.

**Long-term debt issue, inaugural sustainability-linked bond and early redemption of 2022 Notes**

On April 5, 2021, we issued $500 million of senior unsecured 4.10% Notes, Series CAE, which will mature on April 5, 2051. The net proceeds from this offering were used to fund the repayment upon maturity of the Series 3, 10.65% debentures of TELUS Communications Inc. due June 2021, the repayment of commercial paper and for general corporate purposes.

On June 28, 2021, we announced the successful closing of our inaugural sustainability-linked bond, the first of its kind in Canada. The $750 million of senior unsecured 2.85% Sustainability-Linked Notes, Series CAF, will mature on November 13, 2031, and were issued pursuant to our sustainability-linked bond framework announced on June 14, 2021 (see *Section 3* for additional details). As part of this framework, we have committed to reducing our absolute scope 1 and 2 greenhouse gas emissions by 46% from 2019 levels by 2030 (our sustainability performance target). If we fail to achieve this target by December 31, 2030, the interest payable on these notes will increase by 1.00% in the final year of maturity. We will report annually on our performance against the sustainability performance target and will also obtain an annual independent and external verification of our performance against the target.

On August 17, 2021, we early redeemed all of our $1 billion 2.35% Notes, Series CT, due March 28, 2022. The long-term debt prepayment premium recorded in the three-month period ended September 30, 2021 was $10 million before income taxes ($0.01 per share after income taxes). Subsequent to this early redemption, there are no TELUS Corporation notes maturing in 2022.

**Our Board of Directors**

At our 2021 annual general meeting held on May 7, 2021, the nominees listed in the TELUS 2021 information circular were elected as directors of TELUS, including two new nominees, Hazel Claxton and Sean Willy.

Hazel is a corporate director. She served as Executive Vice-President and Chief Human Resources Officer with LifeWorks Inc. (formerly Morneau Shepell Inc.) from 2013 to 2018. Prior to that, Hazel spent 29 years at PwC Canada where she held several leadership roles including Canadian Leadership Group member, Human Capital leader, and Partner within the Corporate Advisory and Restructuring Group, an area she practiced in for 20 years. Hazel holds a Bachelor of Commerce (Honours) from Queen's University and the ICD.D designation from the Institute of Corporate Directors. She is a Chartered Professional Accountant.

Sean is President and Chief Executive Officer of Des Nedhe Development, the economic development entity for English River First Nation, which includes a broad portfolio of businesses and investments that range from construction and mining to retail and communications, a role he has held since August 2017, and prior thereto he was a Vice-President of Des Nedhe Development since June 2016. Sean holds a Bachelor of Commerce from the Edwards School of Business of the University of Saskatchewan.

Our Board diversity policy includes separate diversity targets of having (i) at least two directors who represent a visible minority or are Indigenous and (ii) women and men each represent at least one-third of the independent directors. With the appointment of directors at our May 2021 annual meeting, we surpassed both targets.

**3500 MHz spectrum auction developments**

Innovation, Science and Economic Development Canada (ISED) held its 3500 MHz band spectrum auction from June 15, 2021, through July 23, 2021. We acquired 142 licences equating to 16.4 MHz of spectrum for a total purchase price of $1.95 billion. Combined with the spectrum we acquired privately ahead of the auction, we now hold 25 MHz of spectrum in the 3500 MHz spectrum band nationally and 40 MHz within key markets, at an average price of $2.53 per MHz-pop (where pop refers to the population in a licence area). In accordance with the terms of the auction, 20% ($389 million) was remitted to ISED on its due date, August 13, 2021. On September 22, 2021, ISED sought further consultation on the Standard Radio Systems Plan (SRSP)-520 affecting the deployment of 3500 MHz spectrum and advised that it would issue the 3500 MHz spectrum licences after determining whether amendments were needed to SRSP-520. ISED also notified prospective 3500 MHz licensees that the final auction payments and issuance of licences, originally scheduled for October 4, 2021, were delayed until December 17, 2021, at which time we made the final payment.

**Blacksmith Applications acquisition**
On September 22, 2021, we acquired 100% ownership of Blacksmith Applications Holdings Inc., a provider of management, optimization and analytics to food, beverage and consumer goods providers. The acquisition is complementary to, and was made with a view to growing, our existing smart data solutions business.

**Sale of financial solutions business**
On December 6, 2021, we announced the disposition of our financial solutions business for $500 million. Net proceeds from the transaction will be used to support strategic growth investments, including connecting more homes and businesses to our TELUS PureFibre network and advancing our 5G network build and investments to support enhancing new areas of growth, including our offerings to small and medium-sized businesses, as well as in TELUS Health and TELUS Agriculture. Proceeds will also support debt retirement.

**Business acquisition – subsequent to 2021**
On January 1, 2022, we acquired 100% ownership of Fully Managed Inc. for cash and contingent consideration of approximately $137 million. Fully Managed Inc. provides managed information technology support, technology strategy and network management. This investment was made with a view to growing our end-to-end capabilities to support small and medium-sized business customers.

**Consolidated highlights**

| Years ended December 31 ($ millions, except footnotes and unless noted otherwise) | 2021 | 2020 | Change |
|---|---|---|---|
| **Consolidated statements of income** | | | |
| Operating revenues and other income | **17,258** | 15,463 | 11.6% |
| Operating income | **3,074** | 2,482 | 23.9% |
| Income before income taxes | **2,278** | 1,711 | 33.1% |
| Net income | **1,698** | 1,260 | 34.8% |
| Net income attributable to Common Shares | **1,655** | 1,207 | 37.1% |
| Adjusted Net income[1] | **1,430** | 1,361 | 5.1% |
| Earnings per share (EPS) ($) | | | |
| Basic EPS | **1.23** | 0.95 | 29.5% |
| Adjusted basic EPS[1] | **1.07** | 1.06 | 0.9% |
| Diluted EPS | **1.22** | 0.94 | 29.8% |
| Dividends declared per Common Share ($) | **1.2710** | 1.18495 | 7.3% |
| Basic weighted-average Common Shares outstanding (millions) | **1,346** | 1,275 | 5.6% |
| **Consolidated statements of cash flows** | | | |
| Cash provided by operating activities | **4,388** | 4,574 | (4.1)% |
| Cash used by investing activities | **(5,466)** | (6,165) | (11.3)% |
| Acquisitions | **(468)** | (3,205) | (85.4)% |
| Capital expenditures[2] | **(3,498)** | (2,775) | 26.1% |
| Cash provided by financing activities | **953** | 1,904 | (49.9)% |
| **Other highlights** | | | |
| Subscriber connections[3] (thousands) | **16,887** | 15,943 | 5.9% |
| Earnings before interest, income taxes, depreciation and amortization[1] (EBITDA) | **6,290** | 5,494 | 14.5% |
| EBITDA margin[1] (%) | **36.4** | 35.5 | 0.9 pts. |
| Restructuring and other costs | **186** | 259 | (28.2)% |
| Adjusted EBITDA[1] | **6,069** | 5,701 | 6.4% |
| Adjusted EBITDA margin[1] (%) | **36.0** | 37.0 | (1.0) pt. |
| Free cash flow[1] | **777** | 1,435 | (45.9)% |
| Net debt to EBITDA – excluding restructuring and other costs[1] (times) | **3.17** | 3.45 | (0.28) |

Notations used in MD&A: n/m – not meaningful; pts. – percentage points.

1 These are non-GAAP and other specified financial measures. See *Section 11.1 Non-GAAP and other specified financial measures*.
2 Capital expenditures include assets purchased, excluding right-of-use lease assets, but not yet paid for, and consequently differ from Cash payments for capital assets, excluding spectrum licences, as reported in the Consolidated financial statements. Refer to *Note 31* of the Consolidated financial statements for further information.
3 The sum of active mobile phone subscribers, connected device subscribers, internet subscribers, residential voice subscribers, TV subscribers and security subscribers, measured at the end of the respective periods based on information in billing and other source systems. Effective January 1, 2021, with retrospective application to January 1, 2020, in alignment with our segment reporting changes, we made a retroactive adjustment to remove internal network service revenue and approximately 29,000 subscribers from our mobile phone subscriber base and associated operating statistics (average billing per subscriber per month (ABPU) / average revenue per subscriber per month (ARPU) and churn). Effective January 1, 2021, on a prospective basis, following an in-depth review of customer accounts within a legacy subscriber provisioning system to be decommissioned, we adjusted our internet subscriber base to remove 16,000 subscribers.

**Operating highlights**

- **Consolidated Operating revenues and Other income** increased by $1.8 billion in 2021.

  Service revenues increased by $1.3 billion in 2021. TTech service revenue growth of $685 million was driven by growth in internet and data service revenues, as well as smart food-chain technology and other fixed data services revenues; higher mobile network revenue; and growth in health services revenue. Increased DLCX revenues were due to business acquisitions, and organic growth from both new clients and expanded services for existing customers.

  Equipment revenues increased by $239 million in 2021, reflecting higher-value smartphones in the sales mix, higher handset upgrade volumes and greater collectability of mobile device balances.

  Other income increased by $298 million in 2021, largely due to a $410 million gain arising from the disposition of our financial solutions business in the fourth quarter of 2021, as described earlier in this section within *Highlights of 2021*.

  For additional details on Operating revenues and other income, see *Section 5.4 TELUS technology solutions segment* and *Section 5.5 Digitally-led customer experiences – TELUS International segment*.
- **Operating income** increased by $592 million in 2021. In addition to the gain on sale of our financial solutions business, this increase was driven by growth in network revenue; growth in mobile equipment margins; growth in internet and data service margins, as well as other fixed data service margins; an increased contribution from DLCX; and lower bad debt expense. This was partly offset by higher employee benefits expense and lower legacy fixed voice and legacy fixed data services. This growth also reflects lower non-labour restructuring and other costs related to the pandemic, partly offset by the dilutive lingering impacts of the pandemic, including reduced roaming margins related to travel restrictions. (See *Section 5.3 Consolidated operations* for additional details.)

  EBITDA, which includes restructuring and other costs, other equity losses related to real estate joint ventures, the gain on disposition of our financial solutions business and a gain on a retirement of a provision arising from business acquisition-related written put options within DLCX, increased by $796 million in 2021.

  Adjusted EBITDA, which excludes restructuring and other costs, other equity losses related to real estate joint ventures, the gain on disposition of our financial solutions business and a gain on a retirement of a provision arising from business acquisition-related written put options within DLCX, increased by $368 million in 2021, reflecting the factors mentioned in the Operating income discussion above. (See *Section 5.3 Consolidated operations* for additional details.)
- **Income before income taxes** increased by $567 million in 2021 as a result of higher Operating income, partly offset by increased Financing costs. The increase in Financing costs in 2021 largely resulted from the cessation of capitalized long-term debt interest costs in the first quarter of 2021 for 600 MHz spectrum licences that are now being deployed. (See *Financing costs* in *Section 5.3*.)
- **Income tax expense** increased by $129 million in 2021. The effective income tax rate decreased from 26.3 to 25.5% in 2021, largely due to the non-taxable portion of the gain on the disposition of our financial solutions business partially offset by lower adjustments to prior period income taxes.
- **Net income attributable to Common Shares** increased by $448 million in 2021, resulting from the after-tax impacts of higher Operating income offset by higher Financing costs.

  Adjusted Net income excludes the effects of restructuring and other costs, income tax-related adjustments, other equity losses related to real estate joint ventures, long-term debt prepayment premium, the gain on disposition of our financial solutions business, and a gain on a retirement of a provision arising from business acquisition-related written put options within DLCX. Adjusted Net income increased by $69 million or 5.1% in 2021.
- **Basic EPS** increased by $0.28 or 29.5% in 2021 as a result of the after-tax impacts of higher Operating income and higher Financing costs, which were partially offset by the effect of a higher number of Common Shares outstanding.

  Adjusted basic EPS excludes the effects of restructuring and other costs, income tax-related adjustments, other equity losses related to real estate joint ventures, long-term debt prepayment premium, the gain on disposition of our financial solutions business, and a gain on a retirement of a provision arising from business acquisition-related written put options within DLCX. Adjusted basic EPS increased by $0.01 or 0.9% in 2021.
- **Dividends declared per Common Share** were $1.2710 in 2021, an increase of 7.3% from 2020. Consistent with our target of increasing dividends between 7 to 10% in the near term, the Board declared a first quarter dividend of $0.3274 per share on our issued and outstanding Common Shares, payable on April 1, 2022, to shareholders of record at the close of business on March 11, 2022. The first quarter dividend increased by $0.0162 per share or 5.2% from the $0.3112 per share dividend declared one year earlier, consistent with our multi-year dividend growth program described in *Section 4.3 Liquidity and capital resources*.
- During 2021, our total **subscriber connections** increased by 944,000. This reflected an increase of 4.1% in mobile phone subscribers, 18.8% in connected device subscribers, 6.2% in internet subscribers, 4.1% in TV subscribers and 13.7% in security subscribers, partly offset by a decline of 3.5% in residential voice subscribers. (See *Section 5.4 TELUS technology solutions segment* for additional details.)

**Liquidity and capital resource highlights**

- **Cash provided by operating activities** decreased by $186 million in 2021, largely attributable to other working capital changes, as well as higher income taxes paid related to the disposition of our financial solutions business. (See *Section 7.2 Cash provided by operating activities*.)
- **Cash used by investing activities** decreased by $699 million in 2021, largely attributable to a reduced number of business acquisitions and the proceeds received upon the disposition of our financial solutions business. This was partially offset by the cash payments for the 3500 MHz spectrum acquired for $1.95 billion in the most recent spectrum auction and higher cash payments for capital assets. Acquisitions decreased by $2.7 billion in 2021, as we made larger cash payments for business acquisitions in 2020, primarily Competence Call Center (CCC) (since rebranded as TELUS International Northern Europe or TINE and comprised substantially of CCC), Mobile Klinik®, AFS Technologies Inc., EQ Care and Lionbridge AI. Capital expenditures increased by $723 million in 2021, due to accelerated investments in our 5G network, our broadband build, enhanced product development and digitization to increase system capacity and reliability, in addition to strong security subscriber growth and the advanced purchase of customer equipment to mitigate supply chain risks and support subscriber growth. (See *Section 7.3 Cash used by investing activities*.)
- **Cash provided by financing activities** decreased by $951 million in 2021 as we had higher redemptions and repayment of long-term

debt, including the application of net cash proceeds from the TELUS International initial public offering (IPO) in the first quarter of 2021 which were used to reduce TI credit facility indebtedness. The proceeds from equity issuance in the first quarter of 2021 were lower than the proceeds from equity issuance in the first quarter of 2020, as we issued approximately 6 million fewer Common Shares. As well, cash payments for dividends were also higher in 2021. (See *Section 7.4 Cash provided by financing activities*.)

- **Net debt to EBITDA – excluding restructuring and other costs** ratio was 3.17 times at December 31, 2021, an improvement from 3.45 times at December 31, 2020, as the effect of the increase in EBITDA – excluding restructuring and other costs exceeded the effect of the increase in net debt, notwithstanding the COVID-19 pandemic impacts that have reduced EBITDA. As at December 31, 2021, the acquisition of spectrum licences increased the ratio by approximately 0.49 and business acquisitions over the past 12 months increased the ratio by approximately 0.05, while business dispositions over the same period decreased the ratio by approximately 0.26. (See *Section 4.3 Liquidity and capital resources* and *Section 7.5 Liquidity and capital resource measures*.)
- **Free cash flow** decreased by $658 million in 2021, driven by: higher capital expenditures as previously noted; higher lease principal payments; higher income taxes paid; and the net impact of increased customer additions and the timing related to device subsidy repayments and associated revenue recognition and our TELUS Easy Payment device financing program; partly offset by higher EBITDA. The increase in capital expenditures was announced on March 25, 2021 to advance our fibre build and 5G coverage which utilized proceeds from our first quarter 2021 equity offering. Our definition of free cash flow, for which there is no industry alignment, is unaffected by accounting changes that do not impact cash, such as IFRS 15 and IFRS 16.

## 1.4 Performance targets (key performance measures)

In 2021, we achieved all four of our consolidated financial targets. Our original targets were announced on February 11, 2021. On May 7, 2021, we updated the financial targets for free cash flow and capital expenditures based on our March 25, 2021 announcement that we intended to strategically bring forward transformational capital investments in broadband connectivity, including fibre and 5G, to enhance our industry-best customer experience, leading networks and competitive position.

We exceeded our consolidated revenue target and met the target when excluding the gain on disposition of our financial solutions business. Growth in our mobile phone and connected devices subscriber bases contributed to the revenue achievement, as well as higher-value smartphones in the sales mix and higher handset upgrade volumes. We also experienced increased fixed data service revenues resulting from increased internet and data services and smart food chain technology, as well as increased health services revenues, partly offset by the ongoing decline in legacy fixed voice revenue. Additionally, DLCX operating revenues increased, reflecting both business acquisitions and organic growth.

We achieved our Adjusted EBITDA target largely from growth in internet and data services margins. Fixed data services margins also improved, driven by a growing customer base and expanded services. Mobile network revenue and improved mobile equipment margins supported the achievement of the target, as well as increased contribution from DLCX. These factors were partly offset by declines in legacy fixed voice and legacy fixed data services and higher Employee benefits expense.

Our free cash flow target was met, attributable to EBITDA growth and strong cash flow management, including our disciplined focus on profitable loading and effective inventory management to drive strong customer net additions growth.

Our capital expenditures in 2021 met our consolidated target, as we advanced our investments in our broadband build, including connecting more homes and businesses directly to our fibre-optic infrastructure, enabling us to significantly expand our broadband footprint. In addition, investments in our 5G network build allowed us to expand coverage to 70% of the Canadian population at December 31, 2021. Other capital investments enabled us to support continuing subscriber growth, deliver on our digitization strategy, and enhance our systems reliability and operational efficiency.

Our capital structure financial policies and report on financing and capital structure management plans are included in *Section 4.3*.

The following scorecard compares TELUS' performance to our consolidated 2021 targets.

| SCORECARD | | 2021 PERFORMANCE | |
|---|---|---|---|
| | Consolidated targets[1] and growth | Actual results and growth | Result |
| Revenues and other income | An increase of 8 to 10% | $17.26 billion[2]<br>11.6% | ✓ |
| Net income[3] | n/a | $1.70 billion<br>34.8% | n/a |
| Adjusted EBITDA | An increase of 6 to 8% | $6.07 billion<br>6.4% | ✓ |
| Cash provided by operating activities[3] | n/a | $4.39 billion<br>(4.1)% | n/a |
| Free cash flow | Approximately $750 million[1a] | $777 million | ✓ |
| Capital expenditures (excluding spectrum licences) | Approximately $3.5 billion[1b] | $3.50 billion | ✓ |

1 Reflects the 2021 revised targets that were announced on May 7, 2021 to reflect our capital acceleration program.
  a. The original target for free cash flow was approximately $1.5 billion.
  b. The original target for capital expenditures was approximately $2.75 billion.
2 Includes a $410 million gain on disposition of our financial solutions business. Excluding the gain, Revenues and other income increased by 9.0%.
3 As a result of applying National Instrument 52-112, these measures are presented as the most directly comparable and similar financial measures to Adjusted EBITDA and free cash flow, respectively, and were not part of our targets for 2021.

✓ met target
n/a – not applicable

We made the following key assumptions when we announced the 2021 targets in February 2021.

**ASSUMPTIONS FOR 2021 TARGETS AND RESULTS**

- Our economic assumptions are based on a composite of estimates from Canadian banks and other sources. Our original assumptions for 2021 economic growth in Canada, B.C., Alberta, Ontario and Quebec were 4.5%, 4.5%, 4.4%, 4.8% and 4.6%, respectively.
  In our first quarter 2021 MD&A, we revised our 2021 economic growth assumptions in Canada, B.C., Alberta, Ontario and Quebec to 5.9%, 5.7%, 5.6%, 5.7% and 5.8%, respectively. In our third quarter 2021 MD&A, we further revised our 2021 economic growth assumptions in Canada, B.C., Alberta, Ontario and Quebec to 5.4%, 5.6%, 6.0%, 5.1% and 6.1%, respectively.
- With respect to annual unemployment rates, our original assumptions for 2021 in Canada, B.C., Alberta, Ontario and Quebec were 7.8%, 6.9%, 9.9%, 8.0% and 6.9%, respectively.
  In our first quarter 2021 MD&A, we revised our 2021 annual unemployment rate assumptions in Canada, B.C., and Alberta to 7.7%, 6.7% and 9.6%, respectively. In our third quarter 2021 MD&A, we further revised our 2021 annual unemployment rate assumptions in Canada, B.C., Alberta and Quebec to 7.6%, 6.6%, 8.7% and 6.3%, respectively.
- With respect to the pace of housing starts, our original assumptions for 2021 on an unadjusted basis in Canada, B.C., Alberta, Ontario and Quebec were 202,000 units, 35,000 units, 24,000 units, 77,000 units and 48,000 units, respectively.
  In our first quarter 2021 MD&A, we revised our 2021 assumptions for the pace of housing starts on an unadjusted basis in Canada, B.C., Alberta, Ontario and Quebec to 232,000 units, 39,000 units, 28,000 units, 82,000 units and 60,000 units, respectively. In our third quarter 2021 MD&A, we further revised our 2021 assumptions for the pace of housing starts on an unadjusted basis in Canada, B.C., Alberta, Ontario and Quebec to 270,000 units, 47,000 units, 32,000 units, 96,000 units and 72,000 units, respectively.
- Our assumption for 2021 restructuring and other costs was approximately $150 million. Our actual 2021 restructuring and other costs were $186 million, as we incurred higher than expected costs for continuing operational effectiveness initiatives, with margin enhancement initiatives to mitigate pressures related to intense competition, technological substitution, repricing of our services, increasing subscriber growth and retention costs, and integration costs associated with business acquisitions.
- Our assumption for 2021 Depreciation and Amortization of intangible assets was approximately $3.25 billion to $3.35 billion. Actual Depreciation and Amortization of intangible assets was $3.22 billion.
- Our assumption for 2021 net Cash interest paid was approximately $755 million to $805 million. Actual net Cash interest paid was $727 million.
- Our assumption for 2021 income taxes was computed at an applicable statutory rate of 25.3 to 25.9%, and cash income tax payments of approximately $540 million to $620 million. In our third quarter 2021 MD&A, our cash income tax payments assumption was revised downward to a range of $480 million to $560 million, primarily due to a refund received upon conclusion of a prior year income tax audit. Our actual results were at a statutory income tax rate of 25.8% and cash income tax payments in respect of net income of $563 million, which includes $61 million for the gain on disposition of our financial solutions business.
- Our assumption was for continued stabilization in the average Canadian dollar: U.S. dollar exchange rate, which was $1.34 in 2020. The average Canadian dollar: U.S. dollar exchange rate was $1.25 in 2021 and closed at $1.27 on December 31, 2021, compared to $1.27 on December 31, 2020.

Confirmed:

- No material adverse regulatory rulings or government actions. See *Section 9.4* for further information.
- Continued intense mobile products and services competition and fixed products and services competition in both consumer and business markets.
- Continued increase in mobile phone penetration of the Canadian market.
- Ongoing subscriber adoption of, and upgrades to, data-intensive smartphones, as customers seek more mobile connectivity to the internet.
- Mobile products and services revenue growth resulting from improvements in subscriber loading, with continued competitive pressure on blended ARPU. Roaming revenue remained at levels similar to the latter half of 2020.
- Continued pressure on mobile products and services acquisition and retention expenses, dependent on gross loading and customer renewal volumes, competitive intensity and customer preferences, as well as continued connected devices growth.
- Continued growth in fixed products and services data revenue, reflecting an increase in internet, TV subscribers and security subscribers, speed upgrades, rate plans with larger data buckets or endless data usage, and expansion of our broadband infrastructure, healthcare solutions and home and business security offerings.
- Continued erosion of residential voice revenues, resulting from technological substitution and greater use of inclusive long distance.
- Continued growth of TI revenue and EBITDA generated by expanded services for existing and new clients and strategic business acquisitions.
- Continued focus on our customers first initiatives and maintaining our customers' likelihood-to-recommend.
- Employee defined benefit pension plans assumptions for 2021: current service costs of approximately $107 million recorded in Employee benefits expense and interest expense of approximately $25 million recorded in Financing costs; a rate of 2.50% for discounting the obligation and a rate of 2.70% for current service costs for employee defined benefit pension plan accounting purposes; and defined benefit pension plan funding of approximately $51 million.
  Actual results were: $107 million recorded in Employee benefits expense for current service costs, $6 million recorded in Employee benefits expense for past service costs and interest expense of $26 million recorded in Financing costs; a rate of 2.95% for discounting the obligation and a rate of 2.70% for current service costs for employee defined benefit pension plan accounting purposes; and defined benefit pension plan funding of $53 million.
- Participation in ISED's 3500 MHz band spectrum auction in June to July 2021. We acquired 142 licences in B.C., Alberta, Manitoba, Ontario and Quebec, which equate to a national average of 16.4 MHz.
- Continued deployment of access-agnostic technology in our network.
- Small and medium-sized businesses (SMB) continued to be negatively impacted by lockdown measures.
- Government funding programs to support consumers' ability to pay bills eased in the latter half of 2021.

**ASSUMPTIONS FOR 2021 TARGETS AND RESULTS**

- We operated our retail stores as effectively as we had in the second half of 2020, with additional safety measures in place but still allowed us to serve our customers in person, in addition to the digital capabilities that have enabled us to continue serving our customers throughout the pandemic.
- We experienced continued impacts on our TELUS Health Care Centres as a result of lockdown and stay-at-home measures resulting in cancellation of appointments, reduced capacity or closure of clinics. We experienced a recovery in the second half of 2021 through effective deployment of value-added services and optimizing efficiency within the clinics.
- Our international operations were impacted by the recoveries in other global economies based on vaccine availability, distribution and effectiveness on their respective populations and regional lockdown measures.

# 2 Core business and strategy

## 2.1 Core business

We provide a wide range of telecommunications technology solutions, including mobile and fixed voice and data telecommunications services and products, healthcare software and technology solutions, and digitally-led customer experiences, as well as related equipment. Data services include: internet protocol; television; hosting, managed information technology and cloud-based services; software, data management and data-analytics-driven smart-food chain technologies; and home and business security. Our TELUS International subsidiary provides digital customer experience and digital-enablement transformation opportunities, and designs, builds and delivers next-generation digital solutions, including artificial intelligence and content management solutions, to enhance the customer experience across targeted industry verticals. We currently earn the majority of our revenue from access to, and usage of, our telecommunications infrastructure, and from providing services and products that facilitate access to, and usage of, our infrastructure, in addition to equipment revenue.

## 2.2 Strategic imperatives

Since 2000, we have maintained a proven national growth strategy. Our strategic intent is to unleash the power of the internet to deliver the best solutions to Canadians at home, in the workplace and on the move.

We also developed six strategic imperatives in 2000 that remain relevant for future growth, despite changing regulatory, technological and competitive environments. We believe that a consistent focus on these imperatives guides our actions and contributes to the achievement of our financial goals. To advance these long-term strategic imperatives and address near-term opportunities and challenges, we confirm or set new corporate priorities each year, as further described in *Section 3*. Our six strategic imperatives are listed below.

- Focusing relentlessly on growth markets of data, IP and wireless
- Providing integrated solutions that differentiate TELUS from our competitors
- Building national capabilities across data, IP, voice and wireless
- Partnering, acquiring and divesting to accelerate the implementation of our strategy and focus our resources on core business
- Going to market as one team under a common brand, executing a single strategy
- Investing in internal capabilities to build a high-performance culture and efficient operation.

# 3 Corporate priorities

We confirm or set new corporate priorities each year to advance our long-term strategic imperatives (see *Section 2.2*) and address near-term opportunities and challenges. The following table provides a discussion of activities and initiatives that relate to our 2021 corporate priorities.

**Elevating our customers, communities and social purpose by honouring our brand promise, Let's make the future friendly**

- In December 2021, the Commission for Complaints for Telecom-television Services (CCTS) issued its annual report for the 12-month period ended July 31, 2021, and TELUS again received the fewest customer complaints among national carriers, while Koodo® again received the fewest complaints among national flanker brands. Although total industry complaints accepted by the CCTS increased by 8.6% year-over-year, complaints involving TELUS increased at a lesser rate of 4.7%.
- Each year, we conduct a Pulsecheck engagement survey to gather confidential team member feedback about TELUS as a place to work in order to measure our progress in creating a high-performance culture. Following each survey, leaders share results with team members and use fair process to build and refine action plans focused on high-priority areas where improvement is required based on Pulsecheck results. In 2021, we achieved an engagement score of 84%, which is an encouraging accomplishment against the backdrop of the highly competitive and dynamic environment in which we work and reinforces the strength of the culture our team members have built together. TELUS is the most engaged organization globally compared to organizations of our size and composition according to our survey provider, Kincentric.
- As the global leader in social capitalism, we are evolving our brand promise to "Let's make the future friendly." By placing an invitation at the heart of our new brand promise, we are inviting all Canadians to join us in partnership to shape and create remarkable human outcomes together. We will ensure every connection is a promise to help create a better future for Canadians.
- Throughout 2021, we continued to leverage our Connecting for Good programs to support marginalized individuals through the global pandemic and also expanded program eligibility to support those who need it most.
  - We welcomed close to 12,000 new households to our Internet for Good program this year, resulting in 106,000 low-income family members, persons with disabilities and youth leaving foster care all benefiting from low-cost internet since the launch of the program in 2016.
  - Our Mobility for Good program offers free or subsidized mobile phone rate plans and devices to all youth aging out of foster care and to low-income seniors across Canada receiving the guaranteed income supplement. We added 7,000 youth, seniors and other marginalized Canadians in 2021. Since we launched the program in 2017, more than 28,000 individuals have benefited.
    - In the fourth quarter of 2021, we launched Mobility for Good for Indigenous Women at Risk, a new program that provides free smartphones and data plans to Indigenous women who are at risk of or surviving violence, in partnership with Indigenous organizations in Alberta and B.C.
  - We expanded our Tech for Good program nationally, in partnership with March of Dimes Canada, and continued to provide people with disabilities access to personalized one-on-one assessments, customized recommendations, training and support on mobile devices. Up to December 31, 2021, we have supported more than 4,600 Canadians with disabilities who require professional assistance to independently use or control their mobile device through the program and the TELUS Wireless Accessibility Discount.
  - Our mobile health clinics, serving 14 communities across Canada, supported 35,000 patient visits in 2021, resulting in close to 95,000 cumulative primary care visits since the inception of our Health for Good program in 2019. Most mobile clinics are also directly supporting the COVID-19 crisis response, providing COVID-19 assessments since the start of the pandemic, and vaccines in 2021. Up to December 31, 2021, our mobile health clinics have administered more than 9,000 vaccinations.
  - We continued to expand our Health for Good program presence with the launch of new clinics throughout the year:
    - In January 2021, we launched a new mobile clinic in Toronto with the Parkdale Queen West Community Health Centre. This clinic provides primary healthcare services for marginalized populations in Toronto's midwest neighbourhoods.
    - In January 2021, we also announced a new partnership and mobile clinic with Kilala Lelum Health Centre. This specially equipped mobile van provides primary healthcare and Indigenous Elder-led cultural care to residents of Vancouver's Downtown Eastside.
    - In May 2021, we enhanced our presence in Victoria, B.C. with the signing of a new partnership agreement with Cool Aid Society, a well-established and highly regarded charity organization that provides primary and mental healthcare, affordable housing and other supports for the homeless in Victoria, Saanich and Langford.
    - In October 2021, we expanded further with the launch of a new mobile clinic in the Niagara Region of Ontario. In collaboration with our partner, REACH Niagara, we are bringing primary care to marginalized and underserved people in the area, including migrant agricultural workers, new immigrants and refugees, while supporting the training of the next generation of healthcare workers.
- We continued to help Canadians stay safe in our digital world through our TELUS Wise® program in 2021. Over 105,000 Canadians participated in virtual TELUS Wise workshops and events in 2021, bringing our cumulative participation to over 450,000 Canadians since the program launched in 2013.
  - Approximately 47,000 youth attendees at our TELUS Be Brave #EndBullying online event. This event was held in support of Pink Shirt Day on February 24, 2021, a day in which citizens are encouraged to wear pink to take a stand against bullying, in partnership with the Calgary Hitmen.
  - In the third quarter of 2021, we hosted a Facebook Live streaming event on digital citizenship, with close to 20,000 Canadians participating in the event.
  - The launch of TELUS Wise online basics helped those who are new to using technology learn basic, everyday digital literacy skills.
- The TELUS Friendly Future Foundation and TELUS Community Boards directed support in 2021 to charitable initiatives helping at-risk youth and other marginalized populations. The Foundation marked its third year in 2021, committing more than $8.7 million in cash donations to 500 charitable organizations. The Foundation has contributed over $25 million in cash donations to our communities since its inception, supported by the work of our TELUS Community Boards. Since 2005, the TELUS Community Boards have invested $91 million in cash donations to 7,800 initiatives, providing resources and support for underserved citizens, especially young people, around the world.

**Elevating our customers, communities and social purpose by honouring our brand promise, Let's make the future friendly (continued)**

- Throughout 2021, the TELUS Pollinator Fund for Good invested nearly $20 million in debt and equity securities of 10 socially responsible and innovative startups, of which 40% are women-led and 50% are led by Indigenous or racialized founders. The Fund was also recognized as a Clean50 Top Project for its contributions to clean capitalism in Canada. Canada's Clean50 offers recognition to Canada's leaders in sustainability for their contributions over the prior two years. The Fund has also been confirmed as a global finalist for the social impact award in Reuters Events Responsible Business Awards.
- In January 2021, we were named to the Corporate Knights 2021 Global 100 Most Sustainable Corporations in the World for the ninth time since inception of the recognition in 2005. In June 2021, we ranked 17th on the Corporate Knights Best 50 Corporate Citizens in Canada for 2021, up from 20th in 2020. This represents our ninth consecutive year and 15th time overall of being recognized, reflecting our commitment to creating a more sustainable future for the next generation
- In February 2021, we were named Canada's Most Respected Mobile Service Provider by Canadians in Canada's Most Respected Corporation Awards program, ranking first out of 22 mobile service providers. The award was based on our reputation across customer service excellence, team culture, contribution to communities, diversity and inclusion efforts, and overall brand trust.
- In February 2021, we introduced our newest TELUS Resource Group, Reach, to advance diverse representation in decision-making and to shine light on systemic issues that disproportionately and uniquely affect the Black community. Together with Reach, we will continue to amplify the voices of marginalized communities by providing resources, offering education, driving action, increasing communication and celebrating the heritage of Black team members, as we reach every team member, ensuring dialogue, partnership and growth.
- In March, May and November of 2021, we were named one of: Canada's Best Diversity Employers (2021), Canada's Greenest Employers 2021, and Canada's Top 100 Employers (2022), respectively, by Mediacorp Canada Inc.
- During the first quarter of 2021, we announced that we were inducted into the Business Continuity Institute (BCI) Hall of Fame, an honour awarded to organizations worldwide that are consistently the best in an award category, winning three or more awards in the same category. In recognition of our emergency response and going above and beyond to help our communities, we won three BCI awards in the Most Effective Recovery category for our work that helped thousands of displaced Albertans stay connected with their families and find safety after the 2013 Southern Alberta floods, the 2016 Fort McMurray wildfires and the 2019 Northern Alberta wildfires.
- In April 2021, Mobile Klinik launched on-site repair units, a van service that offers consumers and businesses nationwide the convenience of professional smartphone and tablet repair at the location of their choice.
- In April 2021, the BlackNorth Initiative recognized TELUS for being a Canadian leader in diversity and inclusion and one of a small number of Canadian publicly traded companies to adopt Board targets that include visible minority and Indigenous representation.
- In April 2021, we became the first national telecommunications company in Canada to set science-based greenhouse gas (GHG) emissions reduction targets approved by the Science Based Targets initiative (SBTi). The SBTi is a partnership between CDP, the United Nations Global Compact, the World Resources Institute and the World Wide Fund for Nature to mobilize companies to set science-based targets and boost their competitive advantage in the transition to a low-carbon economy.
- Throughout May 2021, we evolved our 16-year legacy global volunteer movement, TELUS Days of Giving, to TELUS #FriendlyFuture Days. More than 55,000 TELUS employees, retirees, family and friends participated, helping to volunteer 1.3 million hours of giving by our TELUS team during the year.
- In May 2021, we invested in the Black Innovation Fund, an early-stage venture fund focused on supporting Black-founded technology and technology-enabled businesses based in Canada. Building on our support of the Ryerson DMZ Black Innovation Program, the Black Innovation Fund will help raise the profile of minority entrepreneurs.
- As noted in *Section 1.3*, we surpassed our Board diversity targets.
- As described in *Section 1.3*, on June 14, 2021, we released our sustainability-linked bond framework, the first of its kind in Canada, that aligns our financing strategy with our ambitious goal of achieving operational net carbon neutrality across all of our global operations by 2030. The framework was developed in accordance with the International Capital Market Association's Sustainability-Linked Bond Principles 2020 (SLBP). Sustainalytics, a leading independent environmental, social and governance (ESG) research, ratings and analytics firm, reviewed the framework and is of the opinion that it aligns with the SLBP. Our 2.85% Sustainability-Linked Notes, Series CAF, which closed on June 28, 2021, were the first series of bonds in Canada offered under the framework.
- In June 2021, we renewed our commitment to champion Canadian small businesses through our #StandWithOwners initiative, recognizing that small business owners have needed to pivot and innovate throughout the COVID-19 pandemic. In this second year, we doubled our commitment by investing $1 million to support small businesses with funding, localized advertising and mentorship as they move forward.
- In July 2021, we invested in Radicle, a Calgary-based company that has developed a carbon credit platform for buyers and sellers of carbon credits. We are exploring potential partnership arrangements that would assist Radicle to expand into new business lines and geographies and support our goal of net zero emissions by 2030.
- In the fall, we donated 14,000 backpacks that were filled with essential school supplies to local schools across Canada to support students in need. Since 2006, our annual Kits for Kids program has donated 180,000 backpacks, creating a friendlier future as kids head back to school.
- In September 2021, we launched our Reconciliation Commitment, which was developed in partnership with and in support of Indigenous Peoples across the country. Central to our Reconciliation Commitment is the desire to support the diverse needs of Indigenous Peoples in ways they want to be supported by TELUS. In this regard, we are proud to stand in solidarity with residential school survivors and their families through our $8 million commitment toward reconciliation. This includes a $1 million gift to digitize, promote and distribute the Witness Blanket, as well as investments from the TELUS Pollinator Fund for Good, TELUS Community Boards and TELUS Friendly Future Foundation.
- In November 2021, we released our 2021 Indigenous Reconciliation and Connectivity Report, an evolution from the annual connectivity report that shares inspiring stories of the transformative benefits that connectivity brings to newly connected Indigenous communities. This year's report also includes our first-ever Indigenous reconciliation action plan, making us the first technology company in Canada to publicly commit to an Indigenous reconciliation action plan.
- In November 2021, TELUS was recognized as one of Strategy Magazine's 2021 Brands of the Year. The result is an award-winning brand – valued at almost $9 billion – that is driving real, meaningful change, from transforming healthcare to empowering Canadians with connectivity.

**Elevating our customers, communities and social purpose by honouring our brand promise, Let's make the future friendly (continued)**

- In November 2021, we committed $1 million (including $500,000 of in-kind support in health, network and community services) to support British Columbia following the unprecedented weather events and flooding that sent the province into a state of emergency.
- In December 2021, we were recognized for corporate social responsibility by being named to the Dow Jones Sustainability North America Index for the 21st year in a row, ranking at the 90th percentile in the telecommunications industry for our leadership in sustainability. This ranking demonstrates our global leadership in key categories, including corporate citizenship and philanthropy, innovation management, and environmental and social reporting.
- In the fourth quarter of 2021, we won the 2021 COVID-19 Response and Recovery award from the Disaster Recovery Institute Canada. This recognition is awarded to an organization that has demonstrated a capability to meet the challenges presented by the COVID-19 pandemic, not only to the organization itself, but also to the community it serves. Such commitment would include maintaining operations and ensuring the viability of the organization, providing a safe environment for its employees, relieving the financial pressure that employees face, aiding medical personnel, and providing support for the welfare of the community as a whole.
- Our renewable energy power purchase agreement (PPA) with the Brooks I Solar facility in Alberta has seen production of over 20.5 GWh in 2021, while three additional PPAs are pending commercial operations in the first half of 2022.
- We received the BEST Award for excellence in employee learning and development from the Association for Talent Development for the 16th consecutive year.
- Throughout 2021, we led our national peers in Consumer likelihood-to-recommend (L2R) for both the premium and flanker mobile tiers. Our L2R was also ahead of our largest Western Canadian cable competitor for home phone, TV and internet services. Additionally, our Business Solutions L2R continued to lead among the national telecom providers.
- In January 2022, we were named to the Corporate Knights 2021 Global 100 Most Sustainable Corporations in the World for the 10th time since inception of the recognition in 2005.

**Leveraging TELUS' world-leading technology to drive superior growth across mobile, home and business services**

- We continued to invest in our leading-edge broadband technology, which has enabled the success of our internet, Optik TV and Pik TV® offerings and business services, as well as our Mobility solutions, and helped us deploy our 5G technology in 2020.
  - Our 4G LTE infrastructure covered 99% of Canada's population at December 31, 2021.
  - Over 2.7 million households and businesses in B.C., Alberta and Eastern Quebec were connected with fibre-optic cable, which provides these premises with immediate access to our fibre-optic infrastructure. This is up from approximately 2.5 million households and businesses at December 31, 2020.
  - Our 5G network, launched in the second quarter of 2020, connected over 26.2 million Canadians, representing 70% of the population at December 31, 2021.
- We were recognized with various accolades from U.K.-based Opensignal throughout 2021.
  - In the *Mobile Network Experience Canada* report released in February 2021, we were recognized as being number one for Video Experience, Voice App Experience, Download Speed Experience and Upload Speed Experience, and we tied for number one in 4G Availability, 4G Coverage Experience and Games Experience. This achievement marked the ninth consecutive time an aspect of our mobile network, including download speed experience, has earned top spot from Opensignal.
  - In the *Canada 5G User Experience Report* released in April 2021, we tied for first in 5G Download Speed, 5G Video Experience, 5G Upload Speed, 5G Availability, 5G Voice App Experience and 5G Reach.
  - In *The State of Group Video Calling Experience – North and Latin America* report released in June 2021, we were the joint winner for Group Video Calling Experience in Canada. As well, Canada ranked third out of 19 countries and territories in North and Latin America.
  - In the *Mobile Network Experience: Canada Report* (August 2021), we earned the top spot in six of seven categories, won top spot in four awards (Video Experience, Voice App Experience, Download Speed Experience and Upload Speed Experience), and tied for first in two awards (Games Experience and 4G Coverage Experience). Our speed in the Download Speed Experience category was 73.9 Mbps, which was 5.8% faster than the second place finisher and 28.6% faster than the third place finisher.
  - In the *Canada 5G Experience Report* released in August 2021, we tied for first in 5G Video Experience, 5G Download Speed and 5G Upload Speed.
- We won two Speedtest Awards from U.S.-based Ookla for Canada's Fastest Mobile Network and Canada's Best Mobile Coverage. Also, according to Ookla's Speedtest Intelligence, we were the fastest mobile operator among top providers in Canada in the third quarter of 2021. Additionally, we won the award for Canada's Fastest Mobile Provider for Q3-Q4 2021, for the ninth consecutive time.
- In Canada-based Tutela's report entitled *Canada: State of Mobile Experience March 2021*, we were awarded two of the national awards for Excellent Consistent Quality and Core Consistent Quality, and tied for Download Throughput and Coverage, based on data from September 1, 2020 to February 28, 2021. Tutela also named us the best mobile experience provider in Canada.
- In U.S.-based PCMag's report *The Fastest ISPs of 2021: Canada*, released in June 2021, we were ranked as the fastest internet service provider (ISP) in Canada among major ISPs for the second consecutive year. The report also noted that we expanded the gap between our speeds and those of our peers by a wider margin.
- In January 2021, we expanded our relationship with RingCentral, Inc., a leading provider of global enterprise cloud communications, video meetings, collaboration and contact centre solutions. We are working together to enable Canadian small businesses to easily transition their legacy phone systems to the cloud via TELUS Business Connect®, an all-in-one communications solution for message, video and phone.
- In February 2021, we launched TELUS Global Connect, enabling our customers to customize and manage Internet of Things (IoT) device connectivity on cellular networks around the globe. The launch of TELUS Global Connect is part of a growing relationship between TELUS and Eseye, a pioneer of IoT connectivity management solutions, providing businesses with seamless cellular IoT connectivity to 700 mobile networks across 190 countries.

**Leveraging TELUS' world-leading technology to drive superior growth across mobile, home and business services (continued)**

- In February 2021, we announced the completed deployment of TELUS 4G LTE technology in 14 isolated communities in Quebec's Lower North Shore region, nearly one year ahead of the targeted completion date. For the first time ever, the region's 2,000 households have access to high-speed internet and mobile phone service, and can browse the internet at speeds similar to those living in urban areas.
- In February 2021, we announced a relationship with Worldplay Communications, a global SaaS company and leader in video management, to offer Canadian businesses, non-profit organizations and consumers a new way to stay virtually connected. Consumers have the ability to stream live events online and through the Optik TV platform, including community events, cultural or faith-based services and local sporting events, while businesses can evolve the delivery of virtual conferences, connect through secure video solutions, and create branded content pages where they can engage with their partners and customers.
- In March 2021, we announced a five-year partnership with the University of Alberta (U of A) to establish a 5G Living Lab at the U of A campus to advance research and development of innovative technologies. The $15 million investment will enhance U of A's innovation and commercialization capacity in areas of strength, starting with precision agriculture and autonomous vehicle systems.
- In May 2021, we were recognized as one of the *Best B2B Brands* in Canada in 2021 by Report on Business, ranking eighth out of 74 companies in Canada. This recognition is a testament to our team's commitment to leverage our social purpose to create remarkable human outcomes while delivering exceptional experiences in the business-to-business (B2B) space.
- In June 2021, in partnership with the Kanata North Business Association and Canada's Centre of Excellence in Next Generation Networks, we announced the launch of the 5G Innovation Zone in Ottawa's Hub350. This innovation hub is designed to leverage emerging technology advancements, including edge computing, network slicing and IoT commercialization, to tackle real-world challenges. These technologies are foundational to unleash the potential of 5G and the TELUS innovation zone is expected to help realize both economic and societal value from these capabilities.
- In June 2021, we launched PureFibre X, with upload and download speeds of 2.5 Gbps. PureFibre X plans include the latest Wi-Fi 6, enabling better quality connectivity and connections throughout the home. By leveraging Wi-Fi 6 technology with our new PureFibre X, we can provide households with nearly limitless connectivity, enabling simultaneous 4K streaming, video conferencing, web surfing, gaming, smart home automation and smart home security.
- In July 2021, we invested in Car IQ, a payment technology for vehicle fleets to pay for goods and services without the need for a credit card. The California-based company leverages the car's telematics to identify the location and user in order to validate payment and significantly reduce fraud. The company is exploring working with our fleet and opportunities for potential resale.
- In July 2021, we announced the launch of the TELUS Managed Cloud Security service, which supports an integrated cybersecurity strategy with unified controls and complete visibility across the customers' infrastructure. Built in collaboration with cybersecurity leader Palo Alto Networks, TELUS Managed Cloud Security offers a comprehensive way to secure data wherever customers do business.
- In August 2021, we announced that customers can now control and monitor their TELUS SmartHome Security and entertainment system hands-free by using voice commands with the new TELUS Home Assistant skill for Amazon Alexa. Customers can now use hands-free voice commands to set TELUS SmartHome Security functions such as arming their panel, locking and unlocking doors, setting the thermostat and turning lights on and off.
- In August 2021, we made an investment in Australia-based Quintessence Labs, which has brought commercially ready, quantum-ready cryptography and true random number generation solutions to the cybersecurity market. We are making strategic investments in companies that will protect us and our customers against cybersecurity adversaries who are expected to be able to break current encryption technology within the next five to 10 years.
- In September 2021, we announced a multi-year agreement with General Motors Canada (GM) that will connect GM's next-generation vehicles to our 5G network. We are collaborating with GM to enable high-performance wireless network capabilities that will meet the unique needs of an all-electric and autonomous vehicle future. The first GM vehicles with built-in connectivity to our 4G-LTE and 5G network are expected to be introduced with the 2025 model year.
- In September 2021, we announced the expansion of our Smart Building footprint by leveraging our technology to simplify day-to-day operations, reduce costs and elevate the resident experience. Partnering with Arlington Street Investments, we are transforming a new boutique retail and residential rental development located on 17th Avenue in Calgary into a TELUS Smart Building, allowing residents and building operators the comfort of knowing that the property is safe, sustainable and connected.
- In September 2021, we invested in U.K.-based Unmanned Life, an autonomous ground and aerial drone platform. Initially focused on telecom infrastructure inspection, drones represent an opportunity to disrupt many industries, including ones that are routine, dangerous and surveillance-based. Leveraging our 5G network, we believe we are at an inflection point in drone adoption.
- Together with Hilo, the Hydro Quebec subsidiary that offers complete smart energy services for homes and businesses, in the third quarter of 2021, we launched a pilot project in Quebec City to bundle our home automation and security technologies with Hilo's smart home solutions to help make Quebec homes smarter and more eco-friendly while saving residents money.
- In December 2021, we expanded our strategic relationship with IBM by deploying a Canada-wide 5G edge computing platform to enable enterprises across multiple industries to accelerate innovative solutions that deliver new value to their clients and operations.

**Scaling our innovative digital capabilities in TELUS Health and TELUS Agriculture to build assets of consequence**

- During the ongoing COVID-19 pandemic, TELUS Health MyCare and TELUS Health Virtual Care have benefited from significant adoption. These solutions have helped Canadians stay safe at home and avoid higher-risk environments such as clinics and emergency rooms wherever possible and, in turn, freed up healthcare system capacity to respond to the pandemic. Our two virtual care offerings provide millions of Canadians with the opportunity to seek primary care and mental healthcare, virtually, across the country and also reach Canadians who do not have access to a family doctor or those who seek medical care after-hours.
- Our LivingWell Companion™ personal emergency response service (PERS) continues to support the health and well-being of seniors across Canada. With COVID-19 disproportionately impacting the elderly, LivingWell Companion helps seniors stay connected to emergency support and offers a remote caregiving solution to those who may be unable to physically support their elderly loved ones. In the second quarter of 2021, we launched TELUS Health Companion on Apple Watch, now available to English and French speakers across Canada, which is a 24/7 emergency monitoring service provided through TELUS Health's LivingWell Companion national response service combined with the Apple Watch Fall Detection application programming interface (API) and proactive monitoring functionalities.
- Throughout the pandemic, the TELUS Healthy Living Network® has been providing Optik TV customers with informative and compelling content related to COVID-19 prevention and well-being, and helping them to stay active and healthy at home with over 1,300 leading fitness, yoga, nutrition and mental health titles available for free, for rent or to own. In the fourth quarter of 2020, we announced a global-first partnership with Calm to offer leading mental health content on the TELUS Healthy Living Network, providing support to Canadians as they deal with the stresses brought on by the pandemic. We offer free content for all Optik TV and Pik TV subscribers, as well as additional premium content via our Calm Optik TV theme pack, which includes guided meditations, breathing exercises and Calm's Sleep Stories (bedtime stories for adults). We are Calm's only Canadian telecom partner, and the first to bring Calm's content to a TV service and offer subscriptions through redemptions of TELUS Rewards® loyalty points.
- In the early part of the second quarter of 2020, TELUS Health began enabling Canadian clinicians to conduct virtual visits with their patients by integrating patient videoconferencing into its electronic medical records (EMR) across Canada. This feature allows clinicians to virtually support their own roster of patients, while maintaining continuity of care and fully up-to-date health records. As of December 31, 2021, over 557,000 consultations had been conducted through the TELUS EMR Virtual Visit solution since launch.
- TELUS Health Virtual Care launched LifeJourney™ in February 2021, an integrated virtual health and wellness platform for modern Canadian workplaces. LifeJourney evolves Employee Assistance Programs (EAPs) into a single convenient and collaborative access point. It also ensures dedicated Care Advocates are available to provide personalized, virtual care-centric care plans to Canadian employees.
- In February 2021, the province of Prince Edward Island announced it had selected TELUS Health as the provincial EMR provider.
- In March 2021, TELUS Health Virtual Care announced the next advancement in the digital integration of its employer-focused virtual care service with its own EMR solutions used by 34,000 clinicians across Canada, and with Ontario's Health Report Manager, the provincial report delivery system. This integration means that more informed primary care can be provided as critical patient health information is delivered seamlessly into one medical chart, so patients using this virtual care platform through their employee benefits program will effectively receive better continuity of care.
- In September 2021, we invested in RecoveryOne, which directly supports our virtual healthcare quality efforts, as it provides a comprehensive software solution to optimize a patient's unique recovery journey following musculoskeletal surgery. The California-based company will work with us as its preferred Canadian partner.
- In January 2022, we officially launched TELUS Health Virtual Pharmacy, a patient-focused service designed to improve medication management by ensuring timely delivery of prescriptions direct to a patient's home, providing unlimited access to virtual pharmacist consults, and providing tools to help manage dosing compliance. This virtual pharmacy service allows users to have unlimited one-on-one video and phone consultations with pharmacists from the comfort of their home, while also providing them with tools to keep track of their family's medications through the service's online dashboard.
- In March 2021, Olds College, located in Olds, Alberta, announced that TELUS Agriculture was selected as the Olds College 2021 Partner of the Year. The Olds College Smart Farm, a partnership between Olds College and TELUS Agriculture, has been testing innovations such as security solutions, weather stations, field sensors and rural connectivity solutions. In June 2021, we brought our 5G network to the Olds College Smart Farm. Having improved connectivity on the field will allow for easily accessible cloud computing and responsiveness to data that is gathered and used in precision agriculture, and will help unlock the potential of agriculture technology innovations to enhance productivity and sustainability. 5G will also improve connectivity for farm security and IoT solutions. To address the issue of a loss of cellular connectivity (i.e. dead zones) on farms, in the second quarter of 2021, we began testing a new repeater solution at the Olds College Smart Farm that is quick to install, easy to maintain and cost efficient. The repeater solution captures a signal from the nearest cellular tower and boosts it to extend coverage. This particular design is a trial for a solution that, once installed, is a do-it-yourself operation for farms and is non-intrusive, as it is solar-powered. If successful, the repeater will provide connectivity to mobile devices and agriculture technology like drones, autonomous equipment and field sensors in the area, and will enable the Smart Farm team to complete their day-to-day research such as monitoring crop nutrients and soil moisture.
- In May 2021, we made an investment in Rise Gardens, a direct-to-consumer gardening product that is servicing the emerging connected indoor gardening segment. By leveraging modern hydroponic techniques, consumers will be able to grow leafy greens and rooted vegetables, supported by a mobile app to track, manage and engage with the growing experience. This investment is the latest in our larger agriculture strategy, offering a natural complement to more traditional forms of production.
- In June 2021, Ignition® by TELUS, our supply chain software division, was a recipient of the Food Logistics 2021 Top Green Providers award, which recognizes companies that enhance sustainability within the cold food and beverage industry. Ignition by TELUS exists to combat food supply waste by producing a comprehensive suite of solutions designed to help distributors reduce waste, increase flexibility and agility, and increase visibility across the supply chain.

**Scaling our innovative digital capabilities in TELUS Health and TELUS Agriculture to build assets of consequence (continued)**

- In July 2021, TELUS Agriculture, together with Rabobank, a global food and agriculture bank, acquired Conservis, a company that integrates disparate farm technologies into one streamlined interface to manage the business of farming. Improving on-farm profitability and enabling the efficient sharing of farm data with trusted partners are foundational ingredients to ensure the sustainability and security of our food system. With Rabobank and with the technology available in the Conservis platform, we will be able to make the financial management of farms a more efficient process and unlock new opportunities for our customers across the food value chain.
- In September 2021, we acquired the assets of Herdtrax Inc., a leading integrated online cattle record management software that allows users to capture data at birth and with every subsequent event through the animal's life. Herdtrax will continue to work to bridge information gaps through an animal's life, providing the ability to track and share attributes to help with management decisions made across the beef industry. Herdtrax is already integrated with Feedlot Health Management Services by TELUS Agriculture, allowing farmers to share information with buyers, helping optimize production efficiency and overall animal health by supporting data-based decision-making for feedlot and calf grower clients.
- As noted in *Section 1.3*, in September 2021, we acquired Blacksmith Applications Holdings Inc., a SaaS-based trade promotion management, optimization and analytics (TPx) solutions provider, serving consumer goods manufacturers and retail customers. With Blacksmith Applications, TELUS Agriculture now has a complete set of TPx and analytics capabilities, which strengthens our position as a marketing leader in the space. Our complementary solutions have high cross-sell potential with Exceedra, Ignition and Muddy Boots customers. Combined, we aspire to offer a market-leading solution for retail and the food, beverage and consumer goods industries.
- In November 2021, we invested in Toronto-based Ukko Agro, which provides a predictive analytics platform aggregating weather, soil and crop data to guide farmers on when to apply crop inputs (such as water and pesticides) up to a week in advance. The company will be working with us on resale and integration opportunities.
- In December 2021, we made an investment in Full Harvest Technologies to help the company expand its ability to source and sell imperfect and surplus fruits and vegetables to customers across North America. This investment will support our goal to make food more available and decrease waste.

**Scaling our innovative digital capabilities in TELUS International to build an asset of consequence**

- As noted in *Section 1.3*, in February 2021, TELUS International successfully completed its initial public offering (IPO), further positioning it for continued growth.
- In February 2021, TI announced the expansion of its Google Cloud strategic partnership to drive enterprise digital transformation, due to growth and customer demand for Google Cloud solutions and technology, while deepening TI's successful 10-year relationship with Google.
- In March 2021, TI announced the final completion of the December 31, 2020 closing of the acquisition of a 100% interest in Lionbridge AI, following the clearance of the acquisition by the Committee on Foreign Investment in the United States (CFIUS). Lionbridge AI is one of only two globally scaled, managed AI training data and data annotation services and platform providers in the world.
- In July 2021, TELUS International Philippines opened its seventh delivery centre in the country in Iloilo City, which is the first location outside Metro Manila. This new centre of excellence is focused on digital customer care, IT and technical support.
- In July 2021, TI acquired Bangalore-based Playment, a leader in data annotation and computer vision tools and services specializing in 2D and 3D image, video and light detection and ranging (LiDAR). The acquisition followed TI's purchase of Lionbridge AI in December 2020 and further expanded the company's global leadership in scaled data annotation capabilities, enabling greater opportunities to enhance AI systems and provide more complex solutions to technology, large enterprise and existing hyperscaler clients. Today, TI operates this division as TELUS International AI Data Solutions, with a global AI community of over one million annotators and linguists and one of the largest data annotation platforms of its kind globally.
- In July 2021, TI announced the launch of Intelligent Insights, a vendor-agnostic platform to monitor and manage robotic process automation (RPA) solutions and bots. With Intelligent Insights, companies can track their digital operations on a single platform to monitor effectiveness, cost savings and opportunities for innovation, empowering clients to analyze how much automation and human interaction is best for their business.
- In August 2021, TI opened its third site in the U.S. with a new digital customer experience (CX) delivery centre in North Charleston, South Carolina, providing high-tech and high-touch customer experiences to leading global brands.
- In September 2021, TI successfully completed an upsized underwritten public secondary offering of 14,400,000 subordinate voting shares, at a price of US$34.00 per share, by certain shareholders, including Baring Private Equity Asia. TELUS Corporation did not participate in the offering. Additionally, driven by strong investor demand, the underwriters fully exercised the option to purchase up to an additional 2,160,000 subordinate voting shares from the selling shareholders. Following the offering, TELUS Corporation and Baring Private Equity Asia hold approximately 70.9% and 25.9%, respectively, of the combined voting power of TI and approximately 55.1% and 20.1%, respectively, of the economic interest.
- TI has furthered its leadership in digital solutions and customer experience with a range of industry recognition. In 2021, TI was:
  - Ranked a Leader in the NelsonHall Social Media CX Services NEAT vendor assessment for content moderation and trust and safety, online reputation management, and customer care and sales.
  - Named as the top Challenger on the customer service business process outsourcing (BPO) Magic Quadrant for the execution and delivery of digital capabilities and extensive domain knowledge to support customer experience by Gartner.
  - For the fifth year in a row, included on the International Association of Outsourcing Professionals' Global Outsourcing 100 list 2021, highlighting, among many other items, TI's programs for innovation and corporate social responsibility.
  - Awarded the 2021 AI Breakthrough Award in the Best Informational Bot Solution category for its Agent Assist Chatbot. These awards recognize the best companies, technologies, products and services in the field of AI.
  - Named a Leader by global research firm Everest Group in its 2021 Customer Experience Management (CXM) – Service Provider Landscape with Services PEAK Matrix Assessment. This is the third consecutive year TI has achieved Leader status.

**Scaling our innovative digital capabilities in TELUS International to build an asset of consequence (continued)**

- Successful in claiming the number nine spot, climbing 18 positions from its 2020 ranking, on Everest Group's 2021 BPS Top 50 list – the firm's global list of the 50 largest third-party providers, based on revenue and year-on-year growth. In the third year of being included on the list, TI was the top riser, and also claimed the number one position with respect to revenue growth percentage year-over-year, increasing by 55% from fiscal 2019 to fiscal 2020.
- Recognized by Fast Company as one of the Best Workplaces for Innovators.
- Named on the Achievers 50 Most Engaged Workplaces.
- Recognized as one of Mogul's Top 100 Workplaces with The Best D&I initiatives for 2021, a list that celebrates the efforts of companies that have implemented practices, invested in resources, and developed strategies to create a more inclusive and diverse workplace.
- Named a 2021 Excellence in Customer Service Award winner in the Technology of the Year category in recognition of TI's Work Anywhere / Work From Home solution by Business Intelligence Group. This award recognizes brands, executives and products that are helping companies better communicate with their customers to provide a differentiated level of customer service.
- A recipient of a Stevie Award for Great Employers for its innovative work-from-home plan in the COVID-19 response category.
- Named a Leader by global research firm IDC in its 2021-2022 Worldwide Digital Customer Care Services MarketScape. The IDC study presents a worldwide vendor assessment of digital customer care services firms looking specifically at how they are transforming service delivery with AI, automation, cloud transformation and migration initiatives, omnichannel and self-service.
- Ranked third overall and in first place for both strategy and vision and for growth in the 2021 HFS Top 10: Digital Contact Center Services – The Best of the Best Service Providers report. HFS, a leading global research consultancy firm, assessed and rated the world's largest service providers across a series of capabilities, including execution, innovation and voice of the customer.
- The winner of the ICMI Global Contact Center Awards, in both the Best Digital Customer Experience and the Best New Technology Solution categories. These awards recognize leading companies and teams that are making significant impacts on the customer management industry.

Our 2022 corporate priorities are set out in the table below.

**2022 CORPORATE PRIORITIES**

- Elevating our customers, communities and social purpose by honouring our brand promise, Let's make the future friendly
- Leveraging TELUS' world-leading technology to drive superior growth across mobile, home and business services
- Scaling our innovative digital capabilities in TELUS International, TELUS Health and TELUS Agriculture to build assets of consequence.

# 4 Capabilities

The forward-looking statements in this section, including statements regarding our dividend growth program and our financial objectives in *Section 4.3*, are qualified by the *Caution regarding forward-looking statements* at the beginning of this MD&A.

## 4.1 Principal markets addressed and competition

**TELUS TECHNOLOGY SOLUTIONS (TTech): Mobile products and services for consumers and businesses across Canada. Fixed products and services, including residential services in British Columbia, Alberta and Eastern Quebec; business services across Canada; automation and security solutions across Canada; healthcare solutions across Canada; and global agriculture solutions**

**Our mobile products and services**

- Data and voice – Fast internet access (via our 4G and 5G network available to over 99% and 70% of Canadians, respectively) for video, social networking, messaging and mobile applications, such as My TELUS, TELUS SmartHome, Optik TV, Pik TV and virtual care apps; mobile voice service with features such as Call Control; clear and reliable voice services, including TELUS Business Connect; and international roaming.
- Devices – The latest smartphones, tablets, mobile internet keys, mobile Wi-Fi devices, machine-to-machine (M2M) modems, digital life devices and wearable technology, such as smart watches and our LivingWell Companion.
- Suite of Internet of Things (IoT) solutions, including M2M connectivity, to support Canadian businesses locally and internationally, including asset tracking, fleet management, remote monitoring, digital signage, security, smart hospital solutions, intelligent traffic solutions, contact tracing and data analytics.

**Our fixed products and services**

- Internet – Comprehensive high-speed internet access with TELUS PureFibre; fixed high-speed internet access (HSIA) service, with email and a comprehensive suite of security solutions; and wireless HSIA, with reliable Wi-Fi and cloud storage. TELUS offers multiple plans, including plans with 2.5 Gbps symmetrical download and upload speeds.
- Television – High-definition entertainment service with Optik TV and Pik TV. Optik TV offers extensive content options, including 4K and 4K HDR live TV, On Demand content and streaming services such as Prime Video (included in the Amazon Prime membership), Netflix, YouTube and hayu. Optik TV also delivers innovative features, including a voice assistant that allows customers to control their TV, a wireless digital box, large PVR capacity and the ability to restart live TV in progress or from the past 30 hours. In addition, our Optik TV app allows customers to watch live TV, set recordings and access On Demand content from a smartphone, tablet or computer. Pik TV delivers a streamlined offer for customers through Apple TV or select Android TV devices. It is also accessible through an internet browser or our Android or iOS mobile applications. Pik TV embraces the changing environment, where content is increasingly available from over-the-top (OTT) services.
- Voice – Reliable fixed phone service with long distance and calling features such as Call Control; wireless home phone; and voice over IP (VoIP) supporting voice services into the future.
- Home and business security and automation – Real-time 24/7 central monitoring station, guard response service (where available), and wireless and hard-wired security technology, integrated with smart internet-connected devices. These services are enabling smart homes and smart businesses by allowing customers to remotely monitor and manage their premises via cameras, smoke detectors, lights, door locks, environmental controls, appliances and other systems for enhanced security, comfort, convenience and energy efficiency.
- IP connectivity for businesses – Converged voice, video and data services and internet access, offered on a high-performing network. Also includes software-defined wide area network (SD-WAN) offerings.
- Cloud and managed information technology (IT) services – Suite of hybrid IT solutions provides traditional and cloud technologies, network connectivity, security, managed IT and cloud advisory services.
- Security consulting and managed services – Cloud and on-premises solutions ensuring security for data, email, websites, networks and applications.
- Unified Communications conferencing and collaboration – Full range of equipment and application solutions, including Unified Communications as a Service (UCaaS), to support meetings and webcasts by means of phone, video and internet. Recent acquisitions are bolstering our capabilities in the small and mid-market business segments.
- Healthcare – A variety of healthcare solutions and services, including virtual care, virtual pharmacy, electronic medical records (EMR), pharmacy management systems, claims management solutions, personal health records, remote patient monitoring, personal emergency response services, mental health support, comprehensive primary care and employee wellness, and curation of health content for Canadians.
- Agriculture – Farm management, precision agronomy, feedlot health management, herd management software, application programming interface (API) and application integration services, compliance management, food traceability and quality assurance, data management solutions and software solutions for trade promotion management, retail execution, TPx and analytics capabilities.

**TTech: Mobile products and services for consumers and businesses across Canada. Fixed products and services, including residential services in British Columbia, Alberta and Eastern Quebec; business services across Canada; automation and security solutions across Canada; healthcare solutions across Canada; and global agriculture solutions**

**Our capabilities supporting mobile and fixed products and services**

- Licensed gross national mobile spectrum holdings averaging 198 MHz.
- Coast-to-coast digital 4G LTE access technology and growing 5G deployment:
  - Overall coverage of 99% of Canada's population, with LTE advanced (LTE-A) technology covering more than 97% of Canada's population and 5G covering 70% of Canada's population at December 31, 2021. Coverage includes domestic network sharing agreements.
  - Manufacturer's rated download speeds: 5G, up to 1.9 Gbps; LTE-A, up to 1.5 Gbps; LTE, up to 150 Mbps; HSPA+, up to 42 Mbps. Average expected speeds: 5G, up to 450 Mbps; LTE-A, up to 390 Mbps; LTE, up to 45 Mbps; HSPA+, up to 14 Mbps.[1]
  - Reverts to LTE technology and speeds when customers are outside 5G coverage areas.
  - International voice and data roaming capabilities in more than 225 destinations, including voice over LTE (VoLTE) roaming and 5G roaming. As of the date of this MD&A, VoLTE roaming is available in 35 international destinations and 5G roaming is available in 47 international destinations.
- IoT technology:
  - LTE-machine (LTE-M) technology across Canada, which supports large numbers of devices that transmit infrequent short bursts of data.
  - Multi-service multi-billing capabilities provide the ability to separately classify, rate and bill data traffic across IoT devices.
  - Specialized IoT solutions that support municipalities, construction, utilities and transportation.
- Ongoing connection of households and businesses directly to fibre-optic cable; over 2.7 million households and businesses connected with TELUS PureFibre in B.C., Alberta and Eastern Quebec at December 31, 2021.
- Broadcasting distribution licences allowing us to offer television services in incumbent territories, as well as a licence to offer video-on-demand services.
- Security technology to support central monitoring and guard response service (where available), integrated with automated smart devices. Field services capabilities to install, upgrade and repair security technology at customers' premises.
- An IP-based national network overlaying an extensive switched network in B.C., Alberta and Eastern Quebec, as well as global interconnection arrangements.
- Seven data centres in six communities directly connected to the national TELUS IP network, creating an advanced and regionally diverse computing infrastructure in Canada.
- Provide access for businesses across Canada through our extensive managed fibre network, and product capabilities bolstered by our national delivery teams.
- Technology solutions to assist regional health authorities, hospitals, insurers, consumers and employers; as well as solutions to improve connectivity and collaboration among healthcare providers, including physicians, nurses, pharmacists and physiotherapists.
- Technology solutions to assist agribusinesses, farmers, ranchers, commodity aggregators, processors, distributors, retailers and consumer packaged goods companies in sustainably improving the efficiency, traceability and responsiveness of the food system.
- Our leading customer service generates increased customer loyalty and reduced churn of mobile and fixed services. Having our TI team members assist with performing customer-serving activities strengthens our ability to continue delivering an exceptional customer experience.

**Competition overview for mobile products and services**

- Facilities-based national competitors Rogers Wireless and Bell Mobility, as well as provincial or regional telecommunications companies Shaw, Quebecor, SaskTel, Eastlink, Tbaytel and Xplornet.
- Fixed wireless services.
- Resellers of competitors' mobile networks.
- Services offered by cable and mobile competitors over mobile and metropolitan Wi-Fi networks.
- Competitors for our IoT solutions include other providers of LTE and LTE-M low-power wide-area network capabilities, IoT connectivity tools and platforms, and automated vehicle location and transportation solutions.

**Competition overview for fixed products and services**

- Cable competitors for internet, telephone and entertainment services, such as Shaw Communications (in B.C. and Alberta) and Cogeco Cable and Videotron (in Eastern Quebec).
- Substitution of mobile services, including our own mobile offerings, for residential local and long distance voice services. The percentage of households with mobile-only telephone services (among all providers, including TELUS) was estimated to be 60% in B.C. and Alberta, and 24% in Eastern Quebec in 2021, compared to 56% and 20%, respectively, in 2020.
- Our national telecommunications competitors Rogers Communications Inc. and BCE Inc. also offer telecommunications services for business and enterprise customers, as do various suppliers that are increasingly selling directly to customers.
- Competitors for home and business security range from local to national companies, such as BCE Inc., Rogers Communications Inc., Chubb-Edwards, Stanley Security, Vivint and Fluent Home. Competitors also include do-it-yourself security providers such as Lorex and home automation service providers such as Ring, Nest, and Wyze.
- Various other small, non-traditional companies offering OTT business solutions, including SD-WAN and UCaaS solutions. These competitors are more prevalent in the small and medium-sized business segments.
- Various others offering VoIP-based local and long distance, as well as internet and data services, or reselling those services.
- OTT and direct-to-consumer voice and/or entertainment services.

1 Network speeds vary with location, signal and customer device. Compatible device required.

**TTech: Mobile products and services for consumers and businesses across Canada. Fixed products and services, including residential services in British Columbia, Alberta and Eastern Quebec; business services across Canada; automation and security solutions across Canada; healthcare solutions across Canada; and global agriculture solutions**

**Competition overview for fixed products and services (continued)**

- Satellite-based entertainment and internet services offered by BCE Inc., Shaw Communications and Xplornet.
- Competitors for TELUS Health include providers of EMR and pharmacy management products, such as Omnimed, Familiprix, Medfar, Fillware, ARI and Logipharm. Competitors also include systems integrators; health service providers, such as Loblaw, McKesson and the Jean Coutu Group, that have also become vertically integrated and own a mix of health services delivery, IT solutions and related services; and potentially, global providers, such as EPIC and Cerner, that could achieve expanded Canadian footprints. Competitors for virtual care services include Tia Health, CloudMD, MD Connected, AppleTree VC, Cover Health, Dialogue, Maple, LifeWorks and Homewood. Competitors for TELUS Health's corporate and preventative health service offerings include Medcan, Cleveland Clinic, Loblaw and Wellpoint.
- TELUS Agriculture is unique in the agriculture technology (AgTech) space in that we operate across the entire food chain, from farm to fork. Our ability to provide solutions across the chain provides us with the ability to drive insights through connecting data at various stages of production. The AgTech space broadly displays strong competition across a high volume of smaller competitors. TELUS Agriculture does have competitors at each stage along the food chain:
  - In the animal health business, competitors include companies such as Performance Livestock Analytics (a part of Zoetis).
  - In the food, beverage and consumer goods business, competitors include Accenture, Oracle and Kantar's.
  - Competitors for our agribusiness solutions range from local to global companies, such as AgData, Proagrica, Farmers Edge and FoodLogiQ.

**DIGITALLY-LED CUSTOMER EXPERIENCES – TELUS INTERNATIONAL (DLCX): We are a digital customer experience innovator that designs, builds and delivers high-tech, high-touch next-generation solutions, including artificial intelligence (AI) and content moderation, for global and disruptive brands.**

**We partner with a diverse set of disruptive and established clients across our core industry verticals. For example, within tech and games, we serve some of the leading social networks and search engines, as well as high-growth online games, ride sharing and real estate technology companies. Within eCommerce and fintech we serve both traditional and next-generation payments and point of sale providers, business-to-business and business-to-consumer Software-as-a-Service (SaaS) companies, online marketplaces and large financial services institutions. Our clients are generally multinational and North American and Europe-based, with some Asia-based that are supporting a global customer base.**

**Our products and services**

- Our solutions and services are relevant across multiple markets, including digital transformation of customer experience systems and digital customer experience management.
- Digital transformation (DX) – Companies are increasingly partnering with third-party providers to meet their digital transformation challenges, which include designing solutions that facilitate an omnichannel experience, building digitally scalable infrastructure and delivering new digital channels. To keep systems scalable, an increasing number of companies are opting for cloud-based solutions and seeking to automate processes where possible.
- Digital customer experience management (DCXM) – DCXM represents the next evolution of customer experience management. In recent years, digital customer experience has become increasingly important to companies, as highly engaged users dictate the nature and frequency of interactions. Customers ascribe value to seamless interactions and are willing to reward positive experiences with loyalty and repeat business. As customers have shifted toward digital channels, leveraging next-generation technologies to deliver a unified and satisfying customer experience has become paramount. We believe we are uniquely well-positioned to serve these markets and, as a result, we have a significant market opportunity due to the overall industry growth rate, low penetration to date and strong exposure to the comparatively higher-growth DCXM sector of the market.
- We serve markets that have experienced high growth in recent years, such as content moderation, which includes review and compliance services of user-generated content on social media and other digital platforms. The necessity of moderating content on digital platforms has prompted enterprises to seek specialized services to accommodate changes in the uncertain, highly regulated environment. AI data solutions is another market we serve that is also experiencing high demand. Along with the volume of content continuing to increase, equally important is the need for constant dynamic changes and need for improvement.

**DLCX: We are a digital customer experience innovator that designs, builds and delivers high-tech, high-touch next-generation solutions, including artificial intelligence (AI) and content moderation, for global and disruptive brands.**

**Our capabilities**

We have the right combination of people, capabilities and technology to help companies address the entire spectrum of designing, building and delivering integrated end-to-end customer experience systems. Our service lines of customer experience management (CXM), content moderation, AI data solutions and digital IT services include services and solutions that span the design, build and deliver framework.

**Strategy and innovation – Understand and define client needs to innovate and develop plans.** With our intuitive digital design approach, we help our clients design next-generation business practices based not only on transforming technology, but also on transforming processes and culture.

- Next-generation digital strategy
- Ideation on innovation
- UX/UI design
- CX process consulting, including customer, employee and system journey mapping

**Next-gen tech and IT services – Building digital customer systems using next-gen technologies.** Our clients often need to re-engineer their customer experience systems to provide a seamless, contextual, consistent and personalized customer experience across all channels – digital or human. To do this, they need to modernize their core systems and applications, while at the same time build new digital solutions that leverage technologies such as cloud, mobile, AI, automation, IoT, analytics and more. The key services underlying our next-gen tech and IT services solution are:

- Engineering, application development and quality assurance (QA)
- Data annotation, AI/ML and intelligent automation – including RPA and chatbots
  - We assist our clients to improve customer experience with data annotation in domains such as search relevance, image/video labelling for smart cities, audio transcription and facial recognition to our clients who utilize AI technologies. We also use AI-based conversation bots in customer engagement situations to augment or simulate human interactions, enabling 24/7 personalized responses to customers. Through TIAI Data Solutions, we collect, annotate and validate data in text, images, videos and audio in more than 500 languages and dialects, including for computer vision, for technology companies in social media, search, retail and mobile.
  - We use advanced analytics and AI techniques to analyze structured and unstructured consumer datasets to provide a unified data view of end customers' entire transaction history with the client, and derive real-time insights from it to provide a personalized customer experience.
  - Intelligent Insights is a diagnostic platform tool that aligns human and digital workforce to manage the end-to-end lifecycle of digital co-workers.
- Managed cloud services – including migration, implementation and managed services for public cloud, private cloud and multi-cloud hybrid environments
- Workforce transformation

**CX process and delivery – Delivering exceptional customer experience.** We use our customer experience process expertise as well as our highly skilled, empathetic and engaged teams to provide exceptional, integrated customer experiences. Our global delivery platform enables us to service clients across geographies and customize the delivery strategy according to their evolving needs.

- Managed solutions, including learning services, workforce management, contact centre
- Learning excellence solutions
- Workforce management services
- Contact Centre-as-a-Service
- Omnichannel customer experience, including care, sales and tech support
- Content moderation, trust and safety
  - We combine automated digital moderation tools with human support to provide a robust trust and safety framework to monitor our clients' digital businesses. Our customizable and scalable digital content management solutions can also help clients boost their social media presence, increase their user base and attract more customers through social and e-commerce channels.
  - Adjacent to content moderation and part of our broader trust and safety program, fraud prevention has become more critical across all industries. Our service offering is focused on promoting ethical conduct, identification verification, and profile validations combating asset misappropriation, managing fraudulent statements and preventing corruption or any other unlawful activity such as account takeovers.
- 360-degree customer analytics

**Competition overview**

- The sectors in which we compete are global, fragmented and rapidly evolving. We face competition primarily from:
  - In-house technology and customer experience management teams
  - Digital transformation services providers such as Endava, EPAM and Globant
  - Globally diversified IT and BPO service providers such as Accenture, Cognizant, Genpact and WNS
  - Customer experience providers such as 24-7 Intouch, TaskUs, Teleperformance S.A. and Webhelp
  - Single-threaded data annotation providers such as Appen.
- We believe that the main competitive factors in our business include digital capabilities, comprehensiveness of offerings, vertical and process expertise, global delivery capabilities, team member engagement and retention, reputation, track record and financial stability. We believe that we compete favourably with respect to each of these factors.

## 4.2 Operational resources

**RESOURCES**

**Our team**

- We had approximately 90,800 employees at December 31, 2021, including 62,100 from TI. Of our 90,800 employees, 28,100 were located in Canada and 62,700 were located internationally. We also use external consultants and contractors, including crowdsourced providers through TELUS International AI Data Solutions (TIAI).
- Approximately 8,070 of our employees are covered by collective agreements. The agreement with the Telecommunications Workers Union (TWU), United SteelWorkers Local 1944, which covers approximately 6,515 employees, expired on December 31, 2021. Negotiations to renew this collective bargaining agreement began in October 2021 and are scheduled to continue into 2022. The expired contract remains in effect while the parties are bargaining, until a new agreement is reached.
- The agreement with the Syndicat québécois des employés de TELUS (SQET), which covers approximately 705 employees in Quebec, expires on December 31, 2022. The agreement with the Syndicat des agents de maîtrise de TELUS (SAMT), which covers approximately 555 employees in Quebec, expires on March 31, 2022. Our TELUS Employer Solutions Inc. subsidiary is signatory to a collective agreement with the B.C. Government and Services Employees' Union, which covers fewer than 100 employees and expires on July 31, 2023.
- Approximately 235 employees within the ADT Security Services Canada, Inc. subsidiary (ADT Canada) are unionized. These employees are covered by 10 separate collective agreements between ADT Canada and a number of different unions in multiple provinces. The expiry dates of these collective agreements vary.
- TI has access to labour across 28 countries for both management as well as support. Digital solutions are primarily resourced from North America, India, Philippines, Central America and Europe.
- Our objective is to attract, develop and retain talented employees in Canada and internationally. We achieve this objective by investing in our people throughout their careers, and by offering diverse and inclusive employment prospects and development opportunities.
- Team member engagement was measured again through our annual fall Pulsecheck survey, resulting in an engagement score of 84%, which is an encouraging accomplishment against the backdrop of the highly competitive and dynamic environment in which we work and reinforces the strength of the culture our team members have built together. TELUS is the most engaged organization globally compared to organizations of our size and composition according to our survey provider, Kincentric.
- In our team member surveys, we continue to include questions to assess our team's health and well-being and gather their insights about our work environment, including changes due to the COVID-19 pandemic. Key highlights include team members confirming their belief that their safety is a priority for their leaders; their leader is providing the support they need during this extraordinary time; and their work arrangements allow them to collaborate productively while also allowing them to meet the needs of customers.
- Having engaged teams leads to a better team member experience, which in turn drives an improved customer service experience – our customers are more satisfied, resulting in a lower churn rate with our products and services.
- In 2021, reinforcement of our culture continued to focus on diversity and inclusion, human capital development and team member engagement, through:
  - Leveraging our strong culture with a focus on listening to team members
  - Putting customers first and leaders engaging their teams through our fair process engagement model, and
  - Utilizing Pulsecheck feedback, including our inclusion index results, to build and create action plans for improvements.
- We aim to attract and retain key team members through both monetary and non-monetary approaches. Our compensation and benefits program is designed to support our high-performance culture and is both market-driven and performance-based. Where required, we implement targeted retention solutions for team members with critical skills or talents that are scarce in the marketplace, and we have a succession planning process to identify top talent for senior-level positions.
- For further details related to our team, see the description under *Mitigation* in *Section 10.11 Our team*.

**Our major brands and distribution channels**

- TELUS – A national communications and information technology company serving customers across mobile, data, IP, voice, television, entertainment, video and security, driven by a social purpose to connect all Canadians for good.
- Koodo Mobile – A national provider of postpaid and prepaid mobile voice and data services with a broad distribution network, including TELUS-owned stores, dealers and third-party electronics retailers.
- Public Mobile – A prepaid mobile service provider with web-based and physical distribution, providing customers with a SIM-only service.
- Mobile Klinik – A provider of device performance and professional smartphone and tablet repair offering high-quality, certified pre-owned mobile devices.
- Optik TV, launched in 2010. Pik TV, launched in 2017.
- TELUS PureFibre – Our next-generation fibre-optic network, which delivers fast internet and provides the backbone for our 5G network.
- TELUS SmartHome Security and TELUS Secure Business – Full-service security offerings for residential and business customers.
- TELUS International – A digital customer experience innovator that designs, builds and delivers high-tech, high-touch next-generation solutions, including AI and content moderation, for global and disruptive brands.
- TELUS Health – A national provider of electronic medical and personal health records, home health monitoring, benefits and pharmacy management solutions, preventive healthcare services and virtual care solutions for consumers, employers and insurers. We are improving health outcomes for all Canadians, including those in rural and Indigenous communities, through our virtual care offerings including TELUS Health MyCare, TELUS Health Virtual Care and TELUS Health Virtual Pharmacy, as well as through our TELUS Health Care Centres, LivingWell Companion personal emergency response service, the TELUS Healthy Living Network and Health for Good mobile health clinics.

**RESOURCES**

**Our major brands and distribution channels (continued)**

- TELUS Agriculture – A global provider of agriculture and food technology and data solutions, serving customers across the food value chain.
- TELUS Ventures – A corporate venture capital fund that has invested in more than 80 market-transforming companies since 2001.
- GoCo – An agile entity that brings next-generation unified communications and managed network solutions to the business market in a highly differentiated and entrepreneurial manner.
- Social purpose initiatives – TELUS Wise (national digital safety education program), TELUS Pollinator Fund for Good (impact fund), and Connecting for Good programs that help bridge the digital divide: Mobility for Good (free or low-cost mobility plans and phones), Internet for Good (low-cost internet plans), Tech for Good (support and training, including assistive technology for Canadians with disabilities), and Health for Good (mobile health clinics that bring care to those experiencing homelessness).
- Our sales and support distribution channels:
  - Mobile services are supported through a broad network of TELUS-owned and branded stores, including our 50% ownership of the kiosk channel WOW! Mobile, and an extensive distribution network of exclusive dealers and large third-party national retail partners (e.g. Best Buy, Walmart and London Drugs), as well as online self-serve applications, intuitive virtual-assistant chatbots, mass marketing campaigns and customer care telephone agents. Through Mobile Klinik, we offer on-site professional smartphone and tablet repair services and sales.
  - Fixed residential services (including automation and security) are supported through TELUS-owned and branded stores, customer care telephone agents, digital home technicians and partners and online and TV-based self-serve applications.
  - Through **telus.com**, we sell mobile products and services (including digital accessories), fixed products and services, automation and security, health and business products and services. We provide online account management tools (e.g. My TELUS), enabling customers to manage their accounts through our website or mobile applications, as well as online chats for customer support. We also provide video calling solutions to enable installations without having technicians enter a customer's premises.
  - Dedicated direct-to-consumer channel across multiple provinces focusing on product intensity; safety protocols are maintained at all times when team members interact with customers.
    - In areas where it was decided not to proceed with field activity due to the pandemic, our teams were mobilized to make proactive outbound calls.
  - Business services, including healthcare and security, across mobile and fixed service offerings are supported through certain dedicated stores for business, TELUS sales representatives, product specialists, independent dealers, direct business channels and online self-serve applications for small and medium-sized businesses.
  - TELUS International's solutions are supported through sales representatives, client relationship management teams, data annotation and content moderation teams, and digital engineers, developers and architects.
  - TELUS Health provides some of its services – personal health records and home health monitoring – in partnership with provincial governments.
  - TELUS Agriculture's solutions are supported through online self-serve applications, sales representatives and customer relationship management teams.

**Our technology, systems and properties**

- We are a technology-enabled company with a multitude of IT systems and processes. We are focused on driving innovation and making generational investments to deliver state-of-the-art broadband solutions in an increasingly digital society.
- Broadband consumer and business networks
  - We launched our 4G LTE network in 2012, and today it covers 99% of Canada's population. This network evolved in 2017 to adopt LTE-A technology, which now covers 97% of Canada's population and offers peak theoretical speeds of up to 1.5 Gbps. Our LTE CAT-M1 IoT network covers 96% of Canada's population. See *Leveraging TELUS' world-leading technology to drive superior growth across mobile, home and business services* in *Section 3 Corporate priorities* for additional information.
  - We have made significant investments in heterogeneous network (HetNet) technology, one of the key building blocks for 5G. HetNet combines multiple types of cells, such as outdoor macrocells and microcells, as well as indoor pico cells, to enhance coverage and capacity in crowded urban areas and inside buildings. By taking continuous strides to evolve our small-cell technology concurrent with the evolution of network technologies to LTE-A pro (i.e. 4.5G), in 2017, we became the first operator in Canada to introduce licensed assisted access (LAA) small cells for both outdoor and indoor environments, capable of speeds of up to 970 Mbps. In 2019, we continued advancing LAA technology with speeds of up to 1.2 Gbps, and we have deployed more than 400 LAA sites to date.
  - In 2018, we became the first operator globally to introduce LTE FDD massive multiple-input-multiple-output (MIMO) 32TRx technology on the 2600 MHz band as part of the LTE-A pro technology evolution, and in 2020, we introduced dual-band massive MIMO technology in the 1900 MHz and AWS bands, also a global first. This technology further enhances the capacity of our wireless infrastructure, enables a stronger customer experience and helps to sustain our long-term wireless leadership.
  - In 2019, we progressed the virtualization of our core network infrastructure with the voice core, providing a stepping stone into 5G service readiness. The network virtualization improves our network scalability, resiliency and cost efficiency.
  - In 2020, we launched our 5G technology capable of speeds of up to 1.7 Gbps, and by December 31, 2021, our 5G network covered 70% of Canada's population. In 2021, we increased the speeds of our 5G network, capable of up to 1.9 Gbps, through the deployment of incremental 5G spectrum. Our 5G coverage is foundational, as it will enable the advancement of new 5G capabilities such as network slicing, multi-access edge computing (MEC) and low-latency critical communications. A key enhancement to our 5G network in 2021 is the beginning of the deployment of the 3.5 GHz spectrum with MIMO technology.

**Our technology, systems and properties (continued)**

- Our investments to deploy our PureFibre technology have brought fibre-optic connectivity further into our infrastructure and directly to homes and businesses. At the end of 2021, over 2.7 million homes and businesses in communities across B.C., Alberta and Quebec had access to ultra-fast, symmetrical internet speeds of 150 Mbps up to 1 Gbps, and approximately 1.3 million premises in B.C. and Alberta had access to symmetrical internet speeds of up to 2.5 Gbps with TELUS PureFibre. Recognizing the need for highly reliable connectivity with low latency throughput to support emerging services such as virtualized networks and IoT applications, we have also begun rolling out new equipment for enhanced speeds and services.
  - We continue to deploy the next evolution of our fixed IP and optical core/edge technology, smart edge architecture. This architecture enables significant automation and per-port cost improvement to support network growth and evolution.
  - We continue to roll out our third-generation national dense wavelength division multiplexing (DWDM) transport backbone (packet transport 3.0) colourless, directionless and contentionless (CDC) network overlay that connects from B.C. to Quebec and into the U.S. This architecture allows network growth without the need for costly re-generation, enables optimal optical rerouting during a fibre cut and improves network growth costs.
  - In 2021, we continued evolving our PureFibre and HSIA technologies to deliver a superior customer experience, propelling our market leadership in home and business services by launching 2.5 Gbps symmetrical service to major markets in B.C. and Alberta while continuing to bring broadband network speeds to thousands of homes in rural and Indigenous communities in B.C., Alberta and Quebec.
  - In 2021, we leveraged our national DWDM footprint to launch 1G, 10G and 100G optical wavelength services to our business customers.
  - We continue to evolve our world-class emergency services to harness the power of IP through our implementation of next-generation 9-1-1.
  - In 2021, we enabled the STIR/SHAKEN capabilities across our voice networks as per a CRTC mandate to prevent caller ID spoofing and help combat fraudulent calls.
  - We have continued to innovate for our customers through our Optik TV and Pik TV platforms. In 2018, we introduced high dynamic range (HDR) colour capability to our 4K Optik TV customers, making us the first operator in Canada to deliver 4K HDR video across live TV, video-on-demand and Netflix services. We also launched device applications for Pik TV and Optik TV and gave customers the option to purchase Pik TV using only a web browser. By investing in the cloudification of video infrastructure and innovative applications, we are continuing to advance our priority of enabling “anytime, everywhere” access to content and entertainment, thereby continuing to deliver an exceptional customer experience.
  - In 2021, we launched Wi-Fi 6 capability, following our successful 2018 introduction of TELUS Boost Wi-Fi, a network of boosters that extends the reach of strong and reliable in-home Wi-Fi signals.
  - In 2021, we introduced XGS-PON as the next generation of PureFibre technology to more than quadruple our bandwidth delivery capabilities.
  - We are continually enhancing our customer applications across Pik TV, Optik TV, TELUS SmartHome and TELUS My Wi-Fi, including deploying advanced Cujo-based parental controls.
- We are continuing to monitor traffic requirements and invest in our network to maintain service and support to Canadians:
  - Expanding capacity for Optik TV video-on-demand and new solutions to enable scaling to support a 40% increase in video-on-demand consumption and a 25% increase in broadcast viewing at peak levels.
  - Continuing to migrate voice traffic from legacy 3G with 85% of calls now processed as VoLTE.
  - Doubling virtual private network (VPN) and DefensePro capacities to 12 Gbps to support a 60% growth in VPN daily usage to approximately 19,000 users per day.
  - Doubling virtual desktop infrastructure (VDI) gateway capacity with additional resiliency between data centres; and adding 40% more TELUS Authentication Services (TAS) tokens (10,000) to support 21 times growth in VDI peak connections from home.
  - Augmenting our wireless networks to support a 32% year-over-year increase in mobility traffic and a 21% year-over-year increase in wireless HSIA traffic in 2021.
  - Deploying mission critical environment pods (self-contained units with HVAC and power) to quickly provision our critical network equipment and reduce the risk of equipment outages.

- Real estate – Our network facilities are constructed under or along streets and highways, pursuant to rights-of-way granted by the owners of land, including municipalities and the Crown, or on freehold land we own.
  - Our real estate properties (owned or leased) also include administrative office spaces, mixed-use office, commercial and residential properties, all of which may be developed through joint ventures, as well as other real estate development projects that advance our social purpose, work centres and space for telecommunications equipment. Some buildings are constructed on leasehold land and the majority of wireless radio antennae are on towers that are situated on lands or are on buildings held under leases or licences with varying terms. We currently participate in two real estate joint ventures. (See *Section 7.11*.)
- Intangible assets – Our intangible assets include spectrum licences from Innovation, Science and Economic Development Canada (ISED), which are essential to providing mobile services. We have assets averaging 198 MHz nationally. We have deployed 700 MHz, 2300 MHz, 2500 MHz, 1900 MHz, AWS and 850 MHz spectrum to evolve our wireless infrastructure, and in 2020 we began operationalizing our 600 MHz spectrum acquired in the 2019 auction. Further, we began our work to operationalize our recently acquired 3500 MHz spectrum in the latter part of 2021 and will continue doing so in 2022. We intend to continue acquiring spectrum within the rules set out by ISED to meet our future capacity requirements.
  - Intellectual property, which we own or have been granted the right to use, is an essential asset for us. Intellectual property enables us to be known and recognized in the marketplace through our brand style, trade dress, domain names and trademarks. It protects our know-how and software, systems, processes and methods of doing business through copyrights, patents and confidential information, including trade secrets. It also helps us to improve our competitiveness by fostering an innovative work environment. Each form of intellectual property is important to our success. For instance, the TELUS brand plays a key role in product positioning and our Company’s reputation. We aim to maximize the value of our intangible assets in the areas of innovation and invention by ensuring that they are appropriately used, protected and valued. To protect our intellectual property assets, we rely on a combination of legal protections afforded under copyright, trademark, patent and other intellectual property laws, as well as contractual provisions under licensing arrangements. Further information on recognized tangible and intangible assets can be found in *Section 8.1 Critical accounting estimates and judgments*.

**RESOURCES**

**Our technology, systems and properties (continued)**

  - Our broadcasting distribution licences enable us to provide entertainment services. See *Broadcasting-related issues* in *Section 9.4*, which discusses developments relating to these licences.
- Future technologies – In addition to evolving our existing infrastructure, we are investing in the technologies of the future that will serve as the foundation to provide next-generation services to Canadians.
  - We continue to invest in enabling systems such as our Jasper connected device platform (CDP) and our dedicated machine-to-machine virtual evolved packet core (M2M vEPC) to support IoT applications, where the ease of onboarding partners is crucial for emerging services such as connected vehicles, fleet management and more.
  - In 2018, we deployed our LTE-M technology across Canada. LTE-M is a low-power wide-area network (LPWAN) technology, which is ideal for IoT because it supports large numbers of devices that transmit infrequent short bursts of data, like IoT sensors. It will enable a plethora of IoT applications through long-range connectivity, extended battery life and carrier-grade security and quality of service.
  - We continue to invest in both technology and talent across TELUS to harness the competitive capabilities, flexibility, and resilience of cloud and digital technology. Our ongoing digitization efforts enable TELUS to rapidly introduce new products and services, swiftly respond to customer and market needs, and provide highly reliable service.
  - Advancing our drive to simplify and consolidate systems across several fronts, such as unlocking customer relationship management (CRM)/billing systems in Quebec with LivingWell Companion and SmartHome products now supported for Quebec incumbent local exchange carrier (ILEC) and new fibre customers, opening new Quebec territory growth opportunities, automating copper to fibre (C2F) processes to create a one-click C2F order, reducing call handling time and billing errors, and completing copper on CRM/billing system trials, each paving the way for consolidating consumer ordering into one system stack. Manual migrations of Quebec customers to our shared national systems have started in 2021 and we expect to be substantially complete by the end of 2022.
  - Modernizing our enterprise communication platform to be fully cloud-enabled and to improve system redundancy while processing millions of messages, including mobile eBill short message service (SMS) reminders, Koodo data threshold SMS and upsell messages, and mobile number portability messages.
  - We completed the migration of our internet customers to our new cloud-based email platform. This service, leveraging our partnership with Google, provides an exceptional customer experience, improved reliability and expanded features for our customers.
  - Reducing manual work through automation and advancing Agile and DevOps capabilities:
    - Leading to improved agility, cost to serve and speed to market, while also driving reliability, including expanding test automation capabilities
    - Scaling deploy-on-demand release frameworks, enabling faster speed to market and mitigating risks early in the release cycle, expanding automated software development and self-serve test data management capabilities to improve quality of software
    - Standardizing test case and defect management toolset, mitigating reliability risk related to unsupported tools.
  - Improving our data analytics and telemetry capabilities to deliver business outcomes through enhanced customer targeting, visualization and business intelligence tools, while also making significant accuracy and reliability enhancements to our geo-analytics platform to support new and personalized/targeted market campaigns.
- Through TI, we are a digital customer experience innovator that designs, builds and delivers high-tech, high-touch next-generation solutions, including AI and content moderation, for global and disruptive brands, as described in *Section 4.1.* These services are provided from facilities located in North and Central America, Europe and Asia.
- Through TELUS Health's services – such as pharmacy management, EMRs (including mobile EMRs), electronic health records, personal health records, clinical information systems, remote patient monitoring, virtual care offerings and online claims settlement management software solutions, including the online renewal of prescriptions, e-prescribing services and MedDialog – TELUS Health facilitates the integration of electronic health records from the home to the doctor's office to the hospital, making critical health information available to healthcare providers over our broadband network.
  - Through its TELUS Health Care Centres, TELUS Health also provides executive benefits, occupational health, employee health and wellness services and individual preventive health services. With preventive health assessments, 24/7 virtual care support and health specialists, TELUS Health Care Centres provide proactive health services to individuals and their families.
- Our TELUS Agriculture technology solutions meaningfully impact primary production and sustainability across the food value chain, by empowering value chain participants with solutions that leverage advanced data systems and AI to streamline operations, improve food traceability, and provide consumers with fresher and healthier food.

## 4.3 Liquidity and capital resources

**Capital structure financial policies**

Our objective when managing capital is to maintain a flexible capital structure that optimizes the cost and availability of capital at acceptable risk.

In our definition of capital, we include Common equity (excluding Accumulated other comprehensive income), non-controlling interests, Long-term debt (including long-term credit facilities, commercial paper backstopped by long-term credit facilities and any hedging assets or liabilities associated with Long-term debt items, net of amounts recognized in Accumulated other comprehensive income), Cash and temporary investments, and Short-term borrowings, including those arising from securitized trade receivables.

We manage our capital structure and make adjustments to it in light of changes in economic conditions and the risk characteristics of our business. In order to maintain or adjust our capital structure, we may adjust the amount of dividends paid to holders of Common Shares, purchase Common Shares for cancellation pursuant to normal course issuer bid (NCIB) programs, issue new shares (including Common Shares and TELUS International subordinate voting shares), issue new debt, issue new debt to replace existing debt with different characteristics, and/or increase or decrease the amount of trade receivables sold to an arm's-length securitization trust.

We monitor capital utilizing a number of measures, including our net debt to EBITDA – excluding restructuring and other costs ratio, coverage ratios and dividend payout ratios. (See definitions in *Section 11.1 Non-GAAP and other specified financial measures*.)

**Financing and capital structure management plans**

**REPORT ON FINANCING AND CAPITAL STRUCTURE MANAGEMENT PLANS**

**Pay dividends to the holders of the common shares of TELUS Corporation (Common Shares) under our multi-year dividend growth program**

- In May 2019, we announced our intention to target ongoing semi-annual dividend increases, with the annual increase in the range of 7 to 10% from 2020 through to the end of 2022, thereby extending the policy first announced in May 2011. Notwithstanding this target, dividend decisions will continue to be subject to our Board's assessment and the determination of our financial position and outlook on a quarterly basis. Our long-term Common Share dividend payout ratio guideline is 60 to 75% of free cash flow on a prospective basis. (See *Section 7.5 Liquidity and capital resource measures*.) There can be no assurance that we will maintain a dividend growth program or that it will be unchanged through 2022. (See *Caution regarding forward-looking statements – Lower than planned free cash flow could constrain our ability to invest in operations, reduce leverage or return capital to shareholders, and could affect our ability to sustain our dividend growth program through 2022 and any further dividend growth programs* and *Section 10.14 Financing, debt and dividends*.)
- Dividends declared in 2021 totalled $1.2710 per share, an increase of $0.08605 per share or 7.3% compared to the dividends declared in 2020. On February 9, 2022, the Board elected to declare a first quarter dividend of $0.3274 per share, payable on April 1, 2022, to shareholders of record at the close of business on March 11, 2022. The first quarter dividend for 2022 reflects a cumulative increase of $0.0162 per share or 5.2% from the $0.3112 per share dividend declared one year earlier.
- Our dividend reinvestment and share purchase (DRISP) plan trustee acquired shares from Treasury for the DRISP plan, rather than acquiring Common Shares in the stock market. We may, at our discretion, offer Common Shares at a discount of up to 5% from the market price under the DRISP. Effective with the dividends paid beginning on October 1, 2019, we offered Common Shares from Treasury at a discount of 2%. During 2021, our DRISP plan trustee acquired from Treasury approximately 24 million dividend reinvestment Common Shares for $620 million. For the dividends paid on January 4, 2022, the DRISP participation rate, calculated as the DRISP investment of $156 million (including the employee share purchase plan) as a percentage of gross dividends, was approximately 35%.
- TELUS International intends to retain all available funds and any future earnings to support operations and to finance the growth and development of its business.

**Purchase Common Shares**

- In June 2021, we received approval from the Toronto Stock Exchange (TSX) for a new 2021 normal course issuer bid (NCIB) to purchase and cancel up to 16 million Common Shares for an aggregate purchase price of up to $250 million over a 12-month period, from June 4, 2021, to June 3, 2022, through the facilities of the TSX, the New York Stock Exchange and alternative Canadian trading platforms, or as otherwise permitted by applicable securities laws. TELUS will purchase Common Shares only when and if we consider it opportunistic, subject to any purchases that may be made under automatic share purchase plans (ASPP). As of February 10, 2022, we have not completed any transactions pursuant to our 2021 NCIB.
- We may also enter into ASPP with a broker for the purpose of permitting us to purchase our Common Shares under our NCIB at times when we would not be permitted to trade in our shares, including regularly scheduled quarterly blackout periods. Such purchases will be determined by the broker in its sole discretion based on parameters that we have established prior to any blackout period, in accordance with TSX rules and applicable securities laws. The ASPP has been approved by the TSX and may be implemented from time to time in the future.

**Use proceeds from securitized trade receivables (Short-term borrowings), bank facilities and commercial paper as needed, to supplement free cash flow and meet other cash requirements**

- Our issued and outstanding commercial paper was $1.9 billion at December 31, 2021, all of which was denominated in U.S. dollars (US$1.5 billion), compared to $731 million (US$574 million) at December 31, 2020.
- Net draws due to a syndicate of financial institutions (excluding TELUS Corporation) on the TI credit facility were US$854 million at December 31, 2021, compared to US$1.4 billion at December 31, 2020. The TI credit facility is non-recourse to TELUS Corporation.
- Proceeds from securitized trade receivables were $100 million at December 31, 2021, unchanged from December 31, 2020.

| REPORT ON FINANCING AND CAPITAL STRUCTURE MANAGEMENT PLANS |
| --- |
| **Maintain compliance with financial objectives** |

- **Maintain investment grade credit ratings in the range of BBB+ or the equivalent** – On February 10, 2022, investment grade credit ratings from the four rating agencies that cover TELUS were in the desired range. (See *Section 7.8 Credit ratings*.)
- **Net debt to EBITDA – excluding restructuring and other costs ratio of 2.20 to 2.70 times** – As measured at December 31, 2021, this ratio was 3.17 times, outside of the objective range, primarily due to the acquisition of spectrum licences and the fiscal 2021 impact of the COVID-19 pandemic. The net effect of business dispositions and business acquisitions increased the ratio. Given the cash demands of the 2019 600 MHz, the recent 2021 3500 MHz and upcoming spectrum auctions, as well as the inability to predict impacts of the COVID-19 pandemic, the assessment of the guideline and return to the objective range remains to be determined; however, it is our intent to return to a ratio below 2.70 times in the medium term (following the recent 2021, and upcoming 2023 and 2024, spectrum auctions), consistent with our long-term strategy. (See *Section 7.5 Liquidity and capital resource measures*.)
- **Common Share dividend payout ratio of 60 to 75% of free cash flow on a prospective basis** – Our objective range is on a prospective basis. The Common Share dividend payout ratio[1] we present in this MD&A is a historical measure utilizing the most recent four quarters of dividends declared, net of dividend reinvestment plan effects, and free cash flow, and is disclosed for illustrative purposes in evaluating our target guideline. As at December 31, 2021, the ratio was 140%, outside of the objective range, primarily due to: (i) our planned accelerated capital expenditures program to support our broadband capital investments, the build-out of our TELUS PureFibre infrastructure and the acceleration of our 5G network roll-out; and (ii) the fiscal 2021 impact of the pandemic. Excluding the effects of our accelerated capital expenditures program, as at December 31, 2021, the ratio was 73%. (See *Section 7.5 Liquidity and capital resource measures*.)
- **Generally maintain a minimum of $1 billion in available liquidity** – As at December 31, 2021, our available liquidity[1] was approximately $2.1 billion. (See *Section 7.6 Credit facilities* and *Liquidity risk* in *Section 7.9*.)

1 These are non-GAAP and other specified financial measures. See *Section 11.1 Non-GAAP and other specified financial measures*.

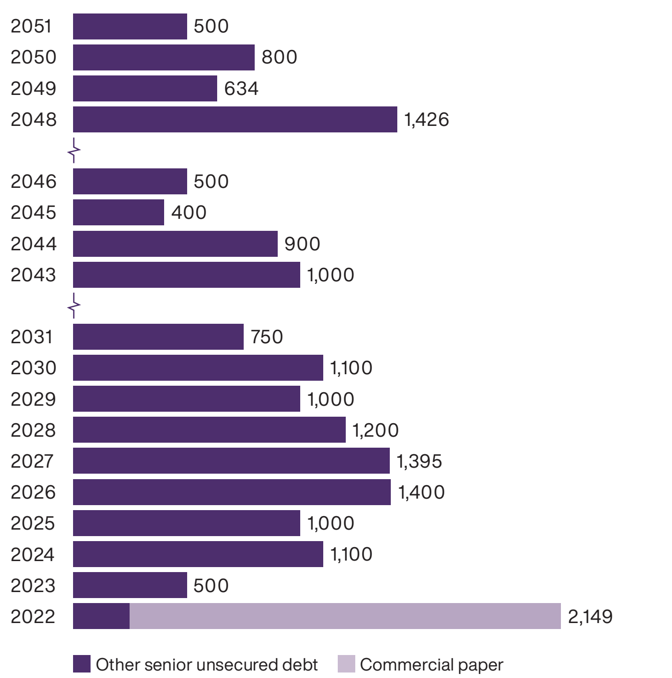
**Financing and capital structure management plans for 2022**

At the end of 2021, our senior unsecured debt (excluding unamortized discount) was $17.8 billion. For our long-term debt, the weighted average term to maturity was approximately 12.5 years (excluding commercial paper, the revolving component of the TI credit facility, lease liabilities and other long-term debt). Our weighted average interest rate on long-term debt (excluding commercial paper, the revolving component of the TI credit facility, lease liabilities and other long-term debt) was 3.72% at December 31, 2021, down from 3.80% one year ago. Aside from Short-term borrowings of $100 million, commercial paper of $1.9 billion (US$1.5 billion), the utilized revolving component of the TI credit facility (excluding TELUS Corporation) of $138 million (US$109 million) and lease liabilities of $1.9 billion, all of our debt was on a fixed-rate basis.

During 2022, we may issue notes to accelerate future debt reduction by prepaying certain notes or to use for general corporate purposes. Anticipated free cash flow and sources of capital are expected to be more than sufficient to meet requirements. For the related risk discussion, see *Section 10.14 Financing, debt and dividends*.

**Senior unsecured debt principal maturities as at December 31, 2021**

($ millions)



## 4.4 Disclosure controls and procedures and changes in internal control over financial reporting

**Disclosure controls and procedures**

Disclosure controls and procedures are designed to provide reasonable assurance that all relevant information is gathered and reported to senior management, including the President and Chief Executive Officer (CEO) and the Executive Vice-president and Chief Financial Officer (CFO), on a timely basis so that appropriate decisions can be made regarding public disclosure.

The CEO and the CFO have assessed the effectiveness of our disclosure controls and procedures related to the preparation of this MD&A and the December 31, 2021, Consolidated financial statements. They have concluded that our disclosure controls and procedures were effective, at a reasonable assurance level, in ensuring that material information relating to TELUS and its consolidated subsidiaries would be made known to them by others within those entities, particularly during the period in which the MD&A and the Consolidated financial statements were being prepared.

**Internal control over financial reporting**

Internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements in accordance with IFRS-IASB and the requirements of the Securities and Exchange Commission in the United States, as applicable. TELUS' CEO and CFO have assessed the effectiveness of our internal control over financial reporting as of December 31, 2021, in accordance with the criteria established in *Internal Control – Integrated Framework (2013)*, issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Based on this assessment, TELUS' CEO and CFO have concluded that our internal control over financial reporting is effective as of December 31, 2021, and have certified TELUS' annual filings within our annual report on Form 40-F, as required by the United States' *Sarbanes-Oxley Act of 2002*, and TELUS' Annual Information Form, as required by National Instrument 52-109 *Certification of Disclosure in Issuers' Annual and Interim Filings*.

Deloitte LLP, our auditor, has audited our internal control over financial reporting as of December 31, 2021.

**Changes in internal control over financial reporting**

There were no changes in internal control over financial reporting that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting in 2021.

# 5 Discussion of operations

This section contains forward-looking statements, including those with respect to mobile phone average revenue per subscriber per month (ARPU) growth, products and services trends regarding loading and retention spending, equipment margins, subscriber growth and various future trends. There can be no assurance that we have accurately identified these trends based on past results or that these trends will continue, in particular given uncertainty with regard to the COVID-19 pandemic and associated economic impacts. See *Caution regarding forward-looking statements* at the beginning of this MD&A.

## 5.1 General

Operating segments are components of an entity that engage in business activities from which they earn revenues and incur expenses (including revenues and expenses related to transactions with the other component(s)), the operations of which can be clearly distinguished and for which the operating results, and in particular, Adjusted EBITDA, are regularly reviewed by a chief operating decision-maker to make resource allocation decisions and to assess performance.

Effective January 1, 2020, we embarked upon the modification of our internal and external reporting processes, systems and internal controls to accommodate the technology convergence-driven cessation of the historical distinction between our wireless and wireline operations at the level of regularly reported discrete performance measures that are provided to our CEO (our chief operating decision-maker). Prior to the World Health Organization characterizing COVID-19 as a pandemic, we had anticipated transitioning to a new segment reporting structure during 2020; commencing with the three-month period ended March 31, 2021, we have now transitioned to our new segment reporting structure and have recast comparative amounts on a comparable basis. Segmented information in *Note 5* of the Consolidated financial statements is regularly reported to our CEO.

The TELUS technology solutions (TTech) segment includes: network revenues and equipment sales arising from mobile technologies; data revenues (which include internet protocol; television; hosting, managed information technology and cloud-based services; software, data management and data analytics-driven smart food-chain technologies; and home and business security); certain healthcare software and technology solutions; voice and other telecommunications services revenues; and equipment sales.

The digitally-led customer experiences – TELUS International (DLCX) segment, which has the U.S. dollar as its primary functional currency, is comprised of digital customer experience and digital-enablement transformation solutions, including artificial intelligence (AI) and content management solutions, provided by TELUS International.

**Selected annual information**

| Years ended December 31 ($ in millions, except per share amounts) | 2021 | 2020 | 2019 |
|---|---|---|---|
| Operating revenues and other income | **17,258** | 15,463 | 14,658 |
| Net income | **1,698** | 1,260 | 1,776 |
| Net income attributable to TELUS Corporation Common Shares (Common Shares) | **1,655** | 1,207 | 1,746 |
| Net income per Common Share | | | |
| Basic earnings per share (EPS) | **1.23** | 0.95 | 1.45 |
| Diluted EPS | **1.22** | 0.94 | 1.45 |
| Dividends declared per Common Share | **1.2710** | 1.18495 | 1.12625 |

| At December 31 ($ millions) | 2021 | 2020 | 2019 |
|---|---|---|---|
| Total assets | **47,994** | 43,273 | 37,985 |
| Current maturities of long-term debt | **2,927** | 1,432 | 1,332 |
| Non-current financial liabilities[1] | | | |
| Provisions | **51** | 54 | 43 |
| Long-term debt | **17,925** | 18,856 | 17,142 |
| Other long-term financial liabilities | **181** | 236 | 113 |
| Total non-current financial liabilities | **18,157** | 19,146 | 17,298 |
| Deferred income taxes | **4,056** | 3,718 | 3,214 |
| Common equity | **15,116** | 12,040 | 10,548 |

1 In our specific current instance, financial liabilities do not include liabilities that are excluded by definition (e.g. employee benefits and share-based compensation liabilities) or liabilities that do not involve a future outlay of economic resources (e.g. deferred recognition of customer activation and connection fees; deferred gains on sale-leaseback of buildings).

**Operating revenues and other income:** Consolidated Operating revenues and other income increased by $1,795 million in 2021 and $805 million in 2020. These increases were largely attributable to increased fixed data services and mobile revenues, as well as growth in DLCX operating revenues.

**Total assets:** Growth in Total assets includes increases in Property, plant and equipment and Intangible assets, which increased by a combined $3,349 million in 2021 and $2,984 million in 2020. These increases resulted primarily from business acquisitions, our ongoing investments in broadband infrastructure, connecting additional homes and businesses directly to our fibre-optic technology and accelerating our 5G network build. See *Section 7.3 Cash used by investing activities*.

Total assets ($ millions)


For changes **in Long-term debt**, see *Section 6 Changes in financial position* and *Section 7.4 Cash provided by financing activities*.

## 5.2 Summary of consolidated quarterly results, trends and fourth quarter recap

### Summary of quarterly results

| ($ millions, except per share amounts) | 2021 Q4 | 2021 Q3 | 2021 Q2 | 2021 Q1 | 2020 Q4 | 2020 Q3 | 2020 Q2 | 2020 Q1 |
|---|---|---|---|---|---|---|---|---|
| Operating revenues and other income[1] | **4,872** | **4,251** | **4,111** | **4,024** | 4,060 | 3,981 | 3,728 | 3,694 |
| Operating expenses | | | | | | | | |
| Goods and services purchased[2] | **1,882** | **1,660** | **1,609** | **1,548** | 1,766 | 1,632 | 1,458 | 1,412 |
| Employee benefits expense[2] | **1,108** | **1,095** | **1,051** | **1,015** | 958 | 959 | 911 | 873 |
| Depreciation and amortization | **830** | **804** | **793** | **789** | 789 | 773 | 725 | 725 |
| Total operating expenses | **3,820** | **3,559** | **3,453** | **3,352** | 3,513 | 3,364 | 3,094 | 3,010 |
| Operating income | **1,052** | **692** | **658** | **672** | 547 | 617 | 634 | 684 |
| Financing costs before long-term debt prepayment premium | **192** | **184** | **203** | **207** | 190 | 187 | 184 | 192 |
| Long-term debt prepayment premium | **–** | **10** | **–** | **–** | – | – | 18 | – |
| Income before income taxes | **860** | **498** | **455** | **465** | 357 | 430 | 432 | 492 |
| Income taxes | **197** | **140** | **111** | **132** | 86 | 109 | 117 | 139 |
| Net income | **663** | **358** | **344** | **333** | 271 | 321 | 315 | 353 |
| Net income attributable to Common Shares | **644** | **345** | **335** | **331** | 260 | 307 | 290 | 350 |
| Net income per Common Share: | | | | | | | | |
| Basic EPS | **0.47** | **0.25** | **0.25** | **0.25** | 0.20 | 0.24 | 0.23 | 0.28 |
| Adjusted basic EPS[3] | **0.23** | **0.29** | **0.26** | **0.27** | 0.22 | 0.28 | 0.25 | 0.32 |
| Diluted EPS | **0.47** | **0.25** | **0.25** | **0.25** | 0.20 | 0.24 | 0.23 | 0.28 |
| Dividends declared per Common Share | **0.3274** | **0.3162** | **0.3162** | **0.3112** | 0.3112 | 0.29125 | 0.29125 | 0.29125 |
| Additional information: | | | | | | | | |
| EBITDA | **1,882** | **1,496** | **1,451** | **1,461** | 1,336 | 1,390 | 1,359 | 1,409 |
| Restructuring and other costs | **44** | **63** | **38** | **41** | 71 | 58 | 70 | 60 |
| Other equity losses related to real estate joint ventures | **1** | **–** | **1** | **1** | 2 | 8 | 3 | 6 |
| Gain on disposition of financial solutions business | **410** | **–** | **–** | **–** | – | – | – | – |
| Retirement of a provision arising from business acquisition-related written put options within DLCX | **–** | **–** | **–** | **–** | – | – | 71 | – |
| Adjusted EBITDA | **1,517** | **1,559** | **1,490** | **1,503** | 1,409 | 1,456 | 1,361 | 1,475 |
| Cash provided by operating activities | **896** | **1,309** | **1,244** | **939** | 1,033 | 902 | 1,462 | 1,177 |
| Free cash flow | **43** | **203** | **210** | **321** | 218 | 161 | 511 | 545 |

1 In the fourth quarter of 2021, we recorded a gain on disposition of our financial solutions business of $410 million.
2 Goods and services purchased and Employee benefits expense amounts include restructuring and other costs.
3 See *Section 11.1 Non-GAAP and other specified financial measures.*

### Trends

COVID-19 was characterized as a pandemic in March 2020 and has had significant impacts on our business. The pandemic prevents us, our customers and our suppliers from operating in traditional manners of business in certain areas. While we expect the pandemic to continue to affect our operations until at least 2023, we have adapted, and continue to adapt, to future modes of operating.

The trend of year-over-year increases in consolidated revenue reflects TTech growth, including: (i) fixed data services growth in internet revenues, TV revenues, home and business security revenues, smart food-chain technology revenues and other advanced application offerings; (ii) mobile network revenue generated from growth in our subscriber base, as well as the acceleration of Internet of Things (IoT) connections, largely offset by COVID-19 pandemic impacts such as lower roaming revenue related to travel restrictions and customers reducing their general shopping habits in retail outlets commencing from the temporary closure of approximately 90% of our retail outlets beginning in March 2020 through a majority of the second quarter of 2020; and (iii) certain health revenues, including health benefits management, collaborative health records, pharmacy management and virtual pharmacy solutions, as well as TELUS Health Virtual Care. All of these areas have been partly offset by moderating equipment revenue growth that can be attributed to the abovementioned change in customers' general shopping habits in retail outlets, which more recently has seen suppressed handset upgrade volumes throughout 2020 manifest in increased demand in the first half of 2021, as well as other pandemic impacts, such as the temporary closure of our TELUS Health Care Centres in 2020, which began operating at reduced volume in 2021, and business customers faced with reduced and/or closed operations. Increased internet and data services and TV service revenues are being generated by subscriber growth and higher internet revenue per customer. There has also been increased customer adoption of our home and business security services and smart food-chain technology. For additional information on mobile and fixed revenue and subscriber trends, see *Section 5.4 TELUS technology solutions segment*.

Year-over-year increases in consolidated revenue also reflect growth in DLCX revenue from a combination of business acquisitions, including Competence Call Center (CCC) (since rebranded as TELUS International Northern Europe or TINE and comprised substantially of CCC) on January 31, 2020, and Lionbridge AI on December 31, 2020, which was subsequently rebranded as TELUS International AI Data Solutions (TIAI), and organic external customer growth.

**Operating revenues (arising from contracts with customers)** ($ millions)


The trend of year-over-year increases in Goods and services purchased reflects increased expenses to support growth in our DLCX business, our subscriber base and business acquisitions; increased fixed data product costs of sales associated with a growing subscriber base; higher mobile equipment expenses associated with higher-value smartphones in the sales mix; and higher operating costs associated with growth related to scaling our health offerings and our digital capabilities. TIAI utilizes contracted labour in servicing its customers as compared to solely utilizing employees, and these contracted services have contributed to year-over-year increases in Goods and services purchased throughout 2021.

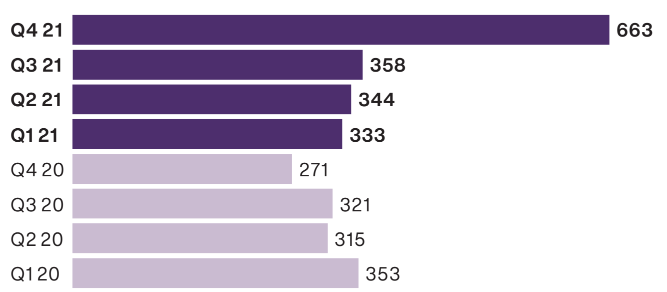
The trend of year-over-year increases in net Employee benefits expense reflects increases in the number of employees related to business acquisitions, including those supporting the growth of DLCX revenue, health offerings, smart food-chain technology business and our other complementary businesses. This was partly offset by moderating salaries expense resulting from reductions in the number of full-time equivalent (FTE) domestic employees, excluding business acquisitions, related in part to absorbed vacancies. We experienced year-over-year increases in net Employee benefits expense in 2021 related to merit-based compensation increases, including an April 2021 compensation program increase.

The trend of year-over-year increases in Depreciation and amortization reflects increases related to capital assets acquired in business acquisitions; growth in capital assets, in support of the expansion of our broadband footprint, including our generational investment to connect homes and businesses to TELUS PureFibre and 5G technology coverage; and growth in internet, TV and security subscriber loading. The investments in our fibre-optic technology also support our technology strategy to improve coverage and capacity, including the ongoing build-out of 5G, as we launched the first wave of our 5G network in June 2020.

The trend of year-over-year increases in Financing costs reflects an increase in long-term debt outstanding, mainly associated with our investments in spectrum, fibre and mobile technology, as well as business acquisitions. Financing costs include a long-term debt prepayment premium of $10 million in the third quarter of 2021 and $18 million in the second quarter of 2020. Moreover, Financing costs are net of capitalized interest related to spectrum licences acquired during the 600 MHz spectrum auction, which we commenced deploying into our existing network in 2021, and during the 3500 MHz spectrum auction. Financing costs also include Interest accretion on provisions (asset retirement obligations and written put options) and Employee defined benefit plans net interest. Additionally, for the eight periods shown, Financing costs include varying amounts of foreign exchange gains or losses and varying amounts of interest income.

The trend in Net income reflects the items noted above, as well as non-cash adjustments arising from substantively enacted changes in income tax and adjustments recognized in the current periods for income taxes of prior periods. Historically, the trend in basic EPS has reflected trends in Net income.

**Net income** ($ millions)




**Adjusted EBITDA** ($ millions)

The general trend of year-over-year decreases in Cash provided by operating activities reflects higher year-over-year income taxes paid, other operating working capital changes and higher interest payments arising from increases in debt outstanding and year-over-year variations in fixed-term interest rates. The general trend of year-over-year decreases in free cash flow reflects the factors affecting Cash provided by operating activities in addition to increased capital expenditure activity, except that accounting policies which do not impact cash (IFRS 15 and IFRS 16) do not affect the determination of free cash flow. For further discussion of trends, see *Section 5.4 TELUS technology solutions segment* and *Section 5.5 Digitally-led customer experiences – TELUS International segment*.

**Fourth quarter recap**

Results for the fourth quarter of 2021 (three-month period ended December 31, 2021) are discussed in our February 10, 2022 news release and are compared with results from the fourth quarter of 2020 (three-month period ended December 31, 2020).

- Consolidated operating revenues and other income were $4,872 million in the fourth quarter of 2021, an increase of $812 million.
  - Service revenues were $3,805 million in the fourth quarter of 2021, an increase of $396 million. TTech service revenue growth of $227 million was driven by (i) increased internet and data service revenues, as well as smart food-chain technology and other fixed data services revenues, driven by higher revenue per customer resulting from internet speed upgrades, subscriber base growth, business acquisitions and expanded services; (ii) higher mobile network revenue from growth in our mobile phone and connected devices subscriber bases and higher ARPU; and (iii) growth in health services revenues. This was partly offset by continued declines in legacy fixed voice and legacy fixed data service revenues. Growth in DLCX operating revenues resulted from business acquisitions, as well as organic growth from both new clients and expanded services for existing customers.
  - Equipment revenues were $656 million in the fourth quarter of 2021, an increase of $4 million, driven by higher-value smartphones in the sales mix, despite an increased mix of certified pre-owned device sales. Additionally, industry-wide mobile handset inventory constraints resulted in lower revenues from mobile handset upgrade volumes.
  - Other income was $411 million in the fourth quarter of 2021, an increase of $412 million, largely reflecting a $410 million gain arising from the disposition of our financial solutions business in the fourth quarter of 2021, as described in *Section 1.3*.
- Consolidated operating expenses were $3,820 million in the fourth quarter of 2021, an increase of $307 million.
  - Goods and services purchased were $1,882 million in the fourth quarter of 2021, an increase of $116 million, due to: (i) higher operating, contracted labour and administrative costs associated with business acquisitions, organic DLCX revenue growth and scaling of our health offerings, including virtual care adoption; (ii) higher product and service costs in supporting growth across our subscriber connections, including TV subscribers; (iii) higher advertising and promotional costs relative to subdued marketing activity in 2020; (iv) higher mobile equipment sales expense, driven by higher-value smartphones in the sales mix, partly offset by lower mobile handset upgrades; and (v) growth in business operations related to scaling of our digital capabilities. These increases were partly offset by lower non-labour-related restructuring costs, lower bad debt expense, and lower commissions expense associated with an increased mix of digital sales and lower contracted volume.
  - Employee benefits expense was $1,108 million in the fourth quarter of 2021, an increase of $150 million, largely due to: (i) higher compensation and benefit costs resulting from an increase in the number of employees related to business acquisitions and organic DLCX revenue growth; and (ii) merit-based compensation increases. These employee benefits expense increases were partly offset by higher capitalized labour costs.
  - Depreciation was $545 million in the fourth quarter of 2021, an increase of $6 million, primarily due to growth in capital assets over the past 12 months, including our expanded broadband footprint and business acquisitions.
  - Amortization of intangible assets was $285 million in the fourth quarter of 2021, an increase of $35 million, arising from business acquisitions and higher expenditures associated with the intangible asset base over the past 12 months.
  - Financing costs were $192 million in the fourth quarter of 2021, an increase of $2 million.
  - Income tax expense was $197 million in the fourth quarter of 2021, an increase of $111 million. The effective tax rate decreased from 24.1 to 22.9% in the fourth quarter of 2021, primarily due to the non-taxable portion of the gain on the disposition of our financial solutions business partially offset by lower adjustments to prior period income taxes.
- EBITDA, which includes restructuring and other costs, other equity losses related to real estate joint ventures, and the gain on disposition of our financial solutions business, was $1,882 million in the fourth quarter of 2021, an increase of $546 million.
- Adjusted EBITDA, which excludes restructuring and other costs, other equity losses related to real estate joint ventures, and the gain on disposition of our financial solutions business, was $1,517 million in the fourth quarter of 2021, an increase of $108 million or 7.6%.

This is reflective of growth in network revenue from increases in our mobile phone and connected devices subscriber bases; growth in mobile equipment margins; growth in internet and data service margins, as well as other fixed data service margins, resulting from subscriber base growth and expanded services; an increased contribution from our DLCX business; and lower bad debt expense. This was partly offset by higher Employee benefits expense and lower legacy fixed voice and legacy fixed data services. This growth also reflects lower non-labour restructuring and other costs related to the pandemic, partly offset by the dilutive lingering impacts of the pandemic, including reduced roaming margins related to travel restrictions

- Net income attributable to Common Shares was $644 million in the fourth quarter of 2021, an increase of $384 million, resulting from the after-tax impacts of higher Operating income and higher Financing costs. Adjusted Net income excludes the effects of restructuring and other costs, income tax-related adjustments, other equity losses related to real estate joint ventures, and the gain on disposition of our financial solutions business. Adjusted Net income in the fourth quarter of 2021 was $331 million, an increase of $42 million or 14.5%.
- Basic EPS was $0.47 in the fourth quarter of 2021, an increase of $0.27 as a result of the after-tax impacts of higher Operating income and higher Financing costs, as well as the effect of a higher number of Common Shares outstanding. Adjusted basic EPS excludes the effects of restructuring and other costs, income tax-related adjustments, other equity losses related to real estate joint ventures, and the gain on disposition of our financial solutions business. Adjusted basic EPS was $0.23 in the fourth quarter of 2021, an increase of $0.01 or 4.5%.
- Cash provided by operating activities was $896 million in the fourth quarter of 2021, a decrease of $137 million, largely attributable to other working capital changes and higher income taxes paid related to the disposition of our financial solutions business.
- Cash used by investing activities was $1,989 million in the fourth quarter of 2021, a decrease of $218 million, largely attributable to fewer business acquisitions and proceeds received upon the disposition of our financial solutions business, partially offset by cash payments for 3500 MHz spectrum licences as noted in *Section 1.3* and higher cash payments for capital assets. Capital expenditures were $909 million in the fourth quarter of 2021, an increase of $296 million, due to accelerated investments in our 5G network, broadband build, enhanced product development, and digitization to increase system capacity and reliability.
- Cash used by financing activities was $48 million in the fourth quarter of 2021, a change of $1,449 million compared to Cash provided by financing activities of $1,401 million in the fourth quarter of 2020, primarily reflecting higher long-term debt issues.
- Free cash flow was $43 million in the fourth quarter of 2021, a decrease of $175 million, driven by higher capital expenditures as previously noted and higher income taxes paid, partly offset by higher EBITDA.

## 5.3 Consolidated operations

The following is a discussion of our consolidated financial performance. Segment information in *Note 5* of the Consolidated financial statements is regularly reported to our CEO. We discuss the performance of our segments in *Section 5.4 TELUS technology solutions segment* and *Section 5.5 Digitally-led customer experiences – TELUS International segment*.

**Operating revenues**
**(arising from contracts with customers)** ($ millions)


**Operating revenues**

| Years ended December 31 ($ in millions) | 2021 | 2020 | Change |
|---|---|---|---|
| Operating revenues | | | |
| Service | **14,535** | 13,277 | 9.5% |
| Equipment | **2,303** | 2,064 | 11.6% |
| Operating revenues (arising from contracts with customers) | **16,838** | 15,341 | 9.8% |
| Other income | **420** | 122 | n/m |
| Operating revenues and other income | **17,258** | 15,463 | 11.6% |

Consolidated Operating revenues and other income increased by $1,795 million in 2021.

- **Service revenues** increased by $1,258 million in 2021. TTech service revenue growth of $685 million was driven by (i) increased internet and data service revenues, as well as smart food-chain technology and other fixed data services revenues, driven by higher revenue per customer resulting from internet speed upgrades, subscriber base growth, business acquisitions and expanded services; (ii) growth in our mobile phone and connected devices subscriber bases; and (iii) growth in health services revenues. This was partly offset by continued declines in legacy fixed voice and legacy fixed data service revenues. Growth in DLCX operating revenues resulted from business acquisitions, as well as organic growth from both new clients and expanded services for existing customers.

  Compared to the prior year, growth in 2021 also reflects the dilutive lingering impacts of the pandemic, most notably in the first quarter of 2021, including reduced roaming revenues related to travel restrictions.
- **Equipment revenues** increased by $239 million in 2021, reflecting higher-value smartphones in the sales mix, higher handset upgrade volumes and greater collectability of mobile device balances. These factors have been partly offset by the recent global supply chain challenges related to chipset shortages that became more prominent in the third quarter of 2021, which we have mitigated by leveraging certified pre-owned device inventory, our Bring-it-Back device program, and device repair businesses, including Mobile Klinik.

- **Other income** increased by $298 million in 2021, largely due to a $410 million gain arising from the disposition of our financial solutions business in the fourth quarter of 2021, as described in *Section 1.3*, in addition to lower other equity losses related to real estate joint ventures. These were partly offset by the non-recurrence of a decrease and subsequent retirement of the comparative period's gain on a provision arising from business acquisition-related written put options to acquire the remaining non-controlling interest of an acquired subsidiary, Xavient Information Systems (Xavient), which was settled in the second quarter of 2020, in addition to the non-recurrence of the sale of certain assets.

**Operating expenses**

| Years ended December 31 ($ in millions) | 2021 | 2020 | Change |
|---|---|---|---|
| Goods and services purchased | **6,699** | 6,268 | 6.9% |
| Employee benefits expense | **4,269** | 3,701 | 15.3% |
| Depreciation | **2,126** | 2,107 | 0.9% |
| Amortization of intangible assets | **1,090** | 905 | 20.4% |
| Operating expenses | **14,184** | 12,981 | 9.3% |

Consolidated operating expenses increased by $1,203 million in 2021.

- **Goods and services purchased** increased by $431 million in 2021 mainly due to: (i) higher operating, contracted labour and administrative costs associated with business acquisitions, organic DLCX revenue growth and scaling of our health offerings, including virtual care adoption; (ii) higher mobile equipment sales expense driven by higher-value smartphones in the sales mix and higher mobile handset upgrade volumes; (iii) higher product and service costs in supporting growth across our subscriber connections, including TV subscribers; (iv) higher advertising and promotional costs relative to subdued marketing activity in 2020; and (v) growth in business operations related to scaling of our digital capabilities. These increases were partly offset by lower non-labour-related restructuring costs, lower bad debt expense, lower commissions expense associated with an increased mix of digital sales and lower contracted volume, and lower roaming expense.
- **Employee benefits expense** increased by $568 million in 2021, largely due to: (i) higher compensation and benefit costs resulting from an increase in the number of employees related to business acquisitions and organic DLCX revenue growth; (ii) merit-based compensation increases; and (iii) higher share-based compensation as a result of the mark-to-market adjustment on liability-accounted awards from an increased TI share price. These employee benefits expense increases were partly offset by higher capitalized labour costs.
- **Depreciation** increased by $19 million in 2021, primarily due to growth in capital assets over the past 12 months, including our expanded broadband footprint and business acquisitions. This was partly offset by the effect of accelerated depreciation in the comparative period from increased asset retirement activity.
- **Amortization of intangible assets** increased by $185 million in 2021 arising from business acquisitions and higher expenditures associated with the intangible asset base over the past 12 months.

**Operating income**

| Years ended December 31 ($ in millions) | 2021 | 2020 | Change |
|---|---|---|---|
| TTech EBITDA[1] (See *Section 5.4*) | **5,735** | 4,976 | 15.2% |
| DLCX EBITDA[1] (See *Section 5.5*) | **555** | 518 | 7.3% |
| EBITDA | **6,290** | 5,494 | 14.5% |
| Depreciation and amortization (discussed above) | **(3,216)** | (3,012) | 6.8% |
| Operating income (consolidated earnings before interest and income taxes (EBIT)) | **3,074** | 2,482 | 23.9% |

1 See *Section 11.1 Non-GAAP and other specified financial measures.*

Operating income increased by $592 million in 2021, while EBITDA increased by $796 million in 2021. In addition to the gain on sale of our financial solutions business, this is reflective of growth in network revenue from increases in our mobile phone and connected devices subscriber bases; growth in mobile equipment margins; growth in internet and data service margins, as well as other fixed data service margins, resulting from subscriber base growth and expanded services; an increased contribution from our DLCX business; and lower bad debt expense. This was partly offset by higher Employee benefits expense and lower legacy fixed voice and legacy fixed data services. This growth also reflects lower non-labour restructuring and other costs related to the pandemic, partly offset by the dilutive lingering impacts of the pandemic, including reduced roaming margins related to travel restrictions.

**Adjusted EBITDA**

| Years ended December 31 ($ in millions) | 2021 | 2020 | Change |
|---|---|---|---|
| TTech Adjusted EBITDA[1] (See *Section 5.4*) | **5,476** | 5,177 | 5.7% |
| DLCX Adjusted EBITDA[1,2] (See *Section 5.5*) | **593** | 524 | 13.2% |
| Adjusted EBITDA | **6,069** | 5,701 | 6.4% |

1 See *Section 11.1 Non-GAAP and other specified financial measures.*
2 For certain financial metrics, there are definitional differences between TELUS and TELUS International reporting. These differences largely arise from TELUS International adopting definitions consistent with practice in its industry.

Adjusted EBITDA increased by $368 million or 6.4% in 2021, reflecting the factors mentioned in the Operating income discussion above.

### Financing costs

| Years ended December 31 ($ in millions) | 2021 | 2020 | Change |
|---|---|---|---|
| Interest on long-term debt, excluding lease liabilities – gross | **683** | 676 | 1.0% |
| Interest on long-term debt, excluding lease liabilities – capitalized | **(3)** | (37) | (91.9)% |
| Interest on lease liabilities | **66** | 70 | (5.7)% |
| Interest on short-term borrowings and other | **15** | 5 | n/m |
| Interest accretion on provisions | **18** | 16 | 12.5% |
| Long-term debt prepayment premium | **10** | 18 | (44.4)% |
| Interest expense | **789** | 748 | 5.5% |
| Employee defined benefit plans net interest | **26** | 16 | 62.5% |
| Foreign exchange (gains) losses | **(3)** | 14 | n/m |
| Interest income | **(16)** | (7) | 128.6% |
| Financing costs | **796** | 771 | 3.2% |

Financing costs increased by $25 million in 2021, mainly due to the following factors:

- **Interest expense** increased by $41 million in 2021, resulting from:
  - Gross interest on long-term debt, excluding lease liabilities, increased by $7 million in 2021, driven by an increase in average long-term debt balances outstanding in part attributable to business acquisitions, and an increase in the blended effective interest rate. Our weighted average interest rate on long-term debt (excluding commercial paper, the revolving component of the TI credit facility, lease liabilities and other long-term debt) was 3.72% at December 31, 2021, compared to 3.80% one year earlier. (See *Long-term debt issued and redemptions and repayment of long-term debt* in *Section 7.4*.)
  - Capitalized long-term debt interest, excluding lease liabilities, in 2021 is in respect of debt incurred for the purchase of spectrum licences during the 3500 MHz spectrum auction held in June to July 2021 by Innovation, Science and Economic Development Canada (ISED). In 2020, capitalized long-term debt interest, excluding lease liabilities, was in respect of debt incurred for the purchase of spectrum licences during the 600 MHz spectrum auction held by ISED in April 2019 for which capitalization ceased in the first quarter of 2021 as we commenced deploying this spectrum into our existing network.
  - In the third quarter of 2021, we recorded a long-term debt prepayment premium of $10 million before income taxes related to the early redemption of all of our $1 billion Notes, Series CT. In the second quarter of 2020, we recorded a long-term debt prepayment premium of $18 million before income taxes related to the early redemption of all of our $400 million Notes, Series CM, and all of our $500 million Notes, Series CO.
- **Employee defined benefit plans net interest** increased by $10 million in 2021, primarily due to the change in the defined benefit plan deficit as at December 31, 2020 to $913 million (net of the plan asset ceiling limit of $123 million), compared to the defined benefit plan deficit of $425 million (net of the plan asset ceiling limit of $121 million) one year earlier, partly offset by a decrease in the discount rate.
- **Foreign exchange gains** changed by $17 million in 2021, primarily reflecting changes in the value of the Canadian dollar relative to the U.S. dollar.

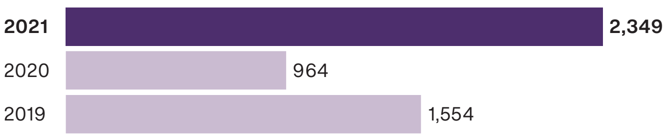
Interest expense ($ millions)


### Income taxes

| Years ended December 31 ($ in millions, except tax rates) | 2021 | 2020 | Change |
|---|---|---|---|
| Income taxes computed at applicable statutory rates (%) | **25.8** | 26.1 | (0.3) pts. |
| Revaluation of deferred income tax liability to reflect future income tax rates (%) | **–** | (0.4) | 0.4 pts. |
| Adjustments recognized in the current period for income taxes of prior periods (%) | **(0.3)** | (1.3) | 1.0 pts. |
| Non-deductible amounts (%) | **1.0** | 1.2 | (0.2) pts. |
| Gain on disposition (%) | **(2.0)** | – | (2.0) pts. |
| Other (%) | **1.0** | 0.7 | 0.3 pts. |
| Effective tax rate (%) | **25.5** | 26.3 | (0.8) pts. |
| Income tax computed at applicable statutory rates | **589** | 446 | 32.1% |
| Revaluation of deferred income tax liability to reflect future income tax rates | **–** | (6) | (100.0)% |
| Adjustments recognized in the current period for income taxes of prior periods | **(8)** | (20) | (60.0)% |
| Non-deductible amounts | **23** | 20 | 15.0% |
| Gain on disposition | **(46)** | – | n/m |
| Other | **22** | 11 | 100.0% |
| Income taxes | **580** | 451 | 28.6% |

Total income tax expense increased by $129 million in 2021. The effective tax rate decreased from 26.3 to 25.5% in 2021, primarily due to non-taxable portion of the gain on the disposal of our financial solutions business partially offset by lower adjustments to prior period income taxes.

Comprehensive income ($ millions)




**Comprehensive income**

| Years ended December 31 ($ in millions) | 2021 | 2020 | Change |
|---|---|---|---|
| Net income | **1,698** | 1,260 | 34.8% |
| Other comprehensive income (net of income taxes): | | | |
| Items that may be subsequently reclassified to income | **(6)** | 2 | n/m |
| Items never subsequently reclassified to income | **657** | (298) | n/m |
| Comprehensive income | **2,349** | 964 | 143.7% |

Comprehensive income increased by $1,385 million, primarily attributable to the increase in net income, discussed above, as well as employee defined benefit plans re-measurement amounts and changes in the unrealized fair value of derivatives designated as cash flow hedges and investment financial assets, partly offset by foreign currency translation adjustments arising from translating financial statements of foreign operations. Items that may subsequently be reclassified to income are composed of changes in the unrealized fair value of derivatives designated as cash flow hedges and foreign currency translation adjustments arising from translating financial statements of foreign operations. Items never subsequently reclassified to income are composed of employee defined benefit plans re-measurement amounts and changes in measurement of investment financial assets.

## 5.4 TELUS technology solutions segment

**+4.1%**
Mobile phone subscribers
2021: 9,290,000
2020: 8,923,000

**+18.8%**
Connected device subscribers
2021: 2,134,000
2020: 1,796,000

**+6.2%**
Internet subscribers
2021: 2,271,000
2020: 2,138,000

**+4.1%**
TV subscribers
2021: 1,265,000
2020: 1,215,000

**+13.7%**
Security subscribers
2021: 804,000
2020: 707,000

**+21.9%**
Healthcare lives covered
2021: 20,600,000
2020: 16,900,000

**TTech trends and seasonality**

The nature of the COVID-19 pandemic has had significant impacts on our business. The pandemic prevents us, our customers, and our suppliers from operating in the normal course of business in certain areas and we expect the pandemic to continue to affect our operations until at least 2023. For example, with the uncertainty surrounding COVID-19 variants and government and land border restrictions, consumer and business travel levels are uncertain, which negatively impacts roaming revenues. As well, our business customers who use our services are faced with reduced and/or closed operations. Additionally, our health services offerings are impacted, as TELUS Health Care Centres were unable to provide their full suite of core services in 2020 and operated at reduced volumes in 2021. Impacts directly associated with the pandemic, such as the reduction of roaming revenue, may be temporary in nature and have the potential to return to pre-pandemic levels once the pandemic has subsided or ended.

The historical trend over the past eight quarters in mobile network revenue reflects growth in our mobile phone subscriber base, as well as the acceleration of IoT connections. This is partly offset by declining mobile phone ARPU, primarily due to: (i) the impacts of the COVID-19 pandemic on international travel and international roaming revenues; (ii) carriers offering larger allotments of data, as well as rate plans that include bonus data, unlimited data plans and data sharing; and (iii) consumer behavioural response to more frequent customer data usage notifications and offloading of data traffic to increasingly available Wi-Fi hotspots, including within the home as a result of the pandemic.

This decline in growth has been partly offset by an increased mix of higher-value rate plans and an increased proportion of higher-value customers in the subscriber mix. As a result of changing industry dynamics, customers have been able to gain access to higher network speeds and larger allotments of data included for a given price point, further limiting mobile phone ARPU expansion, as customers are continuing to obtain plans with a lower cost per gigabyte.

Mobile equipment revenue growth has been moderating, largely due to the impacts of various waves of the pandemic on our retail traffic, in terms of both mandated health restrictions and customer behaviour, in addition to global chipset constraints in our supply chain that became more prominent across the industry in the third quarter of 2021. This has been partly offset by our digital and other direct fulfilment channels, suppressed handset upgrade volumes throughout 2020 manifesting in increased demand in the first half of 2021, and our efforts to moderate supply constraints by leveraging certified pre-owned device inventory, our Bring-it-Back device program and device repair businesses, including Mobile Klinik. Over the past eight quarters, an increase of higher-value smartphones in the sales mix and improved collectability of device balances have been offset by a lower volume of new contracts due to: (i) the improving durability and increasing cost of popular devices that result in customers deferring upgrades; (ii) growing adoption of device financing arrangements, which provide transparency of full device costs and result in customers deferring device upgrades; and (iii) most recently, the effects of the pandemic on customers, the industry, global chipset constraints in our supply chain and methods of distribution, and the Canadian economy.

The general trend of year-over-year increases in mobile phone subscriber net additions resulted from: (i) the success of our promotions, including the bundling of our mobility and home services, and the leveraging of our digital sales channels; (ii) the effects of market growth arising from a growing population, changing population demographics and an increasing number of customers with multiple devices; (iii) continuous improvements in the speed and quality of our network; and (iv) our low churn rate, which reflects our customers first efforts, upgrade volume programs and focus on building, maintaining and enhancing our high-quality network. Additionally, the pandemic has caused customers to change their behaviour, such as reducing travel and making fewer visits to retail outlets, thereby reducing churn and renewal traffic.

Our connected device subscriber base has been growing primarily as a result of our expanded IoT offerings, partly offset by our strategic decision to reduce loading of low or negative-margin tablets. Our spectrum investments and capital expenditures on network improvements increase capacity and coverage, allowing us to grow revenue through net additions of mobile phone and connected devices subscribers.

We expect ongoing internet subscriber base growth as we continue our investments in expanding our fibre-optic infrastructure, supplemented with our low customer churn rate. The total number of TV subscribers has increased (in contrast to market-reported declines in traditional television viewing habits) as a result of healthy net additions in response to our diverse and flexible product offerings, combined with our low customer churn rate. Security subscriber base growth is increasing as a result of organic growth and business acquisitions. Home services growth has also been attributable to the adoption of the TELUS Whole Home bundle and the bundling of our mobility and home services to meet the demand for multiple services per home. Adoption increases our services per home and positively impacts churn for most products, in addition to the effectiveness of our self install and virtual install models. Residential voice subscriber losses continue to reflect the ongoing trend of substitution to mobile and internet-based services, but were partly mitigated by the success of our bundled service offerings and lower-priced offerings.

The trend of growing fixed data services revenues (excluding smart food-chain technology, which is described separately below) is due to the continued appetite for faster internet speeds and larger bandwidth, as well as our diverse suite of TV, home and business security, and other advanced application offerings, which are enabled by investments in our fibre-optic footprint. The trend of declining legacy fixed voice revenues is due to technological substitution and intensification of competition in the small and medium-sized business market; however, our rate of decline has been moderating with our utilization of bundled product offerings and successful retention efforts. The migration of business product and service offerings to IP services and the introduction of new competitors have yielded inherently lower margins compared to some legacy business product and service offerings; however, we are continually refining and diversifying our innovative suite of business offerings, including our Software as a Service (SaaS)-based solutions.

The trend of digitization has propelled the adoption of our health offerings, including virtual care solutions, collaborative health records, health benefits management and personal health monitoring solutions. In health, we are well positioned to improve the lives and outcomes for Canadians. Our competencies and assets in health, combined with the trend in digitization and automation, position us well to bolster the Canadian healthcare system in a complementary fashion. With our technology heritage, we see the trend moving the healthcare system to improved efficiency and improved outcomes through better insights. We also believe Canadians will have greater control of their healthcare outcomes through the integration of disparate data (better flow of information across the system) and consent-based management. While the pandemic has disrupted the operations of our TELUS Health Care Centres since March 2020, our diversified virtual care offerings continue to grow to meet the healthcare needs of Canadians and drive better health outcomes, including the accelerated adoption of virtual consultations, as reflected in our growing virtual care members. Our health benefits management solution is influenced by the number of lives covered and the number of benefit claims, which were disrupted by the pandemic. We expect the demand for these services to resume in correspondence with the effectiveness of COVID-19 vaccinations and higher employment rates.

The trend of greater use of digital solutions within the agriculture industry is due to increased demand for data and analytical insights to drive more effective and agile decision-making to address changing consumer demands and improve profitability. We are committed to providing solutions to create a better flow of information across the value chain, improving the safety and sustainability of our food system. Within the verticals of agri-business; food, beverage, and consumer goods; and animal agriculture, we are expanding our solutions and customer base worldwide through acquisitions and organic growth.

### TTech operating indicators

| At December 31 | 2021 | 2020 | Change |
|---|---|---|---|
| **Subscriber connections** (000s): | | | |
| Mobile phone[1] | **9,290** | 8,923 | 4.1% |
| Connected device | **2,134** | 1,796 | 18.8% |
| Internet[2] | **2,271** | 2,138 | 6.2% |
| TV | **1,265** | 1,215 | 4.1% |
| Residential voice | **1,123** | 1,164 | (3.5)% |
| Security | **804** | 707 | 13.7% |
| Total TTech subscriber connections | **16,887** | 15,943 | 5.9% |
| LTE population coverage[3] (millions) | **37.0** | 37.0 | – % |
| 5G population coverage[3] (millions) | **26.2** | 10.5 | n/m |
| Virtual care members (millions) | **2.8** | 1.7 | 64.7% |
| Healthcare lives covered (millions) | **20.6** | 16.9 | 21.9% |

| Years ended December 31 | 2021 | 2020 | Change |
|---|---|---|---|
| Mobile phone gross additions (000s): | **1,353** | 1,277 | 6.0% |
| **Subscriber connection net additions (losses)** (000s): | | | |
| Mobile phone | **367** | 280 | 31.1% |
| Connected device | **338** | 257 | 31.5% |
| Internet | **149** | 157 | (5.1)% |
| TV | **50** | 55 | (9.1)% |
| Residential voice | **(41)** | (40) | (2.5)% |
| Security | **97** | 68 | 42.6% |
| Total TTech subscriber connection net additions | **960** | 777 | 23.6% |
| Mobile phone ARPU, per month[1,4] ($) | **57.07** | 57.41 | (0.6)% |
| Mobile phone ABPU, per month[1,4] ($) | **69.83** | 70.49 | (0.9)% |
| Mobile phone churn, per month[1,5] (%) | **0.91** | 0.96 | (0.05) pts. |
| Digital health transactions (millions) | **551.1** | 534.9 | 3.0% |

1 Effective January 1, 2021, with retrospective application to January 1, 2020, in alignment with our segment reporting changes, we made a retroactive adjustment to remove internal network service revenue and approximately 29,000 subscribers from our mobile phone subscriber base and associated operating statistics (ARPU, ABPU, and churn). Internal network service revenue consists of earned revenue from both our internal mobile phone and connected devices subscribers, neither of which contribute to our restated subscriber base.

2 Effective January 1, 2021, on a prospective basis, following an in-depth review of customer accounts within a legacy subscriber provisioning system to be decommissioned, we adjusted our internet subscriber base to remove 16,000 subscribers.

3 Including network access agreements with other Canadian carriers.

4 These are non-GAAP and other specified financial measures. See *Section 11.1 Non-GAAP and other specified financial measures*. These are industry measures useful in assessing operating performance of a mobile products and services company, but are not measures defined under IFRS-IASB.

5 See *Section 11.2 Operating indicators*.

- **Mobile phone gross additions** were 1,353,000 in 2021, an increase of 76,000, driven by growth in high-value customer additions, improvements in retail traffic as pandemic-related restrictions had lessened when compared to the prior year, successful promotions, including the bundling of our mobility and home services, expanded channels, and the enhanced capabilities of our digital footprint, inclusive of increased self-serve functions. Industry-wide inventory shortages due to global supply chain challenges had an impact on competitive activity in the second half of 2021. However, we mitigated these challenges by leveraging certified pre-owned device inventory, our Bring-it-Back device program and device repair businesses, including Mobile Klinik, in addition to our compelling rate plan offers.
- Our **mobile phone churn rate** was 0.91% in 2021, compared to 0.96% in 2020, reflecting the impacts of industry-wide inventory shortages arising from global supply chain challenges that became more prominent in the third quarter of 2021, which had an impact on customer switching activity. These relatively low churn rates in the current and comparative period reflect the impacts of the pandemic, with customers reducing their general shopping habits in retail outlets since the start of the pandemic, along with mandated capacity restrictions. Churn continues to benefit from our successful bundling of mobility and home services, our focus on executing customers first initiatives and upgrade volume programs, and our leading network quality.
- **Mobile phone net additions** were 367,000 in 2021, an increase of 87,000, demonstrating improvements in retail traffic compared to the prior year, albeit still below our pre-pandemic baseline, our strong execution in digital sales and expanded channels, and our successful efforts to drive high-value customer net additions, inclusive of our consistently low customer churn, as discussed above.
- **Mobile phone ARPU** was $57.07 in 2021, a decrease of $0.34 or 0.6%, largely due to lower chargeable usage revenues as customers continue to adopt larger data allotments in their rate plans, the impact of the competitive environment putting pressure on base rate plan prices in the current and prior periods, and lower roaming revenues as declines in the first quarter of 2021 compared to a pre-pandemic baseline exceeded the sequential, modest roaming recoveries experienced in the final nine months of 2021, as reflected in ARPU growth in the fourth quarter. These factors were partly offset by higher monthly recurring charges caused by a greater mix of high-value customer additions.
- **Mobile phone ABPU** was $69.83 in 2021, a decrease of $0.66 or 0.9%, largely reflecting the same items noted above for mobile phone ARPU in addition to a greater mix of bring-your-own device customer additions.
- **Connected device net additions** were 338,000 in 2021, an increase of 81,000, largely due to increased demand for IoT net additions and a lower churn rate for tablets.

- **Internet net additions** were 149,000 in 2021, a decrease of 8,000, due to pandemic-related demand decline, higher churn and lower market demand relative to the subdued switching activity and record loading in 2020. This offset our success in driving strong net additions through bundled product offerings, including the TELUS Whole Home bundle and our bundling of mobility and home services.
- **TV net additions** were 50,000 in 2021, a decrease of 5,000, mainly due to lower market demand, primarily in the business market, offsetting a lower customer churn rate from strong retention efforts and the success of our bundled product offerings.
- **Residential voice net losses** were 41,000 in 2021 compared to residential voice net losses of 40,000 in 2020. The residential voice subscriber losses continue to reflect the trend of substitution to mobile and internet-based services, mostly mitigated by our expanding fibre footprint and bundled product offerings, as well as our strong retention efforts, including lower-priced offerings.
- **Security net additions** were 97,000 in 2021, an increase of 29,000, driven by strong growth in new connections through demand for our bundled product offerings and diverse suite of products and services. Our continued focus on connecting more homes and businesses directly to fibre, expanding and enhancing our addressable high-speed internet and Optik TV footprint, and bundling these services together, contributed to combined internet, TV and security subscriber growth of 280,000 over the past 12 months.
- **Virtual care members** were 2.8 million as of the end of 2021, an increase of 1.1 million over the past 12 months, due to the continued adoption of virtual solutions to keep Canadians safely connected to health and wellness care during the pandemic.
- **Healthcare lives covered** were 20.6 million as of the end of 2021, an increase of 3.7 million over the past 12 months, mainly due to the continued demand for virtual solutions, an increase in value-added services including vaccination solutions, and an increase in coverage related to elective health services. See *TTech trends and seasonality* for further details.
- **Digital health transactions** were 551.1 million in 2021, an increase of 16.2 million, largely driven by a higher number of adjudication, eClaims, transport, and collaborative health transactions from a business acquisition as plan members resume the utilization of elective health services with pandemic restrictions easing.

**Operating revenues and other income – TTech segment**

| Years ended December 31 ($ in millions) | 2021 | 2020 | Change |
|---|---|---|---|
| Mobile network revenue | **6,208** | 6,030 | 3.0% |
| Mobile equipment and other service revenues | **2,124** | 1,867 | 13.8% |
| Fixed data services | **4,421** | 3,939 | 12.2% |
| Fixed voice services | **843** | 912 | (7.6)% |
| Fixed equipment and other service revenues | **411** | 408 | 0.7% |
| Health services | **521** | 448 | 16.3% |
| Operating revenues (arising from contracts with customers) | **14,528** | 13,604 | 6.8% |
| Other income | **420** | 19 | n/m |
| External Operating revenues and other income | **14,948** | 13,623 | 9.7% |
| Intersegment revenues | **18** | 13 | 38.5% |
| TTech Operating revenues and other income | **14,966** | 13,636 | 9.8% |

TTech Operating revenues and other income increased by $1,330 million in 2021.

**TTech Operating revenues (arising from contracts with customers)** ($ millions)


**Mobile network revenue** increased by $178 million or 3.0% in 2021, due to growth of 6.3% in the mobile phones and connected devices subscriber base over the past 12 months, partly offset by lower mobile phone ARPU, as described above.

**Mobile equipment and other service revenues** increased by $257 million in 2021, reflecting higher-value smartphones in the sales mix, higher handset upgrade volumes and greater collectability of mobile device balances. Handset upgrades were significantly impacted by the pandemic in 2020, including the temporary closure of approximately 90% of our retail outlets from March 2020 through most of the second quarter, and customers reducing their general shopping habits in retail outlets since the start of the pandemic, which resulted in lower contracted volume and accessory sales. In 2021, handset upgrade volumes increased as a result of the successful execution of our customers first initiatives, including the enhanced capabilities of our digital footprint, suppressed handset upgrade volumes throughout 2020 manifesting in increased demand in the first half of 2021 and fewer retail locations due to the pandemic.

These factors have been partly offset by the recent global supply chain challenges mentioned above, which we have moderated by leveraging our certified pre-owned device inventory, Bring-it-Back device program and device repair businesses, including Mobile Klinik.

**Fixed data services** revenues increased by $482 million in 2021. The increase was driven by: (i) increased internet and data service revenues, reflecting higher revenue per customer resulting from internet speed upgrades, larger allotted data internet rate plans and rate changes, in addition to a 6.2% increase in our internet subscribers over the past 12 months; (ii) increased revenues from smart food-chain technology, driven by business acquisitions; (iii) higher TV revenues, reflecting subscriber growth of 4.1% over the past 12 months; and (iv) increased revenues from home and business security driven by expanded services and customer growth of 13.7% over the past 12 months. This growth was partly offset by the ongoing decline in legacy data service revenues.

**Fixed voice services** revenues decreased by $69 million in 2021, reflecting the ongoing decline in legacy voice revenues resulting from technological substitution and price plan changes. Declines were mitigated by the success of our bundled product offerings and retention efforts and the migration from legacy to IP services offerings The decline in residential voice subscribers over the past 12 months was 3.5%, compared to a 3.3% decline in residential voice subscribers for the 12-month period ended December 31, 2020.

**Fixed equipment and other service** revenues increased by $3 million in 2021, reflecting a higher volume of home and business security equipment sales and data equipment sales.

**Health services** revenues increased by $73 million in 2021, driven by: (i) business acquisitions; (ii) increased in-clinic services in our reopened TELUS Health Care Centres, whereas clinics were impacted by mandated lockdowns last year; (iii) higher revenues from the continued adoption of our virtual care solutions; and (iv) growth in health benefits management services with plan members resuming the use of elective health services.

**Other income** increased by $401 million in 2021, largely related to the $410 million gain on disposition of our financial solutions business as described in *Section 1.3* and lower equity losses related to real estate joint ventures, partly offset by the non-recurrence of 2020 gains on sale of certain assets.

**Intersegment revenues** represent services provided to the DLCX segment that are eliminated upon consolidation, together with the associated DLCX expenses.

**Direct contribution – TTech segment**

| | Mobile products and services[1] | | | Fixed products and services[1] | | | Total TTech | | |
|---|---|---|---|---|---|---|---|---|---|
| Years ended December 31 ($ in millions) | **2021** | 2020 | Change | **2021** | 2020 | Change | **2021** | 2020 | Change |
| **Revenues** | | | | | | | | | |
| Service | **6,297** | 6,096 | 3.3% | **5,928** | 5,444 | 8.9% | **12,225** | 11,540 | 5.9% |
| Equipment | **2,042** | 1,809 | 12.9% | **261** | 255 | 2.4% | **2,303** | 2,064 | 11.6% |
| Operating revenues (arising from contracts with customers) | **8,339** | 7,905 | 5.5% | **6,189** | 5,699 | 8.6% | **14,528** | 13,604 | 6.8% |
| **Expenses** | | | | | | | | | |
| Direct expenses | **2,802** | 2,652 | 5.6% | **1,771** | 1,555 | 13.8% | **4,572** | 4,208 | 8.7% |
| Direct contribution | **5,537** | 5,253 | 5.4% | **4,418** | 4,144 | 6.6% | **9,956** | 9,396 | 6.0% |

1 Includes health services.

The direct expenses included in the direct contribution calculations in the preceding table represent a component of the Goods and services purchased and Employee benefits expense totals included in the table below and have been calculated in accordance with the accounting policies used to prepare the totals presented in the financial statements. TTech direct contribution increased by $560 million or 6.0% in 2021.

TTech mobile products and services direct contribution increased by $285 million or 5.4% in 2021 due to higher network revenues, higher equipment margins and lower commissions expense, as we continue to drive customer transactions to digital channels, in addition to lower contracted volumes in the current and prior periods. These factors were partly offset by the lingering effects of the pandemic on our business, such as lower roaming margins, which were not as prevalent in the first quarter of 2020.

TTech fixed products and services direct contribution increased by $275 million or 6.6% in 2021 due to growth in margins for internet and data services, smart food-chain technology and health services. This was partly offset by declining legacy data and legacy voice margins and the lingering effects of the pandemic on our business, which were not as prevalent in the first quarter of 2020.

**TTech direct contribution** ($ millions)


**Operating expenses – TTech segment**

| Years ended December 31 ($ in millions) | 2021 | 2020 | Change |
|---|---|---|---|
| Goods and services purchased[1] | **6,593** | 6,282 | 5.0% |
| Employee benefits expense[1] | **2,638** | 2,378 | 10.9% |
| TTech operating expenses | **9,231** | 8,660 | 6.6% |

1 Includes restructuring and other costs.

TTech operating expenses increased by $571 million in 2021.

**Goods and services purchased** increased by $311 million in 2021, reflecting: (i) higher mobile equipment sales expense largely from higher-value mobile devices in the sales mix, in addition to higher handset upgrades; ii) higher costs related to business acquisitions, as well as costs associated with scaling our health offerings, including virtual care adoption; (iii) higher product and service costs in support of our growing subscriber connections, including TV subscribers; (iv) higher advertising and promotional costs relative to subdued marketing activity in 2020; and (v) higher costs related to the scaling of our digital capabilities. These factors were partly offset by: (i) lower non-labour-related restructuring costs; (ii) lower bad debt expenses; (iii) lower commissions expense associated with an increased mix of digital sales and lower contracted volume; and (iv) lower roaming expenses.

**Employee benefits expense** increased by $260 million in 2021, primarily due to an increase in compensation and benefits costs resulting from an increase in the number of employees related to business acquisitions in our health and smart food-chain technology businesses, as well as merit-based compensation increases. The increases were partly offset by higher capitalized labour costs.

**EBITDA – TTech segment**

| Years ended December 31 ($ in millions, except margins) | 2021 | 2020 | Change |
|---|---|---|---|
| EBITDA | **5,735** | 4,976 | 15.2% |
| Add restructuring and other costs included in EBITDA | **148** | 182 | n/m |
| Add other equity losses related to real estate joint ventures | **3** | 19 | n/m |
| Deduct gain on disposition of financial solutions business | **(410)** | – | n/m |
| Adjusted EBITDA | **5,476** | 5,177 | 5.7% |
| EBITDA margin[1] (%) | **38.3** | 36.5 | 1.8 pts. |
| Adjusted EBITDA margin[1] (%) | **37.6** | 37.9 | (0.3) pts. |

1 These are non-GAAP and other specified financial measures. See *Section 11.1 Non-GAAP and other specified financial measures*.

TTech EBITDA increased by $759 million or 15.2% in 2021. TTech Adjusted EBITDA increased by $299 million or 5.7% in 2021, reflecting an increase in direct contribution, as mentioned above, and lower bad debt expense. These impacts were partially offset by higher employee benefits expense, operating and administrative costs related to business acquisitions and growth in business operations, in addition to higher advertising and promotional costs relative to subdued marketing activity in 2020.

**TTech Adjusted EBITDA** ($ millions)


**EBIT – TTech segment**

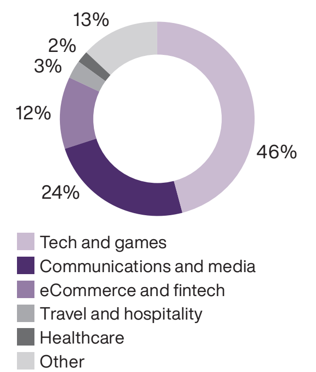
| Years ended December 31 ($ in millions) | 2021 | 2020 | Change |
|---|---|---|---|
| EBITDA | **5,735** | 4,976 | 15.2% |
| Depreciation | **(1,982)** | (1,973) | 0.5% |
| Amortization | **(912)** | (795) | 14.7% |
| EBIT[1] | **2,841** | 2,208 | 28.7% |

1 See *Section 11.1 Non-GAAP and other specified financial measures*.

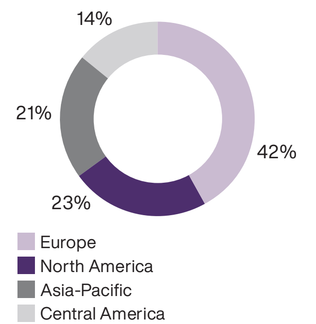
TTech EBIT increased by $633 million in 2021. Depreciation and amortization increased in 2021 due to business acquisitions and growth in capital assets over the past 12 months, including our expanded fibre footprint and 5G network roll-out, partially offset by lower depreciation on right-of-use lease assets. The depreciation increase in 2021 was partially offset by the effect of accelerated depreciation in the first quarter of 2020 from asset retirement activity.

## 5.5 Digitally-led customer experiences – TELUS International segment

**2021 DLCX Operating revenues and other income by industry vertical**




**2021 DLCX Operating revenues and other income by geographic region**




**DLCX trends**

Over the past eight quarters, the COVID-19 pandemic has impacted our business and we are not able to estimate its ultimate duration or the extent of its impact. As our service delivery centres are located in multiple geographic regions, the varying degrees of severity and recovery efforts from the pandemic in the countries we operate has required us to evolve our business operations. As of the date of this report, the majority of our team members continue to work remotely, as they have since the onset of the pandemic, and in some cases we have thoughtfully and strategically returned team members to delivery locations. Over the past few quarters in 2021, we were able to largely mitigate the negative impact on our financial condition, financial performance and operating cash flows by taking steps to strategically grow our client base and contain costs. The pandemic prevents us and our clients from operating in the normal course of business in certain areas, and we are unable to quantify with precision the impact that the pandemic has had or will have on our revenue. We expect the pandemic to continue to affect our operations into at least the first half of 2022.

The trend over the past eight quarters of increases in DLCX revenue reflects both the growth in our organic customer base, as well as the scale-up of new service programs provided to existing external customers. The higher revenue also includes revenue from internal services provided to the TTech segment and revenue growth from business acquisitions, including our acquisitions of CCC (since rebranded as TELUS International Northern Europe or TINE and comprised substantially of CCC) on January 31, 2020, and Lionbridge AI on December 31, 2020, which was subsequently rebranded as TELUS International AI Data Solutions (TIAI).

Goods and services purchased and Employee benefits expense have increased in correspondence with increases in our team member base as a result of business acquisitions and to service growing volumes from both our existing and new customers (including the expansion of our service offerings), increases in external labour to support the growth in our digital business, increases in our software licensing costs associated with our growing team member base, and increases in administrative expenses to support growth in the overall business and business acquisitions.

Depreciation and amortization have increased due to growth in capital assets, which is supporting the expansion of our sites required to service customer demand and growth in intangible assets recognized in connection with our business acquisitions.

**DLCX operating indicators**

| Years ended December 31 ($ in millions) | 2021 | 2020 | Change |
|---|---|---|---|
| **Operating revenues by industry vertical** | | | |
| Tech and games | **1,256** | 840 | 49.5% |
| Communications and media | **674** | 656 | 2.7% |
| eCommerce and fintech | **324** | 233 | 39.1% |
| Travel and hospitality | **78** | 73 | 6.8% |
| Healthcare | **59** | 49 | 20.4% |
| Other[1] | **363** | 302 | 20.2% |
| | **2,754** | 2,153 | 27.9% |
| **Operating revenues by geographic region** | | | |
| Europe | **1,153** | 864 | 33.4% |
| North America | **629** | 472 | 33.3% |
| Asia-Pacific | **575** | 460 | 25.0% |
| Central America | **397** | 357 | 11.2% |
| | **2,754** | 2,153 | 27.9% |

1 Includes, among others, retail and other financial services. No individual vertical included in this category exceeds 3% of revenue.

Revenue from our tech and games industry vertical increased by $416 million to $1,256 million in 2021. This represented 46% of Operating revenues for 2021, compared to 39% in 2020. This growth is partly attributable to the acquisition of Lionbridge AI and continued growth within our existing clients and the addition of new clients, partially offset by the effect of foreign exchange rates. Revenue generated from the eCommerce and fintech industry vertical grew by $91 million to $324 million in 2021, which was primarily attributable to new clients and growth within our existing client base, partly offset by the effect of foreign exchange rates.

We serve our clients, who are primarily domiciled in North America, from multiple delivery locations across four geographic regions. In addition, our TIAI clients are largely supported by crowdsourced contractors that are globally dispersed and not limited to the physical locations of our delivery centres. The table above presents the revenue generated in each geographic region, based on the location of our delivery centre or where the services were provided from, for the periods presented.

**Operating revenues and other income – DLCX segment**

| Years ended December 31 ($ in millions) | 2021 | 2020 | Change |
|---|---|---|---|
| Operating revenues (arising from contracts with customers) | **2,310** | 1,737 | 33.0% |
| Other income | **–** | 103 | n/m |
| External Operating revenues and other income | **2,310** | 1,840 | 25.5% |
| Intersegment revenues | **444** | 416 | 6.7% |
| DLCX Operating revenues and other income | **2,754** | 2,256 | 22.1% |

DLCX Operating revenues and other income increased by $498 million in 2021.

Our **digital and customer experience solutions revenues** increased by $573 million in 2021, attributable in part to growth generated from our acquisitions, particularly within our tech and games clients as noted earlier. The remainder of the growth was organic, coming from growth in services provided to existing clients, as well as new clients added since the prior year. This growth was offset, in part, by foreign exchange impacts in 2021 driven by the strengthening of the Canadian dollar compared to the U.S. dollar, the primary operating currency of DLCX.

**Other income** decreased by $103 million in 2021, related to the non-recurrence of the comparative period's decrease and subsequent retirement of a provision arising from business acquisition-related written put options to acquire the remaining non-controlling interest of an acquired subsidiary, Xavient, which was settled in the second quarter of 2020.

**DLCX Operating revenues (arising from contracts with customers)** ($ millions)


**Intersegment revenues** represent services provided to the TTech segment, including those from the TELUS master services agreement. Such revenue is eliminated upon consolidation, together with the associated TTech expenses.

**Operating expenses – DLCX segment**

| Years ended December 31 ($ in millions) | 2021 | 2020 | Change |
|---|---|---|---|
| Goods and services purchased[1] | **568** | 415 | 36.9% |
| Employee benefits expense[1] | **1,631** | 1,323 | 23.3% |
| DLCX operating expenses | **2,199** | 1,738 | 26.5% |

1 Includes restructuring and other costs.

DLCX operating expenses increased by $461 million in 2021.

**Goods and services purchased** increased by $153 million in 2021, largely due to our acquisitions, in particular TIAI's crowdsourced contractors, for which the contracted labour costs are recognized in Goods and services purchased.

**Employee benefits expense** increased by $308 million in 2021 as a result of business growth, which has resulted in a higher team member count coupled with higher salaries and wages. The increases were also driven, in part, by greater share-based compensation expense associated with an increase in the share price of TELUS International, and the vesting of new awards granted in 2021 (see *Note 14(a)* of the Consolidated financial statements for further details).

**EBITDA – DLCX segment**

| Years ended December 31 ($ in millions, except margins) | 2021 | 2020 | Change |
|---|---|---|---|
| EBITDA | **555** | 518 | 7.3% |
| Add restructuring and other costs included in EBITDA | **38** | 77 | n/m |
| Deduct retirement of a provision arising from business acquisition-related written put options within DLCX | **–** | (71) | n/m |
| Adjusted EBITDA[1] | **593** | 524 | 13.2% |
| EBITDA margin[2] (%) | **20.2** | 22.9 | (2.7) pts. |
| Adjusted EBITDA margin[2] (%) | **21.6** | 24.0 | (2.4) pts. |

1 For certain metrics, there are definitional differences between TELUS and TELUS International reporting. These differences largely arise from TELUS International adopting definitions consistent with practice in its industry.
2 These are non-GAAP and other specified financial measures. See *Section 11.1 Non-GAAP and other specified financial measures*.

DLCX EBITDA increased by $37 million or 7.3% and DLCX Adjusted EBITDA increased by $69 million or 13.2% in 2021. While Adjusted EBITDA increased in 2021, Adjusted EBITDA margin decreased by 2.4 percentage points. The decline in Adjusted EBITDA margin in 2021 was due to the impact of the mark-to-market adjustment on the liability-accounted share-based compensation units associated with an increase in the share price of TELUS International and the expense recognition on new equity-accounted awards granted in 2021, and foreign exchange impacts on revenues as a result of the strengthening of the Canadian dollar compared to the U.S. dollar.

**DLCX Adjusted EBITDA** ($ millions)


**EBIT – DLCX segment**

| Years ended December 31 ($ in millions) | 2021 | 2020 | Change |
|---|---|---|---|
| EBITDA | **555** | 518 | 7.3% |
| Depreciation | **(144)** | (134) | 7.5% |
| Amortization | **(178)** | (110) | 61.8% |
| EBIT[1] | **233** | 274 | (15.0)% |

1 See *Section 11.1 Non-GAAP and other specified financial measures.*

DLCX EBIT decreased by $41 million in 2021. Depreciation and amortization increased in 2021, driven primarily by the acquisitions of CCC and Lionbridge AI and corresponding intangible assets acquired in fiscal 2020.

# 6 Changes in financial position

| Financial position at December 31 ($ millions) | 2021 | 2020 | Change | Change includes: |
|---|---|---|---|---|
| **Current assets** | | | | |
| Cash and temporary investments, net | **723** | 848 | (125) | See *Section 7 Liquidity and capital resources* |
| Accounts receivable | **2,671** | 2,355 | 316 | Increase primarily driven by digitally-led customer experiences – TELUS International (DLCX) receivable, as well as an increase in unbilled customer finance receivables from our Bring-It-Back device program and TELUS Easy Payment device financing program, partly offset by a decrease in dealer and retail channel handset volumes and customer receivables |
| Income and other taxes receivable | **206** | 148 | 58 | Instalments to date are greater than the expense |
| Inventories | **448** | 407 | 41 | Increases in average handset costs and volume of handsets |
| Contract assets | **443** | 439 | 4 | Refer to description in non-current contract assets |
| Prepaid expenses | **528** | 478 | 50 | An increase driven by maintenance contracts from business acquisitions and DLCX |
| Current derivative assets | **13** | 2 | 11 | An increase in the notional amount of U.S. currency hedging items. |
| **Current liabilities** | | | | |
| Short-term borrowings | **114** | 100 | 14 | See *Section 7.7 Sale of trade receivables* |
| Accounts payable and accrued liabilities | **3,705** | 2,971 | 734 | An increase in accounts payable associated with higher capital expenditures, as well as an increase in payroll and other employee-related liabilities. See *Note 23* of the Consolidated financial statements |
| Income and other taxes payable | **104** | 122 | (18) | Instalments to date being greater than the expense |
| Dividends payable | **449** | 403 | 46 | Effects of increases in the number of shares outstanding and dividend rate |
| Advance billings and customer deposits | **854** | 772 | 82 | An increase in advance billings reflecting increased mobile subscriber growth during the period. See *Note 24* of the Consolidated financial statements |
| Provisions | **96** | 73 | 23 | An increase in new restructuring provisions in excess of restructuring disbursements |
| Current maturities of long-term debt | **2,927** | 1,432 | 1,495 | An increase in outstanding commercial paper, and increases from reclassification of long-term debt relating to upcoming 2022 maturities of the TELUS International credit facility term loan of $301 million (US$238 million) and TELUS Communications Inc. debenture of $249 million |
| Current derivative liabilities | **24** | 32 | (8) | A decrease in the notional amount of U.S. currency hedging items. |
| **Working capital** (Current assets subtracting Current liabilities) | **(3,241)** | (1,228) | (2,013) | TELUS normally has a negative working capital position. See *Financing and capital structure management plans* in *Section 4.3* and *Note 4(c)* of the Consolidated financial statements. |

| Financial position at December 31 ($ millions) | 2021 | 2020 | Change | Change includes: |
|---|---|---|---|---|
| **Non-current assets** | | | | |
| Property, plant and equipment, net | **15,926** | 15,014 | 912 | See *Capital expenditures* in *Section 7.3 Cash used by investing activities* and *Depreciation* in *Section 5.3 Consolidated operations* |
| Intangible assets, net | **17,485** | 15,048 | 2,437 | See *Capital expenditures* in *Section 7.3 Cash used by investing activities* and *Amortization of intangible assets* in *Section 5.3 Consolidated operations* |
| Goodwill, net | **7,281** | 7,160 | 121 | An increase primarily due to the acquisition of Blacksmith Applications Holdings Inc., as well as from individually immaterial business acquisitions, offset by the effect of translating TI financial statements into Canadian currency and the disposition of our financial solutions business. See *Note 18* of the Consolidated financial statements |
| Contract assets | **266** | 268 | (2) | A decrease driven by lower subsidized devices from the introduction of our TELUS Easy Payment device financing program |
| Other long-term assets | **2,004** | 1,106 | 898 | An increase in pension assets resulting from gains arising from financial and demographic assumptions re-measurement and the effects of pension plan returns greater than the discount rate, as well as increases in unbilled customer finance receivables, portfolio investments, and the asset fair value of derivatives used to manage currency risk from U.S. dollar-denominated debt. See *Note 20* of the Consolidated financial statements. |
| **Non-current liabilities** | | | | |
| Provisions | **774** | 961 | (187) | A decrease in asset retirement obligations arising from an increase in discount rate |
| Long-term debt | **17,925** | 18,856 | (931) | See *Section 7.4 Cash provided by financing activities* |
| Other long-term liabilities | **907** | 1,265 | (358) | A decrease in pension liabilities resulting from gains arising from financial and demographic assumptions re-measurement and the effects of pension plan returns greater than the discount rate, as well as a decrease in the liability fair value of derivatives used to manage currency risk from U.S. dollar-denominated debt and European euro functional currency operations purchased with U.S. dollar-denominated long-term debt. See *Note 27* of the Consolidated financial statements |
| Deferred income taxes | **4,056** | 3,718 | 338 | An overall increase in temporary differences between the accounting and tax basis of assets and liabilities, including employee benefit plan re-measurements recorded in Other comprehensive income. |
| **Owners' equity** | | | | |
| Common equity | **15,116** | 12,040 | 3,076 | See *Consolidated statements of changes in owners' equity* in the Consolidated financial statements |
| Non-controlling interests | **943** | 528 | 415 | See *Consolidated statements of changes in owners' equity* in the Consolidated financial statements. |

# 7 Liquidity and capital resources

This section contains forward-looking statements, including those with respect to our TELUS Corporation Common Share (Common Share) dividend payout ratio and net debt to EBITDA – excluding restructuring and other costs ratio. See *Caution regarding forward-looking statements* at the beginning of this MD&A.

## 7.1 Overview

Our capital structure financial policies and financing and capital structure management plans are described in *Section 4.3*.

**Cash flows**

| Years ended December 31 ($ millions) | 2021 | 2020 | Change |
|---|---|---|---|
| Cash provided by operating activities | **4,388** | 4,574 | (186) |
| Cash used by investing activities | **(5,466)** | (6,165) | (699) |
| Cash provided by financing activities | **953** | 1,904 | (951) |
| Increase (decrease) in Cash and temporary investments, net | **(125)** | 313 | (438) |
| Cash and temporary investments, net, beginning of period | **848** | 535 | 313 |
| Cash and temporary investments, net, end of period | **723** | 848 | (125) |

## 7.2 Cash provided by operating activities

**Analysis of changes in cash provided by operating activities**

| Years ended December 31 ($ millions) | 2021 | 2020 | Change |
|---|---|---|---|
| Operating revenues and other income (see *Section 5.3*) | **17,258** | 15,463 | 1,795 |
| Goods and services purchased (see *Section 5.3*) | **(6,699)** | (6,268) | (431) |
| Employee benefits expense (see *Section 5.3*) | **(4,269)** | (3,701) | (568) |
| Restructuring and other costs, net of disbursements | **10** | 35 | (25) |
| Net employee defined benefit plans expense | **113** | 102 | 11 |
| Employer contributions to employee defined benefit plans | **(53)** | (51) | (2) |
| Share-based compensation expense, net of payments | **139** | 27 | 112 |
| Interest paid | **(744)** | (740) | (4) |
| Interest received | **17** | 13 | 4 |
| Income taxes paid, net of recoveries received | **(601)** | (430) | (171) |
| Gain on disposition of financial solutions business | **(410)** | – | (410) |
| Other operating working capital changes | **(373)** | 124 | (497) |
| Cash provided by operating activities | **4,388** | 4,574 | (186) |

Cash provided by operating activities decreased by $186 million in 2021.

- Restructuring and other costs, net of disbursements, represented a net change of $25 million in 2021. We incurred lower restructuring and other costs disbursements net of expense, related to improving our overall cost structure and operational effectiveness.
- Share-based compensation expense, net of payments, represented a net change of $112 million in 2021 due to a shift to granting equity-settled restricted share units that started in fiscal 2019 and have now first vested during the year.
- Income taxes paid, net of recoveries received, increased by $171 million, largely due to taxes paid on the disposition of our financial solutions business, as well as higher income taxes paid related to our foreign operations.
- For additional details on the Gain on disposition of financial solutions business, see *Other income* in *Section 5.3*.
- For a discussion of Other operating working capital changes, see *Section 6 Changes in financial position* and *Note 31(a)* of the Consolidated financial statements.

**Cash provided by operating activities** ($ millions)


**Cash used by investing activities** ($ millions)

## 7.3 Cash used by investing activities

**Analysis of changes in cash used by investing activities**

| Years ended December 31 ($ millions) | 2021 | 2020 | Change |
|---|---|---|---|
| Cash payments for capital assets, excluding spectrum licences | **(3,097)** | (2,822) | (275) |
| Cash payments for spectrum licences | **(2,219)** | – | (2,219) |
| Cash payments for acquisitions, net | **(468)** | (3,205) | 2,737 |
| Advances to, and investment in, real estate joint ventures and associates | **(46)** | (100) | 54 |
| Real estate joint venture receipts | **4** | 5 | (1) |
| Proceeds on disposition | **508** | 86 | 422 |
| Investment in portfolio investments and other | **(148)** | (129) | (19) |
| Cash used by investing activities | **(5,466)** | (6,165) | 699 |

Cash used by investing activities decreased by $699 million in 2021.

- The increase in Cash payments for capital assets, excluding spectrum licences in 2021 was primarily composed of:
  - An increase in capital expenditures of $723 million (see *Capital expenditure measures* table and discussion below).
  - Lower capital expenditure payments of $451 million in 2021 with respect to payment timing differences.
- Cash payments for spectrum licences are primarily related to the $1.95 billion for the 3500 MHz spectrum acquired in the 2021 spectrum auction further described in *Section 1.3*. Additionally, in the first quarter of 2021, we acquired 3500 MHz spectrum licences in the urban cores of Edmonton, Guelph/Kitchener, London, Ottawa and Winnipeg, as well as in East Kootenay and Whistler. In the second quarter of 2021, we acquired a 2500 MHz licence in the urban core of Calgary.
- In 2021, we made cash payments for Blacksmith Applications Holdings Inc. as noted in *Section 1.3*, as well as other individually immaterial business acquisitions that are complementary to our existing lines of business. This is compared to a higher number of business acquisitions in 2020 that included Competence Call Center (CCC) (since rebranded as TELUS International Northern Europe or TINE and comprised substantially of CCC), Mobile Klinik, AFS, EQ Care and Lionbridge AI, in addition to other individually immaterial business acquisitions complementary to our existing lines of business.
- Advances to, and investment in, real estate joint ventures and associates represented a net change of $54 million, predominantly related to higher investments in the first quarter of 2020.
- Proceeds on disposition increased by $422 million in 2021 primarily due to the disposition of our financial solutions business described in *Section 1.3*, partly offset by the non-recurrence on the sale of certain assets in the third quarter of 2020.

**Capital expenditures (excluding spectrum licences)** ($ millions)


**Capital expenditure measures**

| Years ended December 31 ($ millions, except capital intensity) | 2021 | 2020 | Change |
|---|---|---|---|
| **Capital expenditures**[1] | | | |
| TELUS technology solutions (TTech) segment | **3,372** | 2,675 | 26.1% |
| Digitally-led customer experiences – TELUS International (DLCX) segment | **126** | 100 | 26.0% |
| Consolidated | **3,498** | 2,775 | 26.1% |
| TTech segment capital expenditure intensity[2] (%) | **23** | 20 | 3 pts. |
| DLCX segment capital expenditure intensity[2] (%) | **5** | 4 | 1 pt. |
| Consolidated capital expenditure intensity[2] (%) | **20** | 18 | 2 pts. |

1 Capital expenditures include assets purchased, excluding right-of-use lease assets, but not yet paid for, and therefore differ from Cash payments for capital assets, excluding spectrum licences, as reported in the Consolidated statements of cash flows. Refer to *Note 31* of the Consolidated financial statements for further information.

2 See *Section 11.1 Non-GAAP and other specified financial measures*.

**Consolidated capital expenditures** increased by $723 million in 2021. TTech drove $697 million of the increase in 2021, primarily due to accelerated investments in our 5G network, broadband build, enhanced product development, and digitization to increase system capacity and reliability as announced on March 25, 2021. In addition, we saw strong security subscriber growth, and advanced the purchase of customer equipment to mitigate supply chain risks and support subscriber growth. This was partly offset by reduced spend resulting from efficiencies in our 4G network. With our investments, we are advancing the mobile speeds and coverage of our expanding 5G network, continuing to connect additional homes and businesses directly to our fibre-optic technology, enhancing products, and supporting system reliability and operational efficiency and effectiveness efforts. These investments also support our internet, TV and security subscriber growth, address our customers' demand for faster internet speeds, and extend the reach and functionality of our business, as well as our healthcare and agriculture solutions. By December 31, 2021, our 5G network covered over 26.2 million Canadians, representing 70% of the population.

On March 25, 2021, we announced that we intended to accelerate up to $750 million of capital spending in 2021. $708 million of accelerated capital had been invested throughout 2021, to advance our fibre build and 5G coverage. This spend has enabled: (i) additional premises to be connected to our fibre network; (ii) acceleration of our copper to fibre migration program; (iii) expansion of the number of communities we are bringing fibre to, including many rural and Indigenous communities; (iv) advancement of our 5G network build, which covered 70% of the Canadian population at December 31, 2021; and (v) progress in the implementation of our digital strategy and enhancing products that will bolster both top-line revenue growth and operating expense efficiency.

## 7.4 Cash provided by financing activities

**Analysis of changes in cash provided by financing activities**

| Years ended December 31 ($ millions) | 2021 | 2020 | Change |
|---|---|---|---|
| Common Shares issued | **1,300** | 1,495 | (195) |
| Dividends paid to holders of Common Shares | **(1,045)** | (930) | (115) |
| Issue (repayment) of short-term borrowings, net | **10** | (8) | 18 |
| Long-term debt issued | **4,891** | 4,882 | 9 |
| Redemptions and repayment of long-term debt | **(4,972)** | (3,863) | (1,109) |
| Shares of subsidiary issued and sold to non-controlling interests, net | **827** | 400 | 427 |
| Other | **(58)** | (72) | 14 |
| Cash provided by financing activities | **953** | 1,904 | (951) |

Cash provided by financing activities decreased by $951 million in 2021.

**Dividends paid to holders of Common Shares** ($ millions)


**Common Shares issued**

Common Shares issued reflect 51 million Common Shares issued at a price of $25.35 per Common Share in the first quarter of 2021 as described in *Section 1.3 Equity offering*. This is compared to 58 million Common Shares issued at a price of $26.00 in the first quarter of 2020.

**Dividends paid to holders of Common Shares**

Our dividend reinvestment and share purchase (DRISP) plan trustee acquired shares from Treasury for the DRISP plan, rather than acquiring Common Shares in the stock market. Effective with the dividends paid on October 1, 2019, we offered Common Shares from Treasury at a discount of 2%. Cash payments for dividends increased by $115 million in 2021, which reflected higher dividend rates under our dividend growth program (see *Section 4.3*) and an increase in the number of shares outstanding. This was partly offset by a higher discounted DRISP issuance. During 2021, our DRISP plan trustee acquired Common Shares for $620 million.

In January 2022, we paid dividends of $293 million to the holders of Common Shares and the trustee acquired dividend reinvestment Common Shares from Treasury for $156 million, totalling $449 million.

**Issue (repayment) of short-term borrowings, net**

There were no material draws or repayments in the current or previous year, with the exception of the first quarter of 2020, when we drew down and repaid $200 million advanced to us from an arm's-length securitization trust.

**Long-term debt issued and redemptions and repayment of long-term debt**

In 2021, long-term debt issued increased by $9 million, while redemptions and repayment of long-term debt increased by $1,109 million. These changes were primarily composed of:

- A net increase in commercial paper outstanding, including foreign exchange effects, of $372 million to a balance of $1.9 billion (US$1.5 billion) at December 31, 2021, from a balance of $731 million (US$574 million) at December 31, 2020. Our commercial paper program, when utilized, provides low-cost funds and is fully backstopped by the revolving credit facility (see *Section 7.6 Credit facilities*).
- A decrease in net draws on the TELUS International (TI) credit facility, including foreign exchange effects, of $742 million. As at December 31, 2021, net draws due to a syndicate of financial institutions (excluding TELUS Corporation) were US$854 million, whereas as at December 30, 2020, net draws were US$1,428 million. The reduction in TI credit facility indebtedness was facilitated by the net proceeds of the TI initial public offering (IPO) (see *Note 28(c)* of the Consolidated financial statements). The TI credit facility is non-recourse to TELUS Corporation.
- The April 5, 2021 issue of $500 million of senior unsecured 4.10% Notes, Series CAE, due April 5, 2051. The net proceeds from this offering were used to fund the repayment upon maturity of the Series 3, 10.65% debentures of TELUS Communications Inc. (TCI) due June 2021, the repayment of commercial paper and for general corporate purposes.
- The June 28, 2021 issue of $750 million of our inaugural senior unsecured 2.85% Sustainability-Linked Notes, Series CAF, due November 13, 2031. The net proceeds were used for the repayment of outstanding indebtedness, including the repayment of commercial paper, and for other general corporate purposes.
- The repayment upon maturity of Series 3, 10.65% debentures of TCI due June 2021.
- The early full redemption of $1 billion of 2.35% Notes, Series CT, due March 28, 2022. The long-term debt prepayment premium recorded in the three-month period ended September 30, 2021 was $10 million before income taxes.

In comparison, in 2020, long-term debt issued decreased by $2,823 million while redemptions and repayment of long-term debt decreased by $1,398 million. These changes were primarily composed of:

- A net decrease in commercial paper outstanding, including foreign exchange effects, of $284 million from a balance of $1,015 million (US$781 million) at December 31, 2019.
- An increase in net draws on the TI credit facility, including foreign exchange effects, of $1,373 million. As at December 31, 2019, net draws were US$336 million.
- The May 29, 2020 issues of $600 million of senior unsecured 2.35% Notes, Series CAC, due January 27, 2028, and $400 million through the re-opening of the 3.95% Notes, Series CAB, due February 16, 2050. The net proceeds of this offering were used for the early full redemptions of the $400 million 3.60% Notes, Series CM, due January 26, 2021 and the $500 million 3.20% Notes, Series CO, due April 5, 2021, as well as for general corporate purposes. The total long-term debt prepayment premium for the $400 million Series CM and $500 million Series CO notes redemptions was $18 million before income taxes.

- The October 5, 2020 issue of $500 million of senior unsecured 2.05% Notes, Series CAD, due October 7, 2030.
- In connection with our acquisitions of CCC and AFS, we repaid other long-term debt acquired of $185 million and $118 million, respectively.

The average term to maturity of our long-term debt (excluding commercial paper, the revolving component of the TI credit facility, lease liabilities and other long-term debt) was 12.5 years at December 31, 2021, an increase from 12.2 years at December 31, 2020. Additionally, the weighted average cost of our long-term debt (excluding commercial paper, the revolving component of the TI credit facility, lease liabilities and other long-term debt) was 3.72% at December 31, 2021, a decrease from 3.80% at December 31, 2020.

**Weighted average interest rate on long-term debt** (%)


**Average term to maturity of long-term debt** (years)


**Shares of subsidiary issued and sold to non-controlling interests, net**
In connection with the TI IPO described in *Section 1.3*, we received net cash proceeds of $827 million in the first quarter of 2021 (see *Note 28(c)* of the Consolidated financial statements). Also in 2020, TI issued shares to non-controlling interests related to its acquisitions of CCC and Lionbridge AI.

**Other**
In the second quarter of 2021, we incurred debt issuance costs in connection with the issuance of 4.10% Notes, Series CAE and 2.85% Sustainability-Linked Notes, Series CAF. In connection with our issuance of 51 million Common Shares in the first quarter of 2021, we incurred certain equity issuance costs. In the first quarter of 2020, we also incurred certain equity issuance costs in connection with our issue of 58 million Common Shares.

## 7.5 Liquidity and capital resource measures

**Net debt** was $20.5 billion at December 31, 2021, an increase of $709 million compared to one year earlier, resulting mainly from an increase in commercial paper outstanding, and the second quarter 2021 issuances of $500 million of Series CAE notes and $750 million of Series CAF Sustainability-Linked Notes as described in *Section 7.4* as well as lower Cash and temporary investments. These factors were partially offset by the early redemption of Series CT notes described in *Section 7.4*, and the repayment upon maturity of Series 3, 10.65% debentures of TCI.

**Fixed-rate debt as a proportion of total indebtedness**, which excludes lease liabilities and other long-term debt, was 87% as at December 31, 2021, down from 89% one year earlier. This was mainly due to: (i) an increase in commercial paper outstanding, which is classified as floating-rate debt in this calculation; (ii) the early redemption of Series CT notes; and (iii) the repayment upon maturity of Series 3, 10.65% debentures of TCI. These factors were partially offset by: (i) a decrease in net draws due to a syndicate of financial institutions (excluding TELUS Corporation) on the TI credit facility, which is non-recourse to TELUS Corporation; and (ii) the second quarter 2021 issuances of $500 million of Series CAE notes and $750 million of Series CAF Sustainability-Linked Notes.

**Net debt to EBITDA – excluding restructuring and other costs** ratio was 3.17 times, as measured at December 31, 2021, down from 3.45 times one year earlier. Our long-term objective for this measure is within a range of 2.20 to 2.70 times, which we believe is consistent with maintaining investment grade credit ratings in the range of BBB+, or the equivalent, and providing reasonable access to capital. As at December 31, 2021, this ratio remains outside of the long-term objective range resulting from prior issuances of incremental debt, primarily due to business acquisitions and the acquisition of spectrum licences, partially offset by growth in EBITDA – excluding restructuring and other costs. Fiscal 2021 EBITDA growth was reduced by impacts from the COVID-19 pandemic. As at December 31, 2021, the acquisition of spectrum licences increased the ratio by approximately 0.49 and business acquisitions over the past 12 months increased the ratio by approximately 0.05, while business dispositions decreased the ratio by approximately 0.26. Our recent acquisitions of spectrum licences have increased our national spectrum holdings and represent an investment to extend our network capacity to support continuing data consumption growth, as well as growth in our mobile subscriber base. Given the cash demands of the 2019 600 MHz, the recent 2021 3500 MHz and upcoming spectrum auctions, as well as the inability to predict impacts of the COVID-19 pandemic, the assessment of the guideline and return to the objective range remains to be determined; however, it is our intent to return to a ratio below 2.70 times in the medium term (following the recent 2021, and upcoming 2023 and 2024, spectrum auctions), consistent with our long-term strategy. While this ratio exceeds our long-term objective range, we are well in compliance with the leverage ratio covenant in our credit facilities, which states that we may not permit our leverage ratio to exceed 4.25 to 1.00 at September 30, 2021 (see *Section 7.6 Credit facilities*).

**Earnings coverage** (times)


**EBITDA – excluding restructuring and other costs interest coverage** (times)

**Liquidity and capital resource measures**

| As at, or for the 12-month periods ended, December 31 | 2021 | 2020 | Change |
|---|---|---|---|
| **Components of debt and coverage ratios[1]** ($ millions) | | | |
| Net debt | **20,535** | 19,826 | 709 |
| EBITDA – excluding restructuring and other costs | **6,476** | 5,753 | 723 |
| Net interest cost | **773** | 792 | (19) |
| **Debt ratios** | | | |
| Fixed-rate debt as a proportion of total indebtedness (excluding lease liabilities and other long-term debt) (%) | **87** | 89 | (2) pts. |
| Average term to maturity of long-term debt (excluding commercial paper, the revolving component of the TI credit facility, lease liabilities and other long-term debt) (years) | **12.5** | 12.2 | 0.3 |
| Weighted average interest rate on long-term debt (excluding commercial paper, the revolving component of the TI credit facility, lease liabilities and other long-term debt) (%) | **3.72** | 3.80 | (0.08) pts. |
| Net debt to EBITDA – excluding restructuring and other costs[1] (times) | **3.17** | 3.45 | (0.28) |
| **Coverage ratios[1]** (times) | | | |
| Earnings coverage | **3.9** | 3.2 | 0.7 |
| EBITDA – excluding restructuring and other costs interest coverage | **8.4** | 7.3 | 1.1 |
| **Other measures[1]** (%) | | | |
| Determined using most comparable IFRS-IASB measures | | | |
| Ratio of Common Share dividends declared to cash provided by operating activities less capital expenditures (excluding spectrum licences) | **192** | 84 | 108 pts. |
| Determined using management measures | | | |
| Common Share dividend payout ratio – net of dividend reinvestment plan effects | **140** | 67 | 73 pts. |

1 See Section *11.1 Non-GAAP and other specified financial measures.*

**Earnings coverage** ratio for the 12-month period ended December 31, 2021 was 3.9 times, up from 3.2 times one year earlier. An increase in income before borrowing costs and income taxes increased the ratio by 0.7; the gain on the disposition of our financial solutions business in the fourth quarter of 2021 contributed to EBITDA growth.

**EBITDA – excluding restructuring and other costs interest coverage** ratio for the 12-month period ended December 31, 2021 was 8.4 times, up from 7.3 times one year earlier. Growth in EBITDA – excluding restructuring and other costs increased the ratio by 0.9 and a decrease in net interest costs increased the ratio by 0.2.

**Common Share dividend payout ratios:** Actual Common Share dividend payout decisions will continue to be subject to our Board's assessment of our financial position and outlook, as well as our long-term Common Share dividend payout objective range of 60 to 75% of prospective free cash flow. So as to be consistent with the way we manage our business, our Common Share dividend payout ratio is presented as a historical measure calculated as the sum of the most recent four quarters' dividends declared for Common Shares, as recorded in the financial statements, net of dividend reinvestment plan effects, divided by the sum of the most recent four quarters' free cash flow amounts for interim reporting periods. For fiscal years, the denominator is annual free cash flow. The historical measure for the 12-month period ended December 31, 2021 is presented for illustrative purposes in evaluating our target guideline. As at December 31, 2021, the ratio was outside of the objective range, primarily due to: (i) our planned accelerated capital expenditures program to support our broadband capital investments, the build-out of our TELUS PureFibre infrastructure and the acceleration of our 5G network roll-out; and (ii) the fiscal 2021 impact of the pandemic. Excluding the effects of our accelerated capital expenditures program, as at December 31, 2021, the ratio was 73%.

TI intends to retain all available funds and any future earnings to support operations and to finance the growth and development of its business.

## **7.6** Credit facilities

At December 31, 2021, we had $850 million of liquidity available from the TELUS revolving credit facility and $833 million of liquidity available from the TI credit facility with a syndicate of financial institutions (excluding TELUS Corporation). In addition, we had $500 million available under our trade receivables securitization program (see *Section 7.7 Sale of trade receivables*). We are well within our objective of generally maintaining at least $1.0 billion of available liquidity.

**TELUS revolving credit facility**

We have a $2.75 billion (or U.S. dollar equivalent) unsecured revolving credit facility with a syndicate of financial institutions, expiring April 6, 2026. The revolving credit facility is used for general corporate purposes, including the backstop of commercial paper, as required.

*TELUS revolving credit facility at December 31, 2021*

| ($ millions) | Expiry | Size | Drawn | Outstanding undrawn letters of credit | Backstop for commercial paper program | Available liquidity |
|---|---|---|---|---|---|---|
| Revolving credit facility[1] | April 6, 2026 | 2,750 | – | – | (1,900) | 850 |

1 Canadian dollars or U.S. dollar equivalent.

Our revolving credit facility contains customary covenants, including a requirement that we not permit our consolidated leverage ratio to exceed 4.25 to 1.00 and that we not permit our consolidated coverage ratio to be less than 2.00 to 1.00 at the end of any financial quarter. As at December 31, 2021, our consolidated leverage ratio was 3.17 to 1.00 and our consolidated coverage ratio was 8.38 to 1.00. These ratios are expected to remain well within the covenants. There are certain minor differences in the calculation of the leverage ratio and coverage ratio under the revolving credit facility, as compared with the calculation of Net debt to EBITDA – excluding restructuring and other costs and EBITDA – excluding restructuring and other costs interest coverage. Historically, the calculations have not been materially different. The covenants are not impacted by revaluation, if any, of Property, plant and equipment, Intangible assets or Goodwill for accounting purposes. Continued access to our credit facilities is not contingent on maintaining a specific credit rating

**Commercial paper**

TELUS Corporation has an unsecured commercial paper program, which is backstopped by our revolving credit facility, enabling us to issue commercial paper up to a maximum aggregate amount at any one time of $1.9 billion equivalent (US$1.5 billion maximum) as at December 31, 2021. Foreign currency forward contracts are used to manage currency risk arising from issuing commercial paper denominated in U.S. dollars. The commercial paper program is to be used for general corporate purposes, including, but not limited to, capital expenditures and investments. Our ability to reasonably access the commercial paper market in the U.S. is dependent on our credit ratings (see *Section 7.8 Credit ratings*).

**TELUS International credit facility**

As at December 31, 2021, TELUS International (Cda) Inc. had a credit facility, secured by its assets, expiring on January 28, 2025, with a syndicate of financial institutions and, joined in 2020, by TELUS Corporation. The TI credit facility is comprised of US$620 million (TELUS Corporation as an approximately 7.5% lender) and US$230 million (TELUS Corporation as a 12.5% lender) revolving components and amortizing US$600 million (TELUS Corporation as 12.5% lender) and US$250 million term loan components. The TI credit facility is non-recourse to TELUS Corporation. The outstanding revolving components and term loan components had a weighted average interest rate of 1.88% as at December 31, 2021.

The term loan components are subject to an amortization schedule which requires that 5% of the principal advanced be repaid each year of the term of the agreement, with the balance due at maturity and December 22, 2022, for the US$250 million component, respectively.

**Other letter of credit facilities**

At December 31, 2021, we had $193 million of letters of credit outstanding issued under various uncommitted facilities; such letter of credit facilities are in addition to the ability to provide letters of credit pursuant to our committed bank credit facility. Available liquidity under various uncommitted letters of credit facilities was $117 million at December 31, 2021. Further, we had arranged $359 million of incremental letters of credit to allow us to participate in Innovation, Science and Economic Development Canada's 3500 MHz band spectrum auction that was held in June-July 2021, as further described in *Note 18(a)* of the Consolidated financial statements. Concurrent with funding the purchase of the spectrum licences, these incremental letters of credit were extinguished.

**Other long-term debt**

Other liabilities bear interest at 3.19%, are secured by the AWS-4 spectrum licences associated with these other liabilities and a real estate holding, and are subject to amortization schedules, so that the principal is repaid over the periods to maturity, the last period ending March 31, 2035.

## **7.7** Sale of trade receivables

TCI, a wholly owned subsidiary of TELUS, is a party to an agreement with an arm's-length securitization trust associated with a major Schedule I Canadian bank, under which it is currently able to sell an interest in certain trade receivables for an amount up to a maximum of $600 million. The agreement is in effect until December 31, 2024, and available liquidity was $500 million as at December 31, 2021. (See *Note 22* of the Consolidated financial statements.) Sales of trade receivables in securitization transactions are recognized as collateralized Short-term borrowings and thus do not result in our de-recognition of the trade receivables sold.

TCI is required to maintain a credit rating of at least BB by DBRS Ltd. or the securitization trust may require the sale program to be wound down prior to the end of the term. The minimum credit rating was exceeded as of February 10, 2022.

## 7.8 Credit ratings

There were no changes to our investment grade credit ratings during 2021 or as of February 10, 2022. We believe adherence to most of our stated financial policies (see *Section 4.3*), coupled with our efforts to maintain a constructive relationship with banks, investors and credit rating agencies, continue to provide reasonable access to capital markets. (See discussion of risks in *Section 10.14 Financing, debt and dividends*.)

## 7.9 Financial instruments, commitments and contingent liabilities

**Financial instruments**

Our financial instruments, their accounting classification and the nature of certain risks that they may be subject to are described in *Note 4* of the Consolidated financial statements. Our policies in respect of the recognition and measurement of financial instruments are described in *Note 1(c)* of the Consolidated financial statements.

| | | Risks | | | | |
|---|---|---|---|---|---|---|
| | | | | Market risks | | |
| Financial instrument | Accounting classification | Credit | Liquidity | Currency | Interest rate | Other price |
| **Measured at amortized cost** | | | | | | |
| Accounts receivable | AC[1] | X | | X | | |
| Contract assets | AC[1] | X | | | | |
| Construction credit facilities advances to real estate joint venture | AC[1] | | | | X | |
| Short-term borrowings | AC[1] | | X | X | X | |
| Accounts payable | AC[1] | | X | X | | |
| Provisions (including restructuring accounts payable) | AC[1] | | X | X | | X |
| Long-term debt | AC[1] | | X | X | X | |
| **Measured at fair value** | | | | | | |
| Cash and temporary investments | FVTPL[2] | X | | X | X | |
| Long-term investments (not subject to significant influence)[3] | FVTPL/FVOCI[3] | | | X | | X |
| Foreign exchange derivatives[4] | FVTPL[2] | X | X | X | | |

1 For accounting recognition and measurement purposes, classified as amortized cost (AC).
2 For accounting recognition and measurement purposes, classified as fair value through net income (FVTPL). *Unrealized* changes in the fair values of financial instruments are included in net income unless the instrument is part of a cash flow hedging relationship. The effective portions of *unrealized* changes in the fair values of financial instruments held for hedging are included in other comprehensive income.
3 Long-term investments over which we do not have significant influence are measured at fair value if those fair values can be reliably measured. For accounting recognition and measurement purposes, on an investment-by-investment basis, long-term investments are classified as either fair value through net income or fair value through other comprehensive income (FVOCI).
4 Use of derivative financial instruments is subject to a policy which requires that no derivative transaction is to be entered into for the purpose of establishing a speculative or leveraged position (the corollary being that all derivative transactions are to be entered into for risk management purposes only) and sets criteria for the creditworthiness of the transaction counterparties.
Derivatives that are part of an established and documented cash flow hedging relationship are accounted for as held for hedging. We believe that classification as held for hedging results in a better matching of the change in the fair value of the derivative financial instrument with the risk exposure being hedged.
In respect of hedges of anticipated transactions, hedge gains/losses are included with the related expenditure and are expensed when the transaction is recognized in our results of operations. We have selected this method as we believe that it results in a better matching of the hedge gains/losses with the risk exposure being hedged.
Derivatives that are not part of a documented cash flow hedging relationship are accounted for as held for trading and thus are measured at fair value through net income.

*Liquidity risk*

As a component of our capital structure financial policies, discussed in *Section 4.3 Liquidity and capital resources*, we manage liquidity risk by: maintaining a daily cash pooling process that enables us to manage our available liquidity and our liquidity requirements according to our actual needs; maintaining an agreement to sell trade receivables to an arm's-length securitization trust; maintaining bilateral bank facilities and syndicated credit facilities; maintaining a commercial paper program; maintaining an in-effect shelf prospectus; continuously monitoring forecast and actual cash flows; and managing maturity profiles of financial assets and financial liabilities.

As at December 31, 2021, TELUS Corporation could offer $2.75 billion of debt or equity securities pursuant to a shelf prospectus that is in effect until June 2023.

As at December 31, 2021, we had $850 million of liquidity available from the TELUS revolving credit facility and $833 million of liquidity available from the TI credit facility with a syndicate of financial institutions (excluding TELUS Corporation) (see *Section 7.6 Credit facilities*), as well as $500 million available under our trade receivables securitization program (see *Section 7.7 Sale of trade receivables*). Excluding the TI credit facility and including cash and temporary investments of $723 million, we had available liquidity of approximately $2.1 billion at December 31, 2021 (see *Section 11.1 Non-GAAP and other specified financial measures*). This adheres to our objective of generally maintaining at least $1 billion of available liquidity. We believe that our investment grade credit ratings contribute to reasonable access to capital markets.

Refer to *Note 4* of the Consolidated financial statements for further information regarding our financial instruments.

**Commitments and contingent liabilities**

*Contractual obligations as at December 31, 2021*

| ($ millions) | 2022 | 2023 | 2024 | 2025 | 2026 | 2027–2031 | Thereafter | Total |
|---|---|---|---|---|---|---|---|---|
| Short-term borrowings | | | | | | | | |
| Interest obligations | 1 | 1 | 1 | – | – | – | – | 3 |
| Principal obligations[1] | 14 | – | 100 | – | – | – | – | 114 |
| | 15 | 1 | 101 | – | – | – | – | 117 |
| Long-term debt | | | | | | | | |
| Interest obligations | 630 | 601 | 572 | 526 | 481 | 1,793 | 4,251 | 8,854 |
| Principal maturities | 2,500 | 566 | 1,152 | 1,691 | 1,420 | 5,558 | 6,248 | 19,135 |
| | 3,130 | 1,167 | 1,724 | 2,217 | 1,901 | 7,351 | 10,499 | 27,989 |
| Leases | | | | | | | | |
| Interest obligations | 67 | 53 | 44 | 36 | 29 | 86 | 65 | 380 |
| Principal maturities | 437 | 311 | 261 | 140 | 115 | 312 | 279 | 1,855 |
| | 504 | 364 | 305 | 176 | 144 | 398 | 344 | 2,235 |
| Occupancy costs[2] | 117 | 111 | 95 | 75 | 61 | 124 | 61 | 645 |
| Purchase obligations[3] | | | | | | | | |
| Operating expenditures | 943 | 210 | 221 | 237 | 233 | 820 | 7 | 2,671 |
| Property, plant and equipment, and Intangible assets | 597 | 3 | – | – | – | – | – | 600 |
| | 1,540 | 213 | 221 | 237 | 233 | 820 | 7 | 3,271 |
| Non-interest bearing financial liabilities | 3,395 | 62 | 13 | 14 | 2 | 7 | – | 3,493 |
| Other obligations | 23 | (1) | (1) | 18 | 2 | 68 | 72 | 181 |
| Total | 8,724 | 1,917 | 2,458 | 2,737 | 2,343 | 8,768 | 10,983 | 37,931 |

1 See *Section 7.7 Sale of trade receivables*.
2 Occupancy costs include transactions with real estate joint ventures. See *Section 7.11 Transactions between related parties*.
3 Where applicable, purchase obligations reflect foreign exchange rates at December 31, 2021. Purchase obligations include future operating and capital expenditures that have been contracted for at the current year-end and include the most likely estimates of prices and volumes, where necessary. As purchase obligations reflect market conditions at the time the obligation was incurred for the items being purchased, they may not be representative of future years. Obligations from personnel supply contracts and other such labour agreements have been excluded.

*Claims and lawsuits*

A number of claims and lawsuits (including class actions and intellectual property infringement claims) seeking damages and other relief are pending against us and, in some cases, other mobile carriers and telecommunications service providers. As well, we have received notice of, or are aware of, certain possible claims (including intellectual property infringement claims) against us and, in some cases, other mobile carriers and telecommunications service providers. (See the related risk discussion in *Section 10.17 Litigation and legal matters*.)

It is not currently possible for us to predict the outcome of such claims, possible claims and lawsuits due to various factors, including: the preliminary nature of some claims; uncertain damage theories and demands; an incomplete factual record; uncertainty concerning legal theories and procedures and their resolution by the courts, at both the trial and the appeal levels; and the unpredictable nature of opposing parties and their demands.

However, subject to the foregoing limitations, management is of the opinion, based upon legal assessments and information presently available, that it is unlikely that any liability, to the extent not provided for through insurance or otherwise, would have a material effect on our financial position and the results of our operations, including cash flows, with the exception of the items disclosed in *Note 29(a)* of the Consolidated financial statements. This is a significant judgment for us (see *Section 8.1 Critical accounting estimates and judgments*).

*Indemnification obligations*

In the normal course of operations, we provide indemnification in conjunction with certain transactions. The terms of these indemnification obligations range in duration. These indemnifications would require us to compensate the indemnified parties for costs incurred as a result of failure to comply with contractual obligations, or litigation claims or statutory sanctions, or damages that may be suffered by an indemnified party. In some cases, there is no maximum limit on these indemnification obligations. The overall maximum amount of an indemnification obligation will depend on future events and conditions and therefore cannot be reasonably estimated. Where appropriate, an indemnification obligation is recorded as a liability. Other than obligations recorded as liabilities at the time of the related transactions, historically we have not made significant payments under these indemnifications.

As at December 31, 2021, we had no liability recorded in respect of our indemnification obligations.

## 7.10 Outstanding share information

| Outstanding shares (millions) | December 31, 2021 | January 31, 2022 |
|---|---|---|
| Common Shares | 1,370 | 1,376 |
| Common Share options | 3 | 3 |
| Restricted share units – equity-settled | 8 | 8 |

## 7.11 Transactions between related parties

**Transactions with key management personnel**
Our key management personnel have authority and responsibility for overseeing, planning, directing and controlling our activities and consist of our Board of Directors and our Executive Team. Total compensation expense for key management personnel was $99 million in 2021, compared to $62 million in 2020. The increase in compensation expense for key management personnel was primarily due to greater share-based compensation, which was largely related to liability-accounted awards that increased in value in the first quarter of 2021 and decreased in value in the comparative 2020 period and pension plan past service costs recorded in 2021. See *Note 30(a)* of the Consolidated financial statements for additional details.

**Transactions with defined benefit pension plans**
We provided management and administrative services to our defined benefit pension plans. Charges for these services were on a cost recovery basis and were immaterial.

**Transactions with real estate joint venture and associates**
In 2021, we had transactions with the TELUS Sky real estate joint venture, which is a related party to us, as set out in *Note 21* of the Consolidated financial statements. The new-build tower was completed in 2020.

For the TELUS Sky real estate joint venture, commitments and contingent liabilities include construction financing ($342 million, with Canadian financial institutions as 66⅔% lender and TELUS as 33⅓% lender) under a credit agreement maturing August 31, 2023. We have entered into lease agreements with the TELUS Sky real estate joint venture; for lease accounting purposes, the first lease commenced during the three-month period ended June 30, 2019.

# 8 Accounting matters

## 8.1 Critical accounting estimates and judgments

Our significant accounting policies are described in *Note 1* of the Consolidated financial statements for the year ended December 31, 2021. The preparation of financial statements in conformity with generally accepted accounting principles (GAAP) requires management to make estimates, assumptions and judgments that affect: the reported amounts of assets and liabilities at the date of the financial statements; the disclosure of contingent assets and liabilities at the date of the financial statements; and the reported amounts and classification of income and expense during the reporting period. Actual results could differ from those estimates. Our critical accounting estimates and significant judgments are generally discussed with the Audit Committee each quarter.

Refer to *Note 1* of the Consolidated financial statements for further information on our critical accounting estimates, including examples of the significant estimates and judgments that we make, and their relative significance and degree of difficulty, as illustrated in the graphic included in *Note 1*.

**General**

- In determining our critical accounting estimates, we consider trends, commitments, events or uncertainties that we reasonably expect to materially affect our methodology or assumptions. Our statements in this MD&A regarding such consideration are made subject to the *Caution regarding forward-looking statements*.
- In the normal course, we make changes to assumptions underlying all critical accounting estimates so that they reflect current economic conditions, updated historical information used to develop the assumptions, and changes in our credit ratings, where applicable. Unless indicated otherwise in the discussion below, we expect that no material changes in overall financial performance and financial statement line items would arise either from reasonably likely changes in material assumptions underlying the estimate or from selection of a different estimate from within a range of valid estimates.
- Our critical accounting estimates affect the Consolidated statements of income and other comprehensive income, and the Consolidated statements of financial position, as follows:

| | Consolidated statements of income and other comprehensive income | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Operating expenses | | | | | |
| Consolidated statements of financial position | Operating revenues and other income | Goods and services purchased | Employee benefits expense | Depreciation | Amortization of intangible assets | Financing costs | Employee defined benefit plans re-measurements[1] |
| Intangible assets, net, and Goodwill, net | | | | | X[2] | | |
| Employee defined benefit pension plans | | | X | X[3] | X[3] | X | X |
| Property, plant and equipment, net | | | | X | | | |
| Provisions for asset retirement obligations | | X | | X | | X | |
| Provisions related to business combinations | X | | | | | X | |
| Investments | X | | | | | | |
| Accounts receivable | | X | | | | | |
| Contract assets | X | X | | | | | |
| Inventories | | X | | | | | |

1 Other comprehensive income – Item never subsequently reclassified to income.
2 Accounting estimate, as applicable to Intangible assets with indefinite lives relates to spectrum holdings.
3 Accounting estimate impact due to internal labour capitalization rates.

- All critical accounting estimates are uncertain at the time an estimate is made and affect the following Consolidated statements of income and other comprehensive income line items: Income taxes (except for estimates about Goodwill) and Net income. Similarly, all critical accounting estimates affect the following Consolidated statements of financial position line items: Current assets (Income and other taxes receivable), Current liabilities (Income and other taxes payable), Deferred income taxes and Common equity (retained earnings) and Non-controlling interests. The discussion of each critical accounting estimate does not differ between our two segments, TELUS technology solutions (TTech) and digitally-led customer experiences – TELUS International (DLCX), unless explicitly noted.

**Intangible assets, net; Goodwill, net; and Property, plant and equipment, net**

*General*

- The Intangible assets, net, line item represents approximately 36% of Total assets as at December 31, 2021 (35% as at December 31, 2020). Included in Intangible assets are spectrum licences, which represent approximately 25% of Total assets as at December 31, 2021 (23% as at December 31, 2020).
- The Goodwill, net, line item represents approximately 15% of Total assets as at December 31, 2021 and approximately 17% of Total assets as at December 31, 2020.
- The Property, plant and equipment, net, line item on our Consolidated statements of financial position represents approximately 33% of Total assets as at December 31, 2021 and approximately 35% of Total assets as at December 31, 2020.
- If our estimates of the useful lives of assets were incorrect and/or our estimates of the acquisition-date fair value of property, plant, equipment and intangible assets acquired in business combinations were incorrect, we could experience increased or decreased charges for amortization or depreciation in the future. If the future were to differ adversely from our best estimate of key economic assumptions and associated cash flows were to materially decrease, we could potentially experience future material impairment charges in respect of our Property, plant and equipment assets, Intangible assets or Goodwill. If Intangible assets with indefinite lives were determined to have finite lives at some point in the future, we could experience increased charges for amortization of Intangible assets. Such charges in and of themselves do not result in a cash outflow and would not immediately affect our liquidity.

*The recoverability of Intangible assets with indefinite lives; the recoverability of Goodwill*

- The carrying values of Intangible assets with indefinite lives and Goodwill are periodically tested for impairment, and this test represents a significant estimate for us.
- The recoverable amounts of the cash-generating units' assets have been determined based on a fair value less costs of disposal calculation. There is a material degree of uncertainty with respect to the estimates of the recoverable amounts of the cash-generating units' assets, given the necessity of making key economic assumptions about the future. The fair value less costs of disposal calculation uses future cash flows and growth projections; associated economic risk assumptions and estimates of the likelihood of achieving key operating metrics and drivers; estimates of future generational infrastructure capital expenditures; and the future weighted average cost of capital.
- See *Note 18(f)* of the Consolidated financial statements for further discussion of methodology and sensitivity testing.

*The estimated useful lives of assets; the recoverability of tangible assets*

- The estimated useful lives of most assets are determined by a continuing program of asset life studies. The recoverability of assets with finite lives is significantly impacted by the estimated useful lives of assets.
- Assumptions underlying the estimated useful lives of assets include the timing of technological obsolescence, competitive pressures and future infrastructure utilization plans.

**Employee defined benefit pension plans**

*Certain actuarial and economic assumptions used in determining defined benefit pension costs, accrued pension benefit obligations and pension plan assets*

- We review industry practices, trends, economic conditions and data provided by actuaries when developing assumptions used in the determination of defined benefit pension costs and accrued pension benefit obligations. Pension plan assets are generally valued using market prices; however, some assets are valued using market estimates when market prices are not readily available. Actuarial support is obtained for interpolations of experience gains and losses that affect the employee defined benefit plan actuarial gains and losses and accrued pension benefit obligations. The discount rate used to determine the accrued benefit obligation is based upon the yield on long-term, high-quality, fixed-term investments. The discount rate is set annually at the end of each calendar year, at a minimum, based upon yields on long-term corporate bond indices in consultation with actuaries. Future increases in compensation are based upon the current benefits policies and economic forecasts. We have examined our respective pension obligation and current service cost durations and observed an approximate 10-year difference in duration. As individual discount rates more accurately reflect the obligation and current service cost, commencing in 2016, we applied a dual discount rate methodology.
- On an annual basis, at a minimum, the defined benefit pension plan assumptions are assessed and revised as appropriate. Assumptions used in determining defined benefit pension costs, accrued pension benefit obligations and pension plan assets include life expectancy, discount rates, market estimates and rates of future compensation increases. Material changes in overall financial performance and financial statement line items would arise from reasonably likely changes in the material assumptions underlying this estimate, since certain assumptions may have been revised to reflect updated historical information and updated economic conditions. See *Note 15* of the Consolidated financial statements for further analysis.
- This accounting estimate related to employee defined benefit pension plans is in respect of components of the Operating expenses line item, Financing costs line item and Other comprehensive income line item on our Consolidated statements of income and other comprehensive income. If the future were to adversely differ from our best estimate of assumptions used in determining defined benefit pension costs, defined benefit obligations accrued and pension plan assets, we could experience future increased (or decreased) defined benefit pension expense, financing costs and charges to Other comprehensive income.

**Income tax assets and liabilities**

*The amount and composition of income tax assets and income tax liabilities, including the amount of unrecognized tax benefits*

- Assumptions underlying the composition of income tax assets and liabilities are based upon an assessment of the technical merits of tax positions. Income tax benefits on uncertain tax positions are recognized only when it is more likely than not that the ultimate determination of the tax treatment of a position will result in the related benefit being realizable; however, this does not mean that tax authorities cannot challenge these positions. Income tax assets and liabilities are measured at the amount that is expected to be realized or incurred upon ultimate settlement with taxation authorities. Such assessments are based upon the applicable income tax legislation, regulations, interpretations and jurisprudence, all of which in turn are subject to change and interpretation.
- Current income tax assets and liabilities are estimated based upon the amount of income tax that is calculated as being owed to taxation authorities, net of periodic instalment payments. Deferred income tax liabilities are composed of the tax effect of temporary differences between the carrying amount and tax basis of assets and liabilities, as well as the income tax effect of undeducted income tax losses. The timing of the reversal of temporary differences is estimated and the income tax rate substantively enacted for the periods of reversal is applied to the temporary differences. The carrying amounts of assets and liabilities are based upon the amounts recorded in the financial statements and are, therefore, subject to accounting estimates that are inherent in those balances. The tax basis of assets and liabilities, as well as the amount of undeducted income tax losses, is based upon the assessment and measurement of tax positions, as noted above. Assumptions as to the timing of reversal of temporary differences include expectations about the future results of operations and future cash flows. The composition of income tax liabilities is reasonably likely to change from period to period because of changes in the estimation of these significant uncertainties.
- This accounting estimate is in respect of material asset and liability line items on our Consolidated statements of financial position comprising less than 1% of Total assets as at December 31, 2021 and 2020, and approximately 9% of Total liabilities and owners' equity as at December 31, 2021 and 2020. If the future were to adversely differ from our best estimate of the likelihood of tax positions being sustained, the amount of tax expected to be incurred, the future results of operations, the timing of reversal of deductible temporary differences and taxable temporary differences, and the tax rates applicable to future years, we could experience material current income tax adjustments and deferred income tax adjustments. Such current and deferred income tax adjustments could result in an increase or acceleration of cash outflows at an earlier time than might otherwise be expected.

**Provisions for asset retirement obligations**

*Certain economic assumptions used in provisioning for asset retirement obligations*

- Asset retirement obligation provisions are recognized for statutory, contractual or legal obligations, normally when incurred, associated with the retirement of Property, plant and equipment (primarily certain items of outside plant and mobile site equipment) when those obligations result from the acquisition, construction, development and/or normal operation of the assets. The obligations are measured initially at fair value, determined using present value methodology, and the resulting costs are capitalized as a part of the carrying value of the related asset.
- On an annual basis, at a minimum, assumptions underlying the provisions for asset retirement obligations include expectations about inflation, discount rates and any changes in the amount or timing of the underlying future cash flows, which may span numerous decades. Material changes in financial position would arise from reasonably likely changes in the material assumptions underlying this estimate, since certain assumptions may have been revised to reflect updated historical information and updated economic conditions. The capitalized asset retirement cost is depreciated on the same basis as the related asset, and the discount accretion is included in the Consolidated statements of income and other comprehensive income as a component of Financing costs.
- This accounting estimate is in respect of the asset retirement obligations component of the Provisions line item on our Consolidated statements of financial position, and this component comprises approximately 1% of Total liabilities and owners' equity as at December 31, 2021 (2% as at December 31, 2020). If the provisions for asset retirement obligations were to be inadequate, we could experience a charge to Goods and services purchased in the future. A charge for an inadequate asset retirement obligation provision would result in a cash outflow proximate to the time that the asset retirement obligation is satisfied.

**Provisions related to business combinations**

*Provisions for written put options*

- In connection with certain business acquisitions, we have established provisions for written put options in respect of non-controlling interests. We provide written put options to the remaining selling shareholders under which they could put the remaining non-controlling interests at, or after, a specified date. The acquisition-date fair values of the puttable shares held by the non-controlling shareholders are recorded as provisions.
- On an annual basis, at a minimum, the provisions for written put options are assessed and revised as appropriate. The provisions for written put options have been determined based on the net present values of estimated future earnings results; there is a material degree of uncertainty with respect to the estimates of future earnings results, given the necessity of making significant economic assumptions about the future. The amounts of provisions for written put options are reasonably likely to change from period to period because of changes in the estimation of future earnings and foreign exchange rate movements.
- This accounting estimate is in respect of the provisions for written put options related to the non-controlling interests component of the Provisions line item on our Consolidated statements of financial position, and this component comprises less than 1% of Total liabilities and owners' equity as at December 31, 2021 and 2020. If the provisions for written put options were to be inadequate, we could experience a charge to Other income in the future. A charge for an inadequate written put option provision would result in a cash outflow proximate to the time that the written put option is exercised.

**Investments**

*The recoverability of long-term investments*

- We assess the recoverability of our long-term investments on a regular, recurring basis. The recoverability of investments is assessed on a specific-identification basis, taking into consideration expectations about future performance of the investments and comparison of historical results to past expectations.
- The most significant assumptions underlying the recoverability of long-term investments are related to the achievement of future cash flow and operating expectations. Our estimate of the recoverability of long-term investments could change from period to period due to the recurring nature of the recoverability assessment and due to the nature of long-term investments (we do not control the investees).
- Investments are included in the Other long-term assets line item on our Consolidated statements of financial position, which itself comprises approximately 4% of Total assets as at December 31, 2021 (2020 – 3%). If the allowance for recoverability of long-term investments were to be inadequate, we could experience an increased charge to Other income or Other comprehensive income depending on the financial asset classification. Such a provision for recoverability of long-term investments does not result in a cash outflow.

**Accounts receivable**

*General*

- When determining our allowance for doubtful accounts, we consider the business area that gave rise to the Accounts receivable, conduct a statistical analysis of portfolio delinquency trends and perform specific account identification.
- These accounting estimates are in respect of the Accounts receivable line item and the Unbilled customer finance receivables line within the Other long-term assets line item on our Consolidated statements of financial position, which together comprise approximately 7% of Total assets as at December 31, 2021 (6% as at December 31, 2020). If the future were to differ adversely from our best estimates of the fair value of the residual cash flows and the allowance for doubtful accounts, we could experience an increase in doubtful accounts expense in the future. Such doubtful accounts expense in and of itself does not result in a cash outflow.

*The allowance for doubtful accounts*

- The estimate of our allowance for doubtful accounts could materially change from period to period because the allowance is a function of the balance and composition of Accounts receivable, which can vary on a month-to-month basis. The variability of the balance of Accounts receivable arises from the variability of the amount and composition of Operating revenues and other income and from the variability of Accounts receivable collection performance.

**Contract assets**

*General*

- We maintain allowances for lifetime expected credit losses related to contract assets. Current economic conditions, historical information (including credit agency reports, if available), and the line of business from which the contract asset arose are all considered when determining impairment allowances. The same factors are considered when determining whether to write off amounts charged to the impairment allowance for contract assets against contract assets.

*The impairment allowance*

- These accounting estimates are in respect of the Contract assets line items on our Consolidated statements of financial position, which comprise approximately 2% of Total assets as at December 31, 2021 and 2020. If the future were to differ adversely from our best estimates of the fair value of the residual cash flows and the impairment allowance for contract assets, we could experience an increase in the impairment allowance for contract assets against contract assets in the future. Such impairment allowance in and of itself does not result in a cash outflow.

**Inventories**

*The allowance for inventory obsolescence*

- We determine our allowance for inventory obsolescence based upon expected inventory turnover, inventory aging, and current and future expectations with respect to product offerings.
- Assumptions underlying the allowance for inventory obsolescence include future sales trends and offerings and the expected inventory requirements and inventory composition necessary to support these future offerings. Our estimate of the allowance for inventory obsolescence could change materially from period to period due to changes in product offerings and the level of consumer acceptance of those products.
- This accounting estimate is in respect of the Inventories line item on our Consolidated statements of financial position, which comprises approximately 1% of Total assets as at December 31, 2021 and 2020. If the allowance for inventory obsolescence were to be inadequate, we could experience a charge to Goods and services purchased in the future. Such an inventory obsolescence charge does not result in a cash outflow.

## 8.2 Accounting policy developments

Refer to *Note 2* of the Consolidated financial statements for a description of current and future changes in accounting policies, including:

- Initial application of standards, interpretations and amendments to standards and interpretations in the reporting period.
- Standards, interpretations and amendments to standards and interpretations in the reporting period not yet effective and not yet applied.

# 9 General trends, outlook and assumptions, and regulatory developments and proceedings

This section contains forward-looking statements, which should be read together with the *Caution regarding forward-looking statements* at the beginning of this MD&A.

## 9.1 Telecommunications industry in 2021

We estimate that Canadian telecommunications industry revenues (including TV revenue and excluding equipment and media revenue) grew by approximately 3%. Mobile and data services continue to drive ongoing industry growth. Additionally, consumer communications and data consumption behaviours continue to demonstrate a strong preference for data-rich applications and data-intensive devices, including smartphones and tablets. However, this year and similar to 2020, revenue growth across the telecommunications industry was limited by the impacts of the global pandemic and in particular roaming revenue due to travel restrictions and changing consumer behaviour related to travelling.

TELUS reported Operating revenues arising from contracts with customers of $16.8 billion, with TELUS technology solutions (TTech) representing 86% of our total Operating revenues arising from contracts with customers, while our digitally-led customer experiences – TELUS International (DLCX) operating segment represented the remaining 14%. Within TTech, mobile products and services represented 57% of total TTech external Operating revenues arising from contracts with customers. With respect to our fixed products and services, growth in internet and data services, health and agriculture services, home and business security, and TV, all inclusive of acquisitions, more than offset the decline in demand for legacy voice and legacy data services. Within DLCX, we saw strong growth across industry verticals driven by acquisitions, as well as robust organic growth from services provided to existing customers, as well as new clients added since the prior year. Revenue from our largest tech and games vertical increased by 50% from 2020 and represented 46% of DLCX Operating revenues and other income.

**Mobile products and services**

We estimate that in 2021, the Canadian mobile industry experienced mobile network revenue growth of approximately 2.7%, which we believe was attributable to ongoing growth and a general recovery after the first year of the pandemic. We estimate that the Canadian mobile industry added approximately 0.9 million net new subscribers in 2021 (inclusive of TELUS' mobile phone additions), compared to approximately 1.1 million in 2020 for the industry (inclusive of TELUS' mobile phone additions). This was supported by immigration and population growth; the trend toward multiple devices, including tablets; the expanding functionality of data and related applications; and the ongoing adoption of mobile devices and services, including connected devices. Various forms of public health measures during the global health crisis in 2020, including the temporary closure of retail stores, led to pent-up demand in 2021. We estimate that the mobile phone penetration rate increased to approximately 99% in Canada in 2021, with further increases in penetration expected in 2022. By comparison, the mobile phone penetration rate in the U.S. is well over 100%, while in Europe and Asia it is even higher, suggesting an opportunity for continued growth in Canada. TELUS' mobile network revenue increased by 3.0%, and TELUS mobile products and services direct contribution increased by 5.4%.

The 2021 mobile market in Canada continued to face challenges from the pandemic. Growth in blended average revenue per subscriber unit per month (ARPU) had been moderating as carriers migrated their customer bases to unlimited data plans. However, ARPU moderation was exacerbated by the pandemic, as mobile industry roaming revenue significantly declined from customers' reduced travel activity, which has not yet returned to pre-pandemic levels. Additionally, with large numbers of the workforce working from home during the pandemic, there were associated declines in chargeable data usage from workers offloading their mobile device traffic onto Wi-Fi. The Canadian mobile market continued to experience increased levels of competition nationally. This high level of competition has led to continued declines in chargeable data usage and larger allotments of data, in addition to other factors, such as: the popularity of data sharing plans; more frequent customer-friendly data usage notifications; and an evolving shift in the customer mix towards non-traditional mobile devices and tools such as video chats. These factors, combined with increases in overall data usage, which is expected to increase dramatically with the ongoing commercialization of 5G, led to widespread adoption and promotion of unlimited data plans and device financing plans by all national carriers. The build-out of 5G network infrastructure accelerated in 2021, with 5G covering approximately 70% of the Canadian population by the national carriers at the end of 2021. For TELUS, our accelerated 5G investments are underpinned by our accelerated broadband build program, which was pre-funded by our equity offering in March 2021 and will continue into 2022. Our long-standing commitment to network excellence is reflected in multiple independent third-party awards and recognition received in 2021, including from U.K.-based Opensignal and U.S.-based Ookla, each for five consecutive years, and from Canadian-based Tutela, for three years in a row.

We continue to work diligently to better monetize robust growth in data services, while simultaneously delivering a strong value-for-money proposition and leading customer service to our customers. To this end, we are focusing intensely on profitable customer growth and strong ARPU performance through our consistent strategic execution of premium smartphone loading, which includes driving higher-value data and share plan adoption, as well as flexible product offerings, including bundling our mobility and home services. Moreover, we are also focusing on the other levers available to us in an environment of moderating ARPU growth and expanding 5G network infrastructure, to ensure we continue to deliver on our TTech EBITDA growth objectives, including:

- Evolving our approach to mobile plans and device sales, through the simultaneous launch of our Peace of Mind endless data rate plans, TELUS Easy Payment device financing and TELUS Family Discount offerings, which have resulted in simplification for both customers and team members, while supporting growth in digital transactions and improved recovery of handset costs
- Continuing to drive volume growth through high-quality loading on the back of strong ongoing industry growth
- Seeking new sources of wireless revenue, such as Internet of Things (IoT) or Internet of Everything, machine-to-machine (M2M) and

security applications in the B2B market, including health, agriculture and smart cities

- Exploring and securing new channel strategies associated with attractive economic characteristics
- Pursuing smart bundling opportunities across mobile and fixed products and services to achieve better economies of scope and enhance lifetime revenue per customer
- Working persistently to enhance the efficiency of the flow from revenue to EBITDA, or the flow from ARPU to average margin per subscriber unit per month (AMPU), in order to buttress and enhance our operating margins, including ongoing efficiency and effectiveness initiatives.

The Canadian mobile industry continues to be highly competitive and capital-intensive, with carriers continuing to expand and enhance their broadband mobile networks, including the ongoing build-out of 5G, as well as material investments in spectrum.

**Fixed products and services**

Similar to the Canadian mobile industry, fixed markets and operations were significantly affected by the pandemic. Physical distancing requirements impacted traditional fixed installations, as installers were not entering customers' premises. Conversely, with large numbers of workers and students working and learning from home, demand for fixed products and services surged, with traffic levels reaching historic levels during the pandemic. Although the consumer high-speed internet market is maturing, with a penetration rate of approximately 89% in Western Canada and 90% across Canada at the end of 2021, subscriber growth is expected to continue over the coming years. The four major cable-TV companies had an estimated 7.37 million internet subscribers at the end of 2021 (49% market share), up 2.9% from approximately 7.17 million at the end of 2020. Meanwhile, telecommunications companies had approximately 7.56 million internet subscribers (50% market share), up 4% from approximately 7.25 million at the end of 2020. We continue to make gains in market share as a result of the ongoing expansion of our TELUS PureFibre infrastructure and the pull-through of subscribers from our IP-based TELUS TV services (Optik TV and Pik TV), including bundling of our mobility and home services, as well as significant growth in home security and automation. Our ongoing focus on fibre to the premises or home (FTTP/FTTH) has allowed us to connect 2.7 million households and businesses in B.C., Alberta and Eastern Quebec as of December 31, 2021 to our TELUS PureFibre technology. Similar to our accelerated 5G investments, our investments to expand our fibre footprint are supported by our accelerated broadband build program, which commenced in 2021 and will continue into 2022 before capital expenditures on a consolidated basis are expected to decline significantly in 2023. Additionally, we received recognition from PCMag as the fastest internet service provider (ISP) in Canada among major ISPs for the second consecutive year.

While Canadians still watch conventional TV, digital platforms are playing an increasingly important role in the broadcasting industry and in respect of content. Popular online video services are providing Canadians with more choice about where, when and how to access video content. In 2021, Canadian IP TV providers increased their subscriber base by an estimated 4% to 3.2 million, or 32% of market share, up from 30% at the end of 2020, as a result of expanded network coverage, enhanced differentiated service and bundled offerings, and marketing and promotions focused on IP TV. Despite this IP TV growth, the combined cable-TV and satellite-TV subscriber penetration rate was unchanged. We estimate that the four major cable-TV companies had approximately 4.7 million TV subscribers or a 48% market share at the end of 2021, flat compared to 48% at the end of 2020.

In recent years, three of the largest Canadian cable-TV companies have launched new TV services based on the Comcast X1 TV platform, including Shaw, Rogers and Quebecor's Videotron brand. Our IP-based Optik TV platform continues to offer numerous service advantages over this cable platform, including: flexible pricing plans and packaging available to all customers; picture clarity and quality; content depth and breadth; and the number of ways customers can access content, including wireless set-top boxes, Restart TV, higher-capacity PVR and the Optik TV app, which offers more than twice as many live TV channels at home or on the go compared to our largest Western Canadian cable competitor. The TELUS PureFibre network was named the number one network for streaming Netflix for 17 consecutive months prior to the start of the COVID-19 pandemic (based on the Netflix ISP Speed Index rankings for Canadian providers released monthly, as of March 2020) and we are the only Canadian carrier to achieve the highest ratings for each month from August 2020 to December 2021 for the newly revamped index. We continue to offer more on-demand content and more over-the-top (OTT) content with Netflix, YouTube, Prime Video (included in the Amazon Prime membership), hayu, TED Talks and the National Film Board of Canada, and we are the multicultural content leader in Western Canada.

The national Canadian telecom providers continue to acquire and develop capabilities in home security and automation. Through various acquisitions, including ADT Security Services Canada, Inc., in 2019 and smaller tuck-ins in 2020, we have furthered our commitment to leverage the power of technology to bring state-of-the-art convenience, control and safety into the lives, homes and businesses of more Canadians to become Canada's leading security and home automation provider. Security also provides opportunities to offer attractive bundled solutions and advance our connected home strategy while accelerating our entry into the market for smart home and automation and physical and cybersecurity business solutions. Our SmartHome Security and TELUS Secure Business service offerings complement our industry-leading customer service and build on our strategy and commitment to leverage our world-leading wireless and PureFibre network, enabling us to enhance connected home, business, security, IoT, cybersecurity, smart buildings, smart cities and health services for customers in Canada.

Canada's four major cable-TV companies had an estimated base of approximately 3.2 million telephony subscribers at the end of 2021. This represents a national consumer market share of approximately 43%, relatively flat compared to 2020. Telecommunications companies had an estimated 3.6 million telephony subscribers at the end of 2021, representing approximately 48% of market share, relatively flat compared to 2020. Technological substitution by mobile services is continuing to erode the number of residential voice subscribers and associated local and long distance revenues, as expected.

*TELUS Health*

In 2021, we continued to drive strong growth within our industry-leading health business, driven by the ongoing adoption of our unique and innovative portfolio of health offerings across the healthcare ecosystem. Health services revenue increased by 16.3% to $521 million. The Canadian healthcare industry is expected to continue to realize strong growth in future years, based on an aging population in Canada, an increasing emphasis on chronic disease management, and the potential benefits that technology can deliver in terms of efficiency and effectiveness within the sector. Prior to the pandemic, the healthcare industry saw an emerging trend for physicians and other healthcare professionals to use smartphones and connected devices to access patient records from remote locations. Since the COVID-19 lockdown measures were first put into place in 2020, adoption of healthcare technology has accelerated, as clinicians have adapted to primarily virtual and tele-medicine-based practices, resulting in the overall Canadian healthcare technology market growing at a double-digit pace and beyond what was initially predicted at the beginning of 2020. The digitization of everyday functions within the healthcare ecosystem, combined with increased and pervasive broadband network connectivity, provides a unique opportunity to support the development and delivery of even more advanced health applications to benefit Canadians and improve health outcomes.

*TELUS Agriculture*

The global agriculture industry and global food industry are estimated to be valued at approximately $2.5 trillion and $8 trillion, respectively (World Economic Forum). It is estimated that global food supplies will need to increase by as much as 70% over the next 30 years, simply to keep pace with the world's growing population. Subsequently, farmers are managing more acres, equipment and suppliers than ever before; and streamlined digital access to data insights and features can translate into significant time and cost savings. Increasingly, farmers and producers across the globe are leveraging digital technologies to efficiently manage their operations and harness valuable data insights to optimize production and output to take advantage of the growing industry and demand. TELUS continues to grow its position to transform the agriculture industry by targeting the pressing needs across the entirety of the agriculture value chain through our TELUS Agriculture business. Our unique and differentiated seed-to-table approach encompasses strong capabilities from agri-business, to food and beverage, to herd management and animal health.

**DLCX**

In 2021, TI continued to win business with both new and existing clients, driving solid organic growth, supported by strategic acquisitions (see *Section 3 Scaling our innovative digital capabilities in TELUS International to build an asset of consequence* for further details). TI partners with major global and disruptive brands, fuelling all stages of company growth. TI is also exposed to verticals that are experiencing high growth themselves, such as tech and games, enhancing TI's position for continued success. TI's solutions and services are relevant across multiple markets, including information technology services for digital transformation of customer experience systems (DX), digital customer experience management (DCXM) and adjacent new economy services. With its end-to-end digital capabilities, TI is uniquely well-positioned to serve these growing markets, including fast-growing areas such as content moderation and artificial intelligence (AI) data services. The necessity of moderating content on digital platforms has prompted enterprises to seek specialized services to accommodate changes in the dynamic, uncertain, and often highly regulated environment. The demand for AI data services historically has been driven by large technology companies; however, demand is growing from other enterprises as AI adoption increases.

## 9.2 Telecommunications industry general outlook and trends

**Mobile products and services**

Mobile growth continues to be driven by increasing data usage and adoption, including: higher-value smartphones, unlimited data offerings, shared family data plans and tablets, and growth in IoT and M2M devices. In addition, consumers continue to replace fixed access with mobile access and related data services. These trends are expected to continue to drive a growing demand for mobile data services for the foreseeable future. Industry ARPU is expected to continue growing at a more moderate rate as compared to periods prior to the COVID-19 pandemic.

While LTE and LTE advanced (LTE-A) technologies increase download speeds, encourage data usage and improve the customer experience, growth in data traffic poses challenges to mobile access technology. To better manage this data traffic, Canadian providers continue to evolve their networks and deploy spectrum to support the evolution to 5G. Innovation, Science and Economic Development Canada (ISED) held its 3500 MHz spectrum auction in June to July 2021. We expect the 3800 MHz and millimetre wave (mmWave) spectrum auctions to commence in 2023 and 2024, respectively, which will be important to the expansion of 5G networks.

M2M and IoT technologies connect communications-enabled remote devices via wireless technologies, allowing them to exchange key information and share processes. Advanced platforms and networks are already in place in industries such as healthcare, utilities, agriculture and fleet management, with deployment ongoing in other industries, including smart cities, vehicle insurance, retail, food services, consumer utilities, and connected and autonomous vehicles. These and other industries are looking to IoT, combined with other applications, to generate value from their connections. IoT represents a meaningful opportunity for growth in mobility products and services, with secure connectivity, customer value, productivity and efficiency. While M2M applications generally have lower ARPU when sold as a stand-alone product, they tend to generate high service volumes with low or no subsidy costs, thereby supporting both revenue growth and margins. In 2021, we added 338,000 connected devices, bringing our connected device subscriber base to more than 2.1 million, up 18.8% from 2020.

5G has begun to play a mainstream role in technology evolution and innovation globally, and is an important component of meeting Canada's and TELUS' social impact-oriented efforts to further bridge the digital divide and connect rural Canadians. Investing in 5G will drive capital expenditure savings by allowing us to provide high-speed internet services over wireless in less urban areas, as well as improved cost savings and innovative services in industrial automation, transportation and telehealth. Driven by significantly faster speeds, lower latencies, improved reliability and attractive economics, 5G will enable a host of new applications: for businesses, 5G will create opportunities for enhanced productivity, virtual work and profitability; for industries, 5G will enable remote operations, industrial control and manufacturing automation; for consumers, home automation, autonomous vehicles, and wireless-to-the-home connectivity with speeds comparable to fixed access technologies; and for healthcare, converged solutions for hospitals, clinics and remote patient monitoring and even medical procedures. 5G is essential to the future of a global digital economy, including that of Canada's, and is expected to generate significant innovation, growth and productivity. 5G wireless technology is up to 100 times faster than

4G LTE technology. As 5G evolves, it will move from a non-stand-alone core, based on the existing 4G LTE infrastructure, to a stand-alone core, which makes use of cloud-based technology, enabling new functionality through the capacity to support more connected devices and ultra-low latency.

Enabling a robust and reliable 5G experience for Canadians will require complementary spectrum bands to support the needs of a diverse subscriber base and consist of a portfolio of low, mid and high-band spectrum. Low-band spectrum, such as 600 MHz, covers wide areas and penetrates well into buildings, thus improving coverage in urban and suburban areas. This low-band spectrum will play a vital role in bringing 5G to Canadians and as such, it is an important resource for Canada as wireless operators build out 5G in rural areas. High-band spectrum, such as mmWave, can enable speeds up to 100 times faster than 600 MHz spectrum; however, it does not have the same coverage characteristics to penetrate well into buildings or cover wide areas. This high-bandwidth spectrum and the associated faster connection speeds will help unlock new technologies such as virtual and augmented reality and provide a fibre-like experience for fixed wireless access. Mid-band spectrum, such as the 3500 MHz auctioned and acquired by carriers in 2021, is important to the 5G ecosystem as it balances both speed and coverage characteristics. This spectrum will be integral to low-latency communications services, including autonomous monitoring, fixed wireless access and vehicle-to-everything communication. Trials have shown 3500 MHz to be key for broader 5G coverage and is increasingly being used globally for 5G coverage. The 3500 MHz and 3800 MHz spectrum bands are globally recognized as key for 5G networks. All of the national carriers in Canada commenced rolling out their initial 5G services in 2020 and accelerated the roll-out in 2021, and are expected to continue in the years ahead as spectrum is auctioned and deployed, along with the roll-out of new 5G technologies. See *Section 9.4 Communications industry regulatory developments and proceedings* for further details on upcoming spectrum auctions.

**Fixed products and services**

The fixed telecommunications market is expected to remain very competitive in 2022, as technology substitution – such as the broad deployment of higher-speed internet; the use of email, messaging and social media as alternatives to voice services; and the growth of mobile and VoIP services – continues to replace higher-margin legacy voice revenues. In our incumbent operating areas of B.C. and Alberta, it is estimated that, in 2021, 60% of households no longer had a fixed line and 37% of households no longer had a broadcast TV service. We are a key provider of these substitution services and the decline in this legacy business is continuing as expected, although residential voice losses continued to slow in 2021, reflecting our success in bundling our home solutions and services. Our long-standing growth strategy remains focused on mobile, data and IP-centric fixed capabilities.

The popularity of viewing TV and on-demand content anywhere, particularly on handheld devices, is expected to continue to grow as customers adopt services that enable them to view content on multiple screens. Streaming media providers continue to enhance OTT and direct-to-consumer (DTC) streaming services in order to compete for a share of viewership, as viewing habits and consumer demand evolve. Studies suggest that there were more than 25 million paid OTT video service subscriptions in Canada at the end of 2021, up 9.0% from 2020. The launch of streaming TV services is expected to continue in Canada.

Conventional TV content providers are monitoring OTT developments and evolving their content and market strategy to compete with these non-traditional offerings. Bell Media offers a content streaming service through its expanded Crave offering. We view OTT as an opportunity to add further capabilities to our linear and on-demand assets, providing customers with flexible options to choose the content they want and encourage greater customer use of TELUS high-speed internet and wireless services and to limit customer frustration by needing to have a multitude of subscriptions, and continue to partner with and offer services from a wide range of OTT providers.

Consistent with facilities-based competition, telecommunications companies continue to make significant capital investments in broadband networks, with a focus on FTTP to maintain and enhance their ability to support enhanced IP-based services and higher broadband speeds. Cable-TV companies continue to evolve their cable networks with DOCSIS-related bandwidth enhancements and node splitting. Although this platform increases speed in the near term and is cost-efficient, it does not offer the same advanced capabilities as FTTP over the longer term, such as fast symmetrical upload and download speeds. At the end of 2021, our fibre-optic infrastructure was available to more than 2.7 million homes and businesses. Advances in LTE mobile technology and our extensive LTE infrastructure also allow us to target otherwise underserved areas with a fixed mobile solution, and 5G is expected to enhance these capabilities.

Our broadband investments, including the build-out of our FTTP broadband network and our premium differentiated IP-based Optik TV service, as well as lower-cost Pik TV service, home security and automation and integrated bundled service offerings, which also encompass mobility, consumer healthcare and cybersecurity, continue to enhance our competitive position relative to our competitors. Our bundled offerings drive higher product intensity with our customers and lead to improved customer loyalty results.

In the business market (enterprise and small and medium-sized businesses, or SMB), the convergence of IT and telecommunications, facilitated by the ubiquity of IP, continues to shape the competitive environment, with non-traditional providers increasingly blurring the lines of competition and business models. Cable-TV companies continue to make investments to better compete in the highly contested SMB space. Telecommunications companies like TELUS are providing network-centric managed applications that leverage their significant FTTP investments, while IT service providers are bundling network connectivity with their proprietary software as service offerings. While our business-to-business (B2B) line of business was dilutive to our EBITDA growth in 2020, we aggressively pursued opportunities in 2021 to stabilize this business; however, the pandemic continued to negatively impact our SMB customer base.

The development of IP-based platforms providing combined IP voice, data and video solutions creates potential cost efficiencies that compensate, in part, for the loss of margins resulting from the migration from legacy to IP-based services. New opportunities exist for integrated solutions, as well as business process and IT outsourcing, that could have a greater business impact than traditional telecommunications services. Data security represents both a challenge and an opportunity for TELUS to provide customers with our data security solutions. Increasingly, businesses are looking to partner with their communications service provider to address their business goals and challenges, and to tailor cloud-based solutions for their needs that leverage telecommunications in ways not imagined a decade ago. Cloud computing is changing service delivery to always-on and everything-as-a-service, and strong growth is expected in this area. TELUS offers Network-as-a-Service capabilities for businesses with the option of an IT network as a service over the internet, mirrored across multiple locations, based on a self-serve platform that reduces deployment cycles and reliance on IT specialists. Our home and business security offerings are powered by our broadband network and integrate the latest smart devices to improve the lives of Canadians.

As the industry evolves to 5G mobile technologies in the coming years, we expect to be operating on, and providing services over, a more converged network. The lines between fixed access and mobile access will continue to blur, as the way we deliver services to customers – and the way our customers use those services – continues to evolve. As our broadband network continues to expand and 5G is further commercialized in the coming years, we expect to benefit from the flexibility of being able to select the most efficient way to deliver services across our footprint. We do not expect to have to build fibre to every home; instead, we believe that there will be opportunities to deliver services to some areas within our broadband footprint wirelessly with 5G.

*TELUS Health*

Through TELUS Health, we are leveraging our position as the leading end-to-end provider of digital healthcare in Canada and our expanding broadband network technologies such as fibre and 5G to increase access, integration and effectiveness of innovative healthcare tools and applications across the primary care ecosystem in order to continue positioning ourselves for anticipated strong continued growth. These solutions include virtual care applications, personal health records to empower self-management of healthcare data, electronic drug prescriptions with online insurance validation by the physician, and home health monitoring devices and data capture with caregiver oversight. Operating under TELUS Health Virtual Care, our national, employer-focused virtual care services allow patients 24/7 bilingual and unlimited access to healthcare practitioners for the mental and physical care they need, from anywhere in the country. In 2021, we enhanced our TELUS Health Virtual Care offering with the launch LifeJourney, a modernized employee assistance program designed to address various personal and employment-related issues that can compromise an employee's ability to perform at work, including mental health support. Our TELUS Health MyCare application revolutionized consumer access to healthcare. With innovative AI-powered preventative health app features (available in English and French) such as the Symptom Checker, Monitor and Health Check, users can get information about their health and, if required, speak directly with a licensed physician from the convenience of a smartphone, in multiple languages across B.C., Alberta, Saskatchewan and Ontario. In 2020, TELUS Health MyCare also launched two physical clinics in B.C. to augment our digital first approach. Together, these virtual care solutions and capabilities are empowering Canadians to better manage their health and get the care and information they need when it's convenient for them – a huge step forward in the evolution of Canada's healthcare system and the current status quo. In 2020, TELUS Health enabled Canadian practitioners to conduct virtual visits with their patients by integrating patient videoconferencing into its electronic medical records (EMR) across Canada, and by the end of December 2021, more than 557,000 consultations had been conducted through the TELUS EMR Virtual Visit solution. This capability has been augmented by the acquisition of InputHealth Systems Inc. and its Collaborative Health Record (CHR) – a cloud-based solution that strengthens the physician-patient relationship with a full suite of tools for collaboration, patient engagement, automation and data optimization. Since the onset of the pandemic, these virtual care solutions experienced accelerated adoption, easing pressure on the healthcare system, and strong growth in virtual care is expected to continue. Market activities and trends throughout the year have validated TELUS Health's long-standing presence in the healthcare market and assumptions about the business' main growth areas and path forward, reinforcing our focus on employee health and virtual care. In the first quarter of 2021, we acquired a digitally enabled central dispensing pharmacy to make the pharmacy experience more personal, convenient and accessible, as well as easier for users to manage, and in January 2022, we launched TELUS Health Virtual Pharmacy. In 2022 and beyond, aligned with our passionate commitment to social capitalism, TELUS Health will leverage these and other digital health tools to continue to expand access to care and improve health outcomes for Canadians across the country, with the ongoing commercialization of 5G expected to significantly bolster our capabilities with innovative new health care applications taking advantage of higher speeds and lower latency.

*TELUS Agriculture*

With the official launch of TELUS Agriculture in 2020, a business initially built on eight acquisitions throughout 2019 and 2020, we positioned ourselves to become a major global player in the promising and rapidly growing agriculture technology market. With the addition of two companies in 2021, Conservis and Blacksmith Applications, as well as acquiring the assets of Herdtrax, we continued our ongoing growth strategy. TELUS Agriculture is dedicated to creating the best producer-to-consumer outcomes. We deliver digital insights that empower and connect customers, from producers to consumers, around the world, improving the quality, safety, distribution and sustainability of food and consumer goods – both today and for the future. We also provide digitizing activities across a complex and fragmented supply chain to create actionable, integrated solutions. It is estimated that global food supplies will need to increase by as much as 70% over the next 30 years, simply to keep pace with the world's growing population. Increasingly, farmers and producers across the agriculture, food and consumer goods supply chains are leveraging digital technologies to efficiently manage their operations and harness valuable data insights to optimize production and output. With an ever-expanding world population, and increased demand for food and consumer goods, streamlined digital access to data insights and features can translate into significant resource, time and cost savings.

TELUS has established meaningful digital technology and data insight positions in three key segments of the agriculture, food and consumer goods value chain: (i) agri-business, which enables the flow of business data between manufacturers such as farm machinery, seed and chemical suppliers, distributors, retailers and farms; as well as farm solutions, which enable precision agriculture and farm management; (ii) food, beverage and consumer goods, which enables food and consumer goods traceability from producer to consumer and aids efficient promotional activity across industry stakeholders such as food manufacturers, grocers, restaurants and consumers; and (iii) animal health, which supports the safe and efficient development of protein sources through technology and consultative expertise. We offer leading software solutions across the value chain and address complex data management challenges and data silos to digitally transform, protect and improve the global food system by improving the efficient production, transportation, quality and safety of our food and consumer goods.

**DLCX**

Since its inception 17 years ago, TI has grown exponentially in size, scope and geographic diversity to deliver digital customer experience solutions for clients from delivery centres in North and Central America, Europe and Asia. In recent years, TI added significant scale and diversity through the January 2020 acquisition of Competence Call Center (since rebranded as TELUS International Northern Europe or TINE and comprised substantially of CCC), a leading provider of higher-value-added business services with a focus on customer relationship management and content moderation. In December 2020, TI further advanced its digital transformation strategy with the acquisition of Lionbridge AI, a market-leading global provider of crowd-based training data and annotation platform solutions used in the development of AI algorithms to power machine learning. Lionbridge AI's advanced technology innovation, combined with human ingenuity, improves data functionality to deliver significantly enhanced, customized and high-quality outcomes for customers. In July 2021, TI acquired Playment, a leader in data annotation and computer vision tools and services specialized in 2D and 3D image, video and light detection and ranging (LiDAR). Lionbridge AI and Playment now operate as TELUS International AI Data Solutions (TIAI), helping companies test and improve machine learning models through a global AI community of over one million data annotators and linguists. These acquisitions added substantial scale and diversity to TI, as its size, scope and reach grew to encompass over 62,000 highly engaged team members globally at the end of 2021. Armed with deeper end-to-end digital capabilities, TI now provides integrated solutions and services that span digital strategy, innovation, consulting and design, digital transformation and IT lifecycle solutions, data annotation and intelligent automation, and omnichannel CX solutions, including content moderation, trust and safety solutions and other managed solutions, with back-office support in almost 50 languages from 53 delivery locations across over 25 countries. Looking ahead, TI is extremely well-positioned to continue growing with and adding to its over 600 global clients. These clients span a number of high-growth target verticals, including tech and games, e-Commerce and fintech, communications and media, healthcare, and travel and hospitality. The clients TI serves are a diverse group that includes digital native technology companies that need help continuing to grow and scale their businesses, and also well-established companies that require help with their digital transformation strategy and execution. TI's continued focus on providing premium, complex, technology-centric solutions, thoughtfully executed by highly skilled, empathetic engaged team members, positions TI favourably for ongoing success in the growing market.

In February 2021, TI successfully completed its initial public offering (see *Section 1.3* for additional details). In September 2021, TI successfully completed a public secondary offering (see *Section 10.2* and *Section 3 Scaling our innovative digital capabilities in TELUS International to build an asset of consequence* for additional details), further positioning the organization for continued growth in the years to come.

As technology continues to change our industry rapidly, customer demand continues to evolve and grow, and Canada shifts to a more digital economy, we are committed to evolving our business and offering innovative and reliable services and thought leadership in core future growth areas that are complementary to our current operations. This, along with the constant focus of our highly engaged team on leadership in delivering an enhanced customer experience, over world-leading networks, positions us for continued differentiation and growth in the years ahead.

## 9.3 TELUS assumptions for 2022

In 2022, we expect the COVID-19 pandemic to continue to have impacts on our business, primarily in the first half of the year, attributable to economic factors such as continued travel advisories and border restrictions, business and consumer travel not yet at pre-pandemic levels, which continue to impact our roaming revenues, global supply chain challenges, subsequent business lockdowns and disruptions, including staffing shortages, and/or reduced scope of operations impacting our retail and health operations. We expect the pandemic impacts in 2022 to be smaller in scale than in 2021, primarily due to the uptake of COVID-19 vaccinations in the general population, allowing for the re-opening of the global economy in areas where we conduct business. We expect growth in EBITDA, driven by continued demand for data in our mobile and fixed products and services and contributions from new business acquisitions; roaming revenue improvement corresponding with a reduction in pandemic restrictions; continued significant ongoing investments in our leading fibre broadband network and growing 5G deployment; our strategic efforts to enhance operational simplicity and efficiency; and our constant focus on an enhanced customer experience across all areas of our operations, with the objective of simplifying our customers' interaction with us while reducing our overall cost structure.

Our assumptions in support of our 2022 outlook are generally based on industry analysis, including our estimates regarding economic and telecom industry growth, as well as our 2021 results and trends discussed in *Section 5*.

Our key assumptions include the following:

- Estimated economic growth rates in Canada, B.C., Alberta, Ontario and Quebec of 4.3%, 4.2%, 4.4%, 4.5% and 3.7%, respectively.
- Estimated annual unemployment rates in Canada, B.C., Alberta, Ontario and Quebec of 6.1%, 5.2%, 7.1%, 6.1% and 5.3%, respectively.
- Estimated annual rates of housing starts on an unadjusted basis in Canada, B.C., Alberta, Ontario and Quebec of 224,000 units, 39,000 units, 30,000 units, 83,000 units and 55,000 units, respectively.
- No material adverse regulatory rulings or government actions against TELUS.
- Continued intense mobile products and services competition and fixed products and services competition in both consumer and business markets.
- Continued increase in mobile phone industry penetration of the Canadian market.
- Ongoing subscriber adoption of, and upgrades to, data-intensive smartphones, as customers seek more mobile connectivity to the internet at faster speeds.
- Mobile products and services revenue growth resulting from improvements in subscriber loading, with continued competitive pressure on blended ARPU. Roaming revenue from business and consumer travel will improve from levels seen in 2021, with the easing of travel advisories and border restrictions, including those in Canada and the U.S. A full recovery is estimated closer to the end of 2022 at the earliest.
- Continued pressure on mobile products and services acquisition and retention expenses, arising from gross loading and customer renewal volumes, including potential impacts related to deferred device upgrades during the global health pandemic, competitive intensity and customer preferences. Continued connected devices growth, as our IoT offerings diversify and expand.

- Continued growth in fixed products and services data revenue, reflecting an increase in internet, TV and security subscribers, speed upgrades, rate plans with larger data buckets or endless data usage, and expansion of our broadband infrastructure, healthcare solutions, agriculture solutions and home and business security offerings.
- Continued erosion of residential voice revenue resulting from technological substitution and greater use of inclusive long distance.
- Continued growth of DLCX revenue and EBITDA generated by expanded services for existing and new clients and strategic business acquisitions.
- Continued focus on our customers first initiatives and maintaining our customers' likelihood-to-recommend.
- Employee defined benefit pension plans: current service costs of approximately $98 million recorded in Employee benefits expense and interest expense of approximately $8 million recorded in Financing costs; a rate of 2.95% for discounting the obligation and a rate of 3.10% for current service costs for employee defined benefit pension plan accounting purposes; and defined benefit pension plan funding of approximately $52 million.
- Restructuring and other costs of approximately $150 million for continuing operational effectiveness initiatives, with margin enhancement initiatives to mitigate pressures related to intense competition, technological substitution, repricing of our services, increasing subscriber growth and retention costs, and integration costs associated with business acquisitions.
- Net cash Interest paid of approximately $700 million to $750 million.
- Depreciation and Amortization of intangible assets of approximately $3.45 billion to $3.55 billion.
- Income taxes: Income taxes computed at an applicable statutory rate of 25.2 to 25.8% and cash income tax payments of approximately $500 million to $580 million (2021 – $563 million).
- Continued stabilization in the average Canadian dollar: U.S. dollar exchange rate ($1.25 in 2021).
- Continued deployment of access-agnostic technology in our network.
- SMB will continue to be negatively impacted by lockdown measures primarily during the first quarter of the year, and will continue to feel the effects through the rest of the year, with access to continued government support easing in mid-2022.
- Government funding programs to support consumers' ability to pay bills will ease in the first half of 2022.
- We expect that we will be able to operate our retail stores as effectively as we did in 2021, reflecting the additional safety measures in place but still allowing us to serve our customers in person, in addition to the digital capabilities that have enabled us to continue serving our customers through the pandemic.
- Continued impacts on our TELUS Health Care Centres as a result of ongoing restrictive measures resulting in cancellations of appointments, reduced capacity or closure of clinics. We expect a slow recovery throughout the year, with a focus on effective deployment of value-added services, building capabilities on our virtual platform and optimizing efficiency.
- Our international operations will be impacted by the recoveries in other global economies based on vaccine availability, distribution and effectiveness on their respective populations and regional lockdown measures.
- Our smart food-chain technology business will continue to expand through business acquisitions and organic growth.
- We expect to continue our digitization efforts to simplify how our customers do business with us, introduce new products and services, respond to customer and market needs, and provide highly reliable service.

Our 2022 outlook is forward-looking information that is based on these assumptions and is subject to inherent risks and uncertainties. These assumptions may ultimately prove to have been inaccurate. Events or our actual results may differ materially from expectations expressed in or implied by this outlook due to these assumptions having been incorrect or as a result of risks such as those described in detail in *Section 10 Risks and risk management*.

## **9.4** Communications industry regulatory developments and proceedings

Our telecommunications, broadcasting and radiocommunication services are regulated under federal laws by various authorities, including the Canadian Radio-television and Telecommunications Commission (CRTC), ISED, Canadian Heritage and the Competition Bureau.

The following is a summary of certain significant regulatory developments and proceedings relevant to our business and our industry. This summary is not intended to be a comprehensive legal analysis or description of all of the specific issues described. Although we have indicated those issues for which we do not currently expect the outcome of a development or proceeding to be material to us, there can be no assurance that the expected outcome will occur or that our current assessment of its likely impact on us will be accurate. See *Section 10.3 Regulatory matters*.

**Radiocommunication licences and spectrum-related matters**

ISED regulates, among other matters, the allocation and use of radio spectrum in Canada and licenses radio apparatus, frequency bands and/or radio channels within various frequency bands to service providers and private users. The department also establishes the terms and conditions that may attach to such radio authorizations, including restrictions on licence transfers, coverage obligations, research and development obligations, annual reporting, and obligations concerning mandated roaming and antenna site sharing with competitors.

*3500 MHz spectrum auction to support 5G*

On July 29, 2021, ISED released the provisional results of its auction of spectrum in the 3500 MHz band. We acquired 142 licences equating to 16.4 MHz of spectrum at a price of approximately $1.95 billion. Combined with the spectrum we acquired privately in advance of the auction, we now hold an average of 25 MHz of spectrum in the 3500 MHz band nationally. The auction framework included a 50 MHz set-aside in all markets where 50 MHz or more spectrum was available. This was on top of the competitive imbalance that was already introduced by ISED's 2019 transition decision for the band. That decision left nearly 90 MHz of the 200 MHz band in the hands of band incumbents.

On August 26, 2021, we brought an application in Federal Court for judicial review of the decision of the Minister of Innovation, Science and Industry to permit Videotron to bid on set-aside blocks of spectrum in B.C., Alberta and Manitoba in the 3500 MHz auction. In the application, we argue that Videotron did not meet the eligibility test set out by ISED in the auction framework, and thus should not have been permitted to bid on a portion of the set-aside spectrum that it eventually won. Bell has also brought a similar application. Additionally, on September 21, 2021, we brought a motion for an interim order enjoining the Minister from releasing the impugned spectrum to Videotron until our application for judicial review is decided. Our motion for an injunction was dismissed on October 22, 2021. Our application for judicial review is scheduled to be heard in February 2022.

We continue to review the results of the auction, including the amounts acquired by our competitors, to determine the impact of the auction on us.

*Consultation on amendments to SRSP-520, Technical requirements for fixed and/or mobile systems, including flexible use broadband systems, in the band 3450-3650 MHz*

In August 2021, ISED issued a consultation on Standard Radio System Plan (SRSP) 520 to examine technical specifications on the use of 3500 MHz spectrum. In the consultation, ISED identified a concern that 5G equipment operating on 3500 MHz spectrum may have the potential to cause interference with altimeters on aircraft. ISED proposed new restrictions on 3500 MHz spectrum, including a ban on its use in large areas around major airports. Though the consultation closed in August 2021, on September 22, 2021, ISED announced that it was re-opening its consultation to give additional time for parties to comment and made public technical studies that it relied upon to formulate its proposals. ISED also notified prospective 3500 MHz licensees that their final auction payments and issuance of licences, originally scheduled for October 4, 2021, would be delayed until December 17, 2021. On November 18, 2021, ISED issued its decision on amendments to the 3500 MHz technical requirements, which remain effectively as proposed; limiting use in areas around major airports and restricting the transmission of energy above the horizon. ISED projected next steps including a future consultation, should Canadian or global developments and studies merit further changes to the technical rules as it relates to the radio altimeter protection issue. There is a risk that this decision could have a material impact on TELUS depending on how long they remain in application.

*mmWave and 3800 MHz spectrum auctions to support 5G*

On June 5, 2019, ISED released its *Decision on Releasing Millimetre Wave Spectrum to Support 5G*, repurposing several tranches of mmWave spectrum for mobile use. ISED will consult on a licensing framework (i.e., auction rules and conditions of licence) for these mmWave bands in the future. ISED formerly projected that the mmWave auction would commence in 2021, but has now revised its forecast to the first quarter of 2024. There is a risk that the auction rules may favour certain carriers over us and impact our ability to acquire an adequate quantity of mmWave spectrum.

The 3800 MHz spectrum band is seen as an extension to the 3500 MHz band. ISED released the first of two consultations on August 27, 2020. This first consultation featured proposals from ISED and from Telesat, the Canadian satellite spectrum licensee of 3700 to 4200 MHz spectrum, on how to repurpose existing spectrum. On May 21, 2021, ISED released its *Decision on the Technical and Policy Framework for the 3650-4200 MHz Band and Changes to the Frequency Allocation of the 3500-3650 MHz Band*, which will make 250 MHz of spectrum available for auction in the first quarter of 2023. ISED's decision rejects Telesat's proposal for private auction and early clearing of the band. The 3800 MHz spectrum will only be cleared and available by March 2025 in urban areas and March 2027 in many rural areas. Certain rural areas (in the territories and northern parts of B.C., Alberta, Saskatchewan, Manitoba, Ontario, Quebec and Newfoundland and Labrador) are still deemed satellite-dependent areas and this spectrum will not be available for mobile use in these areas. Many important issues (such as auction format or competitive measures) are subject to the second consultation on an auction framework for the 3800 MHz band. There is a risk that the auction rules will favour certain carriers over us and impact our ability to acquire an adequate quantity of 3800 MHz band spectrum.

**Regulatory and federal government reviews**

The CRTC and the federal government have initiated public proceedings to review various matters. A number of key proceedings are discussed below.

*Proposed acquisition of Shaw by Rogers*

In March 2021, Rogers Communications Inc. and Shaw Communications Inc. announced their agreement for Rogers Communications Inc. to acquire Shaw Communications Inc. In addition to approval by shareholders of Shaw Communications Inc., the acquisition will require approvals by the Competition Bureau, the CRTC and ISED. It is possible that the parties to the transaction will agree to merger remedies that could negatively affect us, or that the CRTC, ISED or other governmental authorities could make (or decline to make) other regulatory changes, or impose behavioural remedies, that could materially affect us directly or affect the industry as a whole. It is also possible that this acquisition could trigger further consolidation in the industry. Until the governmental authorities complete their reviews and make a determination on whether to allow the acquisition and, if so, under what conditions, it is too early to determine the impact of these reviews on us.

*Review of mobile wireless services*

On April 15, 2021, the CRTC released its decision in the *Wireless Regulatory Framework Review*. The CRTC determined that Bell, Rogers, TELUS and SaskTel must provide wholesale mobile virtual network operator (MVNO) access to facilities-based regional wireless providers in areas where those providers hold a mobile wireless spectrum licence. MVNO access is based on commercially negotiated rates and will be phased out after seven years. In addition, the CRTC has requested that Bell, Rogers, TELUS and SaskTel provide certain low-cost and occasional-use plans, which we have now implemented. We are working to implement the new MVNO and other requirements. The impact of this decision on us will be dependent on the commercial rates that are negotiated for MVNO access.

On May 4, 2021, Data on Tap Inc. brought a petition to the Governor in Council to vary the CRTC's decision in the *Wireless Regulatory Framework* so as to mandate and set rates for full MVNO access. On September 22, 2021, we filed our response opposing this petition. The impact of this petition will not be known unless and until the Governor in Council issues a decision. The Governor in Council has until April 14, 2022, to do so.

We have also been granted leave to appeal two determinations from this decision to the Federal Court of Appeal: (i) the requirement for the national mobile carriers, including us, to offer seamless roaming as an additional condition under which the existing mandated wholesale roaming service must be offered; and (ii) the ruling that sections 43 and 44 of the *Telecommunications Act* do not provide the CRTC with jurisdiction to adjudicate disputes involving mobile wireless transmission facilities. If we are successful on appeal, we anticipate it will be easier for us to deploy our 5G infrastructure, in particular on municipal property.

*Wireline wholesale services follow-up*

On July 22, 2015, the CRTC released *Review of wholesale wireline services and associated policies*, Telecom Regulatory Policy CRTC 2015-326 (TRP 2015-326). The major component of this decision was that the CRTC ordered the introduction of a disaggregated wholesale high-speed access (HSA) service for ISP competitors. This includes access to FTTP facilities.

On June 11, 2020, the CRTC released *Call for comments – Appropriate network configuration for disaggregated wholesale high-speed access services*, Telecom Notice of Consultation CRTC 2020-187 (TNC 2020-187), where it is examining the appropriate network and service configurations for the disaggregated wholesale HSA service regime for all wholesale HSA service providers across the country. This process, which took the place of the previous follow-up proceedings, is now closed. Until the CRTC issues its decision, it is too early to determine the impact of this proceeding on us.

*Final rates for aggregated wholesale internet access services*

On August 15, 2019, the CRTC released Telecom Order CRTC 2019-288, which finalized rates for the aggregated wholesale internet services of the ILEC and incumbent cable companies. The final rates were considerably lower than the interim rates, and the CRTC ordered the rates to apply retroactively to October 6, 2016. The financial impact of this decision was not material to us.

On September 13, 2019, Bell Canada and affiliated companies and a group of cable companies filed separate applications with the Federal Court of Appeal to seek leave to appeal Telecom Order CRTC 2019-288. Bell Canada and the cable companies also sought a stay of the order. On November 22, 2019, the Federal Court of Appeal allowed both leave applications and granted a stay pending the disposition of the appeal. On September 10, 2020, the Federal Court of Appeal dismissed the appeals on their merits, thereby upholding the CRTC's decision. On February 25, 2021, the Supreme Court of Canada dismissed applications for leave to appeal the Federal Court of Appeal decision brought by Bell Canada and the group of cable companies.

Separately, on November 13, 2019, we filed a petition to the Governor in Council seeking to refer back to Telecom Order CRTC 2019-288 for redetermination of the rates and seeking to vary Telecom Order CRTC 2019-288 on the basis that the rates and retroactive component of the order will threaten future investment. Bell Canada and a group of cable companies filed similar petitions on the same day. On August 15, 2020, the Governor in Council issued an Order in Council dismissing the petitions. However, the Order in Council, as well as an accompanying statement from the Minister of Innovation, Science and Industry, recognized that the rates set out in Telecom Order CRTC 2019-288 would, in some instances, undermine investment in high-quality networks.

On May 27, 2021, following separate applications requesting the CRTC to review and vary Telecom Order 2019-288 filed by each of TELUS, Bell Canada and a group of cable carriers, the CRTC issued Telecom Decision CRTC 2021-181. In this decision, the CRTC largely reversed Telecom Order 2019-288, meaning that we do not have to implement the rates ordered in Telecom Order CRTC 2019-288 or issue significant retroactive refunds to wholesale customers. Given that Telecom Decision 2021-181 essentially maintains the rates that have been in place since 2016, the decision does not have a material effect on us.

On May 28, 2021, TekSavvy Solutions Inc. brought a petition to the Governor in Council to vary the decision. On July 15, 2021, the Competitive Network Operators of Canada brought a similar petition. On August 25, 2021, National Capital Freenet Inc. also filed a petition to the Governor in Council. On June 28, 2021, TekSavvy Solutions Inc. sought leave to appeal Telecom Decision CRTC 2021-181 to the Federal Court of Appeal. The Federal Court of Appeal granted leave to appeal on September 15, 2021. We are not filing responding submissions in the petitions or the appeal.

*5G security review – Public Safety Canada*

In September 2018, the federal government announced a review of national cybersecurity requirements for Canada's 5G networks. The stated objective of the reviews was to provide policy clarity on what security controls or restrictions the government intends to impose on 5G networks in Canada and to which foreign vendors such controls and restrictions would apply. The timelines for the conclusion of this review were never released by the federal government, which has also not announced its intentions regarding 5G cybersecurity requirements. Following the September 20, 2021 federal election, on September 28, 2021, Prime Minister Justin Trudeau stated: "We will look forward to sharing a decision on many different issues, including telecommunications and Huawei, in the coming weeks," indicating that the government is still weighing some decisions, but is nearing a final decision. Given the range of potential government or regulatory action that may result from this review, the impact on us, and on Canadian mobile service providers in general, cannot be reliably predicted.

*International security developments*

On May 16, 2019, an executive order entered into force permitting the U.S. Secretary of Commerce to block certain technology transactions deemed to constitute national security risks. The U.S. Department of Commerce subsequently established a list of entities, including Huawei Technologies Co., Ltd. and its global affiliates, to whom the export, re-export or transfer (in-country) of certain restricted technologies was prohibited unless specifically authorized under licence.

In a unanimous vote on July 13, 2021, the U.S. Federal Communications Commission authorized a US$1.9 billion subsidy program to enable telecommunications companies with fewer than 10 million subscribers to replace Huawei and ZTE equipment.

Given the range of potential government or regulatory actions by foreign governments with respect to Huawei, the impact on us, and on Canadian mobile service providers generally, cannot currently be predicted.

*CRTC proceeding regarding potential barriers to the deployment of broadband-capable networks in underserved areas in Canada*

On December 10, 2019, the CRTC issued *Call for comments regarding potential barriers to the deployment of broadband-capable networks in underserved areas in Canada*, Telecom Notice of Consultation CRTC 2019-406. In this proceeding, the CRTC sought comment on barriers that service providers and communities face in building new facilities, or interconnecting to or accessing existing facilities, and in extending networks into underserved areas in order to offer universal service objective-level services. The CRTC has specifically identified access to affordable transport services and efficient use of support structures as potential barriers. The record of the proceeding is now closed and we anticipate a decision in early 2022. It is too early to determine the impact of the proceeding on us.

*CRTC proceeding regarding access to poles owned by Canadian carriers*

On October 30, 2020, the CRTC issued *Call for comments regarding potential regulatory measures to make access to poles owned by Canadian carriers more efficient*, Telecom Notice of Consultation CRTC 2020-366. The CRTC commenced the proceeding further to comments in the proceeding initiated by Telecom Notice of Consultation CRTC 2019-406 that untimely and costly access to poles owned by Canadian carriers has negative impacts on broadband deployment, particularly in areas with limited or no access to broadband-capable networks. In the most recent proceeding, the CRTC is considering, among other issues, authorization delays, make-ready costs, spare capacity reservations, joint use agreements and the potential for improved dispute resolution. We are participating fully in the proceeding. It is too early to determine the impact of the proceeding on us.

*Government mobile wireless pricing election commitment*

Ahead of the 2019 federal election, the Liberal Party of Canada made a commitment to reduce wireless prices by 25%. On March 5, 2020, the Liberal government clarified its expectation that we, Bell, and Rogers (including flanker brands) lower mobile prices for postpaid, bring-your-own-device plans in the 2 to 6 GB range by 25% over a two-year period. To track progress, the government is reporting quarterly on wireless pricing. Although the required price reductions were reported as met in the latest quarterly report which covered the period from October to December 2021, the two-year period to reduce wireless prices is due to end in March 2022, following the initial announcement made in March 2020 to track wireless prices. In light of the fact that the two-year reporting period continues and the government's statement that wireless services are still too expensive, we are unable to determine the full impact of this commitment at this time. The announcement or implementation of specific regulations or other actions intended to reduce cell phone plan prices could precipitate a material reduction in operating expenditures and capital expenditures to ameliorate this impact.

*CRTC review of rate setting for wholesale telecommunications services*

On April 24, 2020, the CRTC issued *Call for comments – Review of the approach to rate setting for wholesale telecommunications services*, Telecom Notice of Consultation CRTC 2020-131. In this proceeding, the CRTC is seeking comment on whether to change its methodology of setting wholesale rates and, if so, how. The CRTC has stated its intent to use the proceeding to establish a more transparent and efficient rate-setting process. We are participating fully in all stages of the proceeding. It is too early to determine the impact of the proceeding on us.

*CRTC review of deadlines for transition to next-generation 9-1-1 service*

On June 14, 2021, the CRTC issued Telecom Decision CRTC 2021-199, *Establishment of new deadlines for Canada's transition to next-generation 9-1-1* (NG9-1-1), where the CRTC stipulated revised implementation for NG9-1-1 service in Canada. The CRTC directed NG9-1-1 network providers, including us, to establish their NG9-1-1 networks, complete all NG9-1-1 production onboarding activities, and be ready to provide NG9-1-1 voice service by transiting live NG9-1-1 traffic, wherever public safety answering points have been established in a particular region, by March 1, 2022. We will work to comply with the directives from this decision, including our recent application proposing to introduce NG9-1-1 and the associated service agreements filed on November 1, 2021. The impact of this proceeding is not expected to be material.

*Amendments to Quebec's public and private sector privacy law*

On September 22, 2021, the Quebec National Assembly passed *An Act to modernize legislative provisions as regards the protection of personal information*, which received assent the same day. Extensive new requirements governing the collection, use and disclosure of the personal information of individuals in Quebec will be phased in over three years. The Act also creates a new enforcement regime with significant criminal fines and administrative monetary penalties for certain infractions and a private right of action with minimum statutory punitive damages. The full impact of the Act is not yet known because some key provisions, such as those relating to AI, have to be further elaborated through government regulations and interpretive guidance from the regulator. The materiality of the change cannot be fully assessed at this time.

*Proposed subsidy increases for Northwestel*

On November 2, 2020, the CRTC initiated a review of its regulatory framework for Northwestel Inc. and the state of telecommunications services in Canada's North in Telecom Notice of Consultation CRTC 2020-367. On January 20, 2021, a number of interveners proposed large subsidy increases to Northwestel and other companies providing service in the North. The proceeding is ongoing. The impact of this proceeding is not expected to be material.

**Broadcasting-related issues**

*Review of the Telecommunications Act, the Radiocommunication Act and the Broadcasting Act*

On January 29, 2020, the Broadcasting and Telecommunications Legislative Review Panel released its final report entitled *Canada's Communications Future: Time to Act*. The report contains 97 recommendations to update legislation governing broadcasting, telecommunications and radiocommunication for the Government of Canada to consider. Further to the report, on November 3, 2020, the government introduced legislation to amend the *Broadcasting Act*. Bill C-10 would have: brought streaming services that operate over the internet expressly within the scope of the *Broadcasting Act*; provided the CRTC with new and expanded regulatory powers to implement a modernized regulatory framework that addresses declining levels of support for Canadian content over the past several years; and provided a more sustainable source of support going forward. On June 21, 2021, Bill C-10 passed third reading at the House of Commons, but its debate in the Senate was cut short upon the proroguing of parliament and the calling of the federal election. On September 20, 2021, the Liberals were re-elected with a minority government, and may either attempt to reinstate Bill C-10 to the progress it had reached under the previous session, or alternatively, introduce a new bill to reform the *Broadcasting Act* and the entire legislative review process would start anew. It is too early to determine if proposed amendments, as well as any other potential legislative changes arising as a result of the report, will have a material impact on us.

*Review of the Copyright Act and Copyright Board reforms*

The *Copyright Act*'s statutorily mandated five-year review was due in 2017, and a process for conducting the review via parliamentary committee was announced in December 2017. The House of Commons Standing Committee on Industry, Science and Technology, with the assistance of the House of Commons Standing Committee on Canadian Heritage, completed the review early in 2019, and both committees presented reports to the House of Commons in May and June of 2019.

To date, no legislation has been proposed as a result of the parliamentary review, although it has led to further government consultations to explore specific issues raised during the review, such as how to modernize the copyright framework for online intermediary liability, AI and IoT. The timeline for potential changes to the *Copyright Act* is uncertain, although government officials have signaled that copyright reform legislation may be tabled in early 2022. The policy approach for copyright has traditionally been based on a balance of interests of creators and consumers, and as a result, the impact of this proceeding is not expected to be material.

On April 14, 2021, ISED announced the launch of a consultation to modernize the copyright framework for online intermediaries. The consultation builds on the work done in 2018 and 2019 as part of the parliamentary review of the *Copyright Act*. ISED has sought comments on a broad range of issues, including the role of intermediaries in policing online copyright infringement, how to remunerate rights holders for the use of their content on online platforms, and what types of enforcement tools (such as website-blocking orders) should be available against intermediaries. We participated in this consultation and filed joint comments with other ISPs on May 31, 2021. Among other things, the comments advocated for a continuation of existing government policy that provides ISPs with unconditional safe harbour protection for the potentially infringing activities of their customers. It is too early to tell whether this consultation will have a material impact on us.

On July 19, 2021, the government announced a consultation to modernize the copyright framework applicable to AI and IoT. The government's objectives were to support innovation and investment in AI and other digital and emerging technologies, support Canada's cultural industries and preserve the incentive to create and invest provided by the economic rights set out in the Act, and support competition and marketplace needs regarding IoT devices and other software-enabled products. We participated in this consultation and filed joint comments with other ISPs on September 17, 2021. Among other things, the joint comments advocated that no changes should be made to the *Copyright Act* that would unduly burden or create potential liability risks for ISPs. Similar to the broader *Copyright Act* review, the impact of this proceeding is not expected to be material.

*Legal challenge to the CRTC's ability to regulate affiliation agreements*

The CRTC's ability to regulate affiliation agreements between broadcasting distributors and programming services was challenged by a vertically integrated broadcasting entity before the Federal Court of Appeal. The Federal Court of Appeal heard the case on May 18, 2021, and released its decision on July 28, 2021. We were granted leave to intervene in the case and appeared at the hearing, where we defended the CRTC's jurisdiction. The Federal Court of Appeal's decision confirmed that the CRTC has jurisdiction to govern economic aspects of disputes between programming services and distributors, and generally supported our competitive position by reinforcing the validity of competitive safeguards put in place by the CRTC to protect non-vertically integrated companies in the broadcasting sector. On September 29, 2021, the vertically integrated company filed an application for leave to appeal the Federal Court of Appeal's decision to the Supreme Court of Canada. On November 25, 2021, we filed a response opposing the application for leave to appeal. It is too early to determine the impact this application for leave to appeal might have on our broadcasting distribution activities.

*Consultation on the government's proposed approach to address harmful content online*

On July 29, 2021, the government launched a consultation on its proposed approach to address harmful content online. The government's proposals largely target social media and content platforms, but a few proposals would also have impacted ISPs. Accordingly, we participated in this consultation and filed joint comments with other ISPs on September 25, 2021. Among other things, the joint comments advocated that the legal framework for addressing harmful online content should not create undue obligations or liability for telecommunications carriers, and that requirements to block access to content online or to provide subscriber information should continue to require judicial orders. The impact of this proceeding is not expected to be material.

# 10 Risks and risk management

## 10.1 Overview

Risk arises from the uncertainty around events, actions and our business activities that may have a negative impact on the achievement of our objectives and goals, but may also create positive opportunities. Risk oversight and management processes are integral elements of our risk governance and strategic planning practices.

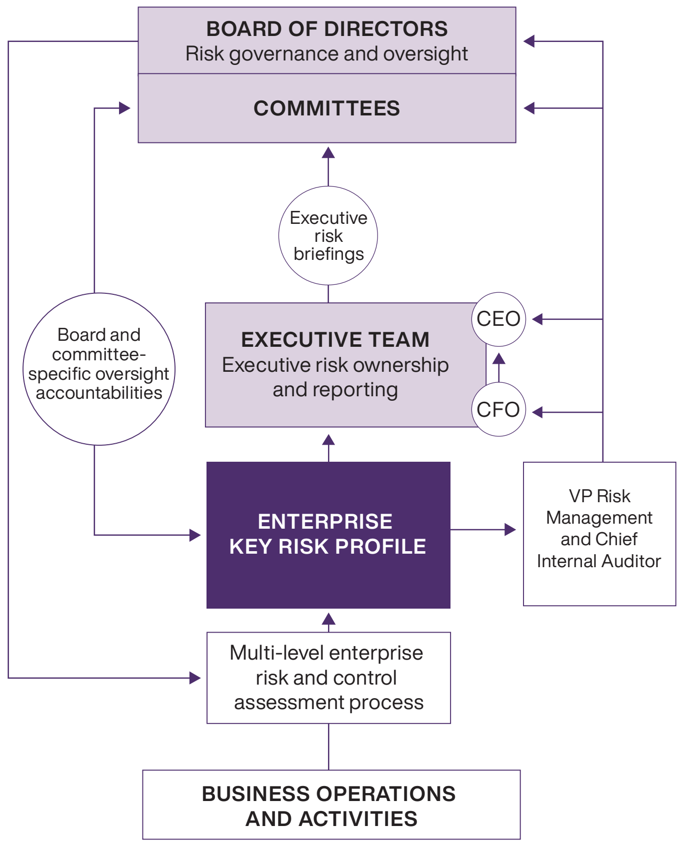
**Risk governance, oversight and culture**
We maintain strong risk governance and oversight practices, with risk oversight responsibilities outlined in the policy manual for our Board of Directors (Board). Our Board is responsible for ensuring that material risks to our business are identified, and for overseeing the implementation of systems and processes that effectively identify, monitor and manage material risks.

Our risk governance culture starts with clear risk management leadership and transparent communications, supported by our Board and Executive Team. In our approach to risk governance, accountability for the management of risks and reporting of risk information is clearly defined. Training and awareness programs, appropriate resources and risk champions help to ensure that we have the risk management competencies necessary to support effective decision-making across the organization. Ethics are integral to our risk governance culture, and our code of ethics and conduct directs team members to meet the highest standards of integrity in all business decisions and actions.

**Responsibilities for risk management**
We take a multi-step approach to managing risks, sharing responsibility across the organization and recognizing that agile and effective risk management is integral to the achievement of our strategic and operational objectives. The first line of assurance is executive and operating management, and these team members are expected to integrate risk management into core decision-making processes (including strategic planning processes) and day-to-day operations. We have risk management and compliance functions across the organization, in areas that include Finance, Legal, Data and Trust (which includes Privacy), Security and other business operational areas, and these form the second line of assurance. These teams establish policies, provide guidance and expertise, and work collaboratively with management to monitor the design and operation of controls. Internal Audit is the third line of assurance, providing independent assessments of the effectiveness and efficiency of risk management and controls across all areas of our business.

**Risk and control assessment process**
Events within and outside of TELUS present us with both risks and opportunities. We strive to avoid taking on undue risk and we work to ensure alignment of risks with business strategies, objectives, values and risk tolerances; we also seek to take advantage of opportunities that may emerge and, in so doing, consider the impacts of our decisions on our multiple stakeholders. We strive to proactively mitigate our risk exposures through performance planning, operational management and risk response strategies, which can include mitigating, transferring, retaining and/or avoiding risks.

**TELUS enterprise risk governance and management**




We have in place multi-level enterprise risk and control assessment processes that solicit and incorporate insights from leaders across all areas of TELUS and enable us to track multi-year trends in key risks and the control environment. A comprehensive annual risk and control assessment is conducted with leaders and an annual assessment is completed by Board members to provide perspective on key enterprise risks. Results of the assessments are shared with senior management, our Board of Directors and Audit Committee, and inform the development of our risk-focused internal audit program. These risk assessments are also incorporated into our strategic planning, operational risk management and performance management processes. In addition, key enterprise risks are reviewed on a quarterly basis in order to capture and communicate any changes, and detailed risk assessments are conducted for various risk management, strategic and operational initiatives throughout the year.

## 10.2 Principal risks and uncertainties

This section describes our principal risks and uncertainties. The significance of these risks is such that they, alone or in combination, may have material impacts on our operations, results, reputation and brand, as well as the approaches taken by investment analysts when evaluating or valuing TELUS as an investment. These risks and the associated risk mitigation activities are addressed further in the following sections.

On March 11, 2020, the World Health Organization declared the spread of the novel coronavirus associated with COVID-19 to be a global pandemic. Due to the wide range of possible COVID-19 pandemic outcomes and the uncertainty with regard to the duration and impact of the pandemic, government policies implemented to limit its spread and the ongoing development and distribution of effective vaccines and treatments, we cannot accurately forecast the impact of the COVID-19 pandemic on our future operations, financial performance, financial position or cash flows. Throughout 2021, successive waves of the pandemic continued to have a material impact on our customers and on our business. Restrictions on travel continued to reduce our revenue from mobile roaming and lockdowns have led to decreased foot traffic which has impacted loading across in-person channels. Our global operations have also been impacted depending on the geographical regions where we and our customers operate, and other international, regional and local government responses to the COVID-19 pandemic, for example, temporary site closures enforced across our delivery sites. In response, we have made significant investments to adapt to these challenges, ensuring that our workforce is equipped to be flexible when restrictions are imposed. While high vaccination rates have enabled the reopening of many areas of the economy, successive waves of COVID-19 cases have resulted in restrictions being introduced and continue to affect customer behaviour, for example by driving a demand for online shopping.

The COVID-19 pandemic has impacted our customers, suppliers and vendors, our team members and our communities, and this has led to changes in our business and operations, including the levels of demand for, and supply of, the products and services that we offer and the channels through which we offer them. Risks and uncertainties that could affect our business results and the market prices of our debt and equity securities, including those of our TELUS International (Cda) Inc. subsidiary, and that could also be heightened by the COVID-19 pandemic or by any future pandemic or similar event include, but are not limited to, the risks described in *Section 10*.

Although we believe the measures we take to identify and mitigate risks are reasonable, there can be no expectation or assurance that they will effectively mitigate or fully address the risks described, or that new developments and risks will not materially affect our operations or financial results. Despite our efforts to implement controls in our domestic and international operations, there can be no assurance that these controls will prove to be effective in all instances. Forward-looking statements in this section and elsewhere in this MD&A are based on the assumption that our risk mitigation measures and controls will be effective. See *Caution regarding forward-looking statements*. We consider our exposure to risk in four categories: strategic, operational, financial and compliance.

**Strategic risks and uncertainties**

These strategic risks arise from uncertainties that may shape the nature and focus of our strategic direction as an organization and our ability to sustain profitable revenue growth.

| Risk | Potential impact | Mitigations |
|---|---|---|
| **Regulatory matters** (see 10.3) | We operate in a number of highly regulated industries and are therefore subject to a wide variety of laws and regulations domestically and internationally. Policies and practices of elected officials and regulatory decisions, reviews and government activity may have strategic, operational and/or financial impacts (including revenue and free cash flow). | • Advocacy<br>• Spectrum acquisition strategies<br>• Non-regulated, diversified revenue streams<br>• Prudent investment and cost efficiency planning decisions that consider our regulatory environment |
| **Competitive environment** (see 10.4) | Competitor expansion, activity and intensity (pricing, bundling), as well as non-traditional competitors, disruptive technology and disintermediation, may alter the nature of the market and impact our market share and financial results (including revenue and free cash flow). | • Customers first strategy<br>• Bundling of services<br>• Diversified investment<br>• Monitoring of competitors<br>• Product portfolio innovation and acquisition<br>• Product life cycle management |
| **Technology** (see 10.5) | Consumer adoption of alternative technologies and changing customer expectations have the potential to impact our revenue streams and customer churn rates. | • Technology road map<br>• Fibre deployment<br>• Spectrum acquisition strategies<br>• 5G roll-out |
| **Suppliers** (see 10.6) | We may be impacted by supply chain disruptions and lack of resiliency in relation to global or localized events. Dependence on a single supplier for products, components, service delivery or support may impact our ability to efficiently meet constantly changing and rising customer expectations while maintaining our quality of service. | • Supplier risk profiling and multi-vendor strategy<br>• Vendor partnerships, contracts and agreements<br>• Supplier code of conduct<br>• Business continuity management plans<br>Information on supply chain sustainability can be found in our sustainability report[1] at **telus.com/sustainability**. |
| **Organizational change** (see 10.7) | Investment and acquisition activities present opportunities to expand our scope but may expose us to new risks. We may be unsuccessful in gaining market traction/share and realizing benefits, and integration efforts may divert resources from other priorities. | • Investment and acquisition strategy<br>• Pre- and post-acquisition due diligence<br>• TELUS Ventures investments<br>• Innovation partnerships |

1 Not incorporated by reference.

**Operational risks and uncertainties**

Operational risks arise from uncertainties we face in our day-to-day operations. Our approach is guided by our code of ethics and conduct, while our operations are supported by policies, procedures and internal controls.

| Risk | Potential impact | Mitigations |
|---|---|---|
| **Customer service**<br>(see 10.8) | Our service delivery directly impacts customer experience, customer churn rates, and likelihood to recommend outcomes. We may not be able to deliver the excellence our customers expect or maintain our competitive advantage in this area. | • Process simplification and digitization<br>• Customer experience management |
| **Our systems and processes**<br>(see 10.9) | Systems and technology innovation, maintenance and management may impact our IT systems and network reliability, as well as our operating costs. | • Life cycle management and adoption of emerging solutions<br>• Project management<br>• Change management<br>• Continuous monitoring and response programs<br>• Disaster recovery program and plans |
| **Security and data protection**<br>(see 10.10) | Our awareness of security issues and the effectiveness of our security controls influence our ability to identify potential threats and vulnerabilities, protect our environment, detect breaches, respond to attacks and restore normal operations. A successful disruption may impact the operations of our network or allow the unauthorized interception, destruction, use or dissemination of customer, team member or business information. | • Security policies, standards and methodologies<br>• Privacy and security impact assessments<br>• Vulnerability assessments<br>• Continuous monitoring and response programs |
| **Our team**<br>(see 10.11) | The rapidly evolving and highly competitive nature of our business and changing workforce demographics, as well as the relative effectiveness of internal training, development and succession programs, may impact our ability to attract, develop and retain team members with the skills required to meet the changing needs of our customers and our business.<br><br>Increased mental health challenges faced by team members (and their families) due to ongoing pandemic pressures may result in the loss of key team members through short-term and long-term disability. An organic shift in personal values/expectations may also lead to elevated voluntary turnover. | • Performance development program<br>• Health and well-being strategy:<br>  ◦ Mental health training for leaders and all team members<br>  ◦ Ongoing awareness-building with managers<br>  ◦ Early intervention strategies for those facing significant challenges<br>• Compensation and benefits program<br>• Retention and succession planning<br>• Work Styles program<br>• Integration of team members joining from acquisitions<br><br>Additional information on our team member programs can be found in our sustainability report at **telus.com/sustainability**. |
| **Our environment**<br>(see 10.12) | Natural disasters, pandemics, climate change impacts and disruptive events may impact our operations, customer satisfaction and team member experience. | • Business continuity and disaster recovery program and plans<br>• Emergency Management Operating Committee (EMOC)<br>• Medical Advisory Council (MAC) to ensure our response and mitigation measures related to the COVID-19 pandemic are informed and supported by qualified medical advice<br>• Commitments to sustainable and responsible business practices, with targets that balance economic growth with positive social and environmental outcomes<br><br>See *Section 5.2* of our 2021 Annual Information Form for a description of our alignment with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). Additionally, a detailed report of our environmental risk mitigation activities can be found in our sustainability report at **telus.com/sustainability**. |

| Risk | Potential impact | Mitigations |
|---|---|---|
| **Real estate matters** (see 10.13) | Real estate investments are subject to possible financing risks and uncertainty of future demand, occupancy and rental rates, especially during the pandemic. Future real estate developments may not be completed on budget or on time and may not obtain lease commitments as planned. | • Rationalization of locations<br>• Fixed-price supply contracts and expert project management oversight<br>• Costs for the real estate projects are monitored through capital gating and approval processes<br>• Arrange pre-lease agreements with prospective tenants prior to construction completion to fill vacant space<br>• Work from home initiatives |

**Financial risks and uncertainties**

Financial risks arise from uncertainties involved in maintaining appropriate levels of liquidity, financing and debt to sustain operations and support future growth.

| Risk | Potential impact | Mitigations |
|---|---|---|
| **Financing, debt and dividends** (see 10.14) | Our access to capital markets at optimal pricing may be impacted by general market conditions and investors' assessments of our cash generation capability. Our current intention to return capital to shareholders could constrain our ability to invest in our operations to support future growth. | • Shelf prospectus in effect until June 2023<br>• Investment grade credit ratings<br>• Credit facilities, trade receivables securitization and commercial paper program<br>• Foreign currency forward contracts |
| **Tax matters** (see 10.15) | Complexity of domestic and foreign tax laws, regulations and reporting requirements applying to TELUS and our international operating subsidiaries may impact financial results, effective governance of tax considerations and compliance. International acquisitions and expansion of operations increase our exposure to multiple forms of taxation. | • Tax strategy<br>• Internal taxation professionals<br>• External advisors |
| **The economy** (see 10.16) | Changing global economic conditions including changing expectations about inflation, as well as our effectiveness in monitoring and revising growth assumptions and contingency plans, may impact the achievement of our corporate objectives, our financial results (including free cash flow), and our defined benefit pension plans. | • Pension investment governance and monitoring<br>• Foreign currency forward contracts<br>• Diverse product sets<br>• Efficient business operations |

**Compliance risks and uncertainties**

Compliance risks arise from uncertainties related to compliance with laws and regulations across the many jurisdictions in which we operate globally. We have policies, controls, processes and contractual arrangements in place, as well as insurance coverage, that are designed to support compliance and limit our exposure to compliance risks.

| Risk | Potential impact | Mitigations |
|---|---|---|
| **Litigation and legal matters** (see 10.17) | Complexity of, and compliance with, laws, regulations and commitments may have a financial and reputational impact. | • Customer contracts and agreements<br>• Supplier contracts and agreements<br>• Insurance policies<br>• Compliance programs |

**TELUS International subordinate voting shares**

The market price of the TI subordinate voting shares may be volatile and is likely to fluctuate due to a number of factors, including actual or anticipated changes in profitability; general economic, social or political developments; changes in industry conditions; changes in governance regulation; inflation; the general state of the securities markets; and other material events. TI may not achieve its publicly announced targets, which could result in a reduction in the market price of the TI subordinate voting shares. A reduction in the market price of the TI subordinate voting shares due to these or other factors could result in a reduction in the fair value of TI multiple voting shares held by TELUS.

## 10.3 Regulatory matters

**Risk category: Strategic**

The regulatory regime under which we operate, including the laws, regulations, and decisions in regulatory proceedings and court cases, reviews, appeals, policy announcements and other developments, such as those described in *Section 9.4 Communications industry regulatory developments and proceedings*, imposes conditions on the products and services that we provide and the ways in which we provide them. The regulatory regime sets forth, among other matters, rates, terms and conditions for the provision of telecommunications services, licensing of broadcast services, licensing of spectrum and radio apparatus, and restrictions on ownership and control by non-Canadians.

The allocation and use of spectrum in Canada are governed by Innovation, Science and Economic Development Canada (ISED), which establishes spectrum policies, determines spectrum auction frameworks, issues licences and sets radio authorization conditions.

Canadian ownership and control requirements, including restrictions on the ownership of the common shares of TELUS Corporation (Common Shares) by non-Canadians, are imposed by the *Canadian Telecommunications Common Carrier Ownership and Control Regulations* under the *Telecommunications Act* (collectively, the Telecommunications Regulations) and the *Direction to the CRTC (Ineligibility of Non-Canadians)*, as ordered by the Governor in Council pursuant to the *Broadcasting Act* (the Broadcasting Direction).

With our Internet of Things (IoT), business, health, agriculture and international footprint, our operations must also comply with the laws, regulations and decisions in effect in all of the jurisdictions in which we operate. These jurisdictions, as well as the contracts that we enter into (particularly those of our TI and TELUS Agriculture subsidiaries), require us to comply with, or facilitate our customers' and clients' compliance with, numerous complex and sometimes conflicting legal regimes, both domestically and internationally. These laws and regulations relate to a number of aspects of our business, including anti-corruption, internal financial control and disclosure obligations, data privacy and protection, wages-and-hours-of-work standards, employment and labour relations, trade protections and restrictions, import and export control, tariffs, taxation, sanctions, data and transaction processing security, payment card industry data security standards, records management, user-generated content hosted on websites we operate, privacy practices, data residency, corporate governance, anti-trust and competition, team member and third-party complaints, telemarketing regulations, telephone consumer regulations, government affairs and other regulatory requirements affecting trade and investment. Our customers and clients are also located around the world, and the laws and regulations that apply include, among others, U.S. federal laws and regulations; state laws on third-party administration services, utilization review services, data privacy and protection telemarketing services; and state laws on debt collection in the United States, collectively enforced by numerous federal and state government agencies and attorneys general; as well as similar consumer protection laws in other countries in which our international subsidiaries' clients are based. Failure to provide services in a manner that complies with any such requirements could result in breaches of contracts with our international subsidiaries' clients. The application of these laws and regulations to our international subsidiaries' clients is often unclear, and laws and regulations of different jurisdictions may at times conflict. The global nature of our operations increases the difficulty of compliance. For example, in many foreign countries, particularly in those with developing economies, it is common to engage in business practices that are prohibited by regulations applicable to us or our international subsidiaries' clients, including Canada's *Corruption of Foreign Public Officials Act* and the U.S. *Foreign Corrupt Practices Act*. We cannot provide assurance that our international subsidiaries' clients or their customers will not take actions in violation of our internal policies or Canadian or U.S. laws. Compliance with these laws and regulations may be further challenged by the shift to remote working arrangements that was initiated in response to the COVID-19 pandemic and is expected to continue in the near term. For example, payment card industry and *Health Insurance and Portability and Accountability Act* guidance is evolving in light of these remote working arrangements globally, and thus there is uncertainty over additional costs and our ability to comply with these evolving standards.

We have acquired a number of businesses and entered into new areas in the health sector, including virtual care and digital pharmacy services, that are highly regulated and that also involve risk related to the quality of care. The operations of our health business are subject to various federal and provincial laws and regulations, as well as policies, guidelines and directives issued by regulatory and administrative bodies, such as medical associations, provincial colleges of physicians and other associations governing the practice of the health professionals (the holders of licences and permits to provide healthcare services) that we engage for the delivery of our services. In the case of virtual care, in addition to the laws and regulations applicable to the provision of "insured" services (including temporary billing codes adopted by each provincial government in response to the COVID-19 pandemic, which are determined by each province and are not uniform across Canada), the related laws, regulations, policies, guidelines and directives are still evolving and thus are subject to being interpreted and applied in different ways.

In Canada, federal and provincial privacy laws are changing, with a trend toward more stringent requirements and greater enforcement powers. The province of Quebec recently passed amendments to the *Act Respecting the Protection of Personal Information in the Private Sector*. Over three years, the amendments will phase in major changes and new regulatory requirements in areas such as notice, consent, data breach notification and the use of automated decision systems. In September 2023, the amendments will implement a new enforcement regime, which includes substantial fines, administrative monetary penalties and a private right of action with minimum statutory damages. The federal government may also re-introduce privacy reform legislation that will increase the regulatory burden, as described in *Section 9.4 Communications industry regulatory developments and proceedings*. Similarly, provinces such as British Columbia and Ontario are considering privacy reforms that risk fragmenting the regulatory landscape in Canada.

**Potential impact**

Changes to the regulatory regime under which we operate, including changes to laws and regulations and ownership rules or the enactment of laws or regulations by provinces or municipalities that threaten unitary federal regulatory authority over telecommunications in Canada, could materially and adversely affect our business. These changes may increase our costs, restrict or impede the way we provide our services, limit the range of services we provide, and otherwise cause us to reduce our capital and operational expenditures, including investment in network technologies, and alter customer perceptions of our operations. The further regulation of our broadband, mobile and other operations and any related regulatory decisions could also restrict our ability to compete in the marketplace and limit the return we can expect to achieve on past and future investments in our network. Such changes may not be anticipated or, when they are anticipated, our assessment of their impact on us and our business may not be accurate.

Our ability to provide competitive services, including our ability to enhance our current services and offer new services on a timely basis, is also dependent on our ability to obtain access to new spectrum licences at a reasonable cost as they are made available. The revocation of, or a material limitation on obtaining, spectrum licences could have a material adverse effect on our business and our operations, including the quality and reliability of our network and service offerings, as well as our financial condition.

Government or regulatory actions with respect to certain countries or suppliers may also impact us, and other Canadian telecommunications carriers generally, and may have material non-recurring incremental cost consequences for us.

Changes to the regulatory regime under which we operate our health business, including enactment of laws, regulations and policies, guidelines or directives by regulatory and administrative bodies, such as medical associations, provincial colleges of physicians and other associations governing health professionals, could adversely affect the reputation, brand, financial results and operations of our health business. As it relates to our virtual care business, uncertainty regarding the regulatory regime, including the temporary measures adopted in response to the COVID-19 pandemic, combined with the anticipated regulatory changes that may be enacted by provincial governments, could have adverse effects on our business if they result in the revocation of, or significant limitations on, our ability to provide and charge for the provision of virtual care services to our customers.

Overall, compliance with laws and regulations in multiple jurisdictions globally may involve significant costs, consume significant time and resources or require changes in our business practices that result in reduced revenue and profitability. We may also face burdensome and expensive governmental investigations or enforcement actions regarding our compliance. Non-compliance could result in fines, damages, criminal sanctions against us, our officers or our team members, prohibitions on the conduct of our business, damage to our reputation, restrictions on our ability to process information, allegations by our customers that we have not satisfied our contractual obligations, or other unintended consequences. In addition, we are required under various laws to obtain and maintain accreditations, permits and/or licences for the conduct of our business in all jurisdictions in which we have operations and, in some cases, where our customers receive our services, including the United States, Canada, Europe and Asia. If we do not maintain our accreditations, licences or other qualifications to provide our services, or if we do not adapt to changes in legislation or regulation, we may have to cease operations in the relevant jurisdictions and may not be able to provide services to existing customers or attract new customers. Our failure to comply with applicable legal and regulatory requirements could have a material adverse effect on our business, financial performance, financial condition and cash flows.

**Changes over the past 12 months**

Significant regulatory developments and proceedings by the Government of Canada, and its various agencies, continued through 2021. Certain significant regulatory developments and proceedings relevant to our business and industry are highlighted in *Section 9.4*. These include, but are not limited to, the following:

- The issuance of the CRTC's decision in its review of the regulatory framework for mobile wireless services
- Continued cybersecurity review of international suppliers of 5G network equipment and technologies to evaluate potential risks involved in the development of 5G networks in Canada
- The CRTC's revisions to its 2019 decision, in which it had significantly reduced wholesale internet service rates charged by incumbent local exchange carriers for wholesale digital subscriber services and cable companies' third-party internet access services to competitor internet service providers
- The expectation set out by the federal government that we, BCE Inc. and Rogers (including respective flanker brands) lower mobile prices for postpaid, bring-your-own-device plans in the 2, 4 and 6 GB range by 25% by March 2022
- The award of spectrum licenses in the 3500 MHz band, including the award of set-aside licenses in B.C., Alberta and Manitoba to Videotron, and our application for judicial review of that decision
- The agreement under which Rogers would acquire Shaw Communications Inc. (Shaw) requires approvals from the Competition Bureau, the CRTC and ISED. The governmental reviews of this transaction are underway and will continue into 2022.

**Mitigation**

We advocate at all levels of government, including: our participation in CRTC and federal government proceedings, studies, reviews and other consultations; representations before provincial and municipal governments pertaining to telecommunications issues; legal proceedings impacting our operations at all levels of the courts; and other relevant inquiries (such as those relating to the exclusive federal jurisdiction over telecommunications), as described in *Section 9.4 Communications industry regulatory developments and proceedings*.

We will continue to monitor regulatory developments and may need to reconsider our investment decisions with a view to generating a necessary return on capital. Our risk mitigation strategies for investment decisions may include, but are not limited to, reducing capital and operational expenditures and reducing employment.

We continue to strive to comply with all radio authorization and spectrum licence and renewal conditions, and we plan to participate in future spectrum auctions. We continue to advocate with the federal government for fair spectrum auction rules, so that companies like TELUS can bid on an equal footing with other competitors for spectrum blocks available at auction and can purchase spectrum licences available for sale from competitors. We also continue to strongly advocate that preferential treatment is not required and is not in the best interests of Canadians, especially rural Canadians, for regional carriers, including for 5G services, most notably carriers that are currently part of established, sophisticated and well-financed cable companies.

As it relates to our health business, we monitor new and amended regulations, policies, guidelines and directives to stay ahead and plan for new and changing requirements. In addition, we have put in place internal governance to ensure oversight of clinical practice across all healthcare operations, to manage compliance with licensing requirements and to ensure quality of care. We also advocate with the federal and provincial governments for reasonable regulations, in part by participating in market studies and other consultations.

The Canadian Telecommunications Common Carrier Ownership and Control Regulations require us to monitor and control the level of non-Canadian ownership of our Common Shares. These powers have been incorporated into our Articles and extended to ensure compliance under the *Broadcasting Act*.

## 10.4 Competitive environment

**Risk category: Strategic**

As the telecommunications industry continues to evolve, we have expanded our offerings beyond the delivery of traditional voice and data services for consumer and business customers. We offer services in security and home automation, next-generation digitally-led customer experiences, healthcare and agriculture, both inside and outside Canada (see *Competition overview* in *Section 4.1*). We face intense competition in our traditional voice and data services, as well as in all sectors of our business operations and in all geographic markets.

Mobile markets are characterized by aggressive competition from established players and regional carriers, with competitors using aggressive promotional offers to attract and retain customers.

In the consumer market, cable companies and other competitors continue to offer a mix of residential local voice over IP (VoIP), long distance, internet access and, in some cases, mobile services under one bundled and/or discounted monthly rate, along with their existing broadcast or satellite-based TV services. Some of our competitors own and continue to acquire broadcast content assets, and we continue to source content from them for our broadcasting services.

In the business market, traditional facilities-based competitors continue to compete based on network footprint and reliability, while hyperscalers such as Microsoft (Teams, Skype) and other IP voice/collaborative service providers such as Zoom emphasize price, flexibility and convenience. These service providers do not invest in, or own, networks or other infrastructure but compete directly with video, voice and messaging services across both the consumer and business market segments.

TI is a leading digital customer experience innovator with a focus on customer experience and transformation innovation that designs, builds and delivers next-generation digital solutions, including artificial intelligence (AI) and content moderation. TI competes with professional services companies that offer consulting services, information technology companies with digital capabilities, AI and data labelling providers, and traditional contact centre and business process outsourcing companies that are expanding their capabilities to offer higher-margin and higher-growth digital services. In addition, the continued expansion of the digital services offered by TI and the markets in which it operates will also introduce it to new and different competitors, many of which may have significantly greater market recognition than TI in the markets it is entering, as well as increased competition from existing competitors that are also expanding their services to include digital capabilities. From time to time, TI's clients that are currently using services may determine that they can provision these services in-house. As a result, TI faces competitive pressure to continually offer services in a manner that will be viewed by its clients as better and more cost-effective than the in-house provision of those services.

TELUS Health competes with other providers of virtual and clinical care, electronic medical records (EMR) and pharmacy management products, claims adjudicators, systems integrators and health service providers, including those that own a vertically integrated mix of health services delivery, IT solutions and related services, as well as global providers. With consumer-facing health products, we compete in the provision of virtual healthcare services (with access to general practitioners, nurse practitioners, mental health therapists and dieticians through virtual consultations), preventative health services, and personal emergency response services.

TELUS Agriculture is a global data science and digital technology business leveraging technology innovation, ingenuity and AI to optimize agricultural production and the global and local food and consumer goods supply chain. While we maintain a broad solution set as compared to other agriculture technology providers, we compete with focused software and IoT competitors.

**Potential impact**

Our customers' loyalty and their likelihood to recommend TELUS both depend on our ability to provide a service experience that meets or exceeds their expectations, a range of relevant products and services, and reliable state-of-the-art networks.

Intense competition from mobile competitors, traditional telephony, data, IP and IT service providers and VoIP-focused competitors in both the consumer and business markets, along with various promotional offers, inclusive bundles and rate plans, places pressures on average revenue per subscriber per month (ARPU), average billing per subscriber per month (ABPU), churn rates and costs of acquisition and retention. In addition, technological substitution and technological advances across all key business lines and market segments have blurred the boundaries between broadcasting, internet service and telecommunications sectors (see *Section 10.5 Technology*).

If TI is unable to compete successfully against companies that offer similar services and offer its clients a compelling alternative to the in-house provision of services, the results could include higher client churn rates, revenue loss, pressures on recruitment and retention of team members, service price reductions, and increased marketing and promotional expenses, as well as reduced operating margins, which could have a material adverse effect on the business, financial performance, financial condition and cash flows.

We also face intense competition in agriculture, health and digital technologies from companies that offer similar services. If we are unable to effectively differentiate our offerings in these sectors, our business, financial performance, financial condition and cash flows could be materially adversely impacted, and we may not achieve the benefits of the significant investments that we have made in acquiring, integrating and growing these businesses.

**Changes over the past 12 months**

On March 15, 2021, Shaw and Rogers announced an agreement under which Rogers would purchase all of Shaw's issued and outstanding Class A and Class B shares for $40.50 per share, representing a transaction value of approximately $26 billion (including approximately $6 billion in Shaw debt). While this transaction is subject to regulatory review by the CRTC, ISED and the Competition Bureau (including if approved, potential requirements for remediation), regardless of outcome, a business combination of this size has significant competitive implications across the telecommunications landscape in Canada. As of February 10, 2022, those reviews have yet to be concluded.

In October 2021, the flanker market (all carriers) aligned to meet the ISED recommended 25% price reduction on 2, 4 and 6GB rate plans. These plans are available across all flanker brands for 4G service with bring-your-own-phone only, effectively increasing the financed entry point to $50 across all regions in the flanker market.

In October 2020, the CRTC approved the application from Space Exploration Technologies Corp. (SpaceX Starlink) to provide low-earth orbit satellite internet to rural Canadians. Starlink did not complete its beta testing as expected in 2021, although the size of the beta test continues to grow with reports that Starlink now has over 140,000 customers across 20 countries. However, customers have reported long lead times on equipment delivery. Additionally, in August 2021, the Government of Canada announced a $1.44 billion investment in Telesat's low-earth orbit satellite constellation. Other competitors in the market include Amazon (Kuiper), Boeing, OneWeb and the Europe-based Thales Alenia. However, as of February 10, 2022, these companies do not yet have approval to provide services in Canada.

Canadian cable competitors are licensing next-generation TV platforms while continuing to increase the speed of their internet offerings and their roll-out of Wi-Fi services in metropolitan areas. Over-the-top (OTT) services, such as Amazon Prime Video, Apple TV, Disney+, Netflix and YouTube, are also competing for share of viewership, which may accelerate the disconnection of traditional paid TV services or affect subscriber and revenue growth in our TV and entertainment services.

Erosion of our residential voice service and the decline of higher-margin legacy voice revenues are expected to continue, due to ongoing technological substitution by mobile and VoIP and competition. This decline has been partially offset by growth in demand and/or migration of customers to IP-based platforms.

The COVID-19 pandemic has driven an accelerated adoption of cloud-based solutions (IP voice, collaboration and network-as-a-service (NaaS) offerings) and expedited the shift from legacy business solutions to next-generation technologies, as businesses adopted solutions that enable remote working arrangements.

Non-traditional competitors such as Amazon, Google and Microsoft are entering the business market and are able to leverage their global scale to offer low-cost data storage and cloud computing services. In addition, rapidly evolving technologies, such as software-defined networks (SDNs) and virtualized network functions (VNFs), enable the layering of new services in cloud-centric solutions.

Digital health adoption, including virtual care, is accelerating, prompting rapid expansion of competitor offerings and the emergence of new players in the market, capitalizing on increased demand and available government funding. Early in the COVID-19 pandemic, non-traditional healthcare companies, such as Google, Amazon Web Services and Apple, also entered the healthcare space.

Within the Canadian digital health market specifically, several of TELUS Health's long-standing competitors announced significant investments or acquisitions that mirror the activities of U.S.-based or international companies. The overall trend sees competitors quickly expand product offerings through partnerships or acquisitions. In several cases, some of our competitors are now working together, such as Loblaw Companies Ltd. and Maple Corporation, or Sun Life Financial and Dialogue Technologies Inc. However, we believe no other digital health provider spans the Canadian healthcare ecosystem with breadth or depth comparable to TELUS Health.

In the markets TI competes in, competitors are actively building scale through consolidation (e.g. Sitel Group acquisition of Sykes Enterprises, Inc.) and enhancing digital capabilities through niche acquisitions. There was also a steep rise in employee attrition and labour rates in 2021, in particular at global IT companies, with demand for skilled talent generally driving higher wages worldwide.

**Mitigation**

Our top corporate priority is putting customers first and earning industry leadership in likelihood to recommend. In fact, 60% of our 2021 internal corporate scorecard is weighted to team member engagement and customer experience. To enhance customer experience, we continue to invest in our products and services, system and network reliability, team members, and system and process improvements. Additionally, with our product life cycle management processes, we endeavour to introduce innovative products and services through both research and development and acquisition, enhance our current services with integrated bundled offers, and invest in customer-focused initiatives to bring greater transparency and simplicity to our customers, all in order to differentiate ourselves from our competition.

Our 4G technology covers approximately 99% of Canada's population, which has enabled us to establish and maintain a strong position in smartphone and data device selection and expand roaming capability to more than 225 global destinations. To compete effectively across customer segments, we offer a wide range of services through our TELUS, Koodo and Public Mobile brands. Each brand has a unique value proposition and web-based channel (see *Our capabilities* in *Section 4.1* and *Our major brands and distribution channels* in *Section 4.2*). TELUS' 5G network has been deployed across most major tier 1 and tier 2 areas in Canada, and covered 70% of Canada's population as at December 31, 2021. As we expand our 5G coverage, we will continue to offer a network that is reliable, fast and built in full compliance with all of the Health Canada safety guidelines in order to provide our customers with faster speeds, increased capacity and near-instantaneous responsiveness, while also enabling applications such as remote surgery and autonomous cars and the creation of truly smart cities (see *Our technology, systems and properties* in *Section 4.2*).

We are continuing to make significant investments in our broadband infrastructure, including connecting more homes and businesses directly to our fibre-optic network. At December 31, 2021, more than 2.7 million households and businesses in B.C., Alberta and Eastern Quebec were connected with fibre-optic cable, which provides these premises with immediate access to our fibre-optic infrastructure. This is up from approximately 2.5 million households and businesses at December 31, 2020. Our broadband investments extend the reach and functionality of our IP TV services and business and healthcare solutions, and are also enabling a more efficient and timely evolution to a converged 5G network (see *Our technology, systems and properties* in *Section 4.2*).

Our IP TV and OTT multimedia initiatives support the next generation of IP TV and, importantly, tie our OTT environment to a single platform, which allows us to be agile in the delivery of OTT services, such as Amazon Prime Video, Apple TV, Disney+, Netflix and YouTube, while also strengthening our leadership position in Western Canada in the provision of high-definition linear channels, video-on-demand services and ultra-high definition 4K HDR content. Our strategy is to aggregate and integrate content and applications and make them accessible for our customers' enjoyment, on a timely basis across multiple devices. We have demonstrated that it is not necessary to own content in order to make it accessible to customers on an economically attractive basis, provided there is timely and strict enforcement of the CRTC's regulatory safeguards. In addition, as more OTT service providers launch services and offer higher-resolution video over the internet, we continue to make investments in our network. As of January 2022, TELUS PureFibre is still the leader in Canada in the Netflix Internet Service Provider (ISP) Speed Index, a measure of prime-time Netflix performance delivered by a specific group of ISPs around the world, as well as being ranked as the fastest ISP in Canada among major ISPs by U.S.-based PCMag. In 2021, we were ranked first in network coverage, speed, reliability or experience by Opensignal, Ookla and Tutela.

Our SmartHome Security and Secure Business solutions offerings further leverage our infrastructure investments and our proven customer experience capabilities to enhance our suite of services with video surveillance and analytics, home and business automation and related safety and security monitoring. These services leverage smartphone applications and our leading PureFibre and wireless networks, while also generating multi-service bundling and retention profiles.

We continue to add to our capabilities in the business market through product development, acquisitions and partnerships and investments in SDN, unified communications and IoT. By acquiring and combining six companies (bluArc, BroadConnect Canada, Infra-Solutions, Netrium, Radiant and Ubity), TELUS created GoCo, a fully integrated organization that quickly became one of Canada's leading providers of some of the market's fastest-growing solutions, such as SD-WAN and unified communication.

To meet our customer expectations, TI provides an experience that is not only personalized and empathetic, but also consistent and integrated across omni-channel touchpoints. To quickly capture, evaluate and adapt to customer feedback on a global scale, we have team members with expertise in advanced analytics, AI, machine learning and data analysis, together with leading digital technologies. We have also built an agile delivery model with global scale with substantially all of our delivery locations connected through a carrier-grade infrastructure backed by cloud-based technologies, enabling globally distributed and virtualized teams. However, our primary competitive differentiator is our unique workplace culture, which makes people and a shared set of values a priority in everything we do. We continue to build on this culture of care, ensuring the full engagement of the individuals we choose to join our team, the clients we choose to work with and the manner in which we build and run our business. TI is focused on organic growth, accelerating digital adoption for all solutions offered, with an emphasis on collaborative innovation. We also continue to consider inorganic mergers and acquisitions in executing our growth strategy, adding scale and digital capabilities. In the current evolving labour market, the ability to attract and retain talent is key to TI's business. We continue to adapt our models and practices by assessing the regional conditions of the markets we operate in, and by offering proactive compensation and talent programs.

Through TELUS Health, we have leveraged our systems, proprietary solutions and third-party solutions to extend our footprint in healthcare and benefit from the investments in eHealth being made by governments and employers. With the introduction of healthcare products and services for Canadians, we are seeing evidence of a positive shift in perception, driving overall interest and sales of our services, and differentiating us from our competitors.

Over the course of two and a half years, we completed a number of key acquisitions in order to assemble a suite of agriculture industry assets. In November 2020, TELUS Agriculture was launched to help companies improve the reliability of their supply chain, protect their brands, and drive efficiency and profitability. As one of the few service providers with a perspective that spans the full value chain, we expect to be able to differentiate ourselves from more narrowly focused competitors.

We are continuing our disciplined long-term strategy of investing in our growth areas and delivering on our customers first priority. We intend to continue to market and distribute innovative and differentiated services; offer bundled services across our product portfolio; invest in our extensive network and systems to support customer service; evolve technologies; invest in our distribution channels, including our digital capabilities; and acquire the use of spectrum to facilitate service development and the expansion of our subscriber base, as well as to address the accelerating growth in demand for data usage.

## **10.5** Technology

**Risk category: Strategic**

We are a technology-enabled company and we maintain short-term and long-term strategies to optimize our selection, costs and use of technology, minimize risks and uncertainties and diversify our product and service offerings. Our 5G technology, 4G LTE technology, LTE advanced (LTE-A) and TELUS PureFibre infrastructure are foundational to our future growth (see *Our technology, systems and properties* in *Section 4.2*).

An accentuation of a paradigm shift involving customer adoption of alternative technologies, such as video and voice OTT offerings (e.g. Netflix and FaceTime), IP voice and collaboration services, NaaS, and increasingly available Wi-Fi networks, could negatively affect our revenue streams. For example, Wi-Fi networks are being used to deliver entertainment services to customers outside the home, while OTT content providers are competing for a share of entertainment viewership. OTT technology may also impact the business by enabling capabilities that in the past were associated with telecommunications service providers (e.g. cloud-based services and roaming). The proliferation of low-power wide-area (LPWA) IoT networks and services also presents challenges arising from low bandwidth usage, which may put additional pressure on our revenue streams. In addition, we are constantly focused on advances in cybersecurity, in order to identify any opportunities they may offer.

Through TI, we are a digital customer experience innovator that designs, builds and delivers high-tech, high-touch next-generation solutions, including artificial intelligence and content moderation.

Through TELUS Health's services – such as pharmacy management, EMRs (including mobile EMRs), electronic health records, personal health records, clinical information systems, remote patient monitoring, virtual care offerings and online claims settlement management software solutions, including the online renewal of prescriptions, e-prescribing services and MedDialog – TELUS Health facilitates the integration of electronic health records from the home to the doctor's office to the hospital, making critical health information available to healthcare providers over our broadband network.

Our TELUS Agriculture technology solutions meaningfully impact primary production and sustainability across the food value chain, by empowering value chain participants with solutions that leverage advanced data systems and AI to streamline operations, improve food traceability, and provide consumers with fresher and healthier food.

**Potential impact**

Our mobile business depends on deploying technology and maintaining sufficient access to spectrum to deliver services. Rising data traffic levels and the fast pace of data device innovation present challenges to providing adequate capacity and maintaining high service levels at competitive cost structures.

Our growth and profitability and the diversity of our revenue sources will depend on our ability to develop and adopt new technologies that help us expand our existing offerings, proactively identify new revenue streams and improve cost efficiencies in our operations, all while meeting rapidly evolving customer expectations. We may not always be successful in anticipating or responding to our customers' expectations and interests when we adopt evolving technology solutions and integrate these solutions into our offerings, and we may not achieve the intended enhancements or cost reductions in our operations. New services and technologies offered by our competitors may make our service offerings uncompetitive. Our failure to innovate, maintain technological advantages or respond effectively and in a timely manner to changes in technology could have a material adverse effect on our business, financial performance, financial condition and cash flows.

**Changes over the past 12 months**

The demand for mobile data services continues to grow rapidly. According to the 2021 Communications Market Report, the average data usage per subscriber increased by 27.6% in 2020 over the 2019 average, while mobile data revenue grew by less than 1% over the same period.

In July 2021, ISED completed its auction of 3500 MHz spectrum, which has become the primary band for 5G mobile coverage globally. TELUS secured 16.4 MHz of 3500 MHz spectrum at the auction, and together with the spectrum acquired privately in January 2021, this brings our national 3500 MHz spectrum holdings to 25 MHz, averaging 40 MHz in our key markets. The limited amount of spectrum available at auction creates a risk that we may not be able to compete equally in the provision of higher network speeds and 5G capacity in all of the markets we serve.

**Mitigation**

As at December 31, 2021, our 4G LTE access technology covered 99% of Canada's population, and our LTE-A access technology covered 97%, while our 5G access technology covered 70%. Our ongoing investments in 4G LTE technology, including LTE-A technology and new 5G capabilities, allow us to manage data capacity demands by more effectively utilizing our spectrum holdings. The evolution to 5G technologies is supported by our investments in our core network, IP network, IP/fibre back-haul to cell sites, including our small-cell infrastructure, as well as our software-upgradeable radio infrastructure. The 5G expansion is expected to further increase network capacity and speed, reduce delivery costs per megabyte, deliver a superior subscriber experience, and enable new innovative applications for consumers and businesses.

Mobile network infrastructure investments will increasingly be directed to systems based on Network Function Virtualization (NFV), which offers greater capacity for computing and storage, higher levels of resiliency and more flexible software design. Our large-scale move to national, geographically distributed private cloud-based facilities that use commercial off-the-shelf computing and storage solutions enables the deployment of broad-scale NFV and SDN technologies. This will allow us to virtualize much of our infrastructure and will also facilitate a common control plane for coordination of our virtualized and non-virtualized network assets. The architecture of our intelligence and content capabilities is located at the edge of our network, close to our customers. The distributed smaller-scale computing power and storage deliver services faster while managing the ongoing need to continually scale the IP/fibre core network infrastructure.

Rapid growth of data volumes requires efficient utilization of all our spectrum. We have extensively deployed our 4G spectrum holdings, and we began operationalizing our 5G spectrum in 2020, including spectrum in the 600 MHz band. Further, we expect to continue operationalizing our recently acquired 3500 MHz spectrum through early 2022. The spectrum licences previously used for our CDMA access technology have been repurposed for use with LTE and 5G technologies. Our deployment of small-cell technology is helping us achieve a more efficient utilization of our spectrum holdings and mitigate any potential speed and capacity disadvantages created by 3500 MHz availability.

Since early 2014, we have also worked with numerous businesses and many major sports and entertainment venues as we continue to expand our public Wi-Fi infrastructure. This public Wi-Fi service is a part of our network strategy of deploying small cells that integrate seamlessly with our 4G and 5G wireless access technology, automatically shifting our smartphone customers to Wi-Fi and offloading data traffic from our wireless spectrum. Integrated public Wi-Fi infrastructure build-out activity also extends service and channel opportunities with small and medium-sized businesses and improves customers' likelihood to recommend. Integration of home Wi-Fi increases the propensity for higher data usage on smartphones within and outside the home, helping to drive the uptake of our internet service. In addition to the availability of our Wi-Fi service, our IoT portfolio is also growing, with the addition of services such as GEOTrac and TELUS Alert and Assist, as well as a wide variety of IoT solutions, combined with seamless global IoT connectivity across more than 200 countries and networks. We are also capitalizing on advanced self-learning technologies and automation (e.g. AI and robotic process automation), which will change the way we manage our operations and support customer experience innovation, as well as presenting new revenue opportunities. In addition, we are maintaining a constant focus on cybersecurity solutions, recognizing that cybersecurity, as an ecosystem of technologies and processes working together, may provide greater visibility of risks and guide better security decisions for organizations across Canada.

Ongoing investments in fibre-to-the-premises, along with our copper-to-fibre migration program and copper decommissioning within our fibre footprint, should support the further evolution of IP-based telephony, and as those services evolve, we will continue to assess opportunities to further consolidate separate technologies within a single voice service environment. The overall convergence of mobile and fixed services provides opportunities for cost savings and for the rapid development and deployment of new and advanced services. To support this convergence within a common IP-based application environment, we are leveraging modular architectures, lab investments and employee trials. We are partnering with system integrators where appropriate, purchasing hardware that is common to most other North American IP-based technology deployments and introducing virtualization technologies, where feasible. We are also active in a number of standard-setting bodies, such as the Metro Ethernet Forum, in order to advocate for a new IP infrastructure strategy that leverages standards-based functionality, which could allow us to further simplify our network.

## 10.6 Suppliers

**Risk category: Strategic**

We rely on, and have relationships with, multiple vendors, including large suppliers such as Amazon, Apple, Cisco, Google, Microsoft, Ericsson, Nokia and Samsung, which are important in supporting our network and service evolution plans and our delivery of services to our customers. Our suppliers and vendors may experience business difficulties or privacy and/or security incidents, and may face external challenges such as epidemics or pandemics, global supply chain shortages or global shipping and port disruptions, as well as government or regulatory pressures. They may restructure their operations, be consolidated with other suppliers, discontinue or cease to provide support or updates for certain products or sell their operations or products to other vendors. In addition, various suppliers may sell products or services directly to our customers rather than selling those products and services through us.

In certain cases, the number of suppliers of a product, service or technology that we use is limited. In addition, government or regulatory actions with respect to certain countries or suppliers may affect our relationship with certain vendors and our future use of their products and services.

**Potential impact**

Our agility in the delivery of products and services is directly linked to our ability to engage or replace a supplier or vendor on a timely basis and without incurring additional cost. Reliance on certain manufacturers may increase their market power and adversely affect our ability to purchase certain products at an affordable cost. Consequently, the success of upgrades and the evolution of technology that we offer our customers, including our IP TV solutions and the roll-out and evolution of our broadband technologies and systems, may be impacted, as well as the cost of acquisition or the time required to deploy certain technologies and systems.

There is no guarantee that our vendor strategies and agreements will not be impacted by vendor operational difficulties or government/regulatory pressures, or that we will not incur additional costs or delays in continuing to provide services or in deploying our technologies and systems.

**Changes over the past 12 months**

While the COVID-19 pandemic has had a significant impact on many of our suppliers, the pandemic-related challenges affecting manufacturing operations have largely been managed effectively. The continued pandemic-related reduction in commercial air traffic has eliminated the accompanying air cargo capacity, resulting in a rising demand for ocean freight. This has put pressure on the availability of both shipping vessels and ports, as well as domestic road and rail transportation capacities. The widely reported global supply chain shortages have had a particular impact on technology products, beginning with a shortage of silicon wafers and extending to the chipsets and circuit boards that are embedded in almost all of the products TELUS purchases. These shortages have resulted in both longer lead times and higher costs. These combined logistics and supply chain challenges are expected to continue until the end of 2022.

Following the restrictions placed on its access to U.S.-based technologies, Huawei has exited the mobile phone business. As part of our 5G network upgrade, we have also chosen to replace many of the Huawei products in other layers of our network with enhanced equipment from the suppliers of our 5G network (either Ericsson, Samsung or Nokia). During the transition phase, components removed from the network will be used as replacements, as required on the remaining network, thus ensuring a supply of necessary materials.

**Mitigation**

We value our relationships with our suppliers because they help us achieve our business objectives and contribute to our success. We work closely with key strategic suppliers to ensure appropriate timing in the manufacturing, delivery and warehousing of their products so that our needs will be met regardless of changing conditions. We strive to award business to suppliers that have demonstrated a strong commitment to sustainable development by adopting ethical, labour, health and safety, and environmental principles and compliance practices that align with our expectations and support the well-being of their employees, contractors and communities.

In response to the impact of the pandemic and global supply chain challenges, our supply operations, in collaboration with our product development and marketing teams, have extended future forecasts and increased purchase order quantities to help maintain our fulfilment capabilities in the context of longer lead times. In addition, we continue to seek alternative devices or sources of supply, and where possible, we refurbish equipment in the form of certified pre-owned devices, including smartphones from our Bring-it-Back program and our Mobile Klinik business, to support sustainability.

As a leading network aggregator, we partner with several network equipment suppliers and work with numerous international and domestic vendors to deliver the best possible experience for our customers across our business operations. We consider possible vendor strategies and/or restructuring outcomes when planning for our future growth, as well as the maintenance and support of existing equipment and services. We have reasonable contingency plans for different scenarios, including working with multiple vendors, maintaining ongoing strong vendor relationships with periodic reviews of vendor performance, and working closely with other product and service users to influence vendors' product or service development plans. With continued international focus on telecom suppliers, business continuity plans have been formalized to ensure availability of supply in compliance with U.S. Bureau of Industry and Security (BIS) Entity List restrictions. For our 5G network build, we have announced partnerships with Ericsson, Nokia and Samsung, consistent with our multi-vendor strategy.

In addition, we regularly monitor the risk profiles of our key vendors and review the applicable terms and conditions of our agreements to determine whether additional contractual safeguards are required. We also promote our supplier code of conduct, which is based on generally accepted standards of ethical business conduct.

In respect of supplier market power, we offer and promote alternative devices to provide greater choice for consumers and to help limit our reliance on a few key suppliers.

Additional information on supply chain sustainability can be found in our sustainability report at **telus.com/sustainability**.

## **10.7** Organizational change

**Risk category: Strategic**

We will partner, acquire and divest as necessary to accelerate the implementation of our growth strategy. Through the partnerships and acquisitions we pursue, we may seek opportunities to expand the scope of our existing services, add new customers or enter new markets around the world. There can be no assurance that we will successfully identify suitable candidates in the future for partnerships, for strategic transactions at acceptable prices or at all, or be able to complete any such transactions.

As we have implemented this strategy, we have experienced rapid growth and significantly expanded our operations into new business sectors and geographic markets, and the number of our team members has increased significantly over the past several years. We expect to develop and improve our internal systems in the locations where we operate in order to address the anticipated continued growth of our business. We are also continuing to look for delivery locations, service offerings and organizations outside of our current geographic operating regions in order to limit the risks of operating from a limited number of countries and/or expand our capabilities and customer value propositions. We may not, however, be able to effectively manage our infrastructure and team member expansion, establish additional delivery locations or hire skilled team members as and when they are required to meet the ongoing needs of our customers and clients and to maintain our current growth trajectory, and we may not be able to develop or improve our internal systems. We also need to manage cultural differences between our team member populations, which may increase the risk for employment law claims. Our inability to execute our growth strategy, to ensure the continued adequacy of our current systems or to manage our expansion, capital and other resources effectively could have a material adverse effect on our business, financial performance, financial condition and cash flows.

A substantial majority of the assets and operations of our DLCX and TELUS Agriculture lines of business are located outside of Canada and the United States. In addition, the business strategies of DLCX and TELUS Agriculture may involve expanding or developing their business operations in emerging market regions, including Europe and Asia-Pacific. Due to the international nature of our business, we are exposed to various economic, political and other risks of doing business globally.

**Potential impact**

Business combination transactions add complexity to our corporate structure, product and service offerings, and operational systems and processes. If pre-acquisition due diligence is insufficient or ineffective, our investments may not realize potential synergies or generate strategic growth.

We may be unable to successfully identify, complete, integrate and realize the benefits of acquisitions or manage the associated risks. Consequently, any acquisition we complete may not result in anticipated or long-term benefits or synergies to us, and we may not be able to further develop the acquired business in the manner we anticipated.

Acquisitions involve a number of risks, including diversion of management's attention from operating our business, developing our relationships with customers and seeking new revenue opportunities; failure to retain key personnel of acquired companies; legal risks and liabilities relating to the acquisition or the acquired entity's legacy operations that may be unknown or undisclosed and for which we may not be indemnified fully or at all; failure to integrate the acquisition in a timely manner; and in the case of potential acquisitions, our ability to finance the acquisitions on attractive terms or at all, any of which could have an adverse effect on our business, financial performance, financial condition and cash flows. Future acquisitions may also require that we incur indebtedness or issue equity securities.

We could also experience financial or other setbacks if transactions encounter unanticipated problems, including problems related to execution, integration or underperformance relative to prior expectations. Post-acquisition activities include the review and alignment of team member cultures, accounting policies, treasury policies, corporate policies such as ethics and privacy policies, team member transfers and moves, information systems integration, optimization of service offerings and the establishment of control over new operations. Such activities may not be conducted efficiently and effectively. Our management may not be able to successfully integrate any future acquired business into our operations and culture on the anticipated timeline or at all, or maintain our standards, controls and policies, which could negatively impact the experience of our customers and clients, the optimization of our service offerings and our control over operations, and otherwise have a material adverse effect on our business, financial performance, financial condition and cash flows. Consequently, acquisitions may not result in anticipated or long-term benefits or synergies for us, and we may not be able to further develop the acquired business in the manner we anticipated.

The risks to which we are exposed by doing business globally and in emerging markets may impede the execution of our strategy by limiting the countries and regions in which we are able to expand. The impacts of these risks may also only emerge after we have begun preparations and made investments to provide services in a new country or region. Our exposure to such risks may cause us to incur additional costs to mitigate the impact of these risks on our business. As we continue to operate our business globally, our success will depend, in part, on the nature and extent of any such impacts and our ability to anticipate, respond to and effectively manage these impacts. Finally, international trade and political disputes can adversely affect the operations of multinational corporations like TELUS by limiting or disrupting trade and business activity between countries or regions. For example, we may be required to limit or halt operations, terminate customer or client relationships or forgo profitable opportunities in countries which may, in the future, be subject to sanctions or other restrictions on the business activity of corporations such as TELUS, by U.S. or Canadian legislation, executive order or otherwise. Some TI clients have been targeted by, and may in the future be subject to, such sanctions. Additionally, trade disputes between countries may also lead to unexpected operating difficulties in certain countries, including heightened regulatory scrutiny, greater difficulty transferring funds or negative impacts on currency exchanges. All of the foregoing could have a material adverse effect on our business, financial performance, financial condition and prospects.

Given the rapid rate of technological change, we may also look to partner and invest in emerging opportunities that may not yet be fully viable and established. These investments may require high levels of initial funding and experience low levels of initial adoption, growth and returns, all of which could impact our financial position in the short term.

**Changes over the past 12 months**

Over the course of 2021, we made a number of acquisitions to support our growth strategy. Please refer to *Note 18* of the Consolidated financial statements for more information.

**Mitigation**

To support ongoing investment in leading-edge and innovative technology, we have diversified our approach to allow for varied levels of commitment, which we determine based on the relative maturity of a technology in its life cycle, its alignment with our strategy and its linkage with our value proposition. Our TELUS Ventures investments include more than 50 active companies, and we continue to build on our commitment to help develop exciting new technologies with the potential to deliver benefits for our customers, stakeholders and shareholders. In addition, we continue to engage in partnerships that can conduct research and development of leading-edge innovative technology and services in sectors such as healthcare, agriculture and entertainment.

Over the course of time, we have built a disciplined corporate development and ventures expertise, with due diligence and post-acquisition integration planning rigour, reinforced by a well-defined process and governance approach to evaluating investments and acquisitions. Where a larger-scale business combination is contemplated, our teams follow a well-established and collaborative due-diligence review process, with oversight by our senior leadership and Board.

In addition, formal post-acquisition processes are in place to support onboarding, engagement and operational integration with our risk monitoring and management practices.

## 10.8 Customer service

**Risk category: Operational**
Our customers' loyalty, their likelihood to add to the services they engage us for and their likelihood to recommend us are dependent upon our ability to provide a service experience that meets or exceeds their expectations and is differentiated from our competitors. Our service delivery teams focus on driving excellence and efficiency in our operations, implementing radical simplification, investing in digitization to enhance the customer experience and becoming best-in-class solution advisors, with the objective of safely minimizing the effort involved for our customers when they interact with us. Having our TI team members assist with customer-serving activities further strengthens our ability to continue delivering exceptional customer service.

**Potential impact**
Delivering sub-optimal experiences when our customers engage with us for the provision of services or support may negatively impact customer satisfaction, our portfolio of brands and our ability to grow our customer base, including customers of our telecom businesses, DLCX, TELUS Health and TELUS Agriculture. Inadequate or inefficient customer interactions (e.g. order taking, support contact, service delivery, billing accuracy, and network and services reliability) may increase customer dissatisfaction and churn rates. Failure to continue to execute effectively on organizational initiatives, such as our customers first priority, solutions advisor support, digitization and simplification, may lead to a deterioration in the customer experience we provide. Any significant or prolonged systems and service disruptions or outages may negatively impact customer satisfaction and our brands. Regulatory decisions may also limit our ability to invest in our customer experience.

Our corporate sustainability and social purpose initiatives are an important part of our organizational culture and are key factors in attracting and retaining customers and employees and differentiating us from our competitors. If we are unable to meet or exceed the evolving expectations of our customers in these areas or implement high-quality corporate sustainability and social purpose initiatives on a timely basis, and effectively communicate them to our customers, our reputation may suffer, which may negatively impact our ability to attract new customers and retain existing customers.

Our TI business has derived a significant portion of its revenue from a limited number of large clients, and we believe this will continue in the near term. A leading social media company was TI's largest external client in the years ended December 31, 2021 and 2020, and accounted for approximately 18% and 16%, respectively, of its revenue in those periods. Additionally, the volume of work performed for specific clients of TI or the revenue it generates can vary from year to year. For example, a client may demand price reductions, change its customer engagement strategy or begin to provision services in-house, and continued consolidation in many of the verticals in which TI offers services could result in the loss of a client. In light of the foregoing, a major client in one year may not provide the same level of revenue in any subsequent year.

Any significant reduction in, or elimination of, the use of the services TI provides as a result of client consolidation or our removal from a key client's provider network would reduce TI's revenue and could negatively affect our business. In addition, such consolidation may encourage TI's clients to apply more pressure on TI to lower the prices it charges for its solutions. All of the foregoing could have a material adverse effect on our business, financial condition, financial performance and prospects.

**Changes over the past 12 months**
The global pandemic has had widespread effects on many areas of service delivery. These include significant constraints on our interactions with our customers; a major acceleration of our transformation into a digital-first organization; and the proliferation of self-serve capabilities to help our customers. These impacts have affected our team around the world, requiring us to be agile in enabling our team members to work efficiently from home or from alternative locations, as well as virtually with customers through our virtual technician model (VTM) and do-it-yourself (DIY) capabilities.

**Mitigation**
Continued simplification and digitization, including our ongoing work on conversational interactive voice response and enhanced call-back capabilities, have improved first-time interaction experiences by reducing the number of call transfers and shortening customer wait times. We continue to enhance the reliability and functionality of our websites and applications, while promoting digital engagement to minimize effort for our customers and reduce the volume of calls related to basic transactions, interactions and other concerns.

To ensure minimal disruption of our ability to deliver on our service promise during any further lockdown scenarios, we quickly developed a robust capacity to ramp our virtual repair and installation program up or down at a community level in response to outbreak data, maximizing value and safety. This is in conjunction with our focus on further developing our DIY installation and repair program and our VTM, which will generate further internal cost savings and provide greater choice for our customers. We have also invested in our work-from-home capabilities around the world, including additional virtual private network (VPN) capacity, allowing more than 90% of our global workforce to work from home or from alternative locations for the foreseeable future and serve our customers safely. The work of our EMOC also helps us track outbreaks and coordinate responses to keep our customers and team members safe.

Our TI subsidiary was created with an intense focus on customer service excellence, continuous improvement and a values-driven culture with the goal of better serving a growing portfolio of global clients. Through TI, customer care and business services are delivered from within a unified TELUS-wide culture by a flexible team of over 62,000 team members in over 25 countries, minimizing business disruptions. Competence Call Center (CCC) (since rebranded as TELUS International Northern Europe or TINE and comprised substantially of CCC) and Lionbridge AI were acquired during 2020, with the latter's business subsequently rebranded as TELUS International AI Data Solutions (TIAI); these acquisitions help extend the reach of TI's customer service capabilities by diversifying its service offerings. The acquired CCC capabilities have enabled higher-value-added business services with a focus on trust and safety, including content moderation, while TIAI's solutions help improve data functionality and deliver secure, compliant, scalable and high-quality solutions for our TI subsidiary's clients.

Within TELUS Health, we have developed virtual care delivery options, including the capability to perform virtual health assessments from our local care centres. We have also introduced a "virtual first" approach to implementation of our software solutions. Virtual training and onboarding are being delivered to new physician and pharmacist clients, incorporating rigorous practices that ensure the safety of our customers and team members when on-site visits are required. The integration of virtual-visit functionality into our EMR service offering across Canada allows clinicians to support their own roster of patients virtually while maintaining continuity of care and fully up-to-date health records. As of December 31, 2021, more than 950,000 consultations have been conducted through our various virtual care solutions, including TELUS MyCare, TELUS Health Virtual Care and TELUS EMR Virtual Visit.

As a social capitalism company, we are also committed to making a difference by building stronger, healthier communities and ensuring that the most vulnerable among us are not left behind. Our Internet for Good program is focused on connecting Canadians in need by providing low-cost high-speed internet access for low-income families, young people leaving foster care and people with disabilities, as well as empowering schools across Alberta and B.C. to extend the offer directly to families in need. In addition, our Mobility for Good program provides subsidized smartphones and plans for young people leaving foster care, low-income seniors and, new in 2021, Indigenous women at risk, helping them stay in touch with loved ones, maintain vital support networks and build new lives. We believe these initiatives increase our customers' loyalty and likelihood to recommend, and are key factors in differentiating us from our competitors. Additional information on our sustainability and environmental governance practices and related disclosure is included in *Section 10.12 Our environment*.

We continue to be ranked favourably in third-party reports based on customer and network experience. In 2021, we were ranked first in network coverage, speed, reliability or experience by Opensignal, Ookla and Tutela, as well as being ranked as the fastest ISP among major ISPs in Canada by U.S.-based PCMag. This successful performance was the result of continuing to evolve our coverage across Canada, increasing the accessibility of our network, and working to better understand the emerging network methodologies that can enhance coverage and LTE availability, all of which earned TELUS recognition for providing the best network coverage among our competitors.

## 10.9 Our systems and processes

**Risk category: Operational**

We are a key provider of essential telecommunications services, as well as security and health services in Canada. Through TELUS International, we provide digital customer experience services to global brands, and through TELUS Health, we ensure optimal care is made possible by combining the power of technology and data with the provision of market-leading experiences. Within TELUS Agriculture, we leverage technology and data to improve the flow of information across the agricultural, food and consumer goods production industries in Canada and internationally. Our success depends on our ability to deliver reliable and continuous services to all our customers.

We have a large number of interconnected operational and business support systems. Acquisitions, business combinations and the development and launch of new services typically require significant systems development and integration efforts. Acquisitions may also pose potential cybersecurity, privacy and brand risks. As next-generation services are introduced, they must work with next-generation systems, frameworks and IT infrastructures, while also being compatible with legacy services and support systems. In addition, our large enterprise deals and our TI subsidiary's client contracts may involve complex and multi-faceted customer-specific enterprise requirements, including customized systems and reporting requirements in support of service delivery.

**Potential impact**

Our network, technology, infrastructure, supply chain, team members and operations may be materially impacted by disruptions in the functioning of critical infrastructure due to intentional threats (see *Section 10.10 Security and data protection*), labour disruptions (see *Section 10.11 Our team*), climate-related risks and natural hazards or unintentional threats (see *Section 10.12 Our environment*), health threats (such as epidemics or pandemics), competitive threats and geopolitical pressures. Any of these risks or hazards may lead to the disruption of our ability to deliver services to our customers and may also make it difficult or impossible for team members to reach or work in our business locations. Damage or destruction that interrupts our provision of services could adversely affect our reputation, our relationships with our customers and our leadership team's ability to administer and supervise our business, and could also cause us to incur substantial additional expenditures to repair or replace damaged equipment or sites. We may also be liable to our customers for any service disruption resulting from such damage or destruction. Our resiliency provisions and disaster recovery plans may not be sufficient to support continuity and reliability of service during disruptions or reduce the duration and impact of service outages. While we currently have commercial liability insurance, our insurance coverage may be insufficient or may not provide coverage at all for certain events. Furthermore, we may be unable to secure such insurance coverage at premiums acceptable to us in the future, or such insurance may become unavailable. Core expertise and competencies in all areas of our organization are in high demand worldwide and our operations and continued growth depend on our ability to hire, retain and develop highly skilled leaders and key personnel. Any of the above factors may adversely affect our business.

As the complexity of our systems increases, our system stability and availability may be affected. There can be no assurance that any of our proposed IT systems or process change initiatives will be implemented successfully, that they will be implemented in accordance with anticipated timelines, or that sufficient numbers of skilled team members will be available to complete such initiatives and maintain our competitive position in the marketplace. If we fail to implement and maintain appropriate IT systems on a timely basis, fail to create and maintain an effective governance and operating framework to support the management of our teams, or fail to understand and streamline our significant number of legacy systems and proactively meet constantly evolving business requirements, we could experience an adverse impact on our business and financial performance.

**Changes over the past 12 months**

Expansion of our work-from-home programs due to the COVID-19 pandemic increased requirements on our VPN systems.

IT services are increasingly delivered by cloud-based vendors as either Software-as-a-Service (SaaS) or Infrastructure-as-a-Service (IaaS) and our reliance upon these third-party cloud-based computing services is growing. While this can result in benefits for our speed to market, reliability, performance and agility, it requires adjustments to our operations and may increase the potential for service disruptions. Operational support processes and vendor negotiations must now take into account that the delivery of hardware and software services may occur outside of our own infrastructure, and therefore controls need to be incorporated into our operational support processes and tools.

In addition, we routinely have numerous integration activities, complex system and process change initiatives, and development projects underway.

**Mitigation**
During the COVID-19 pandemic, we expanded our VPN capacity in order to ensure stability, productivity and security for team members working from home and from alternative locations, and we accelerated the purchase and deployment of a new VPN system, improving connection capacity and reliability while enhancing security measures. For our TI subsidiary's clients, to the extent possible, we were able to redistribute customer volumes from facilities impacted by local government-mandated temporary site closures to locations that were less impacted. We have also equipped the majority of our customer-serving TI team members to provide remote support to our clients, as they have since the onset of the pandemic, and in some cases we have thoughtfully and strategically had team members return to work on-site. In addition, the TIAI business utilizes the services of a crowd-sourced provider base that is geographically dispersed across the globe.

In line with industry best practice, our approach is to separate business support systems (BSS) from operational support systems (OSS) and underlying network technology. Our aim is to decouple the introduction of new network technologies from the services we sell to customers so that both can evolve independently. This allows us to optimize network investments while limiting the impact on customer services, and also facilitates the introduction of new services. In addition, due to the maturing nature of telecommunications vendor software, we adopt industry-standard software for BSS/OSS functions, leverage SaaS and IaaS capacities, and avoid custom development where possible. This enables us to leverage vendor knowledge and industry practices acquired through the installation of those platforms at numerous global telecommunications companies. We have established a next-generation BSS/OSS framework to ensure that, as new services and technologies are developed, they are part of the next-generation framework that will ease the retirement of legacy systems in accordance with TeleManagement Forum's next-generation operations systems and software program. As part of our ongoing fibre roll-out, we have invested in new operational support systems that are consolidating our legacy systems and simplifying our current environment. Concurrent with our fibre roll-out, we are also migrating customers from our legacy copper network to our fibre network and beginning to decommission the copper network within our fibre footprint. This will improve our ability to support and maintain our systems with newer, more resilient technology and improve the customer experience. We also continue to make significant investments in system resiliency and reliability in support of our ongoing customers first initiatives.

For each new large enterprise deal, we look to leverage systems and processes developed for previous contracts while incorporating others as required, using a controlled methodology to draft a new custom solution and following standard industry practices for project management and systems support. We have release and change management policies, processes and controls in place that are based on industry best practices. In general, we strive to ensure that system development and process changes are prioritized, and we apply a project management approach to such initiatives that includes appropriate risk identification and contingency planning, scope and change control, and resource and quality management. We conduct reasonable functional, performance and revenue assurance testing, as well as capturing and applying any lessons learned. Where a change involves major system and process conversions, we often shift our business continuity planning and emergency management operations centre to a heightened state of readiness in advance of the change.

Consistent with best practice, we continue to make smart investments in mitigating risk in older technology, modernizing key platforms and capabilities for greater flexibility and reliability, and securing the benefits and capabilities that cloud-based operations can offer. We continue to make progress in modernizing and improving our systems and critical applications by leveraging proven, state-of-the-art, cloud-based technologies and capabilities. Over the past two years, we have augmented our teams with additional digitization and cloud expertise so they can play a leading role, today and into the future. We are leveraging our 10-year partnership with Google Cloud to supplement our in-house expertise and experience as we extend the digitization of TELUS by harnessing the capabilities of Google Cloud Platform, as well as other partners and cloud-based service providers.

We have adopted a post-acquisition stabilization period for the SmartHome Security and automation line of business to deeply assess any risks, vulnerabilities and exposures, and consider the mitigation of key risks, before integrating common elements into our core systems and critical applications.

We conduct ongoing monitoring of our systems and critical applications. Risk-based disaster recovery capabilities are leveraged to help prevent outages and limit impacts on our customers and operations. In addition, enterprise-wide business continuity programs are in place to support monitoring, preparedness, mitigation, response and recovery. However, there can be no assurance that specific events, or a combination of events, will not disrupt our operations.

## 10.10 Security and data protection

**Risk category: Operational**
As a national provider of information and communications services, we have a perspective extending beyond that of individual organizations. We leverage this insight and understanding to monitor and identify security-related trends as they evolve in the wider threat landscape. The risks outlined below reflect both our experience and the trends we have observed in the wider ecosystem.

We have a number of assets that may be exposed to risks involving intentional threats. These include physical assets that may be exposed to terrorist attacks, vandalism and/or theft, including (but not limited to) cellular towers, distributive copper cable, corporate stores, network and telephone switch centres, and elements of corporate infrastructure.

Additionally, we operate data centres and collect and manage data in our business and on behalf of our customers (including, in the case of TELUS Health, sensitive personal health information) that may move across our interconnected operational and business support systems and networks. Depending on the nature of the data, it may be restricted for use within Canada or leveraged by our teams or outsourcing partners in Canada or abroad. Our systems and networks may also be subject to cyberattacks. Personal health information in particular is known to be a prime target for these attacks.

A number of TI's service contracts provide for high or unlimited liability for the benefit of its clients related to damages resulting from breaches of privacy or data security in connection with the provision of its services.

Although our network security measures and our authentication of customer credentials are designed to protect against unauthorized disclosure, alteration and destruction of, and access to, data on our networks, it is impossible for such security measures to be perfectly effective. There can be no assurance that such measures will function as expected or will be sufficient to protect our network infrastructure against certain attacks, and there can be no assurance that such measures will successfully prevent or mitigate service interruptions or other security-related incidents. All network infrastructure is vulnerable to rapidly evolving cyberattacks, and our user data and corporate systems and security measures may be breached due to the actions of outside parties (including malicious cyberattacks), team member error, malfeasance, internal bad actors, a combination of these, or other circumstances. A breach may allow an unauthorized party to obtain access to or exfiltrate our data or our users', customers' or clients' data. Additionally, outside parties may attempt to fraudulently induce team members, users, customers or clients to install malicious software, disclose sensitive information or access credentials, or take other actions that may provide access to our data or our users', customers' or clients' data. Because networking and computing environments are increasing in complexity and the techniques used to obtain unauthorized access, disable or degrade service or sabotage systems change frequently, become more sophisticated over time, or may be designed to remain dormant until a predetermined event and thus may not be identified until deployed against a target, we may be unable to anticipate these techniques or implement adequate preventative measures. If an actual or perceived breach of our security measures occurs (or a breach of a third-party vendor's, customer's or client's security that can be attributed to our failure or is perceived to be our fault), the market perception of the effectiveness of our security measures could be harmed and we could lose users, customers and clients. Security breaches also expose us to risk involving loss of information, class action or other litigation brought both by customers and clients and by individuals whose information was compromised; or to remediation costs, increased costs for security measures, loss of revenue, damage to our reputation, and potential liability.

**Potential impact**

Physical security threats can place both our team members and our infrastructure, systems and networks at risk of incurring significant harm, including personal injury, destruction of property and loss of service and/or data. The risks and consequences of cyberattacks on our assets could surpass the risks and consequences of physical attacks, due to the rapidly evolving nature and sophistication of these threats.

We and our partners may also be subject to software, equipment or other system malfunctions that could result in unauthorized access to, or change, loss or destruction of, our data. These malfunctions could compromise the privacy of individuals, including our customers, team members and suppliers, and could expose other sensitive information.

A successful disruption of our systems, networks and infrastructure, or those of third parties, including our suppliers, vendors and partners, may prevent us from providing reliable service, impact the operations of our networks, or lead to the unauthorized interception, destruction, use or dissemination of our information or our customers' information. Such disruption, whether physical or digital, or unauthorized access to our data could cause us to lose customers or revenue, incur expenses, or experience reputational and goodwill damages. Additionally, such damages could result in TELUS incurring costs arising from investigation efforts, replacement or restoration of assets and potential civil lawsuits or fines imposed by regulatory bodies.

While we believe our team members receive appropriate training, if any person, including any of our team members, negligently disregards or intentionally breaches controls or procedures with which we are required to comply in relation to a customer's data, or otherwise mismanages or misappropriates that data, or if unauthorized access to or disclosure of data in our possession or control occurs, we could be subject to significant liability to customers, our TI subsidiary's clients or its clients' customers for breaching contractual confidentiality and security provisions or for permitting access to personal information subject to privacy laws, as well as liability and penalties in connection with any violation of applicable privacy laws or criminal prosecution. Unauthorized disclosure of sensitive or confidential customer, client or team member data, whether through breach of computer systems, systems failure, team member negligence, fraud or misappropriation, or otherwise, could damage our reputation and cause us to lose customers and clients and result in liability to individuals whose information was compromised.

Similarly, unauthorized access to or through our information systems and networks or those we develop or manage for our customers and clients, whether by our team members or third parties, could result in negative publicity, damage to our reputation, loss of customers, clients or business, class action or other litigation, costly regulatory investigations and other potential liability.

From a TELUS Health perspective, breaches involving personal health information have proven to be the most expensive to remediate; such a breach can have a significant impact on trust and reputation, and may also affect future health outcomes.

**Changes over the past 12 months**

Two major trends evident in the cybersecurity threat landscape in 2021 were supply chain attacks and the use of ransomware in cyberattacks. Supply chain attacks are attractive to cybercriminals since they can have a significant impact on downstream organizations, which adds to the pressure on the primary target and could permit the cybercriminals to leverage that pressure against the downstream organizations and make further demands. Ransomware has been increasingly used in attacks, according to a report from the Cybersecurity and Infrastructure Security Agency in August 2021, which noted a 62% increase in ransomware incidents and a 20% increase in ransomware losses reported between January and July 2021, compared to the same period in 2020.

With our perspective and our monitoring capabilities, we have observed that the frequency and sophistication of cyberattacks continue to increase, with attack techniques evolving in parallel with trends in technology. These attacks may involve a variety of techniques that include the targeting of individuals and the use of sophisticated malicious software and hardware, or a combination of both, to evade the technical and administrative safeguards that are in place (including firewalls, intrusion prevention systems, active monitoring and other measures).

Cyberattacks penetrating the network security of our data centres, or any unauthorized disclosure of, or access to, confidential information and data of our customers and clients or their end customers, could have a negative impact on our reputation and customer confidence, which could have a material adverse effect on our business, financial performance, financial condition and cash flows.

**Mitigation**

Our security program addresses risk through a number of mechanisms, including:

- Security awareness programs
- Controls based on policies, standards and methodologies that are aligned with recognized industry frameworks and practices
- Monitoring of external activities by potential attackers
- Incident response

- Regular security evaluations of our most important assets
- Identification and regular re-evaluation of our known security risks
- Regular reviews of our standards and policies to ensure they address current needs and threats
- Regular reviews of our business continuity and recovery planning processes that would be invoked in the event of a disruption
- A privacy and security impact assessment process
- A secure-by-design process that incorporates security provisions into new initiatives across the Company.

Incident response is a critical component of control within our organization. Our technical capabilities help us identify security-related events, respond to possible threats and adjust our security posture appropriately. Additionally, our approach to cyber-hygiene includes regular vulnerability assessments and the prioritization and remediation of any identified exposure through patching or other mechanisms. Our security office also works with law enforcement and other agencies to address ongoing threats and disruptions, and provides awareness training to our team members to help them better recognize and report threats.

## 10.11 Our team

**Risk category: Operational**

Our success depends on the abilities, experience, well-being and engagement of our team members, as well as our ability to attract and retain the talent upon which our service offerings depend. Each year, we launch a number of unique initiatives that are intended to improve our productivity and competitiveness. These may include acquisitions, operational business integrations, efficiency programs, business process automation and/or outsourcing, offshoring and reorganizations. Since keeping team members healthy is critical to keeping them engaged and productive, our well-being strategy provides an array of resources and initiatives to support optimal health and well-being for our team.

We believe that our unique customers first, inclusive and caring culture has contributed to our ability to attract and retain a highly skilled, engaged and motivated workforce, which in turn has driven strong customer and client retention. It may become more difficult for us to maintain a culture that supports our success as we continue to evolve our products and services, enter new geographic areas, open new delivery locations, increase the number of team members and acquire new businesses. Current thought-leadership suggests that the experience of the COVID-19 pandemic has altered many shared values and expectations; there is a significant amount of concern regarding a surge in voluntary turnover rates, given the difficulties many people have faced during this trying time and their renewed perspectives moving into the future. If our unique culture is not maintained, our ability to attract and retain highly skilled team members, customers and clients across our core verticals may be adversely impacted, and our operational and financial results may be negatively affected.

Our business could also be adversely affected if individuals providing their data annotation services through TIAI's crowdsourcing solutions were classified as employees. The classification of certain individuals who provide their services through third-party digital platforms as independent contractors is currently being challenged in courts, by legislators and by government agencies in the United States and many other countries where our TIAI business uses the services of independent contractors. Similarly, some of our healthcare practitioners who are supporting our virtual care business in TELUS Health may be classified as employees instead of independent contractors by decision-makers in certain jurisdictions. We generally believe that most individuals who provide their data annotation services through TIAI's crowdsourcing solution and those healthcare practitioners who support our virtual care business are independent contractors. Since, among other things, independent contractors can choose whether, when, and where to provide services, and for data annotation professionals they are free to provide services on competitors' platforms, and they use their own equipment. In the case of healthcare practitioners, they are free to provide services in other non-virtual healthcare settings. We may not be successful in defending the independent contractor classification in the jurisdictions where we operate or where such classification is challenged. The costs associated with defending, settling or resolving any future lawsuits (including demands for arbitration) relating to the independent contractor classification could be material to our business.

**Potential impact**

Lost work time resulting from team member illness or injury can negatively affect organizational productivity and employee benefit costs. The loss of key team members through short-term and long-term disability (including absences resulting from mental health concerns), attrition and retirement, the inability to attract and retain team members with essential or evolving skills, including familiarity with legacy systems, or, in the case of team members leading recent acquisitions in emerging areas of our business, specialized knowledge of such businesses, or any deterioration in overall team member morale and engagement resulting from organizational changes, unresolved collective agreements or ongoing cost reduction initiatives, could have an adverse impact on our growth, business and profitability and our efforts to enhance the customer experience. In addition, changes in technology are shifting the set of skills needed by our team and driving competition for resources among global players.

Our corporate sustainability and social purpose initiatives are also important to our team members, as is our ability to offer resources and services to maintain optimal health and well-being. Our failure to meet or exceed our team members' evolving expectations in these areas could have adverse impacts on our ability to attract and retain team members.

**Changes over the past 12 months**

The COVID-19 pandemic continues to cause heightened uncertainty in many of our lives, resulting in more stress and anxiety and waning resiliency among our team members. Long before March 2020, when we began adopting stricter measures to prevent the spread of COVID-19, 500,000 Canadians per week were citing mental health symptoms or illnesses as the reason they were unable to work. Many Canadian workers – our team members included – are still working from home, isolated from peers and extended family members and friends, and juggling multiple competing priorities. More than 90% of our domestic team members (excluding field technicians and retail store representatives) and over 80% of our TI team members continue to work from home or from alternative work locations.

Global events and ongoing efforts from marginalized communities to achieve equality and social justice have also focused attention on the discrimination and racial injustice that continue to affect many communities.

**Mitigation**

Our People and Culture team works to provide an environment for our team members that is safe, empowering and engaging. Our culture is anchored in our TELUS leadership values, which were set out by our team nearly two decades ago. These values affirm that:

- We embrace change and initiate opportunity
- We have a passion for growth
- We believe in spirited teamwork
- We have the courage to innovate.

Our objective is to attract, develop and retain talented employees in Canada and internationally. We achieve this objective by investing in our people throughout their careers, and by offering diverse and inclusive employment prospects and development opportunities.

To support team members' overall well-being and to achieve a positive effect on absenteeism in the workplace, we take a holistic and proactive approach to health that involves risk prevention, early intervention, team member and family assistance, mental health training, engaging social and educational well-being initiatives, assessment and support services, disability management, and accommodation and return-to-work services. Our well-being strategy encourages our team members to develop optimal personal health across five dimensions of well-being: physical, psychological, financial, social and environmental. To promote safe work practices, we offer training and orientation programs for team members and contractors who have access to our facilities.

Having teams that are engaged leads to a better team member experience, which in turn drives an improved customer service experience – our customers are more satisfied, resulting in a lower churn rate for our products and services.

Through our annual Pulsecheck engagement surveys, we continue to assess our team's health and well-being and gather their insights about our work environment, including changes due to the COVID-19 pandemic. Key highlights included team members confirming their belief that their safety is a priority for their leaders; that their leaders are providing the support they need during this extraordinary time; and that their work arrangements allow them to collaborate productively to meet the needs of customers. TELUS is the most engaged organization globally among organizations of our size and composition according to Kincentric, our survey provider.

In 2021, reinforcement of our culture continued to focus on Diversity and Inclusion, human capital development and team member engagement, through:

- Leveraging our strong culture with a focus on listening to team members;
- Putting customers first and leaders engaging their teams through our fair process engagement model; and
- Utilizing Pulsecheck feedback including our Inclusion index results to build and create action plans for improvements.

At TELUS, we believe that honouring the diversity of our team, customers and communities opens up new perspectives and enables us to connect for good and deliver remarkable outcomes for everyone.

Building on our initiatives in 2020 to encourage team members across TELUS to share our stance against racism and all forms of systemic bias and reaffirm our commitment to standing united in our pursuit of equity, fairness, social justice and systemic change, we continue to drive our renewed D&I strategy.

We appreciate and celebrate every team member's unique talents, voice and abilities, and we encourage them to always bring their whole selves to work. To promote diversity and inclusion at TELUS with a focus on both behavioural and structural change, we developed a new inclusive leadership model, along with an inclusion index in our Pulsecheck survey, to measure our progress in fostering an inclusive culture. We achieved a score of 85%, indicating a strong sense of inclusion and belonging among team members.

Building on our commitment to Indigenous Peoples on which our long-standing, respectful and productive relationships, we formalized our commitment to reconciliation in 2021 and launched a five-year Indigenous Reconciliation Action Plan, setting us on a path that will bring our commitment to life. Developed with guidance from Indigenous voices and frameworks for reconciliation, the plan is based on four pillars on which we believe we can drive meaningful change – connectivity, enabling social outcomes, cultural responsiveness and relationships, and economic reconciliation.

We aim to attract and retain key team members through both monetary and non-monetary approaches. Our compensation and benefits program is designed to support our high-performance culture and is both market-driven and performance-based. Where required, we implement targeted retention solutions for employees with critical skills or talents that are scarce in the marketplace, and we have a succession planning process in place to identify top talent for senior-level positions.

We focus on and manage organizational change through a formal business transformation function that leverages the expertise, key learnings and effective practices developed in recent years during the implementation of mergers, business integrations and efficiency-related reorganizations.

We have a post-acquisition integration team that works with our business units and the operations they acquire, applying an integration model based on learnings from previous integrations, while also focusing on the unique attributes and employee cultures of the acquired companies, which advances the standardization of our business processes and is intended to preserve the unique qualities of each acquired operation.

Additionally, we continuously strive to raise the level of our team members' engagement. We believe that our strong team member engagement continues to be driven by our focus on the customer and team member experience, our success in the marketplace and our social purpose. We plan to continue our focus on other non-monetary factors that are supportive of team member engagement, including performance development, career opportunities, learning and development, recognition, diversity and inclusiveness, well-being resources and initiatives, our leading-edge Work Styles program (enabling team members to work where and how they will be most effective and equipping them with robust digital collaboration tools to stay connected), and our community volunteerism, including TELUS Days of Giving. Additional information on our programs can be found in our sustainability report at **telus.com/sustainability**.

## 10.12 Our environment

**Risk category: Operational**

Our operations, infrastructure and team members are exposed to climate-related physical risks, which include extreme weather events and other natural hazards. We may also be exposed to transition risks related to climate change, such as the impact of changes in policy or the deployment of lower-emission technology.

Our data and voice communications infrastructure, including TI delivery locations in Central America, India, Europe and the Philippines, may be damaged or disrupted as a result of natural disasters or extreme weather events, including those resulting from or exacerbated by climate change, such as earthquakes, floods, volcano eruptions, heavy rains, winter storms, extreme heat waves, tsunamis and cyclones; epidemics or pandemics, including the COVID-19 pandemic; technical disruptions and infrastructure breakdowns, including damage to, or interruption of, electrical grids, transportation systems, communication systems or telecommunication cables; issues with information technology systems and networks, including computer glitches, software vulnerabilities and electronic viruses or other malicious code; accidents and other events, such as fires, floods and failures of fire suppression and detection, heating, ventilation or air conditioning systems; or other events, such as protests, riots, labour unrest, security threats and terrorist attacks. Any of these events may lead to the disruption of information systems and telecommunications services for sustained periods and may create delays and inefficiencies in providing services to clients and potentially result in closure of our operating sites. They also may make it difficult or impossible for team members to reach or work in our business locations. Some locations may not be well-suited to work-from-home approaches to providing client services due to connectivity, infrastructure or other issues.

Certain areas of our operations are subject to environmental considerations, such as the construction of telecommunications infrastructure, handling and disposing of waste, electronic waste or other residual materials, managing our water use, and responding to spills and releases. Some areas of our operations are also subject to evolving and increasingly stringent federal, provincial and local environmental and health and safety laws and regulations. Such laws and regulations impose requirements with respect to matters such as the release of certain substances into the environment, corrective and remedial action concerning such releases, protection of sensitive ecosystems and associated wildlife habitat, and the proper handling and management of certain substances, including wastes.

**Potential impact**

Evolving public expectations and increasingly stringent laws and regulations could result in increased costs of compliance, while failure to recognize and adequately respond to them could result in penalties, regulatory scrutiny or damage to our reputation and brand.

Damage or destruction that interrupts our provision of services could adversely affect our reputation and our relationships with our customers and clients, and could also cause us to incur additional expenditures to repair or replace damaged equipment or sites. Our resiliency provisions and disaster recovery plans may not be sufficient to support continuity and reliability of service during disruptions or reduce the duration and impact of service outages. While we currently have commercial liability insurance, our insurance coverage may be insufficient or may not provide coverage at all for certain events. Furthermore, we may be unable to secure such insurance coverage at premiums acceptable to us in the future, or such insurance may become unavailable. Prolonged disruption of our services could also entitle our customers and clients to terminate their contracts with us or require us to pay penalties or damages. Any of the above factors may materially adversely affect our business, financial performance, financial condition and cash flows.

**Changes over the past 12 months**

The COVID-19 pandemic has had a significant impact on our operations and team members throughout 2021.

Along with the continued and widely shared concerns about climate-related and other environmental impacts on our business operations, there are growing expectations regarding the disclosure of environmental and sustainability governance strategies, targets, and risk management practices, including climate-related scenario analysis. In its 2021 Status Report, the TCFD stated that the number of organizations expressing support for TCFD had grown to more than 2,600 globally, with many companies having begun to implement TCFD recommendations. Our disclosure aligned with these recommendations can be found in our 2021 Annual Information Form.

Potential impacts associated with low levels of non-ionizing radio frequency (RF) emissions from mobile phones and cell towers continue to be a matter of public concern, and will remain a public concern as we deploy 5G technology, with the number of small cells in our infrastructure expected to increase as we continue to upgrade our network.

**Mitigation**

We have in place widely recognized and award-winning business continuity and disaster recovery programs that encompass provisions for monitoring and preparedness, mitigation, response and recovery. These programs enhance the safety of our team members, minimize the potential impact of threats to our facilities, infrastructure and business operations, support the maintenance of service to our customers and help keep our communities connected.

In response to the COVID-19 pandemic, our Corporate Business Continuity Office convened a cross-functional working group in January 2020, and in March 2020, our EMOC was activated. In 2021, EMOC continued to meet regularly to coordinate strategic management of the COVID-19 pandemic and advise on tactical issues such as door-to-door activities, retail safety measures, and technician safety in the field. COVID-19 case counts are closely monitored so that we can align our operations with public health measures within individual public health agency jurisdictions. These actions are likely to continue in 2022.

We also assembled a Medical Advisory Council (MAC), composed of leading medical professionals from across the country, along with other key leaders from within TELUS. The MAC meets regularly, advises on the Company's COVID-19 pandemic policy, and makes recommendations for specific health and safety measures, which are incorporated into our corporate infectious disease playbook and other guidance. These documents are continuously updated and provide foundational governance for all other pandemic-related playbooks for specific business functions.

The Corporate Business Continuity Office convened the EMOC an additional two times in 2021 to manage the impacts on TELUS of wildfires and flooding in British Columbia.

We are committed to following sustainable and responsible business practices and making decisions that balance economic growth with social and environmental benefits. We have implemented award-winning sustainability and environmental governance practices and related disclosure. The Corporate Governance Committee of our Board is responsible for oversight of corporate social responsibility and climate-related risks. Our Chief Executive Officer and Executive Team exercise oversight of climate-related risks and opportunities and provide approval of the overall strategic direction of our sustainability programs. Our Sustainability and Environmental Compliance team prepares quarterly reports for the Corporate Governance Committee, as well as other updates for the Board as required, on risks, targets and other key performance metrics related to climate change and the environment.

Disclosure in our sustainability report and other filings contains information pertaining to the governance and management of climate-related risks and opportunities. Included are approaches to assessing impacts of these risks using scenario analysis, as well as strategies for addressing impacts of these risks, risk management practices pertaining to these risks, and the metrics and targets used to manage them. Scenario analysis in 2021 included a consideration of risks and opportunities under a low-carbon adoption scenario and an extreme global warming scenario. Additionally, we have established corporate targets with respect to operational net carbon neutrality, renewable energy, energy efficiency and waste reduction. Included in these are science-based targets, approved by the Science-based Targets initiative, for our scope 1, 2 and 3 greenhouse gas (GHG) emissions. Related action plans include having executed multiple power purchase agreements for renewable energy.

An ISO 14001:2015 certified environmental management system is in place to identify and control environmental impacts associated with our operations and to support compliance with regulatory requirements. We continue to identify new ways to reduce our environmental impact.

See our climate-related financial disclosure in *Section 5.2* of our 2021 Annual Information Form. Additionally, a detailed report of our environmental risk mitigation activities and details with respect to our targets can be found in our sustainability report at **telus.com/sustainability**.

Canada's federal government is responsible for establishing safe limits for human exposure to RF electromagnetic fields. We are confident that the mobile handsets and devices we sell, and our cell towers and other associated devices, comply, in all material respects, with all applicable Canadian and U.S. government safety standards. We continue to monitor new published studies, government regulations and public concerns about the health impacts of RF exposure. Stakeholder engagement also continues as part of the regulatory process concerning the installation of new cell towers.

## **10.13** Real estate matters

**Risk category: Operational**

Our real estate properties (owned or leased) include administrative office spaces, mixed-use office, commercial and residential properties, all of which may be developed through joint ventures, as well as other real estate development projects that advance our social purpose, work centres and space for telecommunications equipment. Some buildings are constructed on leasehold land and the majority of wireless radio antennae are on towers that are situated on lands or are on buildings held under leases or licences with varying terms. We currently participate in two real estate joint ventures.

Investments in real estate property development, including return on investment and benefits realization, may be impacted by local economies, changes in construction costs and timelines, financing costs and partnership agreements. Our current and future investments in real estate may also be impacted by the COVID-19 pandemic as we continue to take precautionary measures and follow public health guidelines and restrictions to minimize the spread of the virus to our team members, tenants and the communities in which we operate.

**Potential impact**

Risks associated with our real estate investments include possible financing risks and uncertainty of future demand, occupancy and rental rates especially during the pandemic. There can be no assurance that future real estate developments will be completed on budget or on time or will obtain lease commitments as planned. Accordingly, we are exposed to the risk of loss on investment and loan amounts should a project's business plan not be successfully realized.

**Changes over the past 12 months**

Over the course of 2021, we have:

- Renegotiated and executed two agreements with external global real estate experts for property management and the maintenance and repair of our real estate assets and subject to performance measures overseen by us
- Entered into binding joint venture development agreements with an external real estate development firm for the redevelopment of two surplus real estate sites
- Started executing on our real estate future mode of operation, which involves consolidation of a number of large office holdings throughout the country representing roughly a floor area reduction of 25% of our office space and have undertaken a floor and building hibernation program during the COVID-19 lockdowns to mitigate real estate operating costs
- Downsized our critical network infrastructure in existing network buildings and reduced required equipment space through customer migrations from copper to fibre-based services.

TELUS Sky has completed its development phase and additional office and residential leasing is underway. TELUS Ocean in Victoria, B.C. has received all required municipal planning approvals and commencement of construction and pre-leasing is planned for 2022.

**Mitigation**

For our construction projects (residential and commercial) in progress, budget overrun risks have been mitigated with fixed-price supply contracts and expert project management oversight. Costs for the real estate projects are monitored through our capital gating and approval processes and we aim to mitigate leasing risk of vacant space by arranging pre-lease agreements with prospective tenants prior to construction completion.

On new deals, joint venture partners and developers are compensated partially on a performance basis that encourages projects to meet timing and budget objectives and we engage independent third-party consultants to verify key assumptions such as market rental rates, construction costs and management costs. We also rely on our internal and external legal teams to ensure that contracts, partnerships and procurements with third parties are created to ensure our interests are represented.

We plan in advance our lease strategy for those properties that are not directly owned including quarterly reviews for continued requirement/demand, lease expiry risk, rental rate risk, landlord risk and physical risk (such as poor building condition or flooding).

## **10.14** Financing, debt and dividends

**Risk category: Financial**

Risk factors, such as fluctuations in capital markets, the economic environment or regulatory requirements pertaining to bank capitalization, lending activity or changes in the number of Canadian chartered banks, may impact the availability of capital and the cost of capital for investment-grade corporate issuers, including us.

The market price of our Common Shares may be affected by various factors, such as TELUS Corporation's continued access to bank credit facilities, trade receivables securitization and public debt markets, as well as the continuation of the dividend growth plan outlined in our multi-year objectives.

The trading price may also be affected by TI factors, such as:

- The market price of TI subordinate voting shares
- TI's access to banks and public markets
- Actions taken or statements made by TELUS, TI or others concerning our relationship with TI
- Factors affecting the performance of TI, that may impact TI's financial performance and subsequently our financial performance.

Our financial instruments, and the nature of the credit risks, liquidity risks and market risks to which they may be subject, are described in *Section 7.9 Financial instruments, commitments and contingent liabilities*.

**Potential impact**

Our business plans and growth could be negatively affected if current financing is not sufficient to cover funding requirements. External capital market conditions could potentially affect our ability to make strategic investments or meet ongoing capital funding requirements, and may prohibit the roll-over of commercial paper at low rates.

There can be no assurance that we will maintain or improve our current credit ratings. Given the cash demands of the 3500 MHz spectrum auction held in 2021 and upcoming spectrum auctions, we may be unable to lower our net debt to EBITDA ratio to our objective range in the medium term, which could eventually have a negative impact on our credit ratings. Our cost of capital could increase and our access to capital could be affected by a reduction in the credit ratings of TELUS and/or TELUS Communications Inc. (TCI). A reduction in our ratings from the current BBB+ or equivalent could result in an increase in our cost of capital.

While future free cash flows and sources of capital are expected to be sufficient to meet current requirements, our intention to return capital to shareholders could constrain our ability to invest in our operations for future growth.

**Changes over the past 12 months**

At December 31, 2021, our senior unsecured debt was approximately $17.8 billion (see the *Senior unsecured debt principal maturities* chart in *Section 4.3*). We operate a commercial paper program (maximum of US$1.5 billion) that currently provides access to low-cost funding. As at December 31, 2021, we had $1.9 billion of commercial paper outstanding, all of which was denominated in U.S. dollars (US$1.5 billion). When we issue commercial paper, it must be refinanced on an ongoing basis in order to realize the cost savings relative to borrowing on the $2.75 billion credit facility.

**Mitigation**

We may finance future capital funding requirements with internally generated cash flows, including the possible monetization of non-core assets and cash-generating working capital initiatives, borrowings under the unutilized portion of our bank credit facilities, use of securitized trade receivables, use of commercial paper and/or the issuance of debt or equity securities. We have a shelf prospectus in effect until June 2023, under which we can offer up to $2.75 billion of debt or equity securities as of the date of this MD&A. We believe that our investment grade credit ratings, coupled with our efforts to maintain a constructive relationship with banks, investors and credit rating agencies, continue to provide reasonable access to capital markets.

To enable us to meet our financial objective of generally maintaining $1.0 billion of available liquidity, we have a $2.75 billion credit facility that expires on April 1, 2026 ($850 million available at December 31, 2021), as well as availability under other bank credit facilities (see *Section 7.6 Credit facilities*). In addition, our TCI subsidiary has an agreement with an arm's-length securitization trust, ending December 31, 2024, under which it is able to sell an interest in certain of its trade receivables up to a maximum of $600 million, of which $500 million was available at December 31, 2021 (see *Section 7.7 Sale of trade receivables*).

We successfully completed a number of debt transactions in 2020 and 2021 (see *Section 7.4*). As a result, the average term to maturity of our long-term debt (excluding commercial paper, the revolving component of the TELUS International (Cda) Inc. credit facility (TI credit facility), lease liabilities and other long-term debt) was 12.5 years at December 31, 2021 (compared to 12.2 years at December 31, 2020), and the average cost of our long-term debt was 3.72% (excluding commercial paper, the revolving component of the TI credit facility, lease liabilities and other long-term debt). Foreign currency forward contracts are used to manage currency risk arising from the issuance of commercial paper and substantially all long-term, fixed-term debt denominated in U.S. dollars. Our commercial paper program is fully backstopped by our $2.75 billion credit facility.

At December 31, 2021, TELUS International (Cda) Inc. had a credit facility consisting of US$850 million of revolving components and US$850 million of amortizing term loan components. For further details on the TI credit facility, see *Section 7.6 Credit facilities*.

We manage our capital structure and adjust it in light of changes in economic conditions and the risk characteristics of our business and telecommunications infrastructure. We have financial policies in place that are reviewed annually and are intended to help maintain our existing investment grade credit ratings in the range of BBB+ or the equivalent. Four credit rating agencies currently have ratings that are in line with this target. Access to our $2.75 billion credit facility would be maintained, even if our ratings were reduced to below BBB+.

Funding for future spectrum licence purchases, defined benefit pension plan obligations and any increases in corporate income tax rates will reduce the after-tax cash flow otherwise available to return to our shareholders. Should actual results differ from our expectations, there can be no assurance that we will not change our financing plans, including our intention to pay dividends according to our payout policy guidelines and to maintain our multi-year dividend growth program. No shares were purchased in 2021 under the normal course issuer bid (NCIB) program. In June 2021, we received approval for an NCIB to purchase and cancel up to 16 million Common Shares (to a maximum of $250 million) from June 4, 2021, to June 3, 2022, which would allow us to purchase our Common Shares if and when we consider it advantageous, based on our financial position and outlook, and the market price of our Common Shares. For further details on our multi-year dividend growth program and NCIB program, see *Section 4.3 Liquidity and capital resources*.

Our Board of Directors reviews and approves the declaration of a dividend each quarter, and the amount of the dividend, based on a number of factors, including our financial position and outlook. This assessment is subject to various assumptions and the impact of various risks and uncertainties, including those described here in *Section 10.*

## 10.15 Tax matters

**Risk category: Financial**

We collect and pay significant amounts of indirect taxes, such as goods and services taxes, harmonized sales taxes, provincial sales taxes, sales and use taxes and value-added taxes, to various tax authorities. As our operations are complex and the related tax interpretations, regulations, legislation and jurisprudence that pertain to our activities are subject to continual change and evolving interpretation, the final determination of the taxation of many transactions is uncertain. Moreover, the implementation of new legislation in itself has its own complexities, including those of execution where multiple systems are involved and the interpretation of new rules as they apply to specific transactions, products and services.

TELUS, along with TI and TELUS Agriculture, operates in a number of foreign jurisdictions, including Armenia, Australia, Austria, Bosnia and Herzegovina, Brazil, Bulgaria, China, Costa Rica, the Czech Republic, Denmark, El Salvador, Finland, France, Germany, Guatemala, India, Ireland, Japan, Latvia, Mexico, the Philippines, Poland, Romania, Singapore, Slovakia, Spain, Switzerland, the Republic of Korea, Turkey, the United Kingdom and the United States, which increases our exposure to multiple forms of taxation. Generally, each jurisdiction has taxation peculiarities in the forms of taxation imposed (e.g. value-added tax, gross receipts tax, stamp and transfer tax, and income tax), and differences in the applicable tax base and tax rates, legislation and tax treaties, as well as currency and language differences. In addition, the telecommunications industry faces unique issues that lead to uncertainty in the application of tax laws and the division of tax between domestic and foreign jurisdictions.

**Potential impact**

We are subject to the risk that income and indirect tax amounts, including tax expense, may be materially different than anticipated, and that a general tendency by domestic and foreign tax collection authorities to adopt more stringent interpretations and aggressive auditing practices could adversely affect our financial condition and operating results.

We have significant current and deferred income tax assets and liabilities, income tax expenses and cash tax payments. Income tax amounts are based on our estimates, applying accounting principles that recognize the benefit of income tax positions only when it is more likely than not that the ultimate determination of the tax treatment of a position will result in the related benefit being realized. The assessment of the likelihood and amount of income tax benefits, as well as the timing of realization of such amounts, can materially affect the determination of net income or cash flows. We expect the income taxes calculated at applicable statutory rates to range between 25.2 to 25.8% in 2022 (compared to 25.8% in 2021). These expectations can change as a result of changes in interpretations, regulations, legislation or jurisprudence.

The timing of the monetization of deferred income tax amounts is uncertain, as it is dependent upon our future earnings and other events. The amounts of deferred income tax liabilities are also uncertain, as the amounts are based on substantively enacted future income tax rates that were in effect at the time of deferral, which can be changed by tax authorities. As well, the amounts of cash tax payments and current and deferred income tax liabilities are also based on our anticipated mix of revenues among the jurisdictions in which we operate, which is also subject to change.

The audit and review activities of tax authorities affect the ultimate determination of the actual amounts of indirect taxes payable or receivable, income taxes payable or receivable, deferred income tax liabilities, taxes on certain items included within capital and income tax expense. Therefore, there can be no assurance that taxes will be payable as anticipated and/or that the amount and timing of receipt or use of the tax-related assets will be as currently expected.

**Changes over the past 12 months**

Global and local tax policies are subject to continual change, which increases the complexity of taxation.

Canada, together with approximately 140 other countries comprising the OECD/G20 Inclusive Framework on Base Erosion and Profit Shifting (BEPS), approved in principle in 2021 model Global Anti-Base Erosion Rules. These proposals introduced a form of 15% global minimum tax which is intended to be effective in 2023. Similar proposals were introduced by the European Commission in December 2021. These proposals, together with related changes to domestic laws and tax treaties, may result in an increase to our effective tax rate in certain jurisdictions.

**Mitigation**

We follow a comprehensive tax strategy that has been adopted by our Board. This strategy outlines the principles underlying and guiding the roles of team members, their responsibilities and personal conduct, the method of conducting business in relation to tax law and the approaches to working relationships with external tax authorities and external advisors. This strategy recognizes the requirement to comply with all relevant tax laws. The components necessary to manage tax risk are outlined in the strategy.

In giving effect to this strategy, we maintain an internal Taxation department composed of professionals who stay current on domestic and foreign tax obligations, supplemented where appropriate with external advisors. This team reviews systems and process changes for compliance with applicable domestic and international taxation laws and regulations. Its members are also responsible for the specialized accounting required for income taxes.

Material transactions are reviewed by our Taxation department so that transactions of an unusual or non-recurring nature are assessed from multiple risk-based perspectives. As a matter of regular practice, large transactions are reviewed by external tax advisors, while other third-party advisors may also be engaged to express their views as to the potential for tax liability. We continue to review and monitor our activities, so that we can take action to comply with any related regulatory, legal and tax obligations. In some cases, we also engage external advisors to review our systems and processes for tax-related compliance. The advice provided and tax returns prepared by such advisors and counsel are reviewed for reasonableness by our internal Taxation department.

## 10.16 The economy

**Risk category: Financial**

Risks to the Canadian economy include: fluctuations in oil prices, potential rises in interest rates and levels of consumer and mortgage debt, an acceleration in inflation, fluctuations in the housing market, the timing and rate of economic recovery from the effects of the COVID-19 pandemic, and uncertainty related to trade issues, including the ongoing imposition of tariffs, supply chain disruption and climate change.

In addition, as we expand our international operations through acquisitions, such as those within our TI and TELUS Agriculture businesses, we become more susceptible to global market conditions. Meanwhile, trade disputes between countries, as well as other economic and political uncertainties and developments outside of Canada, may have global implications, as supply chains have become increasingly integrated.

**Potential impact**

Economic uncertainty may cause consumers and business customers to reduce or delay discretionary spending, impacting new service purchases, volumes of use and substitution by lower-priced alternatives.

Globally, some countries may require financial support, sovereign credit ratings may continue to decline, and there may be a default on the sovereign debt obligations of certain countries. Any of these economic outcomes may increase the cost of borrowing and cause credit to become more limited, which could have a material adverse effect on our business, financial condition, financial performance and cash flows. Economic and political uncertainty could undermine business confidence and cause potential new clients of TI to delay engaging TI, and could also cause existing clients to reduce or defer spending on TI's services or reduce or eliminate spending under existing contracts with TI.

Fluctuations in the Canadian economy could adversely impact growth in our customer base revenue, profitability and free cash flow, and could potentially require us to record impairments in the carrying values of our assets, including, but not limited to, our intangible assets with indefinite lives (spectrum licences and goodwill). Impairments in the carrying values of our assets would result in a charge to earnings and a reduction in owners' equity, but would not affect cash flow. Rising inflationary expectations could lead to increases in input costs such as labour, which may not be offset by revenue increases. In addition, ongoing international supply chain disruptions may make it difficult to source key components (such as handsets) in sufficient quantities and at reasonable prices.

Fluctuations in the global economy could affect different industry verticals in different ways. Counter-cyclical industries such as agriculture and logistics should remain reasonably unaffected, as food producers, distributors and retailers would continue to operate. Healthcare, particularly products and services related to logistics or vaccines, should do well as vaccines are rolled out, and hospitals and healthcare providers in certain countries could perform well. Cyclical industries such as retail, travel and hospitality, and others will continue to be negatively affected as consumers alter their behaviour because of the COVID-19 pandemic.

With certain acquisitions, operating costs and revenues, including TI's revenues, denominated in U.S. dollars or other non-Canadian dollar currencies, fluctuations in the Canadian dollar exchange rate may impact our financial and operating results.

Economic and capital market fluctuations could also adversely affect the investment performance, funding and expense associated with our defined benefit pension plans, as obligations are based on certain actuarial assumptions related to expected plan asset returns, salary escalation, retirement ages, life expectancy, the performance of financial markets and future interest rates.

**Changes over the past 12 months**

In 2021, both the Canadian and the global economy continued to perform at suboptimal levels relative to their performance prior to the COVID-19 pandemic. There were indications of a recovery in the fourth quarter of 2021, as high vaccination rates appeared to be lessening the impact of the fourth wave in Canada compared to many other western countries. However, the emergence of the Omicron variant in December 2021 (which has continued into early 2022) has rekindled economic uncertainty with respect to 2022. The opening of the U.S.-Canada border in the fourth quarter of 2021 was expected to lead to improved roaming revenue in the first few months of 2022; however, the rapid spread of the Omicron variant is having a negative impact and there is no assurance that the border will remain open or that international travel will increase. Meanwhile, new COVID-19 variants (in addition to Omicron) may impact consumer behaviour, including international travel, and may lead to a delayed recovery in roaming revenue. We expect that the pandemic will continue to present challenges to both the Canadian and global economy throughout 2022, notwithstanding that vaccines have been developed and are being administered widely, including school-age children.

Interest rates are now expected to rise in 2022 and 2023, with several central banks around the world making specific mention of this monetary tool to combat rising inflation. If monetary bodies raise interest rates more quickly and further than the economy can absorb, there is a risk that both the Canadian and the global economy could slide into a recession later in the year or in 2023.

The Canadian dollar exchange rate with the U.S. dollar remained the same at $1.27 at the end of 2020 and 2021.

The employee defined benefit pension plans, in aggregate with the application of the asset ceiling, were in a $190 million deficit position at December 31, 2021 (compared to a $913 million deficit position at the end of 2020). The solvency position, as determined under the *Pension Benefits Standards Act, 1985*, was estimated to be a surplus of $1,366 million at the end of 2021 (compared to a $375 million surplus at the end of 2020).

**Mitigation**

While economic risks cannot be completely mitigated, our top priority of putting customers first and pursuing global leadership in the likelihood of our customers recommending our products, services and people also supports our efforts to acquire and retain customers through the economic fluctuations that affect them and us. We also continue to pursue cost reduction and efficiency initiatives across our business operations. See *Section 4.3 Liquidity and capital resources* for our capital structure financial policies and plans.

An increase in our revenue denominated in U.S. dollars may help to mitigate currency risk, as our revenue base has been primarily in Canadian dollars.

Foreign currency forward contracts and currency options are leveraged to fix the exchange rates on U.S. dollar-denominated transactions, commitments, commercial paper and U.S. Dollar Notes in order to help mitigate risks related to exchange rate fluctuations, and we seek to mitigate pension risk through the application of policies and procedures for managing exposure to investment risk and through ongoing monitoring of our funding position. Our best estimate of cash contributions to our defined benefit pension plans in 2022 is $32.0 million ($50.6 million in 2021).

## 10.17 Litigation and legal matters

**Risk category: Compliance**

Given the size of our organization, investigations, claims and lawsuits seeking damages and other relief are regularly threatened or pending against us. The expansion of our product and service offerings into areas such as managed services, security, healthcare and agriculture technology, and the initial public offering of shares by TI in February 2021 have also added to our compliance requirements, the risk of litigation and the possibility of damages, sanctions and fines. We may also be the target of class actions due to our millions of customer relationships. In addition, like other public companies, we may be subject to civil liability for misrepresentations in written disclosure and oral statements, and liability for fraud and market manipulation.

The intellectual property and proprietary rights of owners and developers of hardware, software, business processes and other technologies may be protected under statute, such as patent, copyright and industrial design legislation, or under common law, such as trade secrets. Significant damages may be awarded in intellectual property infringement claims and defendants may incur significant costs to defend or settle such claims.

Potentially material certified and uncertified class actions, intellectual property litigation and other claims against us are detailed in *Note 29(a)* of the Consolidated financial statements.

With operations in foreign jurisdictions, we are required to comply not only with Canadian laws and regulations, but also with local laws and regulations in foreign jurisdictions. These laws and regulations may differ substantially from Canadian laws and add to our regulatory, legal and tax exposures. We continue to extend our business and our operations into additional jurisdictions, and expand our product and service offerings in such jurisdictions, and this may also add to our regulatory, legal and tax exposure. In certain cases, laws with extraterritorial application may also impose obligations on us. See *Section 10.3 Regulatory matters*.

**Potential impact**

It is not currently possible to predict the outcome of such legal matters due to various factors, including: the preliminary nature of some claims; uncertain damage theories and demands; incomplete factual records; the uncertain nature of legal theories and procedures and their resolution by the courts, at both the trial and appellate levels; and the unpredictable nature of opposing parties and their demands.

We are typically required to process, and sometimes collect and/or store sensitive data, including, but not limited to, personal data regulated by data protection and privacy legislation, where applicable, including the *General Data Protection Regulation*, the *Personal Information Protection and Electronic Documents Act*, *California Consumer Privacy Act*, the *California Invasion of Privacy Act*, *Personal Data Protection Bill of 2018*, and the *Data Privacy Act of 2012*. The adoption and enforcement by governments of increasingly stringent privacy legislation may increase our exposure to risks related to compliance and liability. A successful class action lawsuit or intellectual property infringement claim, by its nature, could result in a sizeable damages award that could negatively affect a defendant's financial or operating results.

There can be no assurance that our financial or operating results will not be negatively impacted by any of these factors.

**Changes over the past 12 months**

As our TELUS Health team and medical clinics offer new services (such as virtual care and electronic prescriptions), including in some cases to consumers and in other cases through third-party partnerships, new risks arise from parameters such as dependence on third-party suppliers for legal compliance and/or compliance with medical professional standards, as well as a heightened possibility of political intervention.

As we add to our offerings in agriculture technology (such as animal health and management) and the jurisdictions in which we offer them, we face increased risks with respect to regulatory compliance and data security and privacy.

With the growth and development of technology-based industries, the value of intellectual property and proprietary rights has increased. Due to trends in awards for damages, costs to defend and the likelihood of settlements, property rights holders may be encouraged to aggressively pursue infringement claims. Given the vast array of technologies and systems that we use to deliver products and services, and the rapid change and complexity characteristic of such technologies, the number of disputes over intellectual property and proprietary rights can reasonably be expected to increase.

The Province of Quebec has made amendments to the *Act Respecting the Protection of Personal Information in the Private Sector*, as noted in *Section 10.3*. Over three years, the amendments will phase in major changes and new regulatory requirements.

**Mitigation**

We believe that we have in place reasonable policies, controls, processes and contractual arrangements, as well as insurance coverage, intended to enable compliance and reduce our exposure to any related risks. We have a designated Chief Data and Trust Officer, whose role is to work across the enterprise to ensure that TELUS has in place appropriate processes and controls in order to facilitate legal compliance and to report on compliance to the Audit Committee.

Our team of legal professionals advise on and manage risks related to claims and possible claims, vigorously defend class actions and other claims, pursue settlements in appropriate cases, regularly assess our business practices and monitor legal developments that may impact risk. They seek and obtain contractual protections consistent with standard industry practices to help mitigate the risks of intellectual property infringements and work to protect our intellectual property rights through litigation and other means.

We have a corporate disclosure policy that restricts disclosure by team members, defines the role of Company spokesperson, provides a protocol for communicating with investment analysts, investors and others, and outlines our communications approach.

We rely on our team members, officers, Board of Directors, key suppliers and other business partners to demonstrate behaviour consistent with applicable legal and ethical standards in all jurisdictions within which we operate. We have an anti-bribery and corruption policy, a comprehensive code of ethics and conduct for our team members and Board of Directors, and mandatory annual integrity training for all team members and identified contractors.

Subject to the foregoing limitations, management is of the opinion, based upon legal assessments and the information presently available, that it is unlikely that any liability relating to existing investigations, claims and lawsuits, to the extent not provided for through insurance or otherwise, would have a material effect on our financial position and the results of our operations, excepting the items disclosed herein and in *Note 29(a)* of the Consolidated financial statements.

# 11 Definitions and reconciliations

## 11.1 Non-GAAP and other specified financial measures

We have issued guidance on and report certain non-GAAP measures that are used to evaluate the performance of TELUS, as well as to determine compliance with debt covenants and to manage our capital structure. As non-GAAP measures generally do not have a standardized meaning, they may not be comparable to similar measures presented by other issuers. For certain financial metrics, there are definitional differences between TELUS and TELUS International reporting. These differences largely arise from TELUS International adopting definitions consistent with practice in its industry. Securities regulations require such measures to be clearly defined, qualified and reconciled with their nearest GAAP measure. Certain of the metrics do not have generally accepted industry definitions.

**Adjusted Net income and adjusted basic earnings per share (EPS):** These are non-GAAP measures that do not have any standardized meaning prescribed by IFRS-IASB and are therefore unlikely to be comparable to similar measures presented by other issuers. Adjusted Net income excludes the effects of restructuring and other costs, income tax-related adjustments, other equity losses related to real estate joint ventures, long-term debt prepayment premium and other adjustments (identified in the following tables). Adjusted basic EPS is calculated as adjusted net income divided by the basic weighted-average number of Common Shares outstanding. These measures are used to evaluate performance at a consolidated level and exclude items that, in management's view, may obscure underlying trends in business performance or items of an unusual nature that do not reflect our ongoing operations. They should not be considered alternatives to Net income and basic EPS in measuring TELUS' performance.

*Reconciliation of adjusted Net income*

| | Fourth quarters ended December 31 | | Years ended December 31 | |
|---|---|---|---|---|
| ($ millions) | **2021** | 2020 | **2021** | 2020 |
| Net income attributable to Common Shares | **644** | 260 | **1,655** | 1,207 |
| Add (deduct) amounts net of amount attributable to non-controlling interests: | | | | |
| Restructuring and other costs | **43** | 65 | **170** | 244 |
| Tax effect of restructuring and other costs | **(11)** | (15) | **(41)** | (62) |
| Income tax-related adjustments | **3** | (23) | **(16)** | (26) |
| Other equity losses related to real estate joint ventures | **1** | 2 | **3** | 19 |
| Long-term debt prepayment premium | **–** | – | **10** | 18 |
| Tax effect of long-term debt prepayment premium | **–** | – | **(2)** | (4) |
| Gain on disposition of financial solutions business | **(410)** | – | **(410)** | – |
| Tax effect of gain on disposition of financial solutions business | **61** | – | **61** | – |
| Retirement of a provision arising from business acquisition-related written put options within DLCX | **–** | – | **–** | (45) |
| Tax effect of retirement of a provision arising from business acquisition-related written put options within DLCX | **–** | – | **–** | 10 |
| **Adjusted Net income** | **331** | 289 | **1,430** | 1,361 |

*Reconciliation of adjusted basic EPS*

| | Fourth quarters ended December 31 | | Years ended December 31 | |
|---|---|---|---|---|
| ($) | **2021** | 2020 | **2021** | 2020 |
| Basic EPS | **0.47** | 0.20 | **1.23** | 0.95 |
| Add (deduct) amounts net of amount attributable to non-controlling interests: | | | | |
| Restructuring and other costs | **0.03** | 0.05 | **0.13** | 0.18 |
| Tax effect of restructuring and other costs, per share | **(0.01)** | (0.01) | **(0.03)** | (0.04) |
| Income tax-related adjustments, per share | **–** | (0.02) | **(0.01)** | (0.02) |
| Other equity losses related to real estate joint ventures, per share | **–** | – | **–** | 0.01 |
| Long-term debt prepayment premium, after income taxes, per share | **–** | – | **0.01** | 0.01 |
| Gain on disposition of financial solutions business | **(0.30)** | – | **(0.30)** | – |
| Tax effect of gain on disposition of financial solutions business | **0.04** | – | **0.04** | – |
| Retirement of a provision arising from business acquisition-related written put options within DLCX, per share | **–** | – | **–** | (0.04) |
| Tax effect of retirement of a provision arising from business acquisition-related written put options within DLCX, per share | **–** | – | **–** | 0.01 |
| **Adjusted basic EPS** | **0.23** | 0.22 | **1.07** | 1.06 |

**Available liquidity:** This is a non-GAAP measure that does not have any standardized meaning prescribed by IFRS-IASB and is therefore unlikely to be comparable to similar measures presented by other issuers. Available liquidity is calculated as the sum of Cash and temporary investments, net, amounts available from the revolving credit facility and amounts available under our trade receivables securitization program measured at the end of the period. We believe this to be a useful measure because it allows us to monitor compliance with our financial objectives. It should not be considered as an alternative to Cash and temporary investments, net in measuring TELUS' performance.

*Available liquidity reconciliation*

| As at December 31 ($ millions) | 2021 | 2020 |
|---|---|---|
| Cash and temporary investments, net | **723** | 848 |
| Net amounts available from the TELUS Corporation revolving credit facility | **850** | 1,519 |
| Amounts available under trade receivables securitization program | **500** | 400 |
| **Available liquidity** | **2,073** | 2,767 |

**Capital expenditure intensity:** This measure is calculated as capital expenditures (excluding spectrum licences) divided by Operating revenues and other income. It provides a basis for comparing the level of capital expenditures to those of other companies of varying size within the same industry.

*Calculation of Capital expenditure intensity*

| Years ended December 31 ($ millions, except ratio) | TTech | | DLCX | | Eliminations | | Total | |
|---|---|---|---|---|---|---|---|---|
| | **2021** | 2020 | **2021** | 2020 | **2021** | 2020 | **2021** | 2020 |
| Capital expenditures | **3,372** | 2,675 | **126** | 100 | **–** | – | **3,498** | 2,775 |
| Denominator – Operating revenues and other income | **14,966** | 13,636 | **2,754** | 2,256 | **(462)** | (429) | **17,258** | 15,463 |
| **Capital expenditure intensity** (%) | **23** | 20 | **5** | 4 | **n/m** | n/m | **20** | 18 |

**TELUS Corporation Common Share (Common Share) dividend payout ratio:** This is a historical measure calculated as the sum of the most recent four quarterly dividends declared, as recorded in the financial statements, net of dividend reinvestment plan effects, divided by the sum of free cash flow amounts for the most recent four quarters for interim reporting periods. For fiscal years, the denominator is annual free cash flow. Our objective range for the annual TELUS Corporation Common Share dividend payout ratio is on a prospective basis, rather than on a trailing basis. (See *Section 7.5 Liquidity and capital resource measures*.)

*Calculation of ratio of Common Share dividends declared to cash provided by operating activities less capital expenditures (excluding spectrum licences)*

***Determined using most comparable IFRS-IASB measures***

| For the 12-month periods ended December 31 ($ millions, except ratio) | 2021 | 2020 |
|---|---|---|
| Numerator – Sum of the last four quarterly dividends declared | **1,711** | 1,520 |
| Cash provided by operating activities | **4,388** | 4,574 |
| Less: | | |
| Capital expenditures (excluding spectrum licences) | **(3,498)** | (2,775) |
| Denominator – Cash provided by operating activities less capital expenditures (excluding spectrum licences) | **890** | 1,799 |
| **Ratio** (%) | **192** | 84 |

*Calculation of Common Share dividend payout ratio, net of dividend reinvestment plan effects*

***Determined using management measures***

| For the 12-month periods ended December 31 ($ millions, except ratio) | 2021 | 2020 |
|---|---|---|
| Sum of the last four quarterly dividends declared | **1,711** | 1,520 |
| Sum of the last four quarterly amount of dividends declared reinvested in Common Shares | **(624)** | (561) |
| Numerator – Sum of the last four quarterly dividends declared, net of dividend reinvestment plan effects | **1,087** | 959 |
| Denominator – Free cash flow[1] | **777** | 1,435 |
| **Ratio** (%) | **140** | 67 |

1 Reflects the impacts of our accelerated capital program announced on March 25, 2021.

**Earnings coverage:** This measure is defined in the Canadian Securities Administrators' National Instrument 41-101 and related instruments, and is calculated as follows:

*Calculation of Earnings coverage*

| For the 12-month periods ended December 31 ($ millions, except ratio) | 2021 | 2020 |
|---|---|---|
| Net income attributable to Common Shares | **1,655** | 1,207 |
| Income taxes (attributable to Common Shares) | **544** | 428 |
| Borrowing costs (attributable to Common Shares)[1] | **749** | 749 |
| Numerator | **2,948** | 2,384 |
| Denominator – Borrowing costs | **749** | 749 |
| **Ratio** (times) | **3.9** | 3.2 |

1 Interest on Long-term debt plus Interest on short-term borrowings and other plus long-term debt prepayment premium, adding capitalized interest and deducting borrowing costs attributable to non-controlling interests.

**EBITDA** (earnings before interest, income taxes, depreciation and amortization): We have issued guidance on and report EBITDA because it is a key measure used to evaluate performance at a consolidated level. EBITDA is commonly reported and widely used by investors and lending institutions as an indicator of a company's operating performance and ability to incur and service debt, and as a valuation metric. EBITDA should not be considered as an alternative to Net income in measuring TELUS' performance, nor should it be used as a measure of cash flow. EBITDA as calculated by TELUS is equivalent to Operating revenues and other income less the total of Goods and services purchased expense and Employee benefits expense.

We calculate EBITDA – excluding restructuring and other costs, as it is a component of the **EBITDA – excluding restructuring and other costs interest coverage** ratio and the **Net debt to EBITDA – excluding restructuring and other costs** ratio.

We also calculate **Adjusted EBITDA** to exclude items of an unusual nature that do not reflect our ongoing operations and should not, in our opinion, be considered in a long-term valuation metric or should not be included in an assessment of our ability to service or incur debt.

**EBIT** (earnings before interest and income taxes) is calculated for our operating segments because we believe it is a meaningful indicator of our operating performance as it represents our earnings from operations before costs of capital structure and income taxes.

*EBITDA and Adjusted EBITDA reconciliations*

| | TTech | | DLCX | | Total | |
|---|---|---|---|---|---|---|
| Fourth quarters ended December 31 ($ millions) | **2021** | 2020 | **2021** | 2020 | **2021** | 2020 |
| Net income | | | | | **663** | 271 |
| Financing costs | | | | | **192** | 190 |
| Income taxes | | | | | **197** | 86 |
| **EBIT** | **973** | 495 | **79** | 52 | **1,052** | 547 |
| Depreciation | **508** | 504 | **37** | 35 | **545** | 539 |
| Amortization of intangible assets | **240** | 221 | **45** | 29 | **285** | 250 |
| **EBITDA** | **1,721** | 1,220 | **161** | 116 | **1,882** | 1,336 |
| Add restructuring and other costs included in EBITDA | **36** | 39 | **8** | 32 | **44** | 71 |
| **EBITDA – excluding restructuring and other costs** | **1,757** | 1,259 | **169** | 148 | **1,926** | 1,407 |
| Other equity losses related to real estate joint ventures | **1** | 2 | **–** | – | **1** | 2 |
| Gain on disposition of financial solutions business | **(410)** | – | **–** | – | **(410)** | – |
| **Adjusted EBITDA** | **1,348** | 1,261 | **169** | 148 | **1,517** | 1,409 |

*EBITDA and Adjusted EBITDA reconciliations*

| | TTech | | DLCX | | Total | |
|---|---|---|---|---|---|---|
| Years ended December 31 ($ millions) | **2021** | 2020 | **2021** | 2020 | **2021** | 2020 |
| Net income | | | | | **1,698** | 1,260 |
| Financing costs | | | | | **796** | 771 |
| Income taxes | | | | | **580** | 451 |
| **EBIT** | **2,841** | 2,208 | **233** | 274 | **3,074** | 2,482 |
| Depreciation | **1,982** | 1,973 | **144** | 134 | **2,126** | 2,107 |
| Amortization of intangible assets | **912** | 795 | **178** | 110 | **1,090** | 905 |
| **EBITDA** | **5,735** | 4,976 | **555** | 518 | **6,290** | 5,494 |
| Add restructuring and other costs included in EBITDA | **148** | 182 | **38** | 77 | **186** | 259 |
| **EBITDA – excluding restructuring and other costs** | **5,883** | 5,158 | **593** | 595 | **6,476** | 5,753 |
| Other equity losses related to real estate joint ventures | **3** | 19 | **–** | – | **3** | 19 |
| Gain on disposition of financial solutions business | **(410)** | – | **–** | – | **(410)** | – |
| Retirement of a provision arising from business acquisition-related written put options within DLCX | **–** | – | **–** | (71) | **–** | (71) |
| **Adjusted EBITDA** | **5,476** | 5,177 | **593** | 524 | **6,069** | 5,701 |

We calculate **EBITDA margin** and **Adjusted EBITDA margin** to evaluate the performance of our operating segments and we believe these measures are also used by investors as indicators of a company's operating performance. We calculate EBITDA margin as EBITDA divided by Operating revenues and other income. Adjusted EBITDA margin is a non-GAAP ratio that does not have any standardized meaning prescribed by IFRS-IASB and is therefore unlikely to be comparable to similar measures presented by other issuers. We calculate Adjusted EBITDA margin as Adjusted EBITDA divided by adjusted Operating revenues.

*Calculation of EBITDA margin*

| Fourth quarters ended December 31 ($ millions, except margin) | TTech | | DLCX | | Eliminations | | Total | |
|---|---|---|---|---|---|---|---|---|
| | **2021** | 2020 | **2021** | 2020 | **2021** | 2020 | **2021** | 2020 |
| Numerator – EBITDA | **1,721** | 1,220 | **161** | 116 | **–** | – | **1,882** | 1,336 |
| Denominator – Operating revenues and other income | **4,237** | 3,595 | **757** | 577 | **(122)** | (112) | **4,872** | 4,060 |
| **EBITDA margin** (%) | **40.6** | 34.0 | **21.4** | 20.1 | **n/m** | n/m | **38.6** | 32.9 |

*Calculation of EBITDA margin*

| Years ended December 31 ($ millions, except margin) | TTech | | DLCX | | Eliminations | | Total | |
|---|---|---|---|---|---|---|---|---|
| | **2021** | 2020 | **2021** | 2020 | **2021** | 2020 | **2021** | 2020 |
| Numerator – EBITDA | **5,735** | 4,976 | **555** | 518 | **–** | – | **6,290** | 5,494 |
| Denominator – Operating revenues and other income | **14,966** | 13,636 | **2,754** | 2,256 | **(462)** | (429) | **17,258** | 15,463 |
| **EBITDA margin** (%) | **38.3** | 36.5 | **20.2** | 22.9 | **n/m** | n/m | **36.4** | 35.5 |

*Calculation of Adjusted EBITDA margin*

| Fourth quarters ended December 31 ($ millions, except margin) | TTech | | DLCX | | Eliminations | | Total | |
|---|---|---|---|---|---|---|---|---|
| | **2021** | 2020 | **2021** | 2020 | **2021** | 2020 | **2021** | 2020 |
| Numerator – Adjusted EBITDA | **1,348** | 1,261 | **169** | 148 | **–** | – | **1,517** | 1,409 |
| Adjusted Operating revenues and other income: | | | | | | | | |
| Operating revenues and other income | **4,237** | 3,595 | **757** | 577 | **(122)** | (112) | **4,872** | 4,060 |
| Other equity losses related to real estate joint ventures | **1** | 2 | **–** | – | **–** | – | **1** | 2 |
| Gain on disposition of financial solutions business | **(410)** | – | **–** | – | **–** | – | **(410)** | – |
| Denominator – Adjusted Operating revenues and other income | **3,828** | 3,597 | **757** | 577 | **(122)** | (112) | **4,463** | 4,062 |
| **Adjusted EBITDA margin** (%) | **35.2** | 35.1 | **22.5** | 25.8 | **n/m** | n/m | **34.0** | 34.7 |

*Calculation of Adjusted EBITDA margin*

| Years ended December 31 ($ millions, except margin) | TTech | | DLCX | | Eliminations | | Total | |
|---|---|---|---|---|---|---|---|---|
| | **2021** | 2020 | **2021** | 2020 | **2021** | 2020 | **2021** | 2020 |
| Numerator – Adjusted EBITDA | **5,476** | 5,177 | **593** | 524 | **–** | – | **6,069** | 5,701 |
| Adjusted Operating revenues and other income: | | | | | | | | |
| Operating revenues and other income | **14,966** | 13,636 | **2,754** | 2,256 | **(462)** | (429) | **17,258** | 15,463 |
| Other equity losses related to real estate joint ventures | **3** | 19 | **–** | – | **–** | – | **3** | 19 |
| Gain on disposition of financial solutions business | **(410)** | – | **–** | – | **–** | – | **(410)** | – |
| Retirement of a provision arising from business acquisition-related written put options within DLCX | **–** | – | **–** | (71) | **–** | – | **–** | (71) |
| Denominator – Adjusted Operating revenues and other income | **14,559** | 13,655 | **2,754** | 2,185 | **(462)** | (429) | **16,851** | 15,411 |
| **Adjusted EBITDA margin** (%) | **37.6** | 37.9 | **21.6** | 24.0 | **n/m** | n/m | **36.0** | 37.0 |

**EBITDA – excluding restructuring and other costs interest coverage:** This measure is defined as EBITDA – excluding restructuring and other costs, divided by Net interest cost, calculated on a 12-month trailing basis. It is similar to the coverage ratio covenant in our credit facilities, as described in *Section 7.6 Credit facilities*.

*Calculation of EBITDA – excluding restructuring and other costs interest coverage*

| For the 12-month periods ended December 31 ($ millions, except ratio) | 2021 | 2020 |
|---|---|---|
| Numerator – EBITDA – excluding restructuring and other costs | **6,476** | 5,753 |
| Denominator – Net interest cost | **773** | 792 |
| **Ratio** (times) | **8.4** | 7.3 |

**Free cash flow:** We report this measure as a supplementary indicator of our operating performance, and there is no generally accepted industry definition of free cash flow. It should not be considered as an alternative to the measures in the Consolidated statements of cash flows. Free cash flow excludes certain working capital changes (such as trade receivables and trade payables), proceeds from divested assets and other sources and uses of cash, as found in the Consolidated statements of cash flows. It provides an indication of how much cash generated by operations is available after capital expenditures (excluding purchases of spectrum licences) that may be used to, among other things, pay dividends, repay debt, purchase shares or make other investments. We exclude impacts of accounting changes that do not impact cash, such as IFRS 15 and IFRS 16. Free cash flow may be supplemented from time to time by proceeds from divested assets or financing activities.

*Free cash flow calculation*

| | Fourth quarters ended December 31 | | Years ended December 31 | |
|---|---|---|---|---|
| ($ millions) | 2021 | 2020 | 2021 | 2020 |
| EBITDA | **1,882** | 1,336 | **6,290** | 5,494 |
| Deduct gain on disposition of financial solutions business | **(410)** | – | **(410)** | – |
| Deduct non-cash gains from the sale of property, plant and equipment | **–** | (1) | **–** | (4) |
| Restructuring and other costs, net of disbursements | **3** | 14 | **10** | 35 |
| Effects of contract asset, acquisition and fulfilment (IFRS 15 impact) and TELUS Easy Payment device financing | **(117)** | (112) | **(45)** | 43 |
| Effects of lease principal (IFRS 16 impact) | **(131)** | (110) | **(502)** | (365) |
| Leases formerly accounted for as finance leases (IFRS 16 impact) | **–** | 16 | **–** | 86 |
| Items from the statements of cash flows: | | | | |
| Share-based compensation, net | **16** | (62) | **139** | 27 |
| Net employee defined benefit plans expense | **27** | 25 | **113** | 102 |
| Employer contributions to employee defined benefit plans | **(15)** | (14) | **(53)** | (51) |
| Interest paid | **(180)** | (169) | **(744)** | (740) |
| Interest received | **2** | 3 | **17** | 13 |
| Capital expenditures (excluding spectrum licences)[1] | **(909)** | (613) | **(3,498)** | (2,775) |
| Free cash flow before income taxes | **168** | 313 | **1,317** | 1,865 |
| Income taxes paid, net of refunds | **(186)** | (95) | **(601)** | (430) |
| Effect of disposition of financial solutions business on income taxes paid | **61** | – | **61** | – |
| **Free cash flow** | **43** | 218 | **777** | 1,435 |

1 Refer to *Note 31* of the Consolidated financial statements for further information.

The following reconciles our definition of free cash flow with Cash provided by operating activities.

*Free cash flow reconciliation with Cash provided by operating activities*

| | Fourth quarters ended December 31 | | Years ended December 31 | |
|---|---|---|---|---|
| ($ millions) | 2021 | 2020 | 2021 | 2020 |
| **Free cash flow** | **43** | 218 | **777** | 1,435 |
| Add (deduct): | | | | |
| Capital expenditures (excluding spectrum licences) | **909** | 613 | **3,498** | 2,775 |
| Effects of lease principal and leases accounted for as finance leases prior to adoption of IFRS 16 | **131** | 94 | **502** | 279 |
| Gain on disposition of financial solutions business, net of effect on income taxes paid | **(349)** | – | **(349)** | – |
| Individually immaterial items included in Net income neither providing nor using cash | **162** | 108 | **(40)** | 85 |
| **Cash provided by operating activities** | **896** | 1,033 | **4,388** | 4,574 |

**Mobile phone average billing per subscriber per month (ABPU):** Mobile phone ABPU is a non-GAAP ratio that does not have any standardized meaning prescribed by IFRS-IASB and therefore is unlikely to be comparable to similar measures presented by other issuers. Mobile phone ABPU is calculated as network revenue derived from monthly service plan, roaming and usage charges, as well as monthly re-payments of the outstanding device balance owing from customers on contract; divided by the average number of mobile phone subscribers on the network during the period, and is expressed as a rate per month. Compared to ARPU, this measure provides management with a view of average monthly cash receipts from mobile services subscribers by reversing impacts of allocation of revenue to upfront performance obligations due to IFRS 15, in addition to device financing receipts, and is used to evaluate historical trending of an equivalent metric prior to the application of IFRS 15 and introduction of the device financing program.

*Calculation of mobile phone ABPU*

| | Fourth quarters ended December 31 | | Years ended December 31 | |
|---|---|---|---|---|
| | **2021** | 2020 | **2021** | 2020 |
| Numerator | | | | |
| Mobile network revenue ($ millions) | **1,591** | 1,515 | **6,208** | 6,030 |
| Re-payments of the outstanding device balance owing from customers on contract ($ millions) | **350** | 342 | **1,389** | 1,374 |
| | **1,941** | 1,857 | **7,597** | 7,404 |
| Denominator – Simple average number of subscribers during the period[1] (millions) | **9.234** | 8.880 | **9.070** | 8.752 |
| Annual average of billing per subscriber unit ($) | **210** | 209 | **838** | 846 |
| Divide by number of months during the period | **3** | 3 | **12** | 12 |
| **Mobile phone ABPU** ($) | **70.09** | 69.70 | **69.83** | 70.49 |

1 Simple average number of subscribers calculated for quarterly periods as the average of beginning-of-period subscribers and end-of-period subscribers. For annual periods, it is calculated as the average of beginning-of-period subscribers and end-of-period subscribers for each quarterly period. It is used as an illustrative proxy, which does not materially differ from the actual average number of subscribers.

**Mobile phone average revenue per subscriber per month (ARPU)** is calculated as network revenue derived from monthly service plan, roaming and usage charges; divided by the average number of mobile phone subscribers on the network during the period, and is expressed as a rate per month.

**Net debt:** We believe that net debt is a useful measure because it represents the amount of Short-term borrowings and long-term debt obligations that are not covered by available Cash and temporary investments. The nearest IFRS measure to net debt is Long-term debt, including Current maturities of Long-term debt. Net debt is a component of the **Net debt to EBITDA – excluding restructuring and other costs** ratio.

**Net debt to EBITDA – excluding restructuring and other costs:** This measure is defined as net debt at the end of the period divided by 12-month trailing EBITDA – excluding restructuring and other costs. (See discussion in *Section 7.5 Liquidity and capital resource measures*.) This measure is similar to the leverage ratio covenant in our credit facilities, as described in *Section 7.6 Credit facilities*.

*Calculation of Net debt to EBITDA – excluding restructuring and other costs*

| For the 12-month periods ended December 31 ($ millions, except ratio) | **2021** | 2020 |
|---|---|---|
| Numerator – Net debt | **20,535** | 19,826 |
| Denominator – EBITDA – excluding restructuring and other costs | **6,476** | 5,753 |
| **Ratio** (times) | **3.17** | 3.45 |

**Net interest cost:** This measure is the denominator in the calculation of **EBITDA – excluding restructuring and other costs interest coverage**. Net interest cost is defined as financing costs, excluding capitalized long-term debt interest, employee defined benefit plans net interest and recoveries on redemption and repayment of debt, calculated on a 12-month trailing basis. Expenses recorded for the long-term debt prepayment premium, if any, are included in net interest cost.

*Calculation of Net interest cost*

| For the 12-month periods ended December 31 ($ millions) | **2021** | 2020 |
|---|---|---|
| Financing costs | **796** | 771 |
| Deduct: Employee defined benefit plans net interest | **(26)** | (16) |
| Add: Interest on long-term debt, excluding lease liabilities – capitalized | **3** | 37 |
| **Net interest cost** | **773** | 792 |

## 11.2 Operating indicators

The following measures are industry metrics that are useful in assessing the operating performance of a mobile and fixed telecommunications entity, but do not have a standardized meaning under IFRS-IASB.

**Churn** is calculated as the number of subscribers deactivated during a given period divided by the average number of subscribers on the network during the period, and is expressed as a rate per month. Mobile phone churn refers to the aggregate average of both prepaid and postpaid mobile phone churn. A TELUS, Koodo or Public Mobile brand prepaid mobile phone subscriber is deactivated when the subscriber has no usage for 90 days following expiry of the prepaid credits.

**Connected device subscriber** means a TELUS subscriber on an active service plan with a recurring revenue-generating portable unit (e.g. tablets, internet keys, Internet of Things, wearables and connected cars) that is connected to the TELUS network and is intended for limited or no cellular voice capability.

**Mobile phone subscriber** means a TELUS subscriber on an active service plan with a recurring revenue-generating portable unit (e.g. feature phones and smartphones) that is connected to the TELUS network and provides voice, text and/or data connectivity.

**Internet subscriber** means a TELUS subscriber on an active internet plan with a recurring revenue-generating fixed unit that is connected to the TELUS network and provides internet connectivity.

**Residential voice subscriber** means a TELUS subscriber on an active phone plan with a recurring revenue-generating fixed unit that is connected to the TELUS network and provides voice service.

**Security subscriber** means a TELUS subscriber on an active security plan with a recurring revenue-generating fixed unit that is connected to the TELUS security and automation platform.

**TV subscriber** means a TELUS subscriber on an active TV plan with a recurring revenue-generating fixed unit subscription for video services from a TELUS TV platform (e.g. Optik TV and Pik TV).

**Virtual care member** means primary enrolment to receive services on an active TELUS Health virtual care plan.

**Healthcare lives covered** means the number of users (primary members and their dependents) enrolled in various health programs supported by TELUS Health services (e.g. virtual care, health benefits management, preventative care and personal health security).

**Digital health transactions** mean the total number of health claims, dental claims, consultations or other paid transactions facilitated by TELUS Health services.

# Report of management on internal control over financial reporting

Management of TELUS Corporation (TELUS, or the Company) is responsible for establishing and maintaining adequate internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting.

TELUS' President and Chief Executive Officer and Executive Vice-president and Chief Financial Officer have assessed the effectiveness of the Company's internal control over financial reporting as of December 31, 2021, in accordance with the criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission. Internal control over financial reporting is a process designed by, or under the supervision of, the President and Chief Executive Officer and the Executive Vice-president and Chief Financial Officer and effected by the Board of Directors, management and other personnel to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles.

Due to its inherent limitations, internal control over financial reporting may not prevent or detect misstatements on a timely basis. Also, projections of any evaluation of the effectiveness of internal control over financial reporting to future periods are subject to the risk that the controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Based on the assessment referenced in the preceding paragraph, management has determined that the Company's internal control over financial reporting is effective as of December 31, 2021. In connection with this assessment, no material weaknesses in the Company's internal control over financial reporting were identified by management as of December 31, 2021.

Deloitte LLP, an Independent Registered Public Accounting Firm, audited the Company's Consolidated financial statements for the year ended December 31, 2021, and as stated in the Report of Independent Registered Public Accounting Firm, they have expressed an unqualified opinion on the effectiveness of the Company's internal control over financial reporting as of December 31, 2021.

Doug French
Executive Vice-president
and Chief Financial Officer
February 10, 2022

Darren Entwistle
President
and Chief Executive Officer
February 10, 2022

# Report of independent registered public accounting firm

**To the Shareholders and the Board of Directors of TELUS Corporation**

**Opinion on the Financial Statements**

We have audited the accompanying consolidated statements of financial position of TELUS Corporation and subsidiaries (the Company) as at December 31, 2021 and 2020, the related consolidated statements of income and other comprehensive income, changes in owners' equity and cash flows, for each of the two years in the period ended December 31, 2021, and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as at December 31, 2021 and 2020, and its financial performance and its cash flows for each of the two years in the period ended December 31, 2021, in conformity with International Financial Reporting Standards as issued by the International Accounting Standards Board.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2021, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission and our report dated February 10, 2022, expressed an unqualified opinion on the Company's internal control over financial reporting.

**Basis for Opinion**

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

**Critical Audit Matters**

Critical audit matters are matters arising from the current-period audit of the financial statements that were communicated or required to be communicated to the audit committee and that (1) relate to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective, or complex judgments. We determined that there are no critical audit matters.

Deloitte LLP

Chartered Professional Accountants
February 10, 2022
Vancouver, Canada

We have served as the Company's auditor since 2002.

# Report of independent registered public accounting firm

**To the Shareholders and the Board of Directors of TELUS Corporation**

**Opinion on Internal Control over Financial Reporting**

We have audited the internal control over financial reporting of TELUS Corporation and subsidiaries (the Company) as of December 31, 2021, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2021, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by COSO.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated financial statements as of and for the year ended December 31, 2021, of the Company and our report dated February 10, 2022, expressed an unqualified opinion on those financial statements.

**Basis for Opinion**

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Report of Management on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

**Definition and Limitations of Internal Control over Financial Reporting**

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with International Financial Reporting Standards as issued by the International Accounting Standards Board. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with International Financial Reporting Standards as issued by the International Accounting Standards Board, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Deloitte LLP

Chartered Professional Accountants
February 10, 2022
Vancouver, Canada

# Consolidated statements of income and other comprehensive income

| Years ended December 31 (millions except per share amounts) | Note | 2021 | 2020 |
|---|---|---|---|
| **Operating Revenues** | | | |
| Service | | $ 14,535 | $ 13,277 |
| Equipment | | 2,303 | 2,064 |
| Operating revenues (arising from contracts with customers) | *6* | 16,838 | 15,341 |
| Other income | *7* | 420 | 122 |
| Operating revenues and other income | | 17,258 | 15,463 |
| **Operating Expenses** | | | |
| Goods and services purchased | | 6,699 | 6,268 |
| Employee benefits expense | *8* | 4,269 | 3,701 |
| Depreciation | *17* | 2,126 | 2,107 |
| Amortization of intangible assets | *18* | 1,090 | 905 |
| | | 14,184 | 12,981 |
| **Operating Income** | | 3,074 | 2,482 |
| Financing costs | *9* | 796 | 771 |
| **Income Before Income Taxes** | | 2,278 | 1,711 |
| Income taxes | *10* | 580 | 451 |
| **Net Income** | | 1,698 | 1,260 |
| **Other Comprehensive Income (Loss)** | *11* | | |
| Items that may subsequently be reclassified to income | | | |
| Change in unrealized fair value of derivatives designated as cash flow hedges | | 124 | (111) |
| Foreign currency translation adjustment arising from translating financial statements of foreign operations | | (130) | 113 |
| | | (6) | 2 |
| Items never subsequently reclassified to income | | | |
| Change in measurement of investment financial assets | | 57 | 14 |
| Employee defined benefit plan re-measurements | | 600 | (312) |
| | | 657 | (298) |
| | | 651 | (296) |
| **Comprehensive Income** | | $ 2,349 | $ 964 |
| **Net Income Attributable to:** | | | |
| Common Shares | | $ 1,655 | $ 1,207 |
| Non-controlling interests | | 43 | 53 |
| | | $ 1,698 | $ 1,260 |
| **Comprehensive Income Attributable to:** | | | |
| Common Shares | | $ 2,341 | $ 893 |
| Non-controlling interests | | 8 | 71 |
| | | $ 2,349 | $ 964 |
| **Net Income Per Common Share** | *12* | | |
| Basic | | $ 1.23 | $ 0.95 |
| Diluted | | $ 1.22 | $ 0.94 |
| **Total Weighted Average Common Shares Outstanding** | | | |
| Basic | | 1,346 | 1,275 |
| Diluted | | 1,351 | 1,278 |

*The accompanying notes are an integral part of these consolidated financial statements.*

# Consolidated statements of financial position

| As at December 31 (millions) | Note | 2021 | 2020 |
|---|---|---|---|
| **Assets** | | | |
| Current assets | | | |
| Cash and temporary investments, net | | **$ 723** | $ 848 |
| Accounts receivable | *6(b)* | **2,671** | 2,355 |
| Income and other taxes receivable | | **206** | 148 |
| Inventories | *1(l)* | **448** | 407 |
| Contract assets | *6(c)* | **443** | 439 |
| Prepaid expenses | *20* | **528** | 478 |
| Current derivative assets | *4(h)* | **13** | 2 |
| | | **5,032** | 4,677 |
| Non-current assets | | | |
| Property, plant and equipment, net | *17* | **15,926** | 15,014 |
| Intangible assets, net | *18* | **17,485** | 15,048 |
| Goodwill, net | *18* | **7,281** | 7,160 |
| Contract assets | *6(c)* | **266** | 268 |
| Other long-term assets | *20* | **2,004** | 1,106 |
| | | **42,962** | 38,596 |
| | | **$ 47,994** | $ 43,273 |
| **Liabilities and Owners' Equity** | | | |
| Current liabilities | | | |
| Short-term borrowings | *22* | **$ 114** | $ 100 |
| Accounts payable and accrued liabilities | *23* | **3,705** | 2,971 |
| Income and other taxes payable | | **104** | 122 |
| Dividends payable | *13* | **449** | 403 |
| Advance billings and customer deposits | *24* | **854** | 772 |
| Provisions | *25* | **96** | 73 |
| Current maturities of long-term debt | *26* | **2,927** | 1,432 |
| Current derivative liabilities | *4(h)* | **24** | 32 |
| | | **8,273** | 5,905 |
| Non-current liabilities | | | |
| Provisions | *25* | **774** | 961 |
| Long-term debt | *26* | **17,925** | 18,856 |
| Other long-term liabilities | *27* | **907** | 1,265 |
| Deferred income taxes | *10* | **4,056** | 3,718 |
| | | **23,662** | 24,800 |
| Liabilities | | **31,935** | 30,705 |
| Owners' equity | | | |
| Common equity | *28* | **15,116** | 12,040 |
| Non-controlling interests | | **943** | 528 |
| | | **16,059** | 12,568 |
| | | **$ 47,994** | $ 43,273 |
| Contingent liabilities | *29* | | |

*The accompanying notes are an integral part of these consolidated financial statements.*

Approved by the Directors:

David L. Mowat
Director

R.H. Auchinleck
Director

# Consolidated statements of changes in owners' equity

| (millions) | Note | Common equity – Equity contributed – Common Shares (Note 28) – Number of shares | Share capital | Contributed surplus | Retained earnings | Accumulated other comprehensive income | Total | Non-controlling interests | Total |
|---|---|---|---|---|---|---|---|---|---|
| Balance as at January 1, 2020 | | 1,209 | $ 5,660 | $ 398 | $ 4,371 | $ 119 | $ 10,548 | $ 111 | $ 10,659 |
| Net income | | – | – | – | 1,207 | – | 1,207 | 53 | 1,260 |
| Other comprehensive income (loss) | *11* | – | – | – | (312) | (2) | (314) | 18 | (296) |
| Dividends | *13* | – | – | – | (1,520) | – | (1,520) | – | (1,520) |
| Dividends reinvested and optional cash payments | *13(b), 14(c)* | 23 | 541 | – | – | – | 541 | – | 541 |
| Equity accounted share-based compensation | | 1 | 15 | 82 | – | – | 97 | – | 97 |
| Issue of Common Shares in business combination | | – | 8 | – | – | – | 8 | – | 8 |
| Common Shares issued | | 58 | 1,453 | – | – | – | 1,453 | – | 1,453 |
| Change in ownership interests of subsidiaries | | – | – | 54 | (34) | – | 20 | 346 | 366 |
| Balance as at December 31, 2020 | | 1,291 | $ 7,677 | $ 534 | $ 3,712 | $ 117 | $ 12,040 | $ 528 | $ 12,568 |
| Balance as at January 1, 2021 | | **1,291** | **$ 7,677** | **$ 534** | **$ 3,712** | **$ 117** | **$ 12,040** | **$ 528** | **$ 12,568** |
| Net income | | **–** | **–** | **–** | **1,655** | **–** | **1,655** | **43** | **1,698** |
| Other comprehensive income (loss) | *11* | **–** | **–** | **–** | **600** | **86** | **686** | **(35)** | **651** |
| Dividends | *13* | **–** | **–** | **–** | **(1,711)** | **–** | **(1,711)** | **–** | **(1,711)** |
| Dividends reinvested and optional cash payments | *13(b), 14(c)* | **24** | **621** | **–** | **–** | **–** | **621** | **–** | **621** |
| Equity accounted share-based compensation | *14(b)* | **4** | **79** | **49** | **–** | **–** | **128** | **13** | **141** |
| Common Shares issued | *28(a)* | **51** | **1,267** | **–** | **–** | **–** | **1,267** | **–** | **1,267** |
| Change in ownership interests of subsidiary | *28(c)* | **–** | **–** | **430** | **–** | **–** | **430** | **394** | **824** |
| Balance as at December 31, 2021 | | **1,370** | **$ 9,644** | **$ 1,013** | **$ 4,256** | **$ 203** | **$ 15,116** | **$ 943** | **$ 16,059** |

*The accompanying notes are an integral part of these consolidated financial statements.*

# Consolidated statements of cash flows

| Years ended December 31 (millions) | Note | 2021 | 2020 |
|---|---|---|---|
| **Operating Activities** | | | |
| Net income | | **$ 1,698** | $ 1,260 |
| Adjustments to reconcile net income to cash provided by operating activities: | | | |
| Depreciation and amortization | | **3,216** | 3,012 |
| Deferred income taxes | *10* | **47** | 76 |
| Share-based compensation expense, net | *14(a)* | **139** | 27 |
| Net employee defined benefit plans expense | *15(a)* | **113** | 102 |
| Employer contributions to employee defined benefit plans | | **(53)** | (51) |
| Non-current contract assets | | **2** | 60 |
| Non-current unbilled customer finance receivables | *20* | **(184)** | (136) |
| Gain on disposition of financial solutions business | *7* | **(410)** | – |
| Loss from equity accounted investments | *7, 21* | **10** | 29 |
| Other | | **(108)** | (75) |
| Net change in non-cash operating working capital | *31(a)* | **(82)** | 270 |
| Cash provided by operating activities | | **4,388** | 4,574 |
| **Investing Activities** | | | |
| Cash payments for capital assets, excluding spectrum licences | *31(a)* | **(3,097)** | (2,822) |
| Cash payments for spectrum licences | *18(a)* | **(2,219)** | – |
| Cash payments for acquisitions, net | *18(b)* | **(468)** | (3,205) |
| Advances to, and investment in, real estate joint ventures and associates | *21* | **(46)** | (100) |
| Real estate joint venture receipts | *21* | **4** | 5 |
| Proceeds on disposition | | **508** | 86 |
| Investment in portfolio investments and other | | **(148)** | (129) |
| Cash used by investing activities | | **(5,466)** | (6,165) |
| **Financing Activities** | *31(b)* | | |
| Common Shares issued | *28(a)* | **1,300** | 1,495 |
| Dividends paid to holders of Common Shares | *13(a)* | **(1,045)** | (930) |
| Issue (repayment) of short-term borrowings, net | | **10** | (8) |
| Long-term debt issued | *26* | **4,891** | 4,882 |
| Redemptions and repayment of long-term debt | *26* | **(4,972)** | (3,863) |
| Shares of subsidiary issued and sold to non-controlling interests, net | *28(c)* | **827** | 400 |
| Other | | **(58)** | (72) |
| Cash provided by financing activities | | **953** | 1,904 |
| **Cash Position** | | | |
| Increase (decrease) in cash and temporary investments, net | | **(125)** | 313 |
| Cash and temporary investments, net, beginning of period | | **848** | 535 |
| Cash and temporary investments, net, end of period | | **$ 723** | $ 848 |
| **Supplemental Disclosure of Operating Cash Flows** | | | |
| Interest paid | | **$ (744)** | $ (740) |
| Interest received | | **$ 17** | $ 13 |
| Income taxes paid, net | | | |
| In respect of comprehensive income | | **$ (563)** | $ (397) |
| In respect of business acquisitions | | **(38)** | (33) |
| | | **$ (601)** | $ (430) |

*The accompanying notes are an integral part of these consolidated financial statements.*

# Notes to consolidated financial statements

December 31, 2021

TELUS Corporation is one of Canada's largest telecommunications companies, providing a wide range of technology solutions, including mobile and fixed voice and data telecommunications services and products, healthcare software and technology solutions, and digitally-led customer experiences. Data services include: internet protocol; television; hosting, managed information technology and cloud-based services; software, data management and data analytics-driven smart-food chain technologies; and home and business security.

TELUS Corporation was incorporated under the *Company Act* (British Columbia) on October 26, 1998, under the name BCT.TELUS Communications Inc. (BCT). On January 31, 1999, pursuant to a court-approved plan of arrangement under the *Canada Business Corporations Act* among BCT, BC TELECOM Inc. and the former Alberta-based TELUS Corporation (TC), BCT acquired all of the shares of BC TELECOM Inc. and TC in exchange for Common Shares and Non-Voting Shares of BCT, and BC TELECOM Inc. was dissolved. On May 3, 2000, BCT changed its name to TELUS Corporation and in February 2005, TELUS Corporation transitioned under the *Business Corporations Act* (British Columbia), successor to the *Company Act* (British Columbia). TELUS Corporation maintains its registered office at Floor 7, 510 West Georgia Street, Vancouver, British Columbia, V6B 0M3.

The terms "TELUS", "we", "us", "our" or "ourselves" refer to TELUS Corporation and, where the context of the narrative permits or requires, its subsidiaries. Our principal subsidiaries are: TELUS Communications Inc., in which, as at December 31, 2021, we have a 100% equity interest; and TELUS International (Cda) Inc., in which, as at December 31, 2021, we have a 55.1% equity interest, and which completed its initial public offering in February 2021, as discussed further in *Note 28(c)*.

# 1 Summary of significant accounting policies

Our consolidated financial statements are expressed in Canadian dollars. The generally accepted accounting principles that we apply are International Financial Reporting Standards as issued by the International Accounting Standards Board (IFRS-IASB), and Canadian generally accepted accounting principles.

Generally accepted accounting principles require that we disclose the accounting policies we have selected in those instances in which we have been obligated to choose from among various accounting policies that comply with generally accepted accounting principles. In certain other instances, including those in which no selection among policies is allowed, we are also required to disclose how we have applied certain accounting policies. In the selection and application of accounting policies, we consider, among other factors, the fundamental qualitative characteristics of useful financial information, namely relevance and faithful representation. In our assessment, the accounting policy disclosures we are required to make are not all equally significant for us, as set out in the accompanying table; their relative significance for us will evolve over time, as we do.

These consolidated financial statements for each of the years ended December 31, 2021 and 2020, were authorized by our Board of Directors for issue on February 10, 2022.

| | Accounting policy requiring a more significant choice among policies and/or a more significant application of judgment | |
|---|---|---|
| Accounting policy | Yes | No |
| **General application** | | |
| (a) Consolidation | | X |
| (b) Use of estimates and judgments | X | |
| (c) Financial instruments – recognition and measurement | | X |
| (d) Hedge accounting | | X |
| **Results of operations focused** | | |
| (e) Revenue recognition | X | |
| (f) Depreciation, amortization and impairment | X | |
| (g) Translation of foreign currencies | | X |
| (h) Income and other taxes | X | |
| (i) Share-based compensation | | X |
| (j) Employee future benefit plans | X | |
| **Financial position focused** | | |
| (k) Cash and temporary investments, net | | X |
| (l) Inventories | | X |
| (m) Property, plant and equipment; intangible assets | X | |
| (n) Investments | | X |

## (a) Consolidation

Our consolidated financial statements include our accounts and the accounts of all of our subsidiaries, the principal ones of which are: TELUS Communications Inc. and TELUS International (Cda) Inc. TELUS Communications Inc. includes substantially all of our mobile and fixed operations, excluding the customer experience and digital enablement transformation provided through the customer care and business services business of TELUS International (Cda) Inc.

Our financing arrangements and those of our wholly owned subsidiaries do not impose restrictions on inter-corporate dividends.

On a continuing basis, we review our corporate organization and effect changes as appropriate so as to enhance the value of TELUS Corporation. This process can, and does, affect which of our subsidiaries are considered principal subsidiaries at any particular point in time.

## (b) Use of estimates and judgments

The preparation of financial statements in conformity with generally accepted accounting principles requires management to make estimates, assumptions and judgments that affect: the reported amounts of assets and liabilities at the date of the financial statements; the disclosure of contingent assets and liabilities at the date of the financial statements; and the reported amounts and classification of revenue and expense during the reporting period. Actual results could differ from those estimates.

Denotes accounting policy requiring, for us, a more significant choice among accounting policies and/or a more significant application of judgment.

**Estimates**

Examples of the significant estimates and assumptions that we make, and their relative significance and degree of difficulty, are set out in the graphic below.

| SIGNIFICANCE / DEGREE OF DIFFICULTY | Higher | | Lower |
|---|---|---|---|
| Higher | • The recoverability of intangible assets with indefinite lives (see *Note 18(f)* for discussion of key assumptions)<br>• The recoverability of goodwill (see *Note 18(f)* for discussion of key assumptions) | • Certain actuarial and economic assumptions used in determining defined benefit pension costs and accrued pension benefit obligations (see *Note 15(d)* for discussion of key assumptions) | |
| | • Determination of the amounts and composition of income and other tax assets and liabilities, including the amounts of unrecognized tax benefits | • The estimated useful lives of assets (see *(f)* following)<br>• Certain economic assumptions used in provisioning for asset retirement obligations (see *(m)* following) | |
| Lower | • Amounts for net identifiable assets acquired in business combinations and provisions related to business combinations<br>• The recoverability of long-term investments | • The recoverability of tangible and intangible assets subject to amortization | • Determination of allowances for doubtful accounts, unbilled customer finance receivables and contract assets<br>• Determination of the allowance for inventory obsolescence |

**Judgments**

Examples of our significant judgments, apart from those involving estimation, include the following:

- Assessments about whether line items are sufficiently material to warrant separate presentation in the primary financial statements and, if not, whether they are sufficiently material to warrant separate presentation in the notes to the financial statements. In the normal course, we make changes to our assessments regarding materiality for presentation so that they reflect current economic conditions. Due consideration is given to the view that it is reasonable to expect differing opinions of what is, and is not, material.
- In respect of revenue-generating transactions, we must make judgments that affect the timing of the recognition of revenue, as set out following:
  - We have millions of multi-year contracts with our customers and we must make judgments about when we have satisfied our performance obligations to our customers, either over a period of time or at a point in time. Service revenues are recognized based upon customers' access to, or usage of, our telecommunications infrastructure; we believe that this method faithfully depicts the transfer of the services, and thus the revenues are recognized as the services are made available and/or rendered. We consider our performance obligations arising from the sale of equipment to have been satisfied when the equipment has been delivered to, and accepted by, the end-user customers (see *(e)* following).
  - Principally in the context of revenue-generating transactions involving mobile handsets, we must make judgments as to whether third-party re-sellers that deliver equipment to our customers are acting in the transactions as principals or as our agents. Upon due consideration of the relevant indicators, we believe that the decision to consider the re-sellers to be acting, solely for accounting purposes, as our agents is more representative of the economic substance of the transactions, as we are the primary obligor to the end-user customers. The effect of this judgment is that no equipment revenue is recognized upon the transfer of inventory to third-party re-sellers.
  - We compensate third-party re-sellers and our employees for generating revenues, and we must make judgments as to whether such sales-based compensation amounts are costs incurred to obtain contracts with customers that should be capitalized (see *Note 20*). We believe that compensation amounts tangentially attributable to obtaining a contract with a customer, because the amount of such compensation could be affected in ways other than by simply obtaining that contract, should be expensed as incurred; compensation amounts directly attributable to obtaining a contract with a customer should be capitalized and subsequently amortized on a systematic basis, consistent with the satisfaction of our associated performance obligations.

    Judgment must also be exercised in the capitalization of costs incurred to fulfill revenue-generating contracts with customers. Such fulfilment costs are those incurred to set up, activate or otherwise implement services involving access to, or usage of, our telecommunications infrastructure that would not otherwise be capitalized as property, plant, equipment and/or intangible assets (see *Note 20*).
- The decision to depreciate and amortize any property, plant, equipment (including right-of-use lease assets) and intangible assets that are subject to amortization on a straight-line basis, as we believe that this method reflects the consumption of resources related to the economic lifespan of those assets better than an accelerated method and is more representative of the economic substance of the underlying use of those assets.
- The preparation of financial statements in accordance with generally accepted accounting principles requires management to make judgments that affect the financial statement disclosure of information regularly reviewed by our chief operating decision-maker used to

Denotes accounting policy requiring, for us, a more significant choice among accounting policies and/or a more significant application of judgment.

make resource allocation decisions and to assess performance (segment information, *Note 5*). A significant judgment we have historically made is in respect of distinguishing between our wireless and wireline operations and cash flows (and this extends to allocations of both direct and indirect expenses and capital expenditures). The clarity of this distinction has been increasingly affected by the convergence and integration of our wireless and wireline telecommunications infrastructure technology and operations. Less than one-half of the operating expenses included in the segment performance measure reported to our chief operating decision-maker during the year ended December 31, 2020, were direct costs; judgment, largely based upon historical experience, was applied in apportioning indirect expenses that were not objectively distinguishable between our wireless and wireline operations.

Until recently, our judgment was that our wireless and wireline telecommunications infrastructure technology and operations had not experienced sufficient convergence to objectively make their respective operations and cash flows practically indistinguishable. The continued build-out of our technology-agnostic fibre-optic infrastructure, in combination with converged edge network technology, has significantly affected this judgment, as have the commercialization of fixed-wireless telecommunications solutions for customers and the consolidation of our non-customer facing operations.

As a result, it has become increasingly difficult and impractical to objectively and clearly distinguish between our wireless and wireline operations and cash flows, and the assets from which those cash flows arise. Our judgment as to whether these operations can continue to be judged to be individual components of the business and discrete operating segments has changed; effective January 1, 2020, we embarked upon the modification of our internal and external reporting processes, systems and internal controls to accommodate the technology convergence-driven cessation of the historical distinction between our wireless and wireline operations at the level of regularly reported discrete performance measures that are provided to our chief operating decision-maker. We transitioned to a new segment reporting structure during the first quarter of 2021 (see *Note 5*).

The impracticality of objectively distinguishing between our wireless and wireline cash flows, and the assets from which those cash flows arise, is evidence of their increasing interdependence, and this has resulted in the unification of the wireless cash-generating unit and the wireline cash-generating unit as a single telecommunications cash-generating unit, and the identification of the digitally-led customer experiences – TELUS International cash-generating unit, for impairment testing purposes (see *Note 18(f)*). As our business continues to evolve, new cash-generating units may also develop.

- The view that our spectrum licences granted by Innovation, Science and Economic Development Canada (including spectrum licences that have been subordinated to us) will likely be renewed; that we intend to renew them; that we believe we have the financial and operational ability to renew them; and thus, that they have an indefinite life, as discussed further in *Note 18(e)*.
- In connection with the annual impairment testing of intangible assets with indefinite lives and goodwill, there may be instances in which we must exercise judgment in allocating our net assets, including shared corporate and administrative assets, to our cash-generating units when determining their carrying amounts. Historically, these judgments were necessary because of the convergence that our wireless and wireline telecommunications infrastructure technology and operations had experienced to date, and because of our continuous development. There were instances in which similar judgments were also necessary in respect of future capital expenditures in support of both wireless and wireline operations, which were a component of the determination of recoverable amounts used in the annual impairment testing, as discussed further in *Note 18(f)*.
- In respect of claims and lawsuits, as discussed further in *Note 29(a)*, the determination of whether an item is a contingent liability or whether an outflow of resources is probable and thus needs to be accounted for as a provision.

## (c) Financial instruments – recognition and measurement

In respect of the recognition and measurement of financial instruments, we have adopted the following policies:

- Regular-way purchases or sales of financial assets or financial liabilities (purchases or sales that require actual delivery of financial assets or financial liabilities) are recognized on the settlement date. We have selected this method as the benefits of using the trade date method were not expected to exceed the costs of selecting and implementing that method.
- Transaction costs, other than in respect of items held for trading, are added to the initial fair value of the acquired financial asset or financial liability. We have selected this method as we believe that it results in a better matching of the transaction costs with the periods in which we benefit from those costs.

## (d) Hedge accounting

**General**

We apply hedge accounting to the financial instruments used to establish designated currency hedging relationships for certain U.S. dollar-denominated future purchase commitments and debt repayments, as set out in *Note 4(a)* and *(d)*.

**Hedge accounting**

The purpose of hedge accounting, in respect of our designated hedging relationships, is to ensure that counterbalancing gains and losses are recognized in the same periods. We have chosen to apply hedge accounting, as we believe that it is more representative of the economic substance of the underlying transactions.

In order to apply hedge accounting, a high correlation (which indicates effectiveness) is required in the offsetting changes in the risk-associated values of the financial instruments (the hedging items) used to establish the designated hedging relationships and all, or a part, of the asset, liability or transaction having an identified risk exposure that we have taken steps to modify (the hedged items). We assess the anticipated effectiveness of designated hedging relationships at inception and their actual effectiveness for each reporting period thereafter. We consider a designated hedging relationship to be effective if the following critical terms match between the hedging item and the hedged item: the notional amount of the hedging item and the principal amount of the hedged item; maturity dates; payment dates; and interest rate index (if, and as, applicable). As set out in *Note 4(i)*, any ineffectiveness, such as would result from a difference between the notional amount of the hedging item and the principal amount of the hedged item, or from a previously

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effective designated hedging relationship becoming ineffective, is reflected in the Consolidated statements of income and other comprehensive income as Financing costs if in respect of long-term debt and as Goods and services purchased if in respect of U.S. dollar-denominated future purchase commitments.

**Hedging assets and liabilities**

In the application of hedge accounting, an amount (the hedge value) is recorded in the Consolidated statements of financial position in respect of the fair value of the hedging items. The net difference, if any, between the amounts recognized in the determination of net income and the amounts necessary to reflect the fair value of the designated cash flow hedging items recorded in the Consolidated statements of financial position is recognized as a component of Other comprehensive income, as set out in *Note 11*.

## (e) Revenue recognition

**General**

We earn the majority of our TELUS technology solutions service revenues from access to, and usage of, our telecommunications infrastructure, including:

- Mobile network (voice and data);
- Fixed data services (which include: internet protocol; television; hosting, managed information technology and cloud-based services; software, data management and data analytics-driven smart-food chain technologies; and home and business security);
- Fixed voice services; and
- Health services.

The majority of the balance of our TELUS technology solutions revenues (mobile equipment and other service; fixed equipment and other service) arises from providing services and products facilitating access to, and usage of, our telecommunications infrastructure. Our digitally-led customer experiences – TELUS International segment service revenues arise from the provision of digital customer experience solutions, including artificial intelligence and content management solutions.

We offer complete and integrated solutions to meet our customers' needs. These solutions may involve deliveries of multiple services and products (our performance obligations) that occur at different points in time and/or over different periods of time; as referred to in *(b)*, this is a significant judgment for us. As required, the performance obligations of these multiple element arrangements are identified and the transaction price for the entire multiple element arrangement is determined and allocated among the performance obligations based upon our relative stand-alone selling prices for each of them; our relevant revenue recognition policies are then applied, so that revenue is recognized when, or as, we satisfy the performance obligations. To the extent that variable consideration is included in determining the minimum transaction price, it is constrained to the "minimum spend" amount required in a contract with a customer. Service revenues arising from contracts with customers typically have variable consideration, because customers have the ongoing ability to both add and remove features and services, and because customer usage of our telecommunications infrastructure may exceed the base amounts provided for in their contracts.

For purposes of IFRS 15, *Revenue from Contracts with Customers*, our contracts with customers are not considered to have a significant financing component. With the exception of both equipment-related upfront payments that may be required under the terms of contracts with customers and in-store "cash and carry" sales of equipment and accessories, payments are typically due 30 days from the billing date. Billings are typically rendered on a monthly basis.

Multiple contracts with a single customer are normally accounted for as separate arrangements. In instances where multiple contracts are entered into with a customer in a short period of time, the contracts are reviewed as a group to ensure that, as with multiple element arrangements, their relative transaction prices are appropriate.

Lease accounting is applied to an accounting unit if it conveys to a customer the right to use a specific asset but does not convey the risks and/or benefits of ownership.

Our revenues are recorded net of any value-added and/or sales taxes billed to the customer concurrent with a revenue-generating transaction.

We use the following revenue accounting practical expedients provided for in IFRS 15, *Revenue from Contracts with Customers*:

- No adjustment of the contracted amount of consideration for the effects of financing components when, at the inception of a contract, we expect that the effect of the financing component is not significant at the individual contract level.
- No deferral of contract acquisition costs when the amortization period for such costs would be one year or less.
- When estimating minimum transaction prices allocated to any remaining unfulfilled, or partially unfulfilled, performance obligations, exclusion of amounts arising from contracts originally expected to have a duration of one year or less, as well as amounts arising from contracts under which we may recognize and bill revenue in an amount that corresponds directly with our completed performance obligations.

**Contract assets**

Many of our multiple element arrangements arise from bundling the sale of equipment (e.g. a mobile handset) with a contracted service period. Although the customer receives the equipment at contract inception and the revenue from the associated completed performance obligation is recognized at that time, the customer's payment for the equipment will effectively be received rateably over the contracted service period to the extent it is not received as a lump-sum amount at contract inception. The difference between the equipment revenue recognized and the associated amount cumulatively billed to the customer is recognized on the Consolidated statements of financial position as a contract asset and/or an unbilled customer finance receivable, depending upon the form of the contract.

Contract assets may also arise in instances where we give consideration to a customer. When we receive no identifiable, separable benefit for consideration given to a customer, the amount of the consideration is recognized as a reduction of revenue rather than as an expense. Such amounts are included in the determination of transaction prices for allocation purposes in multiple element arrangements.

- Some forms of consideration given to a customer, effectively at contract inception, such as rebates (including prepaid non-bank cards) and/or equipment, are considered to be performance obligations in a multiple element arrangement. Although the performance obligation is satisfied at contract inception, the customer's payment associated with the performance obligation will effectively be

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received rateably over the associated contracted service period. The difference between the revenue arising from the satisfied performance obligation and the associated amount cumulatively billed to the customer is recognized on the Consolidated statements of financial position as a contract asset.

- Other forms of consideration given to a customer, either at contract inception or over a period of time, such as discounts (including prepaid bank cards), may result in us receiving no identifiable, separable benefit and thus are not considered performance obligations. Such consideration is recognized as a reduction of revenue rateably over the term of the contract. The difference between the consideration provided and the associated amount recognized as a reduction of revenue is recognized on the Consolidated statements of financial position as a contract asset.

**Contract liabilities**
Advance billings are recorded when billing occurs prior to provision of the associated services; such advance billings are recognized as revenue in the period in which the services and/or equipment are provided (see *Note 24*). Similarly, and as appropriate, upfront customer activation and connection fees are deferred and recognized over the average expected term of the customer relationship.

**Costs of contract acquisition and contract fulfilment**
Costs of contract acquisition (typically commissions) and costs of contract fulfilment are capitalized and recognized as an expense, generally over the life of the contract on a systematic and rational basis consistent with the pattern of the transfer of goods or services to which the asset relates. The amortization of such costs is included in the Consolidated statements of income and other comprehensive income as a component of Goods and services purchased, with the exception of amounts paid to our employees, which are included as Employee benefits expense.

The total cost of mobile equipment sold to customers and advertising and promotion costs related to initial customer acquisition are expensed as incurred; the cost of equipment we own that is situated at customers' premises and associated installation costs are capitalized as incurred. Costs of advertising production, advertising airtime and advertising space are expensed as incurred.

**Voice and data**
We recognize revenues on an accrual basis and include an estimate of revenues earned but unbilled. Mobile and fixed service revenues are recognized based upon access to, and usage of, our telecommunications infrastructure and upon contract fees.

Advance billings are recorded when billing occurs prior to provision of the associated services; such advance billings are recognized as revenue in the period in which the services are provided. Similarly, and as appropriate, upfront customer activation and connection fees are deferred and recognized over the average expected term of the customer relationship.

We use the liability method of accounting for the amounts of our quality of service rate rebates that arise from the jurisdiction of the Canadian Radio-television and Telecommunications Commission (CRTC).

The CRTC has established a mechanism to subsidize local exchange carriers, such as ourselves, that provide residential basic telephone service to high cost serving areas. The CRTC has determined the per network access line/per band subsidy rate for all local exchange carriers. We recognize the subsidy on an accrual basis by applying the subsidy rate to the number of residential network access lines we provide in high cost serving areas, as discussed further in *Note 7*. Differences, if any, between interim and final subsidy rates set by the CRTC are accounted for as a change in estimate in the period in which the CRTC finalizes the subsidy rate.

**Other and mobile equipment**
We recognize product revenues, including amounts related to mobile handsets sold to re-sellers and customer premises equipment, when the products are both delivered to, and accepted by, the end-user customers, irrespective of which supply channel delivers the product. With respect to mobile handsets sold to re-sellers, we consider ourselves to be the principal and primary obligor to the end-user customers. Revenues from operating leases of equipment are recognized on a systematic and rational basis (normally a straight-line basis) over the term of the lease. We recognize revenues that arise from the provision of software solutions in the accounting period in which they are provided.

We recognize revenues that arise from the provision of digital customer experience solutions, including artificial intelligence and content management solutions, in the accounting period in which they are provided, typically based upon per-productive hour or per transaction.

## (f) Depreciation, amortization and impairment

**Depreciation and amortization**
Property, plant and equipment (including right-of-use lease assets) are depreciated on a straight-line basis over their estimated useful lives (lease terms for right-of-use lease assets) as determined by a continuing program of asset life studies. Depreciation includes amortization of leasehold improvements, which are normally amortized over the lesser of their expected average service lives or the terms of the associated leases. Intangible assets with finite lives (intangible assets subject to amortization) are amortized on a straight-line basis over their estimated useful lives, which are reviewed at least annually and adjusted as appropriate. As referred to in *(b)*, the use of a straight-line basis of depreciation and amortization is a significant judgment for us.

Estimated useful lives for the majority of our property, plant and equipment (including right-of-use lease assets) and intangible assets subject to depreciation and amortization are as follows:

| | Estimated useful lives |
|---|---|
| **Property, plant and equipment (including right-of-use lease assets) subject to depreciation** | |
| Network assets | |
| Outside plant | 17 to 40 years |
| Inside plant | 4 to 25 years |
| Mobile site equipment | 5 to 7 years |
| Real estate right-of-use lease assets | 5 to 20 years |
| Balance of depreciable property, plant and equipment and right-of-use lease assets | 3 to 40 years |
| **Intangible assets subject to amortization** | |
| Customer contracts and related customer relationships | 4 to 15 years |
| Fixed subscriber base | 25 years |
| Software | 2 to 10 years |
| Access to rights-of-way, crowdsource assets and other | 5 to 30 years |

Denotes accounting policy requiring, for us, a more significant choice among accounting policies and/or a more significant application of judgment.

**Impairment – general**

Impairment testing compares the carrying values of the assets or cash-generating units being tested with their recoverable amounts (the recoverable amount being the greater of an asset's or a cash-generating unit's value in use or its fair value less costs of disposal); as referred to in *(b)*, this is a significant estimate for us. Impairment losses are immediately recognized to the extent that the carrying value of an asset or a cash-generating unit exceeds its recoverable amount. Should the recoverable amounts for impaired assets or cash-generating units subsequently increase, the impairment losses previously recognized (other than in respect of goodwill) may be reversed to the extent that the reversal is not a result of "unwinding of the discount" and that the resulting carrying values do not exceed the carrying values which would have been the result if no impairment losses had been recognized previously.

**Impairment – property, plant and equipment; intangible assets subject to amortization**

The continuing program of asset life studies considers such items as the timing of technological obsolescence, competitive pressures and future infrastructure utilization plans; these considerations could also indicate that the carrying value of an asset may not be recoverable, in which case an impairment loss would be recognized.

**Impairment – intangible assets with indefinite lives; goodwill**

The carrying values of intangible assets with indefinite lives and goodwill are periodically tested for impairment. The frequency of the impairment testing is generally the reciprocal of the stability of the relevant events and circumstances, but intangible assets with indefinite lives and goodwill must, at a minimum, be tested annually; we have selected December as the time of our annual test.

We assess our intangible assets with indefinite lives by comparing the recoverable amounts of our cash-generating units to their carrying values (including the intangible assets with indefinite lives allocated to a cash-generating unit, but excluding any goodwill allocated to a cash-generating unit). To the extent that the carrying value of a cash-generating unit (including the intangible assets with indefinite lives allocated to the cash-generating unit, but excluding any goodwill allocated to the cash-generating unit) exceeds its recoverable amount, the excess amount would be recorded as a reduction of the carrying value of intangible assets with indefinite lives.

Subsequent to assessing intangible assets with indefinite lives, we assess goodwill by comparing the recoverable amounts of our cash-generating units (or group of cash-generating units) to their carrying values (including the intangible assets with indefinite lives and any goodwill allocated to a cash-generating unit(s)). To the extent that the carrying value of a cash-generating unit (including the intangible assets with indefinite lives and the goodwill allocated to the cash-generating unit) exceeds its recoverable amount, the excess amount would first be recorded as a reduction of the carrying value of goodwill and any remainder would be recorded as a reduction of the carrying values of the assets of the cash-generating unit on a pro-rated basis.

## (g) Translation of foreign currencies

Trade transactions completed in foreign currencies are translated into Canadian dollars at the rates of exchange prevailing at the time of the transactions. Monetary assets and liabilities denominated in foreign currencies are translated into Canadian dollars at the rate of exchange in effect at the statement of financial position date, with any resulting gain or loss recorded in the Consolidated statements of income and other comprehensive income as a component of Financing costs, as set out in *Note 9*. Hedge accounting is applied in specific instances, as discussed further in *(d)* preceding.

We have foreign subsidiaries that do not have the Canadian dollar as their functional currency. Foreign exchange gains and losses arising from the translation of these foreign subsidiaries' accounts into Canadian dollars are reported as a component of other comprehensive income, as set out in *Note 11*.

## (h) Income and other taxes

We follow the liability method of accounting for income taxes; as referred to in *(b)*, this is a significant estimate for us. Under this method, current income taxes are recognized for the estimated income taxes payable for the current year. Deferred income tax assets and liabilities are recognized for temporary differences between the tax and accounting bases of assets and liabilities, and also for any benefits of losses and Investment Tax Credits available to be carried forward to future years for tax purposes that are more likely than not to be realized. The amounts recognized in respect of deferred income tax assets and liabilities are based upon the expected timing of the reversal of temporary differences or the usage of tax losses and the application of the substantively enacted tax rates at the time of reversal or usage.

We account for any changes in substantively enacted income tax rates affecting deferred income tax assets and liabilities in full in the period in which the changes are substantively enacted. We account for changes in the estimates of tax balances for prior years as estimate revisions in the period in which changes in the estimates arise; we have selected this approach, as its emphasis on the statement of financial position is more consistent with the liability method of accounting for income taxes.

Our operations are complex and the related domestic and foreign tax interpretations, regulations, legislation and jurisprudence are continually changing. As a result, there are usually some tax matters in question that result in uncertain tax positions. We recognize the income tax benefit of an uncertain tax position only when it is more likely than not that the ultimate determination of the tax treatment of the position will result in that benefit being realized; however, this does not mean that tax authorities cannot challenge these positions. We accrue an amount for interest charges on current tax liabilities that have not been funded, which would include interest and penalties arising from uncertain tax positions. We include such charges in the Consolidated statements of income and other comprehensive income as a component of Financing costs.

Our research and development activities may be eligible to earn Investment Tax Credits, for which the determination of eligibility is a complex matter. We recognize Investment Tax Credits only when there is reasonable assurance that the ultimate determination of the eligibility of our research and development activities will result in the Investment Tax Credits being received, at which time they are accounted for using the cost reduction method, whereby such credits are deducted from the expenditures or assets to which they relate, as set out in *Note 10(c)*.

Denotes accounting policy requiring, for us, a more significant choice among accounting policies and/or a more significant application of judgment.

### (i) Share-based compensation

**General**
When share-based compensation vests in its entirety at one future point in time (cliff-vesting), we recognize the expense on a straight-line basis over the vesting period. When share-based compensation vests in tranches (graded-vesting), we recognize the expense using the accelerated expense attribution method. An estimate of forfeitures during the vesting period is made at the date of grant of such share-based compensation; this estimate is adjusted to reflect actual experience.

**Restricted share units**
In respect of restricted share units with neither an equity settlement feature nor market performance conditions, as set out in *Note 14(b)*, we accrue a liability equal to the product of the number of vesting restricted share units multiplied by the fair market value of the corresponding Common Shares at the end of the reporting period. Similarly, we accrue a liability for the notional subset of our restricted share units without an equity settlement feature and with market performance conditions, using a Monte Carlo simulation-determined fair value. Restricted share units that have an equity settlement feature are accounted for as equity instruments. The expense for restricted share units that do not ultimately vest is reversed against the expense that was previously recorded in their respect.

**Share option awards**
A fair value for share option awards is determined at the date of grant and that fair value is recognized in the financial statements. Proceeds arising from the exercise of share option awards are credited to share capital, as are the recognized grant-date fair values of the exercised share option awards.

Share option awards that have a net-equity settlement feature, as set out in *Note 14(d)*, are accounted for as equity instruments. We have selected the equity instrument fair value method of accounting for the net-equity settlement feature, as it is consistent with the accounting treatment applied to the associated share option awards.

### (j) Employee future benefit plans

**Defined benefit plans**
We accrue amounts for our obligations under employee defined benefit plans and the related costs, net of plan assets. The cost of pensions and other retirement benefits earned by employees is actuarially determined using the accrued benefit method pro-rated on service and management's best estimates of both salary escalation and the retirement ages of employees. In the determination of net income, net interest for each plan, which is the product of the plan's surplus (deficit) multiplied by the discount rate, is included as a component of Financing costs, as set out in *Note 9*.

An amount reflecting the effect of differences between the discount rate and the actual rate of return on plan assets is included as a component of employee defined benefit plan re-measurements within Other comprehensive income, as set out in *Note 11* and *Note 15*. We determine the maximum economic benefit available from the plans' assets on the basis of reductions in future contributions to the plans.

On an annual basis, at a minimum, the defined benefit plan key assumptions are assessed and revised as appropriate; as referred to in *(b)*, these are significant estimates for us.

**Defined contribution plans**
We use defined contribution accounting for the Telecommunication Workers Pension Plan and the British Columbia Public Service Pension Plan, which cover certain of our employees and provide defined benefits to their members. In the absence of any regulations governing the calculation of the share of the underlying financial position and plan performance attributable to each employer-participant, and in the absence of contractual agreements between the plans and the employer-participants related to the financing of any shortfall (or distribution of any surplus), we account for these plans as defined contribution plans, in accordance with International Accounting Standard 19, *Employee Benefits*.

### (k) Cash and temporary investments, net

Cash and temporary investments, which may include investments in money market instruments that are purchased three months or less from maturity, are presented net of outstanding items, including cheques written but not cleared by the related banks as at the statement of financial position date. Cash and temporary investments, net, are classified as a liability in the statement of financial position when the total amount of all cheques written but not cleared by the related banks exceeds the amount of cash and temporary investments. When cash and temporary investments, net, are classified as a liability, they may also include overdraft amounts drawn on our bilateral bank facilities, which revolve daily and are discussed further in *Note 22*.

### (l) Inventories

Our inventories primarily consist of mobile handsets, parts and accessories totalling $381 million as at December 31, 2021 (2020 – $328 million), and communications equipment held for resale. Inventories are valued at the lower of cost and net realizable value, with cost being determined on an average cost basis. Costs of goods sold for the year ended December 31, 2021, totalled $2.2 billion (2020 – $2.0 billion).

### (m) Property, plant and equipment; intangible assets

**General**
Property, plant and equipment and intangible assets are recorded at historical cost, which for self-constructed property, plant and equipment includes materials, direct labour and applicable overhead costs. For internally developed, internal-use software, the historical cost recorded includes materials, direct labour and direct labour-related costs. Where property, plant and equipment construction projects are of sufficient size and duration, an amount is capitalized for the cost of funds used to finance construction, as set out in *Note 9*. The rate for calculating the capitalized financing cost is based on the weighted average cost of borrowing that we experience during the reporting period.

When we sell property, plant and/or equipment, the net book value is netted against the sale proceeds and the difference, as set out in *Note 7*, is included in the Consolidated statements of income and other comprehensive income as a component of Other income.

**Asset retirement obligations**
Provisions for liabilities, as set out in *Note 25*, are recognized for statutory, contractual or legal obligations, normally when incurred, associated with the retirement of property, plant and equipment (primarily certain items of outside plant and mobile site equipment) when those obligations result from the acquisition, construction, development and/or normal

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operation of the assets; as referred to in *(b)*, this is a significant estimate for us. The obligations are measured initially at fair value, which is determined using present value methodology, and the resulting costs are capitalized as a part of the carrying value of the related asset. In subsequent periods, the provisions for these liabilities are adjusted for the accretion of discount, for any changes in the market-based discount rate and for any changes in the amount or timing of the underlying future cash flows. The capitalized asset retirement cost is depreciated on the same basis as the related asset and the discount accretion, as set out in *Note 9*, is included in the Consolidated statements of income and other comprehensive income as a component of Financing costs.

### (n) Investments

We account for our investments in companies over which we have significant influence, as discussed further in *Note 21*, using the equity method of accounting, whereby the investments are initially recorded at cost and subsequently adjusted to recognize our share of earnings or losses of the investee companies and any earnings distributions received. The excess of the cost of an equity investment over its underlying book value at the date of acquisition, except for goodwill, is amortized over the estimated useful lives of the underlying assets to which the excess cost is attributed.

Similarly, we account for our interests in the real estate joint ventures, as discussed further in *Note 21*, using the equity method of accounting. Unrealized gains and losses from transactions with (including contributions to) the real estate joint ventures are deferred in proportion to our remaining interest in the real estate joint ventures.

We account for our other long-term investments at their fair values unless they are investment securities that do not have quoted market prices in an active market or do not have other clear and objective evidence of fair value. When we do not account for our other long-term investments at their fair values, we use the cost basis of accounting, whereby the investments are initially recorded at cost, and earnings from those investments are recognized only to the extent received or receivable. When there is a significant or prolonged decline in the value of an other long-term investment, the carrying value of that other long-term investment is adjusted to its estimated fair value.

## 2 Accounting policy developments

### (a) Initial application of standards, interpretations and amendments to standards and interpretations in the reporting period

In August 2020, the International Accounting Standards Board issued *Interest Rate Benchmark Reform – Phase 2*, which amends IFRS 9 *Financial Instruments*, IAS 39 *Financial Instruments: Recognition and Measurement*, IFRS 7 *Financial Instruments: Disclosures*, IFRS 4 *Insurance Contracts* and IFRS 16 *Leases*. The amendments are effective for periods beginning on or after January 1, 2021, although earlier application is permitted. Interest rate benchmarks such as interbank offer rates (IBORs) play an important role in global financial markets as they index a wide variety of financial products, including derivative financial instruments. Market developments have impacted the reliability of some existing benchmarks and, in this context, the Financial Stability Board has published a report setting out recommendations to reform such benchmarks. The *Interest Rate Benchmark Reform – Phase 2* amendments focus on the effects of the interest rate benchmark reform on a company's financial statements that arise when an interest rate benchmark used to calculate interest is replaced with an alternative benchmark rate; most significantly, there will be no requirement to de-recognize or adjust the amount of financial instruments for changes required by the reform, but will instead update the effective interest rate to reflect the change to the alternative benchmark rate. The effects, which have not been material in the current fiscal year, of these amendments on our financial performance and disclosure will be dependent upon the facts and circumstances of future changes in the derivative financial instruments we use, if any, and any future changes in interest rate benchmarks, if any, referenced by such derivative financial instruments we use.

### (b) Standards, interpretations and amendments to standards and interpretations in the reporting period not yet effective and not yet applied

- In February 2021, the International Accounting Standards Board issued narrow-scope amendments to IAS 1, *Presentation of Financial Statements*, IFRS Practice Statement 2, *Making Materiality Judgements* and IAS 8, *Accounting Policies, Changes in Accounting Estimates and Errors*. The amendments are effective for annual periods beginning on or after January 1, 2023, although earlier application is permitted. The amendments will require the disclosure of material accounting policy information rather than disclosing significant accounting policies and clarify how to distinguish changes in accounting policies from changes in accounting estimates. We are currently assessing the impacts of the amended standards, but do not expect that our financial disclosure will be materially affected by the application of the amendments.
- In May 2021, the International Accounting Standards Board issued targeted amendments to IAS 12, *Income Taxes*. The amendments are effective for annual periods beginning on or after January 1, 2023, although earlier application is permitted. With a view to reducing diversity in reporting, the amendments will clarify that companies are required to recognize deferred taxes on transactions where both assets and liabilities are recognized, such as with leases and asset retirement (decommissioning) obligations. Based upon our current facts and circumstances, we do not expect our financial performance or disclosure to be materially affected by the application of the amended standard.

Denotes accounting policy requiring, for us, a more significant choice among accounting policies and/or a more significant application of judgment.

# 3 Capital structure financial policies

## General

Our objective when managing capital is to maintain a flexible capital structure that optimizes the cost and availability of capital at acceptable risk.

In our definition of capital, we include common equity (excluding accumulated other comprehensive income), non-controlling interests, long-term debt (including long-term credit facilities, commercial paper backstopped by long-term credit facilities and any hedging assets or liabilities associated with long-term debt items, net of amounts recognized in accumulated other comprehensive income), cash and temporary investments, and short-term borrowings, including those arising from securitized trade receivables.

We manage our capital structure and make adjustments to it in light of changes in economic conditions and the risk characteristics of our business. In order to maintain or adjust our capital structure, we may adjust the amount of dividends paid to holders of Common Shares, purchase Common Shares for cancellation pursuant to normal course issuer bids, issue new shares (including Common Shares and TELUS International (Cda) Inc. subordinate voting shares), issue new debt, issue new debt to replace existing debt with different characteristics, and/or increase or decrease the amount of trade receivables sold to an arm's-length securitization trust.

During 2021, our financial objectives, which are reviewed annually, were unchanged from 2020. We believe that our financial objectives are supportive of our long-term strategy.

We monitor capital utilizing a number of measures, including: net debt to earnings before interest, income taxes, depreciation and amortization (EBITDA*) – excluding restructuring and other costs ratio; coverage ratios; and dividend payout ratios.

## Debt and coverage ratios

Net debt to EBITDA – excluding restructuring and other costs is calculated as net debt at the end of the period, divided by 12-month trailing EBITDA – excluding restructuring and other costs. This measure, historically, is substantially similar to the leverage ratio covenant in our credit facilities. Net debt and EBITDA – excluding restructuring and other costs are measures that do not have any standardized meanings prescribed by IFRS-IASB and are therefore unlikely to be comparable to similar measures presented by other issuers. The calculation of these measures is set out in the following table. Net debt is one component of a ratio used to determine compliance with debt covenants.

*EBITDA is not a standardized financial measure under IFRS-IASB and might not be comparable to similar measures disclosed by other issuers; we define EBITDA as operating revenues and other income less goods and services purchased and employee benefits expense. We report EBITDA because it is a key measure that management uses to evaluate the performance of our business, and it is also utilized in measuring compliance with certain debt covenants.

| As at, or for the 12-month periods ended, December 31 ($ in millions) | Objective | 2021 | 2020 |
|---|---|---|---|
| Components of debt and coverage ratios | | | |
| Net debt[1] | | **$ 20,535** | $ 19,826 |
| EBITDA – excluding restructuring and other costs[2] | | **$ 6,476** | $ 5,753 |
| Net interest cost[3] *(Note 9)* | | **$ 773** | $ 792 |
| Debt ratio | | | |
| Net debt to EBITDA – excluding restructuring and other costs | 2.20 – 2.70[4] | **3.17** | 3.45 |
| Coverage ratios | | | |
| Earnings coverage[5] | | **3.9** | 3.2 |
| EBITDA – excluding restructuring and other costs interest coverage[6] | | **8.4** | 7.3 |

1 Net debt and total capitalization are calculated as follows:

| As at December 31 | Note | 2021 | 2020 |
|---|---|---|---|
| Long-term debt | *26* | **$ 20,852** | $ 20,288 |
| Debt issuance costs netted against long-term debt | | **94** | 97 |
| Derivative (assets) liabilities, net | | **7** | 120 |
| Accumulated other comprehensive income amounts arising from financial instruments used to manage interest rate and currency risks associated with U.S. dollar-denominated long-term debt – excluding tax effects | | **191** | 69 |
| Cash and temporary investments, net | | **(723)** | (848) |
| Short-term borrowings | *22* | **114** | 100 |
| Net debt | | **20,535** | 19,826 |
| Common equity | | **15,116** | 12,040 |
| Non-controlling interests | | **943** | 528 |
| Less: accumulated other comprehensive income included above in common equity and non-controlling interests | | **(186)** | (135) |
| Total managed capitalization | | **$ 36,408** | $ 32,259 |

2 EBITDA – excluding restructuring and other costs is calculated as follows:

| Years ended December 31 | Note | 2021 | 2020 |
|---|---|---|---|
| EBITDA | *5* | **$ 6,290** | $ 5,494 |
| Restructuring and other costs | *16* | **186** | 259 |
| EBITDA – excluding restructuring and other costs | | **$ 6,476** | $ 5,753 |

3 Net interest cost is defined as financing costs, excluding employee defined benefit plans net interest, recoveries on long-term debt prepayment premium and repayment of debt, calculated on a 12-month trailing basis (expenses recorded for long-term debt prepayment premium, if any, are included in net interest cost) (see *Note 9*).

4 Our long-term objective range for this ratio is 2.20 – 2.70 times. The ratio as at December 31, 2021, is outside the long-term objective range. We may permit, and have permitted, this ratio to go outside the objective range (for long-term investment opportunities), but we will endeavour to return this ratio to within the objective range in the medium term (following the recent 2021, and upcoming 2023 and 2024, spectrum auctions), as we believe that this range is supportive of our long-term strategy. We are in compliance with the leverage ratio covenant in our credit facilities, which states that we may not permit our net debt to operating cash flow ratio to exceed 4.25:1.00 (see *Note 26(d)*); the calculation of the debt ratio is substantially similar to the calculation of the leverage ratio covenant in our credit facilities.

5 Earnings coverage is defined by Canadian Securities Administrators National Instrument 41-101 as net income before borrowing costs and income tax expense, divided by borrowing costs (interest on long-term debt; interest on short-term borrowings and other; long-term debt prepayment premium), and adding back capitalized interest, all such amounts excluding amounts attributable to non-controlling interests.

6 EBITDA – excluding restructuring and other costs interest coverage is defined as EBITDA – excluding restructuring and other costs, divided by net interest cost. This measure is substantially similar to the coverage ratio covenant in our credit facilities.

Net debt to EBITDA – excluding restructuring and other costs was 3.17 times as at December 31, 2021, down from 3.45 times one year earlier. The effect of the increase in net debt, primarily due to business acquisitions and the acquisition of spectrum licences, was exceeded by the effect of growth in EBITDA – excluding restructuring and other costs. EBITDA growth was reduced by COVID-19 pandemic impacts.

The earnings coverage ratio for the twelve-month period ended December 31, 2021, was 3.9 times, up from 3.2 times one year earlier. An increase in income before borrowing costs and income taxes increased the ratio by 0.7. The EBITDA – excluding restructuring and other costs interest coverage ratio for the twelve-month period ended December 31, 2021, was 8.4 times, up from 7.3 times one year earlier. Growth in EBITDA – excluding restructuring and other costs increased the ratio by 0.9 and a decrease in net interest costs increased the ratio by 0.2. Fiscal 2021 EBITDA growth was reduced by COVID-19 pandemic impacts.

### TELUS Corporation Common Share dividend payout ratio

So as to be consistent with the way we manage our business, our TELUS Corporation Common Share dividend payout ratio is presented as a historical measure calculated as the sum of the most recent four quarters' dividends declared for TELUS Corporation Common Shares, as recorded in the financial statements net of dividend reinvestment plan effects (see *Note 13*), divided by the sum of free cash flow* amounts for the most recent four quarters for interim reporting periods (divided by annual free cash flow if the reported amount is in respect of a fiscal year).

| For the 12-month periods ended December 31 | Objective | 2021 | 2020 |
|---|---|---|---|
| Determined using most comparable IFRS-IASB measures | | | |
| Ratio of TELUS Corporation Common Share dividends declared to cash provided by operating activities – less capital expenditures (excluding spectrum licences) | | **192%** | 84% |
| Determined using management measures | | | |
| TELUS Corporation Common Share dividend payout ratio – net of dividend reinvestment plan effects | 60%–75%[1] | **140%** | 67% |

1 Our objective range for the TELUS Corporation Common Share dividend payout ratio is 60%–75% of free cash flow on a prospective basis.

| For the 12-month periods ended December 31 (millions) | 2021 | 2020 |
|---|---|---|
| TELUS Corporation Common Share dividends declared | **$ 1,711** | $ 1,520 |
| Amount of TELUS Corporation Common Share dividends declared reinvested in TELUS Corporation Common Shares | **(624)** | (561) |
| TELUS Corporation Common Share dividends declared – net of dividend reinvestment plan effects | **$ 1,087** | $ 959 |

Our calculation of free cash flow, and the reconciliation to cash provided by operating activities, is as follows:

| For the 12-month periods ended December 31 (millions) | Note | 2021 | 2020 |
|---|---|---|---|
| EBITDA | *5* | **$ 6,290** | $ 5,494 |
| Deduct gain on disposition of financial solutions business | *7* | **(410)** | – |
| Deduct non-cash gains from the sales of property, plant and equipment | | **–** | (4) |
| Restructuring and other costs, net of disbursements | | **10** | 35 |
| Effects of contract asset, acquisition and fulfilment and TELUS Easy Payment device financing | | **(45)** | 43 |
| Effect of lease principal | *31(b)* | **(502)** | (365) |
| Leases accounted for as finance leases prior to adoption of IFRS 16 | | **–** | 86 |
| Items from the Consolidated statements of cash flows: | | | |
| Share-based compensation, net | *14* | **139** | 27 |
| Net employee defined benefit plans expense | *15* | **113** | 102 |
| Employer contributions to employee defined benefit plans | | **(53)** | (51) |
| Interest paid | | **(744)** | (740) |
| Interest received | | **17** | 13 |
| Capital expenditures (excluding spectrum licences) | *5* | **(3,498)** | (2,775) |
| Free cash flow before income taxes | | **1,317** | 1,865 |
| Income taxes paid, net of refunds | | **(601)** | (430) |
| Effect of disposition of financial solutions business on income taxes paid | | **61** | – |
| Free cash flow | | **777** | 1,435 |
| Add (deduct): | | | |
| Capital expenditures (excluding spectrum licences) | *5* | **3,498** | 2,775 |
| Effects of lease principal and leases accounted for as finance leases prior to adoption of IFRS 16 | | **502** | 279 |
| Gain on disposition of financial solutions business, net of effect on income taxes paid | | **(349)** | – |
| Individually immaterial items included in net income neither providing nor using cash | | **(40)** | 85 |
| Cash provided by operating activities | | **$ 4,388** | $ 4,574 |

*Free cash flow is not a standardized financial measure under IFRS-IASB and might not be comparable to similar measures presented by other issuers; we define free cash flow as EBITDA (operating revenues and other income less goods and services purchased and employee benefits expense) excluding certain working capital changes (such as trade receivables and trade payables), proceeds from divested assets and other sources and uses of cash, as found in the consolidated statements of cash flows. We have issued guidance on, and report, free cash flow because it is a key measure that management, and investors, use to evaluate the performance of our business.

# 4 Financial instruments

## (a) Risks – overview

Our financial instruments, their accounting classification and the nature of certain risks to which they may be subject are set out in the following table.

| Financial instrument | Accounting classification | Risks: Credit | Risks: Liquidity | Market risks: Currency | Market risks: Interest rate | Market risks: Other price |
|---|---|---|---|---|---|---|
| **Measured at amortized cost** | | | | | | |
| Accounts receivable | AC[1] | X | | X | | |
| Contract assets | AC[1] | X | | | | |
| Construction credit facilities advances to real estate joint venture | AC[1] | | | | X | |
| Short-term borrowings | AC[1] | | X | X | X | |
| Accounts payable | AC[1] | | X | X | | |
| Provisions (including restructuring accounts payable) | AC[1] | | X | X | | X |
| Long-term debt | AC[1] | | X | X | X | |
| **Measured at fair value** | | | | | | |
| Cash and temporary investments | FVTPL[2] | X | | X | X | |
| Long-term investments (not subject to significant influence)[3] | FVTPL/FVOCI[3] | | | X | | X |
| Foreign exchange derivatives[4] | FVTPL[2] | X | X | X | | |

1 For accounting recognition and measurement purposes, classified as amortized cost (AC).
2 For accounting recognition and measurement purposes, classified as fair value through net income (FVTPL). *Unrealized* changes in the fair values of financial instruments are included in net income unless the instrument is part of a cash flow hedging relationship. The effective portions of *unrealized* changes in the fair values of financial instruments held for hedging are included in other comprehensive income.
3 Long-term investments over which we do not have significant influence are measured at fair value if those fair values can be reliably measured. For accounting recognition and measurement purposes, on an investment-by-investment basis, long-term investments are classified as either fair value through net income or fair value through other comprehensive income (FVOCI).
4 Use of derivative financial instruments is subject to a policy which requires that no derivative transaction is to be entered into for the purpose of establishing a speculative or leveraged position (the corollary being that all derivative transactions are to be entered into for risk management purposes only) and sets criteria for the creditworthiness of the transaction counterparties.
Derivatives that are part of an established and documented cash flow hedging relationship are accounted for as held for hedging. We believe that classification as held for hedging results in a better matching of the change in the fair value of the derivative financial instrument with the risk exposure being hedged.
In respect of hedges of anticipated transactions, hedge gains/losses are included with the related expenditure and are expensed when the transaction is recognized in our results of operations. We have selected this method as we believe that it results in a better matching of the hedge gains/losses with the risk exposure being hedged.
Derivatives that are not part of a documented cash flow hedging relationship are accounted for as held for trading and thus are measured at fair value through net income.

### Derivative financial instruments

We apply hedge accounting to financial instruments used to establish hedge accounting relationships for U.S. dollar-denominated transactions. We believe that our use of derivative financial instruments for hedging or arbitrage assists us in managing our financing costs and/or reducing the uncertainty associated with our financing or other business activities. Uncertainty associated with currency risk and other price risk is reduced through our use of foreign exchange derivatives that effectively swap floating currency exchange rates for fixed rates. When entering into derivative financial instrument contracts, we seek to align the cash flow timing of the hedging items with that of the hedged items. The effects of this risk management strategy and its application are set out in *(i)* following.

## (b) Credit risk

Excluding credit risk, if any, arising from currency swaps settled on a gross basis, the best representation of our maximum exposure (excluding income tax effects) to credit risk, which is a worst-case scenario and does not reflect results we expect, is set out in the following table.

| As at December 31 (millions) | 2021 | 2020 |
|---|---|---|
| Cash and temporary investments, net | $ 723 | $ 848 |
| Accounts receivable | 3,216 | 2,716 |
| Contract assets | 709 | 707 |
| Derivative assets | 89 | 42 |
| | $ 4,737 | $ 4,313 |

### Cash and temporary investments, net

Credit risk associated with cash and temporary investments is managed by ensuring that these financial assets are placed with: governments; major financial institutions that have been accorded strong investment grade ratings by a primary rating agency; and/or other creditworthy counterparties. An ongoing review evaluates changes in the status of counterparties.

**Accounts receivable**

Credit risk associated with accounts receivable is inherently managed by the size and diversity of our large customer base, which includes substantially all consumer and business sectors in Canada. We follow a program of credit evaluations of customers and limit the amount of credit extended when deemed necessary. Accounts are considered to be past due (in default) when customers have failed to make the contractually required payments when due, which is generally within 30 days of the billing date. Any late payment charges are levied at an industry-based market or negotiated rate on outstanding non-current customer account balances.

| As at December 31 (millions) | | | | 2021 | | | 2020 |
|---|---|---|---|---|---|---|---|
| | Note | Gross | Allowance | Net[1] | Gross | Allowance | Net[1] |
| **Customer accounts receivable, net of allowance for doubtful accounts** | | | | | | | |
| Less than 30 days past billing date | | **$ 883** | **$ (8)** | **$ 875** | $ 815 | $ (19) | $ 796 |
| 30–60 days past billing date | | **330** | **(7)** | **323** | 339 | (17) | 322 |
| 61–90 days past billing date | | **92** | **(9)** | **83** | 90 | (19) | 71 |
| More than 90 days past billing date | | **140** | **(21)** | **119** | 98 | (43) | 55 |
| Unbilled customer finance receivables | | **1,323** | **(65)** | **1,258** | 1,026 | (42) | 984 |
| | | **$ 2,768** | **$ (110)** | **$ 2,658** | $ 2,368 | $ (140) | $ 2,228 |
| Current | | **$ 2,194** | **$ (81)** | **$ 2,113** | $ 1,986 | $ (119) | $ 1,867 |
| Non-current | *20* | **574** | **(29)** | **545** | 382 | (21) | 361 |
| | | **$ 2,768** | **$ (110)** | **$ 2,658** | $ 2,368 | $ (140) | $ 2,228 |

1 Net amounts represent customer accounts receivable for which an allowance had not been made as at the dates of the Consolidated statements of financial position (see *Note 6(b)*).

We maintain allowances for lifetime expected credit losses related to doubtful accounts. Current economic conditions (including forward-looking macroeconomic data), historical information (including credit agency reports, if available), reasons for the accounts being past due and the line of business from which the customer accounts receivable arose are all considered when determining whether to make allowances for past-due accounts. The same factors are considered when determining whether to write off amounts charged to the allowance for doubtful accounts against the customer accounts receivable. The doubtful accounts expense is calculated on a specific-identification basis for customer accounts receivable above a specific balance threshold and on a statistically derived allowance basis for the remainder. No customer accounts receivable are written off directly to the doubtful accounts expense.

The following table presents a summary of the activity related to our allowance for doubtful accounts.

| Years ended December 31 (millions) | 2021 | 2020 |
|---|---|---|
| Balance, beginning of period | **$ 140** | $ 55 |
| Additions (doubtful accounts expense) | **42** | 91 |
| Accounts written off[1] less than recoveries | **(77)** | (22) |
| Other | **5** | 16 |
| Balance, end of period | **$ 110** | $ 140 |

1 For the year ended December 31, 2021, accounts written off, but that were still subject to enforcement activity, totalled $110 (2020 – $92).

**Contract assets**

Credit risk associated with contract assets is inherently managed by the size and diversity of our large customer base, which includes substantially all consumer and business sectors in Canada. We follow a program of credit evaluations of customers and limit the amount of credit extended when deemed necessary.

| As at December 31 (millions) | | | 2021 | | | 2020 |
|---|---|---|---|---|---|---|
| | Gross | Allowance | Net (*Note 6(c)*) | Gross | Allowance | Net (*Note 6(c)*) |
| **Contract assets, net of impairment allowance** | | | | | | |
| To be billed and thus reclassified to accounts receivable during: | | | | | | |
| The 12-month period ending one year hence | **$ 595** | **$ (24)** | **$ 571** | $ 611 | $ (29) | $ 582 |
| The 12-month period ending two years hence | **259** | **(11)** | **248** | 265 | (12) | 253 |
| Thereafter | **19** | **(1)** | **18** | 16 | (1) | 15 |
| | **$ 873** | **$ (36)** | **$ 837** | $ 892 | $ (42) | $ 850 |

We maintain allowances for lifetime expected credit losses related to contract assets. Current economic conditions, historical information (including credit agency reports, if available), and the line of business from which the contract asset arose are all considered when determining impairment allowances. The same factors are considered when determining whether to write off amounts charged to the impairment allowance for contract assets against contract assets.

**Derivative assets (and derivative liabilities)**
Counterparties to our material foreign exchange derivatives are major financial institutions that have been accorded investment grade ratings by a primary credit rating agency. The total dollar amount of credit exposure under contracts with any one financial institution is limited and counterparties' credit ratings are monitored. We do not give or receive collateral on swap agreements and hedging items due to our credit rating and those of our counterparties. While we are exposed to the risk of potential credit losses due to the possible non-performance of our counterparties, we consider this risk remote. Our derivative liabilities do not have credit risk-related contingent features.

## (c) Liquidity risk

As a component of our capital structure financial policies, discussed further in *Note 3*, we manage liquidity risk by:

- maintaining a daily cash pooling process that enables us to manage our available liquidity and our liquidity requirements according to our actual needs;
- maintaining an agreement to sell trade receivables to an arm's-length securitization trust and bilateral bank facilities (*Note 22*), a commercial paper program (*Note 26(c)*) and syndicated credit facilities (*Note 26(d)*, *(f)*);
- maintaining an in-effect shelf prospectus;
- continuously monitoring forecast and actual cash flows; and
- managing maturity profiles of financial assets and financial liabilities.

Our debt maturities in future years are disclosed in *Note 26(i)*. As at December 31, 2021, TELUS Corporation could offer $2.75 billion of debt or equity securities pursuant to a shelf prospectus that is in effect until June 2023 (2020 – $2.0 billion of debt or equity securities pursuant to a shelf prospectus that was in effect until June 2022). We believe that our investment grade credit ratings contribute to reasonable access to capital markets.

We closely match the contractual maturities of our derivative financial liabilities with those of the risk exposures they are being used to manage.

The expected maturities of our undiscounted financial liabilities do not differ significantly from the contractual maturities, other than as noted below. The contractual maturities of our undiscounted financial liabilities, including interest thereon (where applicable), are set out in the following tables.

| | Non-derivative | | | | | | Derivative | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Composite long-term debt | | | | | | | |
| | | | | | Currency swap agreement amounts to be exchanged[2] | | | Currency swap agreement amounts to be exchanged | | |
| As at December 31, 2021 (millions) | Non-interest bearing financial liabilities | Short-term borrowings[1] | Long-term debt, excluding leases[1] *(Note 26)* | Leases *(Note 26)* | (Receive) | Pay | Other | (Receive) | Pay | Total |
| 2022 | $ 3,395 | $ 15 | $ 3,130 | $ 504 | $ (2,050) | $ 2,059 | $ 8 | $ (544) | $ 540 | $ 7,057 |
| 2023 | 62 | 1 | 1,167 | 364 | (149) | 148 | – | – | – | 1,593 |
| 2024 | 13 | 101 | 1,724 | 305 | (149) | 148 | – | – | – | 2,142 |
| 2025 | 14 | – | 2,217 | 176 | (522) | 540 | – | – | – | 2,425 |
| 2026 | 2 | – | 1,901 | 144 | (116) | 118 | – | – | – | 2,049 |
| 2027–2031 | 7 | – | 7,351 | 398 | (1,784) | 1,852 | – | – | – | 7,824 |
| Thereafter | – | – | 10,499 | 344 | (2,805) | 2,877 | – | – | – | 10,915 |
| Total | $ 3,493 | $ 117 | $ 27,989 | $ 2,235 | $ (7,575) | $ 7,742 | $ 8 | $ (544) | $ 540 | $ 34,005 |
| | | | Total (*Note 26(i)*) | | | $ 30,391 | | | | |

1 Cash outflows in respect of interest payments on our short-term borrowings, commercial paper and amounts drawn under our credit facilities (if any) have been calculated based upon the interest rates in effect as at December 31, 2021.

2 The amounts included in undiscounted non-derivative long-term debt in respect of U.S. dollar-denominated long-term debt, and the corresponding amounts in the long-term debt currency swap receive column, have been determined based upon the currency exchange rates in effect as at December 31, 2021. The hedged U.S. dollar-denominated long-term debt contractual amounts at maturity, in effect, are reflected in the long-term debt currency swap pay column as gross cash flows are exchanged pursuant to the currency swap agreements.

| As at December 31, 2020 (millions) | Non-derivative | | Composite long-term debt | | | | Derivative | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Non-interest bearing financial liabilities | Short-term borrowings[1] | Long-term debt, excluding leases[1] *(Note 26)* | Leases *(Note 26)* | Currency swap agreement amounts to be exchanged[2] (Receive) | Currency swap agreement amounts to be exchanged[2] Pay | Other | Currency swap agreement amounts to be exchanged (Receive) | Currency swap agreement amounts to be exchanged Pay | Total |
| 2021 | $ 2,669 | $ 101 | $ 1,658 | $ 538 | $ (882) | $ 892 | $ – | $ (454) | $ 475 | $ 4,997 |
| 2022 | 74 | – | 2,204 | 371 | (149) | 151 | – | – | – | 2,651 |
| 2023 | 8 | – | 1,149 | 230 | (149) | 151 | 6 | – | – | 1,395 |
| 2024 | 8 | – | 1,706 | 191 | (150) | 151 | – | – | – | 1,906 |
| 2025 | 9 | – | 2,868 | 145 | (525) | 575 | – | – | – | 3,072 |
| 2026–2030 | 12 | – | 7,953 | 417 | (1,836) | 1,898 | – | – | – | 8,444 |
| Thereafter | – | – | 9,877 | 379 | (2,889) | 2,949 | – | – | – | 10,316 |
| Total | $ 2,780 | $ 101 | $ 27,415 | $ 2,271 | $ (6,580) | $ 6,767 | $ 6 | $ (454) | $ 475 | $ 32,781 |
| | | | Total | | | $ 29,873 | | | | |

1 Cash outflows in respect of interest payments on our short-term borrowings, commercial paper and amounts drawn under our credit facilities (if any) have been calculated based upon the interest rates in effect as at December 31, 2020.
2 The amounts included in undiscounted non-derivative long-term debt in respect of U.S. dollar-denominated long-term debt, and the corresponding amounts in the long-term debt currency swap receive column, have been determined based upon the currency exchange rates in effect as at December 31, 2020. The hedged U.S. dollar-denominated long-term debt contractual amounts at maturity, in effect, are reflected in the long-term debt currency swap pay column as gross cash flows are exchanged pursuant to the currency swap agreements.

## (d) Currency risk

Our functional currency is the Canadian dollar, but certain routine revenues and operating costs are denominated in U.S. dollars and some inventory purchases and capital asset acquisitions are sourced internationally. The U.S. dollar is the only foreign currency to which we have a significant exposure as at the balance sheet date.

Our foreign exchange risk management includes the use of foreign currency forward contracts and currency options to fix the exchange rates on a varying percentage, typically in the range of 50% to 75%, of our domestic short-term U.S. dollar-denominated transactions and commitments and all U.S. dollar-denominated commercial paper. Other than in respect of U.S. dollar-denominated commercial paper, we designate only the spot element of these instruments as the hedging item, as the forward element is wholly immaterial; in respect of U.S. dollar-denominated commercial paper, we designate the forward rate.

As discussed further in *Note 26(b)* and *Note 26(f)*, we are also exposed to currency risk in that the fair value or future cash flows of our U.S. Dollar Notes and our TELUS International (Cda) Inc. credit facility U.S. dollar borrowings could fluctuate because of changes in foreign exchange rates. Currency hedging relationships have been established for the related semi-annual interest payments and the principal payment at maturity in respect of the U.S. Dollar Notes; we designate only the spot element of these instruments as the hedging item, as the forward element is wholly immaterial. As the functional currency of our TELUS International (Cda) Inc. subsidiary is the U.S. dollar, fluctuations in foreign exchange rates affecting its borrowings are reflected as a foreign currency translation adjustment within other comprehensive income.

## (e) Interest rate risk

Changes in market interest rates will cause fluctuations in the fair values or future cash flows of temporary investments, construction credit facility advances made to the real estate joint venture, short-term obligations, long-term debt and interest rate swap derivatives.

When we have temporary investments, they have short maturities and fixed interest rates and, as a result, their fair values will fluctuate with changes in market interest rates; absent monetization prior to maturity, the related future cash flows will not change due to changes in market interest rates.

If the balance of short-term investments includes dividend-paying equity instruments, we could be exposed to interest rate risk.

Due to the short-term nature of the applicable rates of interest charged, the fair value of the construction credit facility advances made to the real estate joint venture is not materially affected by changes in market interest rates; the associated cash flows representing interest payments will be affected until such advances are repaid.

As short-term obligations arising from bilateral bank facilities, which typically have variable interest rates, are rarely outstanding for periods that exceed one calendar week, interest rate risk associated with this item is not material.

Short-term borrowings arising from the sales of trade receivables to an arm's-length securitization trust are fixed-rate debts. Due to the short maturities of these borrowings, interest rate risk associated with this item is not material.

All of our currently outstanding long-term debt, other than commercial paper and amounts drawn on our credit facilities (*Note 26(c)*, *(f)*), is fixed-rate debt. The fair value of fixed-rate debt fluctuates with changes in market interest rates; absent early redemption, the related future cash flows will not change. Due to the short maturities of commercial paper, its fair value is not materially affected by changes in market interest rates, but the associated cash flows representing interest payments may be affected if the commercial paper is rolled over.

Amounts drawn on our short-term and long-term credit facilities will be affected by changes in market interest rates in a manner similar to commercial paper.

### (f) Other price risk

**Long-term investments**
We are exposed to equity price risk arising from investments classified as fair value through other comprehensive income. Such investments are held for strategic rather than trading purposes.

### (g) Market risks

Net income and other comprehensive income for the years ended December 31, 2021 and 2020, could have varied if the Canadian dollar: U.S. dollar exchange rate, the U.S. dollar: European euro exchange rate and market interest rates varied by reasonably possible amounts from their actual statement of financial position date amounts.

The sensitivity analysis of our exposure to currency risk at the reporting date has been determined based upon a hypothetical change taking place at the relevant statement of financial position date. The U.S. dollar-denominated and European euro-denominated balances and derivative financial instrument notional amounts as at the statement of financial position dates have been used in the calculations.

The sensitivity analysis of our exposure to interest rate risk at the reporting date has been determined based upon a hypothetical change taking place at the beginning of the relevant fiscal year and being held constant through to the statement of financial position date. The principal and notional amounts as at the relevant statement of financial position date have been used in the calculations.

Income tax expense, which is reflected net in the sensitivity analysis, reflects the applicable statutory income tax rates for the reporting periods.

| Years ended December 31 (increase (decrease) in millions) | Net income | | Other comprehensive income | | Comprehensive income | |
|---|---|---|---|---|---|---|
| | **2021** | 2020 | **2021** | 2020 | **2021** | 2020 |
| Reasonably possible changes in market risks[1] | | | | | | |
| 10% change in C$: US$ exchange rate | | | | | | |
| Canadian dollar appreciates | **$ 1** | $ – | **$ (33)** | $ 14 | **$ (32)** | $ 14 |
| Canadian dollar depreciates | **$ (1)** | $ – | **$ 33** | $ (14) | **$ 32** | $ (14) |
| 10% change in US$: € exchange rate | | | | | | |
| U.S. dollar appreciates | **$ –** | $ – | **$ (56)** | $ (54) | **$ (56)** | $ (54) |
| U.S. dollar depreciates | **$ –** | $ – | **$ 56** | $ 54 | **$ 56** | $ 54 |
| 25 basis point change in interest rates | | | | | | |
| Interest rates increase | | | | | | |
| Canadian interest rate | **$ (4)** | $ (1) | **$ 90** | $ 107 | **$ 86** | $ 106 |
| U.S. interest rate | **$ –** | $ – | **$ (93)** | $ (107) | **$ (93)** | $ (107) |
| Combined | **$ (4)** | $ (1) | **$ (3)** | $ – | **$ (7)** | $ (1) |
| Interest rates decrease | | | | | | |
| Canadian interest rate | **$ 4** | $ 1 | **$ (94)** | $ (112) | **$ (90)** | $ (111) |
| U.S. interest rate | **$ –** | $ – | **$ 98** | $ 113 | **$ 98** | $ 113 |
| Combined | **$ 4** | $ 1 | **$ 4** | $ 1 | **$ 8** | $ 2 |

1 These sensitivities are hypothetical and should be used with caution. Changes in net income and/or other comprehensive income generally cannot be extrapolated because the relationship of the change in assumption to the change in net income and/or other comprehensive income may not be linear. In this table, the effect of a variation in a particular assumption on the amount of net income and/or other comprehensive income is calculated without changing any other factors; in reality, changes in one factor may result in changes in another, which might magnify or counteract the sensitivities.
The sensitivity analysis assumes that we would realize the changes in exchange rates and market interest rates; in reality, the competitive marketplace in which we operate would have an effect on this assumption.

### (h) Fair values

**General**
The carrying values of cash and temporary investments, accounts receivable, short-term obligations, short-term borrowings, accounts payable and certain provisions (including restructuring provisions) approximate their fair values due to the immediate or short-term maturity of these financial instruments. The fair values are determined directly by reference to quoted market prices in active markets.

The fair values of our investment financial assets are based on quoted market prices in active markets or other clear and objective evidence of fair value.

The fair value of our long-term debt, excluding leases, is based on quoted market prices in active markets.

The fair values of the derivative financial instruments we use to manage our exposure to currency risk are estimated based on quoted market prices in active markets for the same or similar financial instruments or on the current rates offered to us for financial instruments of the same maturity, as well as on discounted future cash flows determined using current rates for similar financial instruments of similar maturities subject to similar risks (such fair value estimates being largely based on the Canadian dollar: U.S. dollar forward exchange rate as at the statements of financial position dates).

**Derivative**

The derivative financial instruments that we measure at fair value on a recurring basis subsequent to initial recognition are set out in the following table.

| As at December 31 (millions) | | 2021 | | | | 2020 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Designation | Maximum maturity date | Notional amount | Fair value[1] and carrying value | Price or rate | Maximum maturity date | Notional amount | Fair value[1] and carrying value | Price or rate |
| **Current Assets[2]** | | | | | | | | | |
| Derivatives used to manage | | | | | | | | | |
| Currency risk arising from U.S. dollar revenues | HFT[4] | – | $ – | $ – | – | 2021 | $ 87 | $ 2 | US$1.00: C$1.27 |
| Currency risk arising from U.S. dollar-denominated purchases | HFH[3] | 2022 | $ 301 | 6 | US$1.00: C$1.25 | – | $ – | – | – |
| Currency risk arising from Indian rupee-denominated purchases | HFT[4] | 2022 | $ 12 | – | US$1.00: ₹76 | – | $ – | – | – |
| Currency risk arising from U.S. dollar-denominated long-term debt (*Note 26(b)-(c)*) | HFH[3] | 2022 | $ 664 | 2 | US$1.00: C$1.26 | 2021 | $ 95 | – | US$1.00: C$1.27 |
| Currency risk arising from European euro functional currency operations purchased with U.S. dollar-denominated long-term debt[7] (*Note 26(f)*) | HFH[5] | 2025 | $ 31 | 3 | €1.00: US$1.09 | 2025 | $ 34 | – | €1.00: US$1.09 |
| Interest rate risk associated with refinancing of debt maturing | HFH[3] | 2022 | $ 250 | 2 | 1.35% | – | $ – | – | – |
| | | | | $ 13 | | | | $ 2 | |
| **Other Long-Term Assets[2]** | | | | | | | | | |
| Derivatives used to manage | | | | | | | | | |
| Currency risk arising from U.S. dollar-denominated long-term debt[6] (*Note 26(b)-(c)*) | HFH[3] | 2048 | $ 2,133 | $ 76 | US$1.00: C$1.27 | 2048 | $ 2,176 | $ 40 | US$1.00: C$1.27 |
| **Current Liabilities[2]** | | | | | | | | | |
| Derivatives used to manage | | | | | | | | | |
| Currency risk arising from U.S. dollar revenues | HFT[4] | 2022 | $ 116 | $ 3 | US$1.00: C$1.27 | – | $ – | $ – | – |
| Currency risk arising from U.S. dollar-denominated purchases | HFH[3] | 2022 | $ 108 | 1 | US$1.00: C$1.28 | 2021 | $ 388 | 21 | US$1.00: C$1.34 |
| Currency risk arising from Indian rupee-denominated purchases | HFT[4] | 2022 | $ 2 | – | US$1.00: ₹75 | – | $ – | – | – |
| Currency risk arising from U.S. dollar-denominated long-term debt (*Note 26(b)-(c)*) | HFH[3] | 2022 | $ 1,248 | 12 | US$1.00: C$1.28 | 2021 | $ 647 | 11 | US$1.00: C$1.29 |
| Interest rate risk associated with non-fixed rate credit facility amounts drawn (*Note 26(f)*) | HFH[3] | 2022 | $ 120 | 3 | 2.64% | 2022 | $ 8 | – | 2.64% |
| Interest rate risk associated with refinancing of debt maturing | HFH[3] | 2022 | $ 500 | 5 | 1.59% | – | $ – | – | – |
| | | | | $ 24 | | | | $ 32 | |
| **Other Long-Term Liabilities[2]** | | | | | | | | | |
| Derivatives used to manage | | | | | | | | | |
| Currency risk arising from U.S. dollar-denominated long-term debt[6] (*Note 26(b)-(c)*) | HFH[3] | 2049 | $ 3,185 | $ 52 | US$1.00: C$1.33 | 2049 | $ 3,260 | $ 82 | US$1.00: C$1.33 |
| Currency risk arising from European euro functional currency operations purchased with U.S. dollar-denominated long-term debt[7] (*Note 26(f)*) | HFH[5] | 2025 | $ 483 | 21 | €1.00: US$1.09 | 2025 | $ 557 | 67 | €1.00: US$1.09 |
| Interest rate risk associated with non-fixed rate credit facility amounts drawn (*Note 26(f)*) | HFH[3] | – | $ – | – | – | 2022 | $ 120 | 6 | 2.64% |
| | | | | $ 73 | | | | $ 155 | |

1 Fair value measured at reporting date using significant other observable inputs (Level 2).
2 Derivative financial assets and liabilities are not set off.
3 Designated as held for hedging (HFH) upon initial recognition (cash flow hedging item); hedge accounting is applied. Unless otherwise noted, hedge ratio is 1:1 and is established by assessing the degree of matching between the notional amounts of hedging items and the notional amounts of the associated hedged items.
4 Designated as held for trading (HFT) and classified as fair value through net income upon initial recognition; hedge accounting is not applied.
5 Designated as a hedge of a net investment in a foreign operation; hedge accounting is applied. Hedge ratio is 1:1 and is established by assessing the degree of matching between the notional amounts of hedging items and the notional amounts of the associated hedged items.
6 We designate only the spot element as the hedging item. As at December 31, 2021, the foreign currency basis spread included in the fair value of the derivative instruments, which is used for purposes of assessing hedge ineffectiveness, was $53 (2020 – $101).
7 We designate only the spot element as the hedging item. As at December 31, 2021, the foreign currency basis spread included in the fair value of the derivative instruments, which is used for purposes of assessing hedge ineffectiveness, was $1 (2020 – $(1)).

**Non-derivative**

Our long-term debt, which is measured at amortized cost, and the fair value thereof, are set out in the following table.

| As at December 31 (millions) | **2021** | | 2020 | |
|---|---|---|---|---|
| | **Carrying value** | **Fair value** | Carrying value | Fair value |
| Long-term debt, excluding leases (*Note 26*) | **$ 18,976** | **$ 20,383** | $ 18,451 | $ 20,313 |

## (i) Recognition of derivative gains and losses

The following table sets out the gains and losses, excluding income tax effects, arising from derivative instruments that are classified as cash flow hedging items and their location within the Consolidated statements of income and other comprehensive income.

Credit risk associated with such derivative instruments, as discussed further in *(a)*, would be the primary source of hedge ineffectiveness. There was no ineffective portion of the derivative instruments classified as cash flow hedging items for the periods presented.

| | | Amount of gain (loss) recognized in other comprehensive income (effective portion) (*Note 11*) | | Gain (loss) reclassified from other comprehensive income to income (effective portion) (*Note 11*) | | |
|---|---|---|---|---|---|---|
| | | | | | Amount | |
| Years ended December 31 (millions) | Note | **2021** | 2020 | Location | **2021** | 2020 |
| Derivatives used to manage currency risk | | | | | | |
| Arising from U.S. dollar-denominated purchases | | **$ (1)** | $ (6) | Goods and services purchased | **$ (24)** | $ (9) |
| Arising from U.S dollar-denominated long-term debt[1] | *26(b)–(c)* | **27** | (44) | Financing costs | **(50)** | 12 |
| Arising from net investment in a foreign operation[2] | | **47** | (67) | Financing costs | **(1)** | – |
| | | **73** | (117) | | **(75)** | 3 |
| Derivatives used to manage other market risks | | | | | | |
| Arising from changes in share-based compensation costs and other | | **–** | (6) | Employee benefits expense and financing costs | **(4)** | 1 |
| | | **$ 73** | $ (123) | | **$ (79)** | $ 4 |

1 Amounts recognized in other comprehensive income are net of the change in the foreign currency basis spread (which is used for purposes of assessing hedge ineffectiveness) included in the fair value of the derivative instruments; such amounts for the year ended December 31, 2021, were $(48) (2020 – $63).

2 Amounts recognized in other comprehensive income are net of the change in the foreign currency basis spread (which is used for purposes of assessing hedge ineffectiveness) included in the fair value of the derivative instruments; such amounts for the year ended December 31, 2021, were $2 (2020 – $(1)).

The following table sets out the gains and losses arising from derivative instruments that are classified as held for trading and that are not designated as being in a hedging relationship, as well as their location within the Consolidated statements of income and other comprehensive income.

| | Gain (loss) recognized in income on derivatives | | |
|---|---|---|---|
| Years ended December 31 (millions) | Location | **2021** | 2020 |
| Derivatives used to manage currency risk | Financing costs | **$ (2)** | $ 11 |

# 5 Segment information

## General

Operating segments are components of an entity that engage in business activities from which they earn revenues and incur expenses (including revenues and expenses related to transactions with the other component(s)), the operations of which can be clearly distinguished and for which the operating results are regularly reviewed by a chief operating decision-maker to make resource allocation decisions and to assess performance.

Effective January 1, 2020, we embarked upon the modification of our internal and external reporting processes, systems and internal controls to accommodate the technology convergence-driven cessation of the historical distinction between our wireless and wireline operations at the level of regularly reported discrete performance measures that are provided to our chief operating decision-maker.

Prior to the World Health Organization characterizing COVID-19 as a pandemic, we had anticipated transitioning to a new segment reporting structure during 2020; commencing with the three-month period ended March 31, 2021, we have now transitioned to our new segment reporting structure and have recast comparative amounts on a comparable basis.

The TELUS technology solutions segment includes: network revenues and equipment sales arising from mobile technologies; data revenues (which include internet protocol; television; hosting, managed information technology and cloud-based services; software, data management and data analytics-driven smart-food chain technologies; and home and business security); certain healthcare software and technology solutions; voice and other telecommunications services revenues; and equipment sales.

The digitally-led customer experiences – TELUS International segment (DLCX), which has the U.S. dollar as its primary functional currency, is comprised of digital customer experience and digital-enablement transformation solutions, including artificial intelligence and content management solutions, provided by our TELUS International (Cda) Inc. subsidiary.

Intersegment sales are recorded at the exchange value, which is the amount agreed to by the parties.

The segment information regularly reported to our Chief Executive Officer (our chief operating decision-maker), and the reconciliations thereof to our products and services view of revenues, other revenues and income before income taxes, are set out in the following table.

| Years ended December 31 (millions) | TELUS technology solutions | | | | | | Digitally-led customer experiences – TELUS International[1] | | Eliminations | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mobile | | Fixed | | Segment total | | | | | | | |
| | **2021** | 2020 | **2021** | 2020 | **2021** | 2020 | **2021** | 2020 | **2021** | 2020 | **2021** | 2020 |
| **Operating revenues** | | | | | | | | | | | | |
| External revenues | | | | | | | | | | | | |
| Service | **$ 6,297** | $ 6,096 | **$ 5,928** | $ 5,444 | **$ 12,225** | $ 11,540 | **$ 2,310** | $ 1,737 | **$ –** | $ – | **$ 14,535** | $ 13,277 |
| Equipment | **2,042** | 1,809 | **261** | 255 | **2,303** | 2,064 | **–** | – | **–** | – | **2,303** | 2,064 |
| Revenues arising from contracts with customers | **$ 8,339** | $ 7,905 | **$ 6,189** | $ 5,699 | **14,528** | 13,604 | **2,310** | 1,737 | **–** | – | **16,838** | 15,341 |
| Other income (*Note 7*) | | | | | **420** | 19 | **–** | 103 | **–** | – | **420** | 122 |
| | | | | | **14,948** | 13,623 | **2,310** | 1,840 | **–** | – | **17,258** | 15,463 |
| Intersegment revenues | | | | | **18** | 13 | **444** | 416 | **(462)** | (429) | **–** | – |
| | | | | | **$ 14,966** | $ 13,636 | **$ 2,754** | $ 2,256 | **$ (462)** | $ (429) | **$ 17,258** | $ 15,463 |
| **EBITDA[2]** | | | | | **$ 5,735** | $ 4,976 | **$ 555** | $ 518 | **$ –** | $ – | **$ 6,290** | $ 5,494 |
| Restructuring and other costs included in EBITDA (*Note 16*) | | | | | **148** | 182 | **38** | 77 | **–** | – | **186** | 259 |
| Equity losses related to real estate joint venture | | | | | **3** | 19 | **–** | – | **–** | – | **3** | 19 |
| Gain on disposition of financial solutions business (*Note 7*) | | | | | **(410)** | – | **–** | – | **–** | – | **(410)** | – |
| Retirement of provision arising from business acquisition-related written put options within DLCX | | | | | **–** | – | **–** | (71) | **–** | – | **–** | (71) |
| **Adjusted EBITDA[2]** | | | | | **$ 5,476** | $ 5,177 | **$ 593** | $ 524 | **$ –** | $ – | **$ 6,069** | $ 5,701 |
| CAPEX, excluding spectrum licences[3] | | | | | **$ 3,372** | $ 2,675 | **$ 126** | $ 100 | **$ –** | $ – | **$ 3,498** | $ 2,775 |

| | 2021 | 2020 |
|---|---|---|
| **Operating revenues – external and other income** (above) | **$ 17,258** | $ 15,463 |
| Goods and services purchased | **6,699** | 6,268 |
| Employee benefits expense | **4,269** | 3,701 |
| **EBITDA** (above) | **6,290** | 5,494 |
| Depreciation | **2,126** | 2,107 |
| Amortization | **1,090** | 905 |
| **Operating income** | **3,074** | 2,482 |
| Financing costs | **796** | 771 |
| **Income before income taxes** | **$ 2,278** | $ 1,711 |

1 The digitally-led customer experiences – TELUS International segment is comprised of our consolidated TELUS International (Cda) Inc. subsidiary and a line of business retrospectively reorganized into, and accounted for using predecessor accounting prospectively applied by, TELUS International (Cda) Inc. (see *Note 28(c)*). All of our other international operations are included in the TELUS technology solutions segment.

2 Earnings before interest, income taxes, depreciation and amortization (EBITDA), both unadjusted and adjusted, are not standardized financial measures under IFRS-IASB and may not be comparable to similar measures disclosed by other issuers (including those disclosed by TELUS International (Cda) Inc.); we define EBITDA as operating revenues and other income less goods and services purchased and employee benefits expense. We calculate adjusted EBITDA to exclude items that do not reflect our ongoing operations and, in our opinion, should not be considered in a long-term valuation metric or included in an assessment of our ability to service or incur debt. We report EBITDA and adjusted EBITDA because they are key measures that management uses to evaluate the performance of our business, and EBITDA is also utilized in measuring compliance with certain debt covenants.

3 Total capital expenditures (CAPEX); see *Note 31(a)* for a reconciliation of capital expenditures, excluding spectrum licences, to cash payments for capital assets, excluding spectrum licences, reported in the Consolidated statements of cash flows.

## Geographical information

We attribute revenues from external customers to individual countries on the basis of the location where the goods and/or services are provided; for the year ended December 31, 2021, we attributed approximately $2.6 billion (2020 – $1.9 billion) of our revenues to countries other than Canada (our country of domicile). We do not have significant amounts of property, plant and equipment located outside of Canada. As at December 31, 2021, on a historical cost basis, we had approximately $2.2 billion (2020 – $2.2 billion) and approximately $2.2 billion (2020 – $2.2 billion) of intangible assets and goodwill, respectively, located outside of Canada.

# 6 Revenue from contracts with customers

## (a) Revenues

In the determination of the minimum transaction prices in contracts with customers, amounts are allocated to fulfilling, or completion of fulfilling, future contracted performance obligations. These unfulfilled, or partially unfulfilled, future contracted performance obligations are largely in respect of services to be provided over the duration of the contract. The following table sets out our aggregate estimated minimum transaction prices allocated to remaining unfulfilled, or partially unfulfilled, future contracted performance obligations and the timing of when we might expect to recognize the associated revenues; actual amounts could differ from these estimates due to a variety of factors, including the unpredictable nature of: customer behaviour; industry regulation; the economic environments in which we operate; and competitor behaviour.

| As at December 31 (millions) | 2021 | 2020 |
|---|---|---|
| **Estimated minimum transaction price allocated to remaining unfulfilled, or partially unfulfilled, performance obligations to be recognized as revenue in a future period[1,2]** | | |
| During the 12-month period ending one year hence | **$ 2,369** | $ 2,279 |
| During the 12-month period ending two years hence | **915** | 883 |
| Thereafter | **56** | 35 |
| | **$ 3,340** | $ 3,197 |

1 Excludes constrained variable consideration amounts, amounts arising from contracts originally expected to have a duration of one year or less and, as a permitted practical expedient, amounts arising from contracts that are not affected by revenue recognition timing differences arising from transaction price allocation **or** from contracts under which we may recognize and bill revenue in an amount that corresponds directly with our completed performance obligations.

2 IFRS-IASB requires the explanation of when we expect to recognize as revenue the amounts disclosed as the estimated minimum transaction price allocated to remaining unfulfilled, or partially unfulfilled, performance obligations. The estimated amounts disclosed are based upon contractual terms and maturities. Actual minimum transaction price revenues recognized, and the timing thereof, will differ from these estimates primarily due to the frequency with which the actual durations of contracts with customers do not match their contractual maturities.

## (b) Accounts receivable

| As at December 31 (millions) | Note | 2021 | 2020 |
|---|---|---|---|
| Customer accounts receivable | | **$ 2,194** | $ 1,986 |
| Accrued receivables – customer | | **313** | 241 |
| Allowance for doubtful accounts | *4(b)* | **(81)** | (119) |
| | | **2,426** | 2,108 |
| Accrued receivables – other | | **245** | 247 |
| Accounts receivable – current | | **$ 2,671** | $ 2,355 |

## (c) Contract assets

| Years ended December 31 (millions) | Note | 2021 | 2020 |
|---|---|---|---|
| Balance, beginning of period | | **$ 850** | $ 1,238 |
| Net additions arising from operations | | **1,324** | 959 |
| Amounts billed in the period and thus reclassified to accounts receivable[1] | | **(1,343)** | (1,363) |
| Change in impairment allowance, net | *4(b)* | **6** | 15 |
| Other | | **–** | 1 |
| Balance, end of period | | **$ 837** | $ 850 |
| To be billed and thus reclassified to accounts receivable during: | | | |
| The 12-month period ending one year hence | | **$ 571** | $ 582 |
| The 12-month period ending two years hence | | **248** | 253 |
| Thereafter | | **18** | 15 |
| Balance, end of period | | **$ 837** | $ 850 |
| **Reconciliation of contract assets presented in the Consolidated statements of financial position – current** | | | |
| Gross contract assets | | **$ 571** | $ 582 |
| Reclassification to contract liabilities of contracts with contract assets less than contract liabilities | *24* | **(13)** | (10) |
| Reclassification from contract liabilities of contracts with contract liabilities less than contract assets | *24* | **(115)** | (133) |
| | | **$ 443** | $ 439 |

1 For the year ended December 31, 2021, amounts billed for our mobile products and services and reclassified to accounts receivable totalled $734 (2020 – $1,015).

# 7 Other income

| Years ended December 31 (millions) | Note | 2021 | 2020 |
|---|---|---|---|
| Government assistance | | $ 8 | $ 13 |
| Other sublet revenue | *19* | 4 | 4 |
| Investment income (loss), gain (loss)[1] on disposal of assets and other | | 404 | (12) |
| Interest income | *21(b)* | 4 | 4 |
| Changes in business combination-related provisions | | – | 113 |
| | | $ 420 | $ 122 |

1 During the year ended December 31, 2021, we disposed of our financial solutions business, which was a part of our TELUS technology solutions segment, and realized a gain on disposition of $410 before income taxes.

We receive government assistance, as defined by IFRS-IASB, from a number of sources and, if not in respect of capital, generally include such amounts received in Other income, other than in respect of the Canada Emergency Wage Subsidy program amounts, as set out in *Note 8*. We recognize such amounts on an accrual basis as the subsidized services are provided or as the subsidized costs are incurred.

### CRTC subsidy

Local exchange carriers' costs of providing the level of residential basic telephone services that the CRTC requires to be provided in high cost serving areas are greater than the amounts the CRTC allows the local exchange carriers to charge for the levels of service. To ameliorate the situation, the CRTC directs the collection of contribution payments, in a central fund, from all registered Canadian telecommunications service providers (including voice, data and mobile service providers) that are then disbursed to incumbent local exchange carriers as subsidy payments to partially offset the costs of providing residential basic telephone services in non-forborne high cost serving areas. The subsidy payment disbursements are based upon a total subsidy requirement calculated on a per network access line/per band subsidy rate. For the year ended December 31, 2021, our subsidy receipts were $5 million (2020 – $10 million).

### Government of Quebec

Salaries for qualifying employment positions in the province of Quebec, mainly in the information technology sector, are eligible for tax credits. In respect of such tax credits, for the year ended December 31, 2021, we recorded $3 million (2020 – $3 million).

# 8 Employee benefits expense

| Years ended December 31 (millions) | Note | 2021 | 2020 |
|---|---|---|---|
| **Employee benefits expense – gross** | | | |
| Wages and salaries[1] | | $ 4,118 | $ 3,668 |
| Share-based compensation[2] | *14* | 236 | 173 |
| Pensions – defined benefit | *15(a)* | 113 | 102 |
| Pensions – defined contribution | *15(f)* | 106 | 94 |
| Restructuring costs[2] | *16(a)* | 79 | 49 |
| Employee health and other benefits | | 227 | 190 |
| | | 4,879 | 4,276 |
| **Capitalized internal labour costs, net** | | | |
| Contract acquisition costs | *20* | | |
| Capitalized | | (91) | (74) |
| Amortized | | 66 | 55 |
| Contract fulfilment costs | *20* | | |
| Capitalized | | (2) | (2) |
| Amortized | | 5 | 4 |
| Property, plant and equipment | | (362) | (350) |
| Intangible assets subject to amortization | | (226) | (208) |
| | | (610) | (575) |
| | | $ 4,269 | $ 3,701 |

1 For the years ended December 31, 2021 and 2020, wages and salaries are net of Canada Emergency Wage Subsidy program amounts.
2 For the year ended December 31, 2021, $8 of share-based compensation in the digitally-led customer experiences segment was included in restructuring costs.

# 9 Financing costs

| Years ended December 31 (millions) | Note | 2021 | 2020 |
|---|---|---|---|
| **Interest expense** | | | |
| Interest on long-term debt, excluding lease liabilities – gross | | $ 683 | $ 676 |
| Interest on long-term debt, excluding lease liabilities – capitalized[1] | | (3) | (37) |
| Interest on long-term debt, excluding lease liabilities | | 680 | 639 |
| Interest on lease liabilities | *19* | 66 | 70 |
| Interest on short-term borrowings and other | | 15 | 5 |
| Interest accretion on provisions | *25* | 18 | 16 |
| Long-term debt prepayment premium | | 10 | 18 |
| | | 789 | 748 |
| **Employee defined benefit plans net interest** | *15* | 26 | 16 |
| **Foreign exchange** | | (3) | 14 |
| | | 812 | 778 |
| **Interest income** | | (16) | (7) |
| | | $ 796 | $ 771 |
| Net interest cost | *3* | $ 773 | $ 792 |
| Interest on long-term debt, excluding lease liabilities – capitalized[1] | | (3) | (37) |
| Employee defined benefit plans net interest | | 26 | 16 |
| | | $ 796 | $ 771 |

1 Interest on long-term debt, excluding lease liabilities, at a composite rate of 3.10% (2020 – 4.33%) was capitalized to intangible assets with indefinite lives during the period.

# 10 Income taxes

## (a) Expense composition and rate reconciliation

| Years ended December 31 (millions) | 2021 | 2020 |
|---|---|---|
| **Current income tax expense** | | |
| For the current reporting period | $ 563 | $ 474 |
| Adjustments recognized in the current period for income taxes of prior periods | (30) | (99) |
| | 533 | 375 |
| **Deferred income tax expense** | | |
| Arising from the origination and reversal of temporary differences | 25 | 3 |
| Revaluation of deferred income tax liability to reflect future income tax rates | – | (6) |
| Adjustments recognized in the current period for income taxes of prior periods | 22 | 79 |
| | 47 | 76 |
| | $ 580 | $ 451 |

Our income tax expense and effective income tax rate differ from those computed by applying the applicable statutory rates for the following reasons:

| Years ended December 31 ($ in millions) | | 2021 | | 2020 |
|---|---|---|---|---|
| Income taxes computed at applicable statutory rates | $ 589 | 25.8% | $ 446 | 26.1% |
| Revaluation of deferred income tax liability to reflect future income tax rates | – | – | (6) | (0.4) |
| Adjustments recognized in the current period for income taxes of prior periods | (8) | (0.3) | (20) | (1.3) |
| Non-deductible amounts | 23 | 1.0 | 20 | 1.2 |
| Gain on disposition | (46) | (2.0) | – | – |
| Other | 22 | 1.0 | 11 | 0.7 |
| Income tax expense per Consolidated statements of income and other comprehensive income | $ 580 | 25.5% | $ 451 | 26.3% |

## (b) Temporary differences

We must make significant estimates in respect of the composition of our deferred income tax liability. Our operations are complex and the related income tax interpretations, regulations, legislation and jurisprudence are continually changing. As a result, there are usually some income tax matters in question.

Temporary differences comprising the net deferred income tax liability and the amounts of deferred income taxes recognized in the Consolidated statements of income and other comprehensive income and the Consolidated statements of changes in owners' equity are estimated as follows:

| (millions) | Property, plant and equipment (owned) and intangible assets subject to amortization | Intangible assets with indefinite lives | Property, plant and equipment (leased), net of lease liabilities | Contract assets and liabilities | Net pension and share-based compensation amounts | Provisions not currently deductible | Losses available to be carried forward[1] | Other | Net deferred income tax liability |
|---|---|---|---|---|---|---|---|---|---|
| As at January 1, 2020[2] | $ 1,616 | $ 1,608 | $ (77) | $ 418 | $ (140) | $ (212) | $ (11) | $ 6 | $ 3,208 |
| Deferred income tax expense recognized in | | | | | | | | | |
| Net income | 85 | 82 | 37 | (111) | (31) | 8 | (33) | 39 | 76 |
| Other comprehensive income | – | – | – | – | (109) | – | – | (13) | (122) |
| Deferred income taxes charged directly to owners' equity and other (*Note 18(c)*) | 591 | 2 | – | – | – | (11) | (23) | (14) | 545 |
| As at December 31, 2020[3] | 2,292 | 1,692 | (40) | 307 | (280) | (215) | (67) | 18 | 3,707 |
| Deferred income tax expense recognized in | | | | | | | | | |
| Net income | **75** | **59** | **7** | **(112)** | **(28)** | **41** | **(23)** | **28** | **47** |
| Other comprehensive income | **–** | **–** | **–** | **–** | **209** | **–** | **–** | **37** | **246** |
| Deferred income taxes charged directly to owners' equity and other (*Note 18(b)*) | **79** | **–** | **–** | **–** | **–** | **–** | **(6)** | **(52)** | **21** |
| **As at December 31, 2021[4]** | **$ 2,446** | **$ 1,751** | **$ (33)** | **$ 195** | **$ (99)** | **$ (174)** | **$ (96)** | **$ 31** | **$ 4,021** |

1 We expect to be able to utilize our non-capital losses prior to expiry.
2 Deferred tax liability of $3,214, net of deferred tax asset of $6 (included in Other long-term assets).
3 Deferred tax liability of $3,718, net of deferred tax asset of $11 (included in Other long-term assets).
4 Deferred tax liability of $4,056, net of deferred tax asset of $35 (included in Other long-term assets).

Temporary differences arise from the carrying value of investments in subsidiaries and partnerships exceeding their tax base, for which no deferred income tax liabilities have been recognized because the parent is able to control the timing of the reversal of the difference and it is probable that it will not reverse in the foreseeable future. In our specific instance, this is relevant to our investments in Canadian subsidiaries and Canadian partnerships. We are not required to recognize such deferred income tax liabilities, as we are in a position to control the timing and manner of the reversal of the temporary differences, which would not be expected to be exigible to income tax, and it is probable that such differences will not reverse in the foreseeable future. We are in a position to control the timing and manner of the reversal of the temporary differences in respect of our non-Canadian subsidiaries, and it is probable that such differences will not reverse in the foreseeable future.

## (c) Other

We conduct research and development activities, which may be eligible to earn Investment Tax Credits. During the year ended December 31, 2021, we recorded Investment Tax Credits of $21 million (2020 – $12 million). Of this amount, $14 million (2020 – $6 million) was recorded as a reduction of property, plant and equipment and/or intangible assets and the balance was recorded as a reduction of goods and services purchased.

# 11 Other comprehensive income

| | Items that may subsequently be reclassified to income | | | | | | | | Item never reclassified to income | | Item never reclassified to income | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Change in unrealized fair value of derivatives designated as cash flow hedges in current period (*Note 4(i)*) | | | | | | | | | | | |
| | Derivatives used to manage currency risk | | | Derivatives used to manage other market risks | | | | | | | | |
| Years ended December 31 (millions) | Gains (losses) arising | Prior period (gains) losses transferred to net income | Total | Gains (losses) arising | Prior period (gains) losses transferred to net income | Total | Total | Cumulative foreign currency translation adjustment | Change in measurement of investment financial assets | Accumulated other compre-hensive income | Employee defined benefit plan re-measurements | Other compre-hensive income |
| Accumulated balance as at January 1, 2020 | | | $ 66 | | | $ (1) | $ 65 | $ 42 | $ 12 | $ 119 | | |
| Other comprehensive income (loss) | | | | | | | | | | | | |
| Amount arising | $ (117) | $ (3) | (120) | $ (6) | $ (1) | (7) | (127) | 113 | 17 | 3 | $ (421) | $ (418) |
| Income taxes | $ (5) | $ (9) | (14) | $ (2) | $ – | (2) | (16) | – | 3 | (13) | (109) | (122) |
| Net | | | (106) | | | (5) | (111) | 113 | 14 | 16 | $ (312) | $ (296) |
| Accumulated balance as at December 31, 2020 | | | (40) | | | (6) | (46) | 155 | 26 | 135 | | |
| Other comprehensive income (loss) | | | | | | | | | | | | |
| Amount arising | **$ 73** | **$ 75** | **148** | **$ –** | **$ 4** | **4** | **152** | **(130)** | **66** | **88** | **$ 809** | **$ 897** |
| Income taxes | **$ 9** | **$ 18** | **27** | **$ –** | **$ 1** | **1** | **28** | **–** | **9** | **37** | **209** | **246** |
| Net | | | **121** | | | **3** | **124** | **(130)** | **57** | **51** | **$ 600** | **$ 651** |
| **Accumulated balance as at December 31, 2021** | | | **$ 81** | | | **$ (3)** | **$ 78** | **$ 25** | **$ 83** | **$ 186** | | |
| Attributable to: | | | | | | | | | | | | |
| Common Shares | | | | | | | | | | **$ 203** | | |
| Non-controlling interests | | | | | | | | | | **(17)** | | |
| | | | | | | | | | | **$ 186** | | |

# 12 Per share amounts

Basic net income per Common Share is calculated by dividing net income attributable to Common Shares by the total weighted average number of Common Shares outstanding during the period. Diluted net income per Common Share is calculated to give effect to share option awards and restricted share unit awards.

The following table presents reconciliations of the denominators of the basic and diluted per share computations. Net income was equal to diluted net income for all periods presented.

| Years ended December 31 (millions) | 2021 | 2020 |
|---|---|---|
| Basic total weighted average number of Common Shares outstanding | **1,346** | 1,275 |
| Effect of dilutive securities – Restricted share units | **5** | 3 |
| Diluted total weighted average number of Common Shares outstanding | **1,351** | 1,278 |

For the years ended December 31, 2021 and 2020, no outstanding equity-settled restricted share unit awards were excluded in the calculation of diluted income per Common Share. For the year ended December 31, 2021, less than 1 million (2020 – 1 million) outstanding TELUS Corporation share option awards were excluded in the calculation of diluted net income per Common Share.

# 13 Dividends per share

## (a) TELUS Corporation Common Share dividends declared

| Years ended December 31 (millions except per share amounts) | 2021 | | | | 2020 | | | |
|---|---|---|---|---|---|---|---|---|
| TELUS Corporation Common Share dividends | Declared Effective | Declared Per share | Paid to shareholders | Total | Declared Effective | Declared Per share | Paid to shareholders | Total |
| Quarter 1 dividend | Mar. 11, 2021 | **$ 0.3112** | Apr. 1, 2021 | **$ 404** | Mar. 11, 2020 | $ 0.29125 | Apr. 1, 2020 | $ 371 |
| Quarter 2 dividend | June 10, 2021 | **0.3162** | July 2, 2021 | **428** | June 10, 2020 | 0.29125 | July 2, 2020 | 372 |
| Quarter 3 dividend | Sep. 10, 2021 | **0.3162** | Oct. 1, 2021 | **430** | Sep. 10, 2020 | 0.29125 | Oct. 1, 2020 | 374 |
| Quarter 4 dividend | Dec. 10, 2021 | **0.3274** | Jan. 4, 2022 | **449** | Dec. 11, 2020 | 0.31120 | Jan. 4, 2021 | 403 |
| | | **$ 1.2710** | | **$ 1,711** | | $ 1.18495 | | $ 1,520 |

On February 9, 2022, the Board of Directors declared a quarterly dividend of $0.3274 per share on our issued and outstanding TELUS Corporation Common Shares payable on April 1, 2022, to holders of record at the close of business on March 11, 2022. The final amount of the dividend payment depends upon the number of TELUS Corporation Common Shares issued and outstanding at the close of business on March 11, 2022.

## (b) Dividend Reinvestment and Share Purchase Plan

We have a Dividend Reinvestment and Share Purchase Plan under which eligible holders of TELUS Corporation Common Shares may acquire additional TELUS Corporation Common Shares by reinvesting dividends and by making additional optional cash payments to the trustee. Under this plan, we have the option of offering TELUS Corporation Common Shares from Treasury or having the trustee acquire TELUS Corporation Common Shares in the stock market. We may, at our discretion, offer TELUS Corporation Common Shares at a discount of up to 5% from the market price under the plan. Effective with our dividends paid October 1, 2019, we offered TELUS Corporation Common Shares from Treasury at a discount of 2%. In respect of TELUS Corporation Common Shares held by eligible shareholders who have elected to participate in the plan, dividends declared during the year ended December 31, 2021, of $582 million (2020 – $524 million) were to be reinvested in TELUS Corporation Common Shares.

# 14 Share-based compensation

## (a) Details of share-based compensation expense

Reflected in the Consolidated statements of income and other comprehensive income as Employee benefits expense and in the Consolidated statements of cash flows are the following share-based compensation amounts:

| Years ended December 31 (millions) | | 2021 | | | 2020 | | |
|---|---|---|---|---|---|---|---|
| | Note | Employee benefits expense[1] | Associated operating cash outflows | Statement of cash flows adjustment | Employee benefits expense | Associated operating cash outflows | Statement of cash flows adjustment |
| Restricted share units | *(b)* | **$ 185** | **$ (35)** | **$ 150** | $ 131 | $ (109) | $ 22 |
| Employee share purchase plan | *(c)* | **41** | **(41)** | **–** | 33 | (33) | – |
| Share option awards | *(d)* | **18** | **(29)** | **(11)** | 9 | (4) | 5 |
| | | **$ 244** | **$ (105)** | **$ 139** | $ 173 | $ (146) | $ 27 |
| TELUS technology solutions | | **$ 150** | **$ (44)** | **$ 106** | $ 135 | $ (123) | $ 12 |
| Digitally-led customer experiences | | **94** | **(61)** | **33** | 38 | (23) | 15 |
| | | **$ 244** | **$ (105)** | **$ 139** | $ 173 | $ (146) | $ 27 |

1 Within employee benefits expense (see *Note 8*), for the year ended December 31, 2021, restricted share units expense of $178 and share option awards expense of $17 are presented as share-based compensation expense and the balance is included in restructuring costs (see *Note 16*) of the digitally-led customer experiences segment.

## (b) Restricted share units

### General

We use restricted share units as a form of retention and incentive compensation. Each restricted share unit is nominally equal in value to one equity share and is nominally entitled to the dividends that would arise thereon if it were an issued and outstanding equity share. The notional dividends are recorded as additional issuances of restricted share units during the life of the restricted share unit. Due to the notional dividend mechanism, the grant-date fair value of restricted share units equals the fair market value of the corresponding equity shares at the grant date, other than for the notional subset of our restricted share units affected by the relative total shareholder return performance condition (which have their grant-date fair value determined using a Monte Carlo simulation). The restricted share units generally become payable when vesting is complete; TELUS Corporation restricted share units typically vest over a period of 33 months (the requisite service period) and TELUS International (Cda) Inc. restricted share units typically vest over a period of 48 months (the requisite service period). The vesting method of restricted share units, which is determined on or before the date of grant, may be either cliff or graded; the majority of TELUS Corporation restricted share units outstanding are cliff-vesting and the majority of TELUS International (Cda) Inc. restricted share units are graded-vesting. Accounting for restricted share units, as either equity instruments or liability instruments, is based upon the expected manner of their settlement when they are granted. Grants of restricted share units prior to fiscal 2019 were accounted for as liability instruments, as the associated obligation was normally cash-settled.

### TELUS Corporation restricted share units

We also award restricted share units that largely have the same features as our general restricted share units, but have a variable payout (0% – 200%) that depends upon the achievement of our total customer connections performance condition (with a weighting of 25%) and the total shareholder return on TELUS Corporation Common Shares relative to an international peer group of telecommunications companies (with a weighting of 75%). The grant-date fair value of the notional subset of our restricted share units affected by the total customer connections performance condition equals the fair market value of the corresponding TELUS Corporation Common Shares at the grant date, and thus the notional subset has been included in the presentation of our restricted share units with only service conditions. The estimate, which reflects a variable payout, of the fair value of the notional subset of our restricted share units affected by the relative total shareholder return performance condition is determined using a Monte Carlo simulation. Grants of restricted share units in 2021 and 2020 are accounted for as equity-settled, as that was their expected manner of settlement when granted.

The following table presents a summary of outstanding TELUS Corporation non-vested restricted share units.

| Number of non-vested restricted share units as at December 31 | **2021** | 2020 |
|---|---|---|
| Restricted share units without market performance conditions | | |
| Restricted share units with only service conditions | **5,481,486** | 5,718,328 |
| Notional subset affected by total customer connections performance condition | **366,983** | 298,957 |
| | **5,848,469** | 6,017,285 |
| Restricted share units with market performance conditions | | |
| Notional subset affected by relative total shareholder return performance condition | **1,100,949** | 896,870 |
| | **6,949,418** | 6,914,155 |

The following table presents a summary of the activity related to TELUS Corporation restricted share units without market performance conditions.

| Years ended December 31 | **2021** | | | 2020 | | |
|---|---|---|---|---|---|---|
| | **Number of restricted share units[1]** | | **Weighted average grant-date fair value** | Number of restricted share units[1] | | Weighted average grant-date fair value |
| | **Non-vested** | **Vested** | | Non-vested | Vested | |
| Outstanding, beginning of period | | | | | | |
| Non-vested | **6,017,285** | **–** | **$ 24.55** | 6,468,954 | – | $ 23.37 |
| Vested | **–** | **29,870** | **$ 24.58** | – | 30,800 | $ 22.02 |
| Granted | | | | | | |
| Initial award | **3,131,508** | **–** | **$ 25.98** | 3,199,809 | – | $ 25.36 |
| In lieu of dividends | **385,783** | **1,394** | **$ 26.74** | 428,750 | 624 | $ 23.08 |
| Variable payout related | **16,886** | **–** | **$ 25.53** | – | – | – |
| Vested | **(3,354,451)** | **3,354,451** | **$ 24.10** | (3,696,539) | 3,696,539 | $ 23.14 |
| Settled | | | | | | |
| In cash | **–** | **(58,704)** | **$ 24.67** | – | (3,053,349) | $ 22.82 |
| In equity | **–** | **(3,277,873)** | **$ 24.07** | – | (644,744) | $ 24.17 |
| Forfeited | **(348,542)** | **–** | **$ 21.59** | (383,689) | – | $ 23.82 |
| Outstanding, end of period | | | | | | |
| Non-vested | **5,848,469** | **–** | **$ 25.67** | 6,017,285 | – | $ 24.55 |
| Vested | **–** | **49,138** | **$ 25.63** | – | 29,870 | $ 24.58 |

1 Excluding the notional subset of restricted share units affected by the relative total shareholder return performance condition.

**TELUS International (Cda) Inc. restricted share units**

We also award restricted share units that largely have the same features as the TELUS Corporation restricted share units, but have a variable payout (0% – 150%) that depends upon the achievement of TELUS International (Cda) Inc. financial performance and non-market quality-of-service performance conditions. Grants of restricted share units in 2021 are accounted for as equity-settled, as that was their expected manner of settlement when granted.

The following table presents a summary of the activity related to TELUS International (Cda) Inc. restricted share units.

| Years ended December 31 | 2021 | | | 2020 | | |
|---|---|---|---|---|---|---|
| | Number of restricted share units | | Weighted average grant-date fair value | Number of restricted share units | | Weighted average grant-date fair value |
| | Non-vested | Vested | | Non-vested | Vested | |
| Outstanding, beginning of period | **1,383,642** | **–** | **US$ 7.94** | 2,093,603 | – | US$ 6.11 |
| Granted – initial award | **1,383,983** | **–** | **US$ 27.26** | 357,966 | – | US$ 11.11 |
| Vested | **(805,429)** | **805,429** | **US$ 7.29** | (982,395) | 982,395 | US$ 5.95 |
| Settled | | | | | | |
| In cash | **–** | **(773,185)** | **US$ 6.31** | – | (982,395) | US$ 5.95 |
| In equity | **–** | **(32,244)** | **US$ 31.01** | – | – | US$ – |
| Forfeited | **(111,389)** | **–** | **US$ 20.16** | (85,532) | – | US$ 7.00 |
| Outstanding, end of period | **1,850,807** | **–** | **US$ 21.94** | 1,383,642 | – | US$ 7.94 |

## (c) TELUS Corporation employee share purchase plan

We have an employee share purchase plan under which eligible employees up to a certain job classification can purchase TELUS Corporation Common Shares through regular payroll deductions. In respect of TELUS Corporation Common Shares held within the employee share purchase plan, TELUS Corporation Common Share dividends declared during the year ended December 31, 2021, of $42 million (2020 – $37 million) were to be reinvested in TELUS Corporation Common Shares acquired by the trustee from Treasury, with a discount applicable, as set out in *Note 13(b)*.

## (d) Share option awards

**General**

We use share option awards as a form of retention and incentive compensation. We apply the fair value method of accounting for share-based compensation awards granted to officers and other employees. Share option awards typically have a three-year vesting period (the requisite service period). The vesting method of share option awards, which is determined on or before the date of grant, may be either cliff or graded; all share option awards granted subsequent to 2004 have been cliff-vesting.

The weighted average fair value of share option awards granted is calculated by using the Black-Scholes model (a closed-form option pricing model). The risk-free interest rate used in determining the fair value of the share option awards is based on a Government of Canada yield curve that is current at the time of grant. The expected lives of the share option awards are based on our historical share option award exercise data. Similarly, expected volatility considers the historical volatility in the price of our Common Shares in respect of TELUS Corporation share options and the average historical volatility in the prices of a peer group's shares, and TELUS International (Cda) Inc.'s own shares, in respect of TELUS International (Cda) Inc. share options. The dividend yield is the annualized dividend current at the time of grant divided by the share option award exercise price. Dividends are not paid on unexercised share option awards and are not subject to vesting.

**TELUS Corporation share options**

Employees may be granted share option awards to purchase TELUS Corporation Common Shares at an exercise price equal to the fair market value at the time of grant. Share option awards granted under the plan may be exercised over specific periods not to exceed seven years from the time of grant. Share option awards granted in fiscal 2021 and 2020 were for front-line employees.

These share option awards have a net-equity settlement feature. The optionee does not have the choice of exercising the net-equity settlement feature; it is at our option whether the exercise of a share option award is settled as a share option or settled using the net-equity settlement feature.

The following table presents a summary of the activity related to the TELUS Corporation share option plan.

| Years ended December 31 | 2021 | | 2020 | |
|---|---|---|---|---|
| | Number of share options | Weighted average share option price[1] | Number of share options | Weighted average share option price |
| Outstanding, beginning of period | **3,014,700** | **$ 21.59** | – | $ – |
| Granted | **324,900** | **$ 25.96** | 3,171,600 | $ 21.57 |
| Forfeited | **(289,300)** | **$ 21.75** | (156,900) | $ 21.29 |
| Outstanding, end of period | **3,050,300** | **$ 22.04** | 3,014,700 | $ 21.59 |

1 The weighted average remaining contractual life is 5.4 years. No options were exercisable as at the balance sheet date.

The weighted average fair value of share option awards granted, and the weighted average assumptions used in the fair value estimation at the time of grant, calculated by using the Black-Scholes model (a closed-form option pricing model), are as follows:

| Years ended December 31 | 2021 | 2020 |
|---|---|---|
| Share option award fair value (per share option) | $ 0.93 | $ 0.65 |
| Risk-free interest rate | 0.79% | 0.95% |
| Expected lives[1] (years) | 4.25 | 4.25 |
| Expected volatility | 12.5% | 12.3% |
| Dividend yield | 4.8% | 5.4% |

1 The maximum contractual term of the share option awards granted in 2021 and 2020 was seven years.

**TELUS International (Cda) Inc. share options**

Employees may be granted equity share options (equity-settled) to purchase TELUS International (Cda) Inc. subordinate voting shares at a price equal to, or a multiple of, the fair market value at the time of grant and/or phantom share options (cash-settled) that provide them with exposure to TELUS International (Cda) Inc. subordinate voting share price appreciation. Share option awards granted under the plan may be exercised over specific periods not to exceed ten years from the time of grant. All equity share option awards and most phantom share option awards have a variable payout (0% – 100%) that depends upon the achievement of TELUS International (Cda) Inc. financial performance and non-market quality-of-service performance conditions.

The following table presents a summary of the activity related to the TELUS International (Cda) Inc. share option plan.

| Years ended December 31 | 2021 | | | | 2020 | | | |
|---|---|---|---|---|---|---|---|---|
| | US$ denominated | | C$ denominated | | US$ denominated | | C$ denominated | |
| | Number of share options | Weighted average share option price[1] | Number of share options | Share option price | Number of share options | Weighted average share option price | Number of share options | Share option price |
| Outstanding, beginning of period | 3,922,056 | US$ 6.94 | 242,244 | $ 4.75 | 4,484,790 | US$ 6.91 | 242,244 | $ 4.75 |
| Granted | 579,949 | US$ 25.00 | – | $ – | – | US$ – | – | $ – |
| Exercised | (1,321,238) | US$ 5.74 | (242,244) | $ 4.75 | (562,734) | US$ 6.21 | – | $ – |
| Outstanding, end of period | 3,180,767 | US$ 10.74 | – | $ – | 3,922,056 | US$ 6.94 | 242,244 | $ 4.75 |
| Exercisable, end of period | 2,096,582 | US$ 7.45 | – | $ – | 3,267,423 | US$ 6.58 | 242,244 | $ 4.75 |

1 For 2,600,818 share options, the range of share option prices is US$4.87 – US$8.95 per TELUS International (Cda) Inc. subordinated voting share and the weighted average remaining contractual life is 5.6 years; for the balance of share options, the price is US$25.00 and the weighted average remaining contractual life is 9.2 years.

The weighted average fair value of share option awards granted, and the weighted average assumptions used in the fair value estimation at the time of grant, calculated by using the Black-Scholes model (a closed-form option pricing model), are as follows:

| Year ended December 31 | 2021 |
|---|---|
| Share option award fair value (per share option) | US$ 5.34 |
| Risk-free interest rate | 0.73% |
| Expected lives[1] (years) | 6.5 |
| Expected volatility | 19.3% |
| Dividend yield | NIL% |

1 The maximum contractual term of the share option awards granted in 2021 was ten years.

# 15 Employee future benefits

## (a) Defined benefit pension plans – summary

**Amounts in the primary financial statements relating to defined benefit pension plans**

| Years ended December 31 | | | | 2021 | | | 2020 |
|---|---|---|---|---|---|---|---|
| (millions) | Note | Plan assets | Defined benefit obligations accrued[1] | Net | Plan assets | Defined benefit obligations accrued[1] | Net |
| **Employee benefits expense** | *8* | | | | | | |
| Benefits earned for current service | | $ – | $ (120) | | $ – | $ (111) | |
| Benefits earned for past service | | – | (6) | | – | (3) | |
| Employees' contributions | | 18 | – | | 19 | – | |
| Administrative fees | | (5) | – | | (7) | – | |
| | | 13 | (126) | $ (113) | 12 | (114) | $ (102) |
| **Financing costs** | *9* | | | | | | |
| Notional income on plan assets[2] and interest on defined benefit obligations accrued | | 238 | (261) | | 285 | (297) | |
| Interest effect on asset ceiling limit | *(c)* | (3) | – | | (4) | – | |
| | | 235 | (261) | (26) | 281 | (297) | (16) |
| **Defined benefit (cost) included in net income[3]** | | | | (139) | | | (118) |
| **Other comprehensive income** | *11* | | | | | | |
| Difference between actual results and estimated plan assumptions[4] | | 661 | (456) | | 480 | (67) | |
| Changes in plan financial assumptions | *(d)* | – | 657 | | – | (836) | |
| Changes in the effect of limiting net defined benefit assets to the asset ceilings | *(c)* | (53) | – | | 2 | – | |
| | | 608 | 201 | 809 | 482 | (903) | (421) |
| **Defined benefit (cost) included in comprehensive income[3]** | | | | 670 | | | (539) |
| **Amounts included in operating activities cash flows** | | | | | | | |
| Employer contributions | *(e)* | 53 | – | 53 | 51 | – | 51 |
| **Benefits paid by plans** | | (474) | 474 | – | (477) | 477 | – |
| **Plan account balances[5]** | | | | | | | |
| Change in year | | 435 | 288 | 723 | 349 | (837) | (488) |
| Balance, beginning of year | | 9,608 | (10,521) | (913) | 9,259 | (9,684) | (425) |
| Balance, end of year | | $ 10,043 | $ (10,233) | $ (190) | $ 9,608 | $ (10,521) | $ (913) |
| **Funded status – plan surplus (deficit)** | | | | | | | |
| Pension plans that have plan assets in excess of defined benefit obligations accrued | *20* | $ 9,141 | $ (8,688) | $ 453 | $ 721 | $ (708) | $ 13 |
| Pension plans that have defined benefit obligations accrued in excess of plan assets | | | | | | | |
| Funded | | 902 | (1,286) | (384) | 8,887 | (9,550) | (663) |
| Unfunded | | – | (259) | (259) | – | (263) | (263) |
| | *27* | 902 | (1,545) | (643) | 8,887 | (9,813) | (926) |
| | | $ 10,043 | $ (10,233) | $ (190) | $ 9,608 | $ (10,521) | $ (913) |
| **PBSR solvency position[6]** | | | | | | | |
| Pension plans that have plan assets in excess of defined benefit obligations accrued | | | | $ 1,366 | | | $ 516 |
| Funded pension plans that have defined benefit obligations accrued in excess of plan assets | | | | – | | | (153) |
| | | | | $ 1,366 | | | $ 363 |
| **Defined benefit obligations accrued owed to:** | | | | | | | |
| Active members | | | $ (2,343) | | | $ (2,461) | |
| Deferred members | | | (528) | | | (561) | |
| Pensioners | | | (7,362) | | | (7,499) | |
| | | | $ (10,233) | | | $ (10,521) | |

1 Defined benefit obligations accrued are the actuarial present values of benefits attributed to employee services rendered to a particular date.
2 The interest income on the plan assets portion of the employee defined benefit plans net interest amount included in Financing costs reflects a rate of return on plan assets equal to the discount rate used in determining the defined benefit obligations accrued.
3 Excluding income taxes.
4 Financial assumptions in respect of plan assets (interest income on plan assets included in Financing costs reflects a rate of return on plan assets equal to the discount rate used in determining the defined benefit obligations accrued) and demographic assumptions in respect of the actuarial present values of the defined benefit obligations accrued (see *(d)*). For the year ended December 31, 2021, the difference between actual results and estimated plan assumptions for defined benefit obligations includes $375 in respect of changes in mortality-related assumptions (see *(d)*).
5 The measurement date used to determine the plan assets and defined benefit obligations accrued was December 31.

*(Continued on next page)*

*(Continued from previous page)*

6 The Office of the Superintendent of Financial Institutions, by way of the *Pension Benefits Standards Regulations, 1985* (PBSR) (see *(e)*), requires that a solvency valuation be performed on a periodic basis. The actual PBSR solvency positions are determined in conjunction with mid-year annual funding reports prepared by actuaries (see *(e)*); as a result, the PBSR solvency positions in this table as at December 31, 2021 and 2020, are interim estimates and updated estimates, respectively. The interim estimate as at December 31, 2020, was a net surplus of $375.

Interim estimated solvency ratios as at December 31, 2021, ranged from 106% to 122% (2020 – updated estimate is 94% to 108%; interim estimate was 95% to 109%) and the estimated three-year average solvency ratios, adjusted as required by the PBSR, ranged from 99% to 113% (2020 – updated estimate is 96% to 108%; interim estimate was 97% to 109%).

The solvency valuation effectively uses the fair value (excluding any asset ceiling limit effects) of the funded defined benefit pension plan assets (adjusted for theoretical wind-up expenses) to measure the solvency valuation assets. Although the defined benefit obligations accrued and the solvency valuation liabilities are calculated similarly, the assumptions used for each differ, primarily in respect of retirement ages and discount rates, and the solvency valuation liabilities, due to the required assumption that each plan is terminated on the valuation date, do not reflect assumptions about future compensation levels. Relative to the experience-based estimates of retirement ages used for purposes of determining the defined benefit obligations accrued, the minimum no-consent retirement age used for solvency valuation purposes may result in either a greater or lesser pension liability, depending upon the provisions of each plan. The solvency positions in this table reflect composite weighted average discount rates of 2.9% (2020 – 2.5%). A hypothetical decrease of 25 basis points in the composite weighted average discount rate would result in a $297 decrease in the PBSR solvency position as at December 31, 2021 (2020 – $330); these sensitivities are hypothetical, should be used with caution, are calculated without changing any other assumption and generally cannot be extrapolated because changes in amounts may not be linear.

## (b) Pension plans and other defined benefit plans – overview

We have a number of defined benefit and defined contribution plans that provide pension and other retirement and post-employment benefits to most of our employees. As at December 31, 2021 and 2020, all registered defined benefit pension plans were closed to substantially all new participants and substantially all benefits had vested. The benefit plans in which our employees are participants reflect developments in our corporate history.

**TELUS Corporation Pension Plan**

Management and professional employees in Alberta who joined us prior to January 1, 2001, and certain unionized employees who joined us prior to June 9, 2011, are covered by this contributory defined benefit pension plan, which comprises slightly more than one-half of our total defined benefit obligation accrued. The plan contains a supplemental benefit account that may provide indexation of up to 70% of the annual increase in a specified cost-of-living index. Pensionable remuneration is determined by the average of the best five years of remuneration in the last ten years preceding retirement.

**Pension Plan for Management and Professional Employees of TELUS Corporation**

This defined benefit pension plan, which with certain limited exceptions ceased accepting new participants on January 1, 2006, and which comprises approximately one-quarter of our total defined benefit obligation accrued, provides a non-contributory base level of pension benefits. Additionally, on a contributory basis, employees annually can choose increased and/or enhanced levels of pension benefits above the base level. At an enhanced level of pension benefits, the plan has indexation of 100% of the annual increase in a specified cost-of-living index, to an annual maximum of 2%. Pensionable remuneration is determined by the annualized average of the best 60 consecutive months of remuneration.

**TELUS Québec Defined Benefit Pension Plan**

This contributory defined benefit pension plan, which ceased accepting new participants on April 14, 2009, covers any employee not governed by a collective agreement in Quebec who joined us prior to April 1, 2006, any non-supervisory employee governed by a collective agreement who joined us prior to September 6, 2006, and certain other unionized employees. The plan comprises approximately one-tenth of our total defined benefit obligation accrued. The plan has no indexation and pensionable remuneration is determined by the average of the best four years of remuneration.

**TELUS Edmonton Pension Plan**

This contributory defined benefit pension plan ceased accepting new participants on January 1, 1998. Indexation is 60% of the annual increase in a specified cost-of-living index and pensionable remuneration is determined by the annualized average of the best 60 consecutive months of remuneration. The plan comprises less than one-tenth of our total defined benefit obligation accrued.

**Other defined benefit pension plans**

In addition to the foregoing plans, we have non-registered, non-contributory supplementary defined benefit pension plans, which have the effect of maintaining the pension benefit earned once the allowable maximums in the registered plans are attained. As is common with non-registered plans of this nature, these plans are typically funded only as benefits are paid. These plans comprise less than 5% of our total defined benefit obligation accrued.

**Telecommunication Workers Pension Plan**

Certain employees in British Columbia are covered by a negotiated-cost, target-benefit union pension plan. Our contributions are determined in accordance with provisions of negotiated labour contracts (the current contract expired on December 31, 2021 – see *Note 29(c)*), and are generally based on employee gross earnings. We are not required to guarantee the benefits or assure the solvency of the plan, and we are not liable to the plan for other participating employers' obligations. For the years ended December 31, 2021 and 2020, our contributions comprised a significant proportion of the employer contributions to the union pension plan; similarly, a significant proportion of the plan participants were our active and retired employees.

**British Columbia Public Service Pension Plan**

Certain employees in British Columbia are covered by a public service pension plan. Contributions are determined in accordance with provisions of labour contracts negotiated by the Province of British Columbia and are generally based on employee gross earnings.

**Defined contribution pension plans**

We primarily offer three defined contribution pension plans, which are contributory, and these are the primary pension plans we sponsor that are available to our non-unionized and certain of our unionized employees. For the years ended December 31, 2021 and 2020, employees could generally choose to contribute to the plans at a rate of between 3% and 10% of their pensionable earnings; generally, we match 100% of contributions of employees up to 5% of their pensionable earnings and 80% of contributions of employees between 5% and 6% of their pensionable earnings. Membership in a defined contribution pension plan is generally voluntary until an employee's third-year service anniversary. In the event that annual contributions exceed allowable maximums, excess amounts are in certain cases contributed to a non-registered supplementary defined contribution savings plan.

**Other defined benefit plans**

Other defined benefit plans, which are all non-contributory and, as at December 31, 2021 and 2020, non-funded, included a healthcare plan for retired employees and a life insurance plan, both of which ceased accepting new participants on January 1, 1997.

### (c) Plan investment strategies and policies

Our primary goal for the defined benefit pension plans is to ensure the security of the retirement income and other benefits of the plan members and their beneficiaries. A secondary goal is to maximize the long-term rate of return on the defined benefit plans' assets within a level of risk acceptable to us.

**Risk management**

We consider absolute risk (the risk of contribution increases, inadequate plan surplus and unfunded obligations) to be more important than relative return risk. Accordingly, the defined benefit plans' designs, the nature and maturity of defined benefit obligations and the characteristics of the plans' memberships significantly influence investment strategies and policies. We manage risk by specifying allowable and prohibited investment types, setting diversification strategies and determining target asset allocations.

**Allowable and prohibited investment types**

Allowable and prohibited investment types, along with associated guidelines and limits, are set out in each plan's required Statement of Investment Policies and Procedures (SIPP), which is reviewed and approved annually by the designated governing body. The SIPP guidelines and limits are further governed by the permitted investments and lending limits set out in the *Pension Benefits Standards Regulations, 1985*. As well as conventional investments, each fund's SIPP may provide for the use of derivative products to facilitate investment operations and to manage risk, provided that no short position is taken and no guidelines and limits established in the SIPP are violated. Internally and externally managed funds are not permitted to invest directly in our securities, or those of our subsidiaries, and are prohibited from increasing grandfathered investments in our securities; any such grandfathered investments were made prior to the merger of BC TELECOM Inc. and TELUS Corporation, our predecessors.

**Diversification**

Our strategy for investments in equity securities is to be broadly diversified across individual securities, industry sectors and geographical regions. A meaningful portion (20% – 30% of total plan assets) of the plans' investment in equity securities is allocated to foreign equity securities with the intent of further diversifying plan assets. Debt securities may include a meaningful allocation to mortgages, with the objective of enhancing cash flow and providing greater scope for the management of the bond component of the plan assets. Debt securities may also include real return bonds to provide inflation protection, consistent with the indexed nature of some defined benefit obligations. Real estate investments are used to provide diversification of plan assets, hedging of potential long-term inflation and comparatively stable investment income.

**Relationship between plan assets and benefit obligations**

With the objective of lowering the long-term costs of our defined benefit pension plans, we purposely mismatch plan assets and benefit obligations. This mismatching is effected by including equity investments in the long-term asset mix, as well as fixed income securities and mortgages with durations that differ from those of the benefit obligations.

As at December 31, 2021, the present value-weighted average timing of estimated cash flows for the obligations (duration) of the defined benefit pension plans was 14.0 years (2020 – 14.1 years) and of the other defined benefit plans was 6.1 years (2020 – 5.8 years). Compensation for liquidity issues that may otherwise have arisen from the mismatching of plan assets and benefit obligations is provided by broadly diversified investment holdings (including cash and short-term investments) and cash flows from dividends, interest and rents from those diversified investment holdings.

**Fair value measurements**

Information about the fair value measurements of our defined benefit pension plan assets, in aggregate, is as follows:

| | | | Fair value measurements at reporting date using | | | |
|---|---|---|---|---|---|---|
| | Total | | Quoted prices in active markets for identical items | | Other | |
| As at December 31 (millions) | **2021** | 2020 | **2021** | 2020 | **2021** | 2020 |
| **Asset class** | | | | | | |
| Equity securities | | | | | | |
| Canadian | **$ 1,104** | $ 1,044 | **$ 945** | $ 849 | **$ 159** | $ 195 |
| Foreign | **2,861** | 2,699 | **826** | 685 | **2,035** | 2,014 |
| Debt securities | | | | | | |
| Issued by national, provincial or local governments | **1,290** | 1,453 | **1,120** | 1,225 | **170** | 228 |
| Corporate debt securities | **2,436** | 2,087 | **–** | – | **2,436** | 2,087 |
| Asset-backed securities | **6** | 32 | **–** | – | **6** | 32 |
| Commercial mortgages | **680** | 803 | **–** | – | **680** | 803 |
| Cash, cash equivalents and other | **820** | 528 | **37** | 20 | **783** | 508 |
| Real estate | **1,025** | 1,085 | **–** | – | **1,025** | 1,085 |
| | **10,222** | 9,731 | **$ 2,928** | $ 2,779 | **$ 7,294** | $ 6,952 |
| **Effect of asset ceiling limit** | | | | | | |
| Beginning of year | **(123)** | (121) | | | | |
| Interest effect on asset ceiling limit | **(3)** | (4) | | | | |
| Change in the effect of limiting net defined benefit assets to the asset ceiling | **(53)** | 2 | | | | |
| End of year | **(179)** | (123) | | | | |
| | **$ 10,043** | $ 9,608 | | | | |

As at December 31, 2021, pension benefit trusts that we administered held no TELUS Corporation Common Shares and no TELUS International (Cda) Inc. subordinate voting shares, and held debt of TELUS Corporation with a fair value of approximately $2 million (2020 – $2 million) (see *(c) – Allowable and prohibited investment types*). As at December 31, 2021 and 2020, pension benefit trusts that we administered did not lease real estate to us.

**Asset allocations**

Our defined benefit pension plans' target asset allocations and actual asset allocations are as follows:

| Years ended December 31 | Target allocation 2022 | Percentage of plan assets at end of year 2021 | 2020 |
|---|---|---|---|
| Equity securities | 25–55% | **38%** | 38% |
| Debt securities | 40–75% | **51%** | 51% |
| Real estate | 10–30% | **11%** | 11% |
| Other | 0–15% | **–** | – |
| | | **100%** | 100% |

## (d) Assumptions

As referred to in *Note 1(b)*, management is required to make significant estimates related to certain actuarial and economic assumptions that are used in determining defined benefit pension costs, defined benefit obligations accrued and pension plan assets. These significant estimates are of a long-term nature, consistent with the nature of employee future benefits.

**Demographic assumptions**

In determining the defined benefit pension expense recognized in net income for the years ended December 31, 2021 and 2020, we utilized the Canadian Institute of Actuaries CPM 2014 mortality tables.

**Financial assumptions**

The discount rate, which is used to determine a plan's defined benefit obligations accrued, is based upon the yield on long-term, high-quality, fixed-term investments, and is set annually. The rate of future increases in compensation is based upon current benefits policies and economic forecasts.

The significant weighted average actuarial assumptions arising from these estimates and used in measuring our defined benefit obligations accrued are as follows:

| | 2021 | 2020 |
|---|---|---|
| Mortality assumptions used to determine defined benefit obligations accrued at December 31 | | |
| Life expectancy at 65 for a member currently at age 65 (years) | **24.2** | 22.7 |
| Discount rate[1] used to determine: | | |
| Net benefit costs for the year ended December 31 | **2.50%** | 3.10% |
| Defined benefit obligations accrued as at December 31 | **2.95%** | 2.50% |
| Current service cost in subsequent fiscal year | **3.10%** | 2.70% |
| Rate of future increases in compensation used to determine: | | |
| Net benefit costs for the year ended December 31 | **2.90%** | 2.90% |
| Defined benefit obligations accrued as at December 31 | **3.00%** | 2.90% |

1 The discount rate disclosed in this table reflects the computation of an average discount rate that replicates the estimated timing of the obligation cash flows.

**Sensitivity of key assumptions**

The sensitivity of our key assumptions for our defined benefit pension plans was as follows:

| Years ended, or as at, December 31 | 2021 | | 2020 | |
|---|---|---|---|---|
| Increase (decrease) (millions) | **Change in obligations** | **Change in expenses** | Change in obligations | Change in expenses |
| Sensitivity of key demographic assumptions to an increase of one year[1] in life expectancy | **$ 323** | **$ 11** | $ 349 | $ 11 |
| Sensitivity of key financial assumptions to a hypothetical decrease of 25 basis points[1] in: | | | | |
| Discount rate | **$ 366** | **$ 13** | $ 386 | $ 15 |
| Rate of future increases in compensation | **$ (34)** | **$ (3)** | $ (36) | $ (3) |

1 These sensitivities are hypothetical and should be used with caution. Favourable hypothetical changes in the assumptions result in decreased amounts, and unfavourable hypothetical changes in the assumptions result in increased amounts, of the obligations and expenses. Changes in amounts based on a variation in assumptions of one year or 25 basis points generally cannot be extrapolated because the relationship of the change in an assumption to the change in amounts may not be linear. Also, in this table, the effect of a variation in a particular assumption on the change in obligations or change in expenses is calculated without changing any other assumption; in reality, changes in one factor may result in changes in another (for example, an increase in the discount rate may result in changes in expectations about the rate of future increases in compensation), which might magnify or counteract the sensitivities.

## (e) Employer contributions

The determination of the minimum funding amounts necessary for substantially all of our registered defined benefit pension plans is governed by the *Pension Benefits Standards Act, 1985*, which requires that current service costs be funded, and that both going-concern and solvency valuations be performed on a specified periodic basis.

- Any excess of plan assets over plan liabilities determined in the going-concern valuation reduces our minimum funding requirement for current service costs, but may not reduce the requirement to an amount less than the employees' contributions. The going-concern valuation generally determines the excess (if any) of a plan's assets over its liabilities on a projected benefit basis.
- As of the date of these consolidated financial statements, the solvency valuation generally requires that a plan's average solvency valuation liabilities, determined on the basis that the plan is terminated on the valuation date, in excess of its assets (if any) be funded, at a minimum, in equal annual amounts over a period not exceeding five years. So as to manage the risk of overfunding the plans, which results from the solvency valuation for funding purposes utilizing average solvency ratios, our funding may include the provision of letters of

credit. As at December 31, 2021, undrawn letters of credit in the amount of $115 million (2020 – $108 million) secured certain obligations of the defined benefit pension plans, including non-registered unfunded plans.

Our best estimate of fiscal 2022 employer contributions to our defined benefit plans is approximately $32 million for defined benefit pension plans. This estimate is based upon the mid-year 2021 annual funding valuations that were prepared by actuaries using December 31, 2020, actuarial valuations. The funding reports are based on the pension plans' fiscal years, which are calendar years. The next annual funding valuations are expected to be prepared mid-year 2022.

**Future benefit payments**

Estimated future benefit payments from our funded and unfunded defined benefit pension plans, calculated as at December 31, 2021, are as follows:

| Years ending December 31 (millions) | Funded | Unfunded | Total |
|---|---|---|---|
| 2022 | $ 457 | $ 11 | $ 468 |
| 2023 | 467 | 11 | 478 |
| 2024 | 473 | 11 | 484 |
| 2025 | 478 | 12 | 490 |
| 2026 | 485 | 12 | 497 |
| 2027–2031 | 2,492 | 69 | 2,561 |

### (f) Defined contribution plans – expense

Our total defined contribution pension plan costs recognized were as follows:

| Years ended December 31 (millions) | 2021 | 2020 |
|---|---|---|
| Union pension plan and public service pension plan contributions | **$ 20** | $ 21 |
| Other defined contribution pension plans | **86** | 73 |
| | **$ 106** | $ 94 |

We expect that our 2022 union pension plan and public service pension plan contributions will be approximately $22 million.

### (g) Other defined benefit plans

For the year ended December 31, 2021, other defined benefit plan current service cost was $2 million (2020 – $3 million). Estimated future benefit payments from our other defined benefit plans, calculated as at December 31, 2021, are $1 million annually for the five-year period from 2022 to 2026 and $5 million for the five-year period from 2027 to 2031.

# 16 Restructuring and other costs

### (a) Details of restructuring and other costs

With the objective of reducing ongoing costs, we incur associated incremental non-recurring restructuring costs, as discussed further in *(b)* following. We may also incur atypical charges when undertaking major or transformational changes to our business or operating models or post-acquisition business integration. In other costs, we include incremental atypical external costs incurred in connection with business acquisition or disposition activity; significant litigation costs in respect of losses or settlements; adverse retrospective regulatory decisions; and certain incremental atypical costs incurred in connection with the COVID-19 pandemic.

Restructuring and other costs are presented in the Consolidated statements of income and other comprehensive income, as set out in the following table:

| | Restructuring *(b)* | | Other *(c)* | | Total | |
|---|---|---|---|---|---|---|
| Years ended December 31 (millions) | 2021 | 2020 | 2021 | 2020 | 2021 | 2020 |
| Goods and services purchased | **$ 62** | $ 160 | **$ 45** | $ 49 | **$ 107** | $ 209 |
| Employee benefits expense | **79** | 49 | **–** | 1 | **79** | 50 |
| | **$ 141** | $ 209 | **$ 45** | $ 50 | **$ 186** | $ 259 |

### (b) Restructuring provisions

Employee-related provisions and other provisions, as presented in *Note 25*, include amounts in respect of restructuring activities. In 2021, restructuring activities included ongoing and incremental efficiency initiatives, some of which involved personnel-related costs and rationalization of real estate. These initiatives were intended to improve our long-term operating productivity and competitiveness.

### (c) Other

During the year ended December 31, 2021, incremental external costs were incurred in connection with business acquisition activity. In connection with business acquisitions, non-recurring atypical business integration expenditures that would be considered neither restructuring costs nor part of the fair value of the net assets acquired have been included in other costs.

Also during the year ended December 31, 2021, other costs were incurred in connection with the COVID-19 pandemic. Incremental costs were incurred due to proactive steps we elected to take in order to keep our customers and employees safe, including adjustments to the frequency of real estate cleaning and maintenance, among other items. As well, costs that have been incurred in the normal course but which are unable to contribute normally to the earning of revenues have been deemed atypical.

# 17 Property, plant and equipment

| (millions) | Note | Owned assets: Network assets | Owned assets: Buildings and leasehold improvements | Owned assets: Computer hardware and other | Owned assets: Land | Owned assets: Assets under construction | Owned assets: Total | Right-of-use lease assets (*Note 19*): Network assets | Right-of-use lease assets: Real estate | Right-of-use lease assets: Other | Right-of-use lease assets: Total | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **At cost** | | | | | | | | | | | | |
| As at January 1, 2020 | | $ 31,713 | $ 3,314 | $ 1,373 | $ 48 | $ 421 | $ 36,869 | $ 219 | $ 1,267 | $ 60 | $ 1,546 | $ 38,415 |
| Additions[1] | | 998 | 43 | 62 | 5 | 1,191 | 2,299 | 282 | 224 | 24 | 530 | 2,829 |
| Additions arising from business acquisitions | | 4 | 22 | 12 | – | – | 38 | – | 74 | 6 | 80 | 118 |
| Dispositions, retirements and other | | (497) | (70) | (142) | – | – | (709) | (2) | (64) | (8) | (74) | (783) |
| Assets under construction put into service | | 752 | 119 | 100 | 1 | (972) | – | – | – | – | – | – |
| Net foreign exchange differences | | 2 | – | (2) | – | – | – | – | 5 | – | 5 | 5 |
| As at December 31, 2020 | | 32,972 | 3,428 | 1,403 | 54 | 640 | 38,497 | 499 | 1,506 | 82 | 2,087 | 40,584 |
| Additions[1] | | 730 | 53 | 82 | 5 | 1,593 | 2,463 | 300 | 220 | 34 | 554 | 3,017 |
| Additions arising from business acquisitions | *18(b)* | – | 1 | 2 | – | – | 3 | – | 4 | – | 4 | 7 |
| Dispositions, retirements and other | | (455) | (36) | (47) | – | – | (538) | (205) | (32) | (17) | (254) | (792) |
| Assets under construction put into service | | 1,266 | 92 | 88 | 16 | (1,462) | – | – | – | – | – | – |
| Net foreign exchange differences | | (3) | (1) | (3) | – | – | (7) | – | (4) | – | (4) | (11) |
| **As at December 31, 2021** | | **$ 34,510** | **$ 3,537** | **$ 1,525** | **$ 75** | **$ 771** | **$ 40,418** | **$ 594** | **$ 1,694** | **$ 99** | **$ 2,387** | **$ 42,805** |
| **Accumulated depreciation** | | | | | | | | | | | | |
| As at January 1, 2020 | | $ 21,060 | $ 2,052 | $ 875 | $ – | $ – | $ 23,987 | $ 6 | $ 174 | $ 16 | $ 196 | $ 24,183 |
| Depreciation[2] | | 1,547 | 127 | 158 | – | – | 1,832 | 37 | 221 | 17 | 275 | 2,107 |
| Dispositions, retirements and other | | (489) | (70) | (142) | – | – | (701) | – | (16) | (6) | (22) | (723) |
| Net foreign exchange differences | | 2 | – | (2) | – | – | – | – | 3 | – | 3 | 3 |
| As at December 31, 2020 | | 22,120 | 2,109 | 889 | – | – | 25,118 | 43 | 382 | 27 | 452 | 25,570 |
| Depreciation[2] | | 1,526 | 135 | 167 | – | – | 1,828 | 77 | 204 | 17 | 298 | 2,126 |
| Dispositions, retirements and other | | (573) | (38) | (116) | – | – | (727) | (56) | (15) | (10) | (81) | (808) |
| Net foreign exchange differences | | (3) | 1 | (2) | – | – | (4) | – | (5) | – | (5) | (9) |
| **As at December 31, 2021** | | **$ 23,070** | **$ 2,207** | **$ 938** | **$ –** | **$ –** | **$ 26,215** | **$ 64** | **$ 566** | **$ 34** | **$ 664** | **$ 26,879** |
| **Net book value** | | | | | | | | | | | | |
| As at December 31, 2020 | | $ 10,852 | $ 1,319 | $ 514 | $ 54 | $ 640 | $ 13,379 | $ 456 | $ 1,124 | $ 55 | $ 1,635 | $ 15,014 |
| **As at December 31, 2021** | | **$ 11,440** | **$ 1,330** | **$ 587** | **$ 75** | **$ 771** | **$ 14,203** | **$ 530** | **$ 1,128** | **$ 65** | **$ 1,723** | **$ 15,926** |

1 For the year ended December 31, 2021, additions include $(171) (2020 – $157) in respect of asset retirement obligations (see *Note 25*).
2 For the year ended December 31, 2021, depreciation includes $7 (2020 – $23) in respect of impairment of real estate right-of-use lease assets.

As at December 31, 2021, our contractual commitments for the acquisition of property, plant and equipment totalled $574 million over a period ending December 31, 2023 (2020 – $235 million over a period ending December 31, 2022).

# 18 Intangible assets and goodwill

## (a) Intangible assets and goodwill, net

| (millions) | Note | Intangible assets subject to amortization: Customer contracts, related customer relationships and subscriber base | Software | Access to rights-of-way, crowdsource assets and other | Assets under construction | Total | Intangible assets with indefinite lives: Spectrum licences | Total intangible assets | Goodwill[1,2] | Total intangible assets and goodwill |
|---|---|---|---|---|---|---|---|---|---|---|
| **At cost** | | | | | | | | | | |
| As at January 1, 2020 | | $ 1,032 | $ 5,870 | $ 137 | $ 254 | $ 7,293 | $ 9,937 | $ 17,230 | $ 5,671 | $ 22,901 |
| Additions | | – | 88 | 4 | 548 | 640 | – | 640 | – | 640 |
| Additions arising from business acquisitions | | 1,766 | 357 | 263 | – | 2,386 | 9 | 2,395 | 1,812 | 4,207 |
| Dispositions, retirements and other (including capitalized interest) | *9* | 100 | (421) | (41) | – | (362) | (36) | (398) | – | (398) |
| Assets under construction put into service | | – | 586 | – | (586) | – | – | – | – | – |
| Net foreign exchange differences | | 47 | (1) | – | – | 46 | – | 46 | 41 | 87 |
| As at December 31, 2020 | | 2,945 | 6,479 | 363 | 216 | 10,003 | 9,910 | 19,913 | 7,524 | 27,437 |
| Additions | | **–** | **139** | **5** | **720** | **864** | **2,272** | **3,136** | **–** | **3,136** |
| Additions arising from business acquisitions | *(b)* | **161** | **187** | **18** | **–** | **366** | **–** | **366** | **255** | **621** |
| Dispositions, retirements and other (including capitalized interest) | *9* | **(15)** | **(740)** | **52** | **–** | **(703)** | **3** | **(700)** | **(60)** | **(760)** |
| Assets under construction put into service | | **–** | **657** | **4** | **(661)** | **–** | **–** | **–** | **–** | **–** |
| Net foreign exchange differences | | **(63)** | **1** | **(5)** | **–** | **(67)** | **–** | **(67)** | **(74)** | **(141)** |
| **As at December 31, 2021** | | **$ 3,028** | **$ 6,723** | **$ 437** | **$ 275** | **$ 10,463** | **$ 12,185** | **$ 22,648** | **$ 7,645** | **$ 30,293** |
| **Accumulated amortization** | | | | | | | | | | |
| As at January 1, 2020 | | $ 285 | $ 4,028 | $ 71 | $ – | $ 4,384 | $ – | $ 4,384 | $ 364 | $ 4,748 |
| Amortization | | 215 | 671 | 19 | – | 905 | – | 905 | – | 905 |
| Dispositions, retirements and other | | (10) | (424) | 6 | – | (428) | – | (428) | – | (428) |
| Net foreign exchange differences | | 5 | (1) | – | – | 4 | – | 4 | – | 4 |
| As at December 31, 2020 | | 495 | 4,274 | 96 | – | 4,865 | – | 4,865 | 364 | 5,229 |
| Amortization | | **288** | **750** | **52** | **–** | **1,090** | **–** | **1,090** | **–** | **1,090** |
| Dispositions, retirements and other | | **(62)** | **(747)** | **24** | **–** | **(785)** | **–** | **(785)** | **–** | **(785)** |
| Net foreign exchange differences | | **(9)** | **2** | **–** | **–** | **(7)** | **–** | **(7)** | **–** | **(7)** |
| **As at December 31, 2021** | | **$ 712** | **$ 4,279** | **$ 172** | **$ –** | **$ 5,163** | **$ –** | **$ 5,163** | **$ 364** | **$ 5,527** |
| **Net book value** | | | | | | | | | | |
| As at December 31, 2020 | | $ 2,450 | $ 2,205 | $ 267 | $ 216 | $ 5,138 | $ 9,910 | $ 15,048 | $ 7,160 | $ 22,208 |
| **As at December 31, 2021** | | **$ 2,316** | **$ 2,444** | **$ 265** | **$ 275** | **$ 5,300** | **$ 12,185** | **$ 17,485** | **$ 7,281** | **$ 24,766** |

1 The amount for goodwill arising from business acquisitions for the year ended December 31, 2020, has been adjusted as set out in *(c)*.
2 Accumulated amortization of goodwill is amortization recorded prior to 2002; there are no accumulated impairment losses in the accumulated amortization of goodwill.

As at December 31, 2021, our contractual commitments for the acquisition of intangible assets totalled $26 million over a period ending December 31, 2023 (2020 – $56 million over a period ending December 31, 2024).

During 2021, we acquired 3500 MHz spectrum licences from the previous licensee for $249 million; such transfer of licences has been approved by Innovation, Science and Economic Development Canada.

During 2021, we obtained the use of AWS-4 and 2500 MHz spectrum licences from the original licensees and have accounted for them as intangible assets with indefinite lives; such subordination of licences has been approved by Innovation, Science and Economic Development Canada. The terms of payment for the obtained AWS-4 spectrum licences are such that the amounts owed to the original licensee are accounted for as a long-term financial liability, as set out in *Note 26(g)*; we paid $21 million for the obtained 2500 MHz spectrum licenses.

Innovation, Science and Economic Development Canada held its 3500 MHz band spectrum auction during the period from June 15, 2021, through July 23, 2021. We were the successful auction participant for 142 spectrum licences, with a total purchase price of approximately $1.95 billion.

## (b) Business acquisitions

**Blacksmith Applications Holdings Inc.**

On September 22, 2021, we acquired 100% ownership of Blacksmith Applications Holdings Inc., a provider of management, optimization and analytics to food, beverage and consumer goods providers. The acquisition is complementary to, and was made with a view to growing, our existing smart data solutions business.

The primary factor that contributed to the recognition of goodwill was the earnings capacity of the acquired business in excess of the net tangible and intangible assets acquired (such excess arising from the acquired workforce and the benefits of acquiring an established business). The amount assigned to goodwill may be deductible for income tax purposes.

**Individually immaterial transactions**

During the year ended December 31, 2021, we acquired 100% ownership of businesses complementary to our existing lines of business. The primary factor that gave rise to the recognition of goodwill was the earnings capacity of the acquired businesses in excess of the net tangible and intangible assets acquired (such excess arising from the low level of tangible assets relative to the earnings capacities of the businesses). A portion of the amounts assigned to goodwill may be deductible for income tax purposes. Any differences between the results of operations currently presented and pro forma operating revenues, net income and basic and diluted net income per Common Share amounts reflecting the results of operations as if the business acquisitions had been completed at the beginning of the current fiscal year are immaterial (as are the post-acquisition operating revenues and net income of the acquired businesses for the year ended December 31, 2021).

**Acquisition-date fair values**

Acquisition-date fair values assigned to the assets acquired and liabilities assumed are set out in the following table:

| (millions) | Blacksmith Applications Holdings Inc.[1] | Total of individually immaterial transactions[1] | Total |
|---|---|---|---|
| **Assets** | | | |
| Current assets | | | |
| Cash | $ 26 | $ 4 | $ 30 |
| Accounts receivable[2] | 14 | 3 | 17 |
| Other | 1 | 5 | 6 |
| | 41 | 12 | 53 |
| Non-current assets | | | |
| Property, plant and equipment | | | |
| Owned assets | – | 3 | 3 |
| Right-of-use lease assets | 3 | 1 | 4 |
| Intangible assets subject to amortization[3] | 262 | 104 | 366 |
| Other | – | 19 | 19 |
| | 265 | 127 | 392 |
| Total identifiable assets acquired | 306 | 139 | 445 |
| **Liabilities** | | | |
| Current liabilities | | | |
| Short-term borrowings | – | 4 | 4 |
| Accounts payable and accrued liabilities | 31 | 5 | 36 |
| Income and other taxes payable | – | 1 | 1 |
| Advance billings and customer deposits | 18 | 2 | 20 |
| Current maturities of long-term debt | 2 | 1 | 3 |
| | 51 | 13 | 64 |
| Non-current liabilities | | | |
| Long-term debt | 73 | 1 | 74 |
| Other long-term liabilities | 5 | – | 5 |
| Deferred income taxes | 66 | 5 | 71 |
| | 144 | 6 | 150 |
| Total liabilities assumed | 195 | 19 | 214 |
| **Net identifiable assets acquired** | 111 | 120 | 231 |
| Goodwill | 161 | 94 | 255 |
| **Net assets acquired** | $ 272 | $ 214 | $ 486 |
| **Acquisition effected by way of:** | | | |
| Cash consideration | $ 272 | $ 214 | $ 486 |

1 The purchase price allocation, primarily in respect of customer contracts, related customer relationships and leasehold interests and deferred income taxes, had not been finalized as of the date of issuance of these consolidated financial statements. As is customary in a business acquisition transaction, until the time of acquisition of control, we did not have full access to the books and records of the acquired businesses. Upon having sufficient time to review the books and records of the acquired businesses, we expect to finalize our purchase price allocations.

2 The fair value of accounts receivable is equal to the gross contractual amounts receivable and reflects the best estimate at the acquisition date of the contractual cash flows expected to be collected.

3 Customer contracts and customer relationships (including those related to customer contracts) are generally expected to be amortized over a period of 8 years; software is expected to be amortized over periods of 5–10 years; and other intangible assets are expected to be amortized over periods of 2–4 years.

### (c) Business acquisitions – prior period

In 2020, we acquired businesses that were complementary to our existing lines of business. As at December 31, 2020, purchase price allocations had not been finalized. During the year ended December 31, 2021, the preliminary acquisition-date fair values for other current assets, intangible assets subject to amortization, goodwill, accounts payable, income and other taxes payable, provisions, deferred income tax liabilities and retained earnings were increased (decreased) by $(6 million), $22 million, $(75 million), $9 million, $(13 million), $37 million, $(58 million), and $(34 million), respectively; as required by IFRS-IASB, comparative amounts have been adjusted so as to reflect those increases (decreases) effective the dates of acquisition.

### (d) Business acquisition – subsequent to reporting period

**Fully Managed Inc.**

On January 1, 2022, we acquired 100% ownership of Fully Managed Inc. for cash and contingent consideration of approximately $137 million. Fully Managed Inc. provides managed information technology support, technology strategy and network management. The investment was made with a view to growing our end-to-end capabilities to support small and medium-sized business customers.

As at February 10, 2022, our initial provision for the net identifiable assets acquired is in the range of $50 million – $60 million; as is customary in a business acquisition transaction, until the time of acquisition of control, we did not have full access to the books and records of the acquired business. Upon having sufficient time to review the books and records of the acquired business, as well as obtaining new and additional information about the related facts and circumstances as of the acquisition date, we will adjust provisional amounts for identifiable assets acquired and liabilities assumed and thus finalize our purchase price allocation.

### (e) Intangible assets with indefinite lives – spectrum licences

Our intangible assets with indefinite lives include spectrum licences granted by Innovation, Science and Economic Development Canada, which are used for the provision of both mobile and fixed wireless services. The spectrum licence policy terms indicate that the spectrum licences will likely be renewed. We expect our spectrum licences to be renewed every 20 years following a review of our compliance with licence terms. In addition to current usage, our licensed spectrum can be used for planned and new technologies. As a result of our assessment of the combination of these significant factors, we currently consider our spectrum licences to have indefinite lives and, as referred to in *Note 1(b)*, this represents a significant judgment for us.

### (f) Impairment testing of intangible assets with indefinite lives and goodwill

**General**

As referred to in *Note 1(f)*, the carrying values of intangible assets with indefinite lives and goodwill are periodically tested for impairment and, as referred to in *Note 1(b)*, this test represents a significant estimate for us, while also requiring significant judgments to be made. Also as referred to in *Note 1(b)*, effective January 1, 2020, we embarked upon the modification of our internal and external reporting processes, systems and internal controls to accommodate the technology convergence-driven cessation of the historical distinction between our wireless and wireline operations and, with effect from January 1, 2021, transitioned to a new segment reporting structure, as referred to in *Note 5*; concurrent with the transition to a new segment reporting structure, there was necessarily a redetermination of our cash-generating units and such redetermination, reflected in the disclosed December 2021 annual test cash-generating units used for intangible assets with indefinite lives and goodwill for impairment testing, aligned with the new segment reporting structure. The December 2020 annual test reflected the historical cash-generating unit distinction.

The carrying values allocated to intangible assets with indefinite lives and goodwill are set out in the following table.

| | Intangible assets with indefinite lives | | Goodwill | | Total | |
|---|---|---|---|---|---|---|
| As at December 31 (millions) | **2021** | 2020 | **2021** | 2020[1] | **2021** | 2020 |
| TELUS technology solutions | **$ 12,185** | $ – | **$ 5,367** | $ – | **$ 17,552** | $ – |
| Digitally-led customer experiences – TELUS International | **–** | – | **1,914** | – | **1,914** | – |
| Wireless | **–** | 9,910 | **–** | 2,890 | **–** | 12,800 |
| Wireline | **–** | – | **–** | 4,270 | **–** | 4,270 |
| | **$ 12,185** | $ 9,910 | **$ 7,281** | $ 7,160 | **$ 19,466** | $ 17,070 |

1 The goodwill balance for wireline as at December 31, 2020, has been adjusted, as set out in *(c)*.

The recoverable amounts of the cash-generating units' assets have been determined based on a fair value less costs of disposal calculation. There is a material degree of uncertainty with respect to the estimates of the recoverable amounts of the cash-generating units' assets, given the necessity of making key economic assumptions about the future. Recoverable amounts based on fair value less costs of disposal calculations are categorized as Level 3 fair value measures.

We validate the results of our recoverable amounts calculations through a market-comparable approach and an analytical review of industry facts and facts that are specific to us. The market-comparable approach uses current (at time of test) market consensus estimates and equity trading prices for U.S. and Canadian firms in the same industry. In addition, we ensure that the combination of the valuations of the cash-generating units is reasonable based on our current (at time of test) market value.

**Key assumptions**

The fair value less costs of disposal calculation uses discounted cash flow projections that employ the following key assumptions: future cash flows and growth projections (including judgments about the allocation of future capital expenditures to support both mobile and fixed operations); associated economic risk assumptions and estimates of the likelihood of achieving key operating metrics and drivers; estimates of future generational infrastructure capital expenditures; and the future weighted average cost of capital. We consider a range of reasonably possible amounts to use for key assumptions and decide upon amounts that represent management's best estimates of market amounts. In the normal course, we make changes to key assumptions so that they reflect current (at time of test) economic conditions, updates of historical information used to develop the key assumptions and changes (if any) in our debt ratings.

The key assumptions for cash flow projections are based upon our approved financial forecasts, which span a period of three years and are discounted, for December 2021 annual impairment test purposes, at a consolidated post-tax notional rate of 6.6% and 9.0% for each of the TELUS technology solutions and the digitally-led customer experiences – TELUS International cash-generating units, respectively (2020 – 7.0% for each of the wireless cash-generating unit and the wireline cash-generating unit). For impairment testing valuations, cash flows subsequent to the three-year projection period are extrapolated, for December 2021 annual impairment test purposes, generally using perpetual growth rates of 1.95% and 3.0% for each of the TELUS technology solutions cash-generating unit and the digitally-led customer experiences – TELUS International cash-generating unit, respectively (2020 – 2.00% for each of the wireless cash-generating unit and the wireline cash-generating unit); these growth rates do not exceed the long-term average growth rates observed in the markets in which we operate.

We believe that any *reasonably possible* change in the key assumptions on which the calculation of the recoverable amounts of our cash-generating units is based would not cause the cash-generating units' carrying values (including the intangible assets with indefinite lives and the goodwill allocated to each cash-generating unit) to exceed their recoverable amounts. If the future were to *adversely* differ from management's best estimates for the key assumptions and associated cash flows were to be materially adversely affected, we could potentially experience future material impairment charges in respect of our intangible assets with indefinite lives and goodwill.

# 19 Leases

We have the right of use of land, buildings and equipment under leases. Most of our leases for real estate that we use for office, retail or network (including mobile site) purposes typically have options to extend the lease terms, which we use to protect our investment in leasehold improvements (including mobile site equipment) and to mitigate relocation risk, and/or which reflect the importance of the underlying real estate right-of-use lease assets to our operations. Judgments about lease terms are determinative of the measurement of right-of-use lease assets and the associated lease liabilities. Our judgment in respect of lease terms for leased real estate utilized in connection with our telecommunications infrastructure, more so than for any other right-of-use lease assets, routinely includes periods covered by options to extend the lease terms, as we are reasonably certain that we will extend such leases.

In the normal course of operations, there are future non-executory cash outflows in respect of leases to which we are potentially exposed and which are not included in our lease liabilities as at the reporting date. A significant portion (approximately one-third) of our mobile site lease payments have consumer price index-based price adjustments and such adjustments result in future periodic re-measurements of the lease liabilities with commensurate adjustments to the associated real estate right-of-use lease assets (and associated future depreciation amounts); these adjustments would represent our current variable lease payments. As well, we routinely and necessarily commit to leases that have not yet commenced.

As mandated by Innovation, Science and Economic Development Canada, telecommunications companies are obligated to allow, on their real estate assets owned, on their real estate right-of-use lease assets and/or on their owned-equipment situated on real estate right-of-use lease assets, competitors to co-locate telecommunications infrastructure equipment. Of our real estate right-of-use lease assets used for purposes of situating telecommunications infrastructure equipment, less than one-fifth have co-location subleases that we, as lessor, account for as operating leases.

Maturity analyses of lease liabilities are set out in *Note 4(c)* and *Note 26(i)*; the period interest expense in respect thereof is set out in *Note 9*. The additions to, the depreciation charges for, and the carrying amounts of, right-of-use lease assets are set out in *Note 17*. We have not currently elected to exclude low-value and short-term leases from lease accounting.

| Years ended December 31 (millions) | Note | **2021** | 2020 |
|---|---|---|---|
| Income from subleasing right-of-use lease assets | | | |
| Co-location sublet revenue included in operating service revenues | | **$ 22** | $ 17 |
| Other sublet revenue included in other income | *7* | **$ 4** | $ 4 |
| Lease payments | | **$ 568** | $ 434 |

# 20 Other long-term assets

| As at December 31 (millions) | Note | 2021 | 2020 |
|---|---|---|---|
| Pension assets | *15* | **$ 453** | $ 13 |
| Unbilled customer finance receivables | *4(b)* | **545** | 361 |
| Derivative assets | *4(h)* | **76** | 40 |
| Deferred income taxes | | **35** | 11 |
| Costs incurred to obtain or fulfill contracts with customers | | **109** | 103 |
| Real estate joint venture advances | *21(b)* | **114** | 114 |
| Investment in real estate joint venture | *21(b)* | **1** | 1 |
| Investment in associates | *21* | **100** | 69 |
| Portfolio investments[1] | | | |
| At fair value through net income | | **26** | 13 |
| At fair value through other comprehensive income | | **370** | 223 |
| Prepaid maintenance | | **62** | 50 |
| Refundable security deposits and other | | **113** | 108 |
| | | **$ 2,004** | $ 1,106 |

1 Fair value measured at reporting date using significant other observable inputs (Level 2).

The costs incurred to obtain and fulfill contracts with customers are set out in the following table:

| Years ended December 31 (millions) | **2021** | | | 2020 | | |
|---|---|---|---|---|---|---|
| | **Costs incurred to** | | | Costs incurred to | | |
| | **Obtain contracts with customers** | **Fulfill contracts with customers** | **Total** | Obtain contracts with customers | Fulfill contracts with customers | Total |
| Balance, beginning of period | **$ 323** | **$ 11** | **$ 334** | $ 344 | $ 14 | $ 358 |
| Additions | **282** | **2** | **284** | 261 | 4 | 265 |
| Amortization | **(269)** | **(7)** | **(276)** | (282) | (7) | (289) |
| Balance, end of period | **$ 336** | **$ 6** | **$ 342** | $ 323 | $ 11 | $ 334 |
| Current[1] | **$ 230** | **$ 3** | **$ 233** | $ 225 | $ 6 | $ 231 |
| Non-current | **106** | **3** | **109** | 98 | 5 | 103 |
| | **$ 336** | **$ 6** | **$ 342** | $ 323 | $ 11 | $ 334 |

1 Presented in the Consolidated statements of financial position in prepaid expenses.

# 21 Real estate joint ventures and investment in associate

## (a) General

**Real estate joint ventures**
In 2013, we partnered, as equals, with two arm's-length parties in a residential, retail and commercial real estate redevelopment project, TELUS Sky, in Calgary, Alberta. The new-build tower, completed in 2020, was to be built to the LEED Platinum standard.

**Associate**
We have acquired a 35% (2020 – 28%) basic equity interest in Miovision Technologies Incorporated, an associate that is complementary to, and is viewed to grow, our existing Internet of Things business; our judgment is that we obtained significant influence over the associate concurrent with acquiring our equity interest.

## (b) Real estate joint ventures

**Summarized financial information**

| As at December 31 (millions) | 2021 | 2020 |
|---|---|---|
| **Assets** | | |
| Current assets | | |
| Cash and temporary investments, net | **$ 11** | $ 11 |
| Other | **28** | 18 |
| | **39** | 29 |
| Non-current assets | | |
| Investment property | **328** | 332 |
| Other | **10** | 13 |
| | **338** | 345 |
| | **$ 377** | $ 374 |

| As at December 31 (millions) | 2021 | 2020 |
|---|---|---|
| **Liabilities and owners' equity** | | |
| Current liabilities | | |
| Accounts payable and accrued liabilities | **$ 10** | $ 21 |
| Construction credit facilities | **–** | 342 |
| | **10** | 363 |
| Non-current liabilities | | |
| Construction credit facilities | **342** | – |
| | **342** | – |
| | **352** | 363 |
| Owners' equity | | |
| TELUS[1] | **9** | 5 |
| Other partners | **16** | 6 |
| | **25** | 11 |
| | **$ 377** | $ 374 |

1 The equity amounts recorded by the real estate joint venture differ from those recorded by us by the amount of the deferred gains on our real estate contributed and the valuation provision we have recorded in excess of that recorded by the real estate joint venture.

| Years ended December 31 (millions) | 2021 | 2020 |
|---|---|---|
| Revenue | **$ 13** | $ 2 |
| Depreciation and amortization | **$ 7** | $ 3 |
| Interest expense[1] | **$ 3** | $ 1 |
| Net income (loss) and comprehensive income (loss)[2] | **$ (18)** | $ (42) |

1 During the year ended December 31, 2020, the real estate joint venture capitalized $4 of financing costs.
2 As the real estate joint ventures are partnerships, no provision for income taxes of the partners is made in determining the real estate joint ventures' net income and comprehensive income.

**Our real estate joint ventures activity**

Our real estate joint ventures investment activity is set out in the following table.

| Years ended December 31 (millions) | 2021 | | | 2020 | | |
|---|---|---|---|---|---|---|
| | Loans and receivables[1] | Equity[2] | Total | Loans and receivables[1] | Equity[2] | Total |
| **Related to real estate joint ventures' statements of income and other comprehensive income** | | | | | | |
| Comprehensive income (loss) attributable to us[3] | $ – | $ (3) | $ (3) | $ – | $ (14) | $ (14) |
| **Related to real estate joint ventures' statements of financial position** | | | | | | |
| Items not affecting currently reported cash flows | | | | | | |
| Construction credit facilities financing costs charged by us (*Note 7*) | 4 | – | 4 | 4 | – | 4 |
| Cash flows in the current reporting period | | | | | | |
| Construction credit facilities | | | | | | |
| Amounts advanced | – | – | – | 10 | – | 10 |
| Financing costs paid to us | (4) | – | (4) | (4) | – | (4) |
| Funds we advanced or contributed, excluding construction credit facilities | – | 10 | 10 | – | 17 | 17 |
| Funds repaid to us and earnings distributed | – | – | – | – | (1) | (1) |
| Net increase (decrease) | – | 7 | 7 | 10 | 2 | 12 |
| **Real estate joint ventures carrying amounts** | | | | | | |
| Balance, beginning of period | 114 | (11) | 103 | 104 | (2) | 102 |
| Valuation provision | – | (4) | (4) | – | (11) | (11) |
| Balance, end of period | $ 114 | $ (8) | $ 106 | $ 114 | $ (11) | $ 103 |

1 Loans and receivables are included in our consolidated statements of financial position as Real estate joint venture advances and are comprised of advances under construction credit facilities.
2 We account for our interests in the real estate joint ventures using the equity method of accounting. As at December 31, 2021 and 2020, we had recorded equity losses in excess of our recorded equity investment in respect of one of the real estate joint ventures; such resulting balance has been included in long-term liabilities (*Note 27*).
3 As the real estate joint ventures are partnerships, no provision for income taxes of the partners is made in determining the real estate joint ventures' net income and comprehensive income.

We have entered into lease agreements with the TELUS Sky real estate joint venture; for lease accounting purposes, the first lease commenced during the three-month period ended June 30, 2019. During the year ended December 31, 2021, the TELUS Sky real estate joint venture recognized $8 million (2020 – $NIL) of revenue from our office tenancy; of this amount, one-third was due to our economic interest in the real estate joint venture and two-thirds was due to our partners' economic interests in the real estate joint venture.

**Construction credit facilities**

The TELUS Sky real estate joint venture has a credit agreement, maturing August 31, 2023, with Canadian financial institutions (as 66⅔% lender) and TELUS Corporation (as 33⅓% lender) to provide $342 million of construction financing for the project. The construction credit facilities contain customary real estate construction financing representations, warranties and covenants and are secured by demand debentures constituting first fixed and floating charge mortgages over the underlying real estate assets. The construction credit facilities are available by way of bankers' acceptance or prime loan and bear interest at rates in line with similar construction financing facilities.

# 22 Short-term borrowings

On July 26, 2002, one of our subsidiaries, TELUS Communications Inc., entered into an agreement with an arm's-length securitization trust associated with a major Schedule I bank under which it is currently able to sell an interest in certain trade receivables up to a maximum of $600 million (2020 – $500 million). The term of this revolving-period securitization agreement ends December 31, 2024 (2020 – December 31, 2021), and it requires minimum cash proceeds of $100 million from monthly sales of interests in certain trade receivables. TELUS Communications Inc. is required to maintain a credit rating of at least BB (2020 – BB) from DBRS Limited or the securitization trust may require the sale program to be wound down prior to the end of the term.

Sales of trade receivables in securitization transactions are recognized as collateralized short-term borrowings and thus do not result in our de-recognition of the trade receivables sold. When we sell our trade receivables, we retain reserve accounts, which are retained interests in the securitized trade receivables, and servicing rights. As at December 31, 2021, we had sold to the trust (but continued to recognize) trade receivables of $118 million (2020 – $123 million). Short-term borrowings of $100 million (2020 – $100 million) are comprised of amounts advanced to us by the arm's-length securitization trust pursuant to the sale of trade receivables.

The balance of short-term borrowings (if any) is comprised of amounts drawn on bank facilities and/or other.

# 23 Accounts payable and accrued liabilities

| As at December 31 (millions) | 2021 | 2020 |
|---|---|---|
| Accrued liabilities | **$ 1,539** | $ 1,251 |
| Payroll and other employee-related liabilities | **633** | 545 |
| Restricted share units liability | **28** | 18 |
| | **2,200** | 1,814 |
| Trade accounts payable | **1,213** | 855 |
| Interest payable | **173** | 173 |
| Indirect taxes payable and other[1] | **119** | 129 |
| | **$ 3,705** | $ 2,971 |

1 The December 31, 2020, balance of indirect taxes payable and other has been adjusted, as set out in *Note 18(c)*.

# 24 Advance billings and customer deposits

| As at December 31 (millions) | 2021 | 2020 |
|---|---|---|
| Advance billings | **$ 636** | $ 551 |
| Deferred customer activation and connection fees | **6** | 7 |
| Customer deposits | **10** | 34 |
| Contract liabilities | **652** | 592 |
| Other | **202** | 180 |
| | **$ 854** | $ 772 |

Contract liabilities represent our future performance obligations to customers in respect of services and/or equipment for which we have received consideration from the customer or for which an amount is due from the customer. Our contract liability balances, and the changes in those balances, are set out in the following table:

| Years ended December 31 (millions) | Note | 2021 | 2020 |
|---|---|---|---|
| Balance, beginning of period | | **$ 806** | $ 801 |
| Revenue deferred in previous period and recognized in current period | | **(593)** | (577) |
| Net additions arising from operations | | **637** | 539 |
| Additions arising from business acquisitions | | **20** | 43 |
| Balance, end of period | | **$ 870** | $ 806 |
| Current | | **$ 780** | $ 735 |
| Non-current | *27* | | |
| Deferred revenues | | **82** | 61 |
| Deferred customer activation and connection fees | | **8** | 10 |
| | | **$ 870** | $ 806 |
| **Reconciliation of contract liabilities presented in the Consolidated statements of financial position – current** | | | |
| Gross contract liabilities | | **$ 780** | $ 735 |
| Reclassification to contract assets of contracts with contract liabilities less than contract assets | *6(c)* | **(115)** | (133) |
| Reclassification from contract assets of contracts with contract assets less than contract liabilities | *6(c)* | **(13)** | (10) |
| | | **$ 652** | $ 592 |

## 25 Provisions

| (millions) | Asset retirement obligation | Employee-related | Written put options and contingent consideration[1] | Other | Total |
|---|---|---|---|---|---|
| As at January 1, 2020 | $ 495 | $ 64 | $ 227 | $ 92 | $ 878 |
| Additions | – | 48 | 186 | 200 | 434 |
| Reversals | (5) | (1) | (114) | (20) | (140) |
| Uses | (3) | (69) | (112) | (143) | (327) |
| Interest effects[2] | 174 | – | 2 | – | 176 |
| Effects of foreign exchange, net | – | – | 13 | – | 13 |
| As at December 31, 2020 | 661 | 42 | 202 | 129 | 1,034 |
| Additions | **23** | **84** | **8** | **70** | **185** |
| Reversals | **(8)** | **(2)** | **(2)** | **(11)** | **(23)** |
| Uses | **(4)** | **(58)** | **(9)** | **(88)** | **(159)** |
| Interest effects[2] | **(171)** | **–** | **4** | **–** | **(167)** |
| **As at December 31, 2021** | **$ 501** | **$ 66** | **$ 203** | **$ 100** | **$ 870** |
| Current | **$ 4** | **$ 55** | **$ 7** | **$ 30** | **$ 96** |
| Non-current | **497** | **11** | **196** | **70** | **774** |
| **As at December 31, 2021** | **$ 501** | **$ 66** | **$ 203** | **$ 100** | **$ 870** |

1 The December 31, 2020, balance of written put options and contingent consideration has been adjusted, as set out in *Note 18(c)*.
2 The difference of $(186) (2020 – $160) between the asset retirement obligation interest effects in this table and the amount included in the amount disclosed in *Note 9* is in respect of the change in the discount rates applicable to the provision, with such difference included in the cost of the associated asset(s) by way of being included with (netted against) the additions detailed in *Note 17*.

### Asset retirement obligation

We establish provisions for liabilities associated with the retirement of property, plant and equipment when those obligations result from the acquisition, construction, development and/or normal operation of the assets. We expect that the associated cash outflows in respect of the balance accrued as at the financial statement date will occur proximate to the dates these assets are retired.

### Employee-related

The employee-related provisions are largely in respect of restructuring activities (as discussed further in *Note 16(b)*). The timing of the associated cash outflows in respect of the balance accrued as at the financial statement date is substantially short-term in nature.

### Written put options and contingent consideration

In connection with certain business acquisitions, we have established provisions for written put options in respect of non-controlling interests. Provisions for some written put options are determined based on the net present value of estimated future earnings results, and such provisions require us to make key economic assumptions about the future. Similarly, we have established provisions for contingent consideration.

No cash outflows in respect of the written put options are expected prior to their initial exercisability, and no cash outflows in respect of contingent consideration are expected prior to completion of the periods during which the contingent consideration can be earned.

### Other

The provisions for other include: legal claims; non-employee-related restructuring activities; contract termination costs and onerous contracts related to business acquisitions; and costs incurred in connection with the COVID-19 pandemic. Other than as set out following, we expect that the associated cash outflows in respect of the balance accrued as at the financial statement date will occur over an indeterminate multi-year period.

As discussed further in *Note 29*, we are involved in a number of legal claims and we are aware of certain other possible legal claims. In respect of legal claims, we establish provisions, when warranted, after taking into account legal assessments, information presently available, and the expected availability of recourse. The timing of cash outflows associated with legal claims cannot be reasonably determined.

In connection with business acquisitions, we have established provisions for contract termination costs and onerous contracts acquired.

# 26 Long-term debt

### (a) Details of long-term debt

| As at December 31 (millions) | Note | 2021 | 2020 |
|---|---|---|---|
| **Senior unsecured** | | | |
| TELUS Corporation senior notes | *(b)* | **$ 15,258** | $ 15,021 |
| TELUS Corporation commercial paper | *(c)* | **1,900** | 731 |
| TELUS Communications Inc. debentures | *(e)* | **448** | 622 |
| **Secured** | | | |
| TELUS International (Cda) Inc. credit facility | *(f)* | **1,062** | 1,804 |
| Other | *(g)* | **308** | 273 |
| | | **18,976** | 18,451 |
| **Lease liabilities** | *(h)* | **1,876** | 1,837 |
| **Long-term debt** | | **$ 20,852** | $ 20,288 |
| Current | | **$ 2,927** | $ 1,432 |
| Non-current | | **17,925** | 18,856 |
| **Long-term debt** | | **$ 20,852** | $ 20,288 |

### (b) TELUS Corporation senior notes

The notes are senior unsecured and unsubordinated obligations and rank equally in right of payment with all of our existing and future unsecured unsubordinated obligations, are senior in right of payment to all of our existing and future subordinated indebtedness, and are effectively subordinated to all existing and future obligations of, or guaranteed by, our subsidiaries. The indentures governing the notes contain certain covenants that, among other things, place limitations on our ability, and the ability of certain of our subsidiaries, to: grant security in respect of indebtedness; enter into sale-leaseback transactions; and incur new indebtedness.

Interest is payable semi-annually. The notes require us to make an offer to repurchase them at a price equal to 101% of their principal amount plus accrued and unpaid interest to the date of repurchase upon the occurrence of a change in control triggering event, as defined in the supplemental trust indenture.

At any time prior to the respective maturity dates set out in the table below, the notes are redeemable at our option, in whole at any time, or in part from time to time, on not fewer than 30 days' and not more than 60 days' prior notice. On or after the respective redemption present value spread cessation dates set out in the table below, the notes are redeemable at our option, in whole but not in part, on not fewer than 30 days' and not more than 60 days' prior notice, at redemption prices equal to 100% of the principal amounts thereof. In addition, accrued and unpaid interest, if any, will be paid to the date fixed for redemption.

| Series | Issued | Maturity | Issue price | Effective interest rate[1] | Principal face amount | | Redemption present value spread | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Originally issued | Outstanding at financial statement date | Basis points[2] | Cessation date |
| 2.35% Notes, Series CT | March 2015 | March 2022[3] | $997.31 | 2.39% | $1.0 billion | $NIL | 35.5 | Feb. 28, 2022 |
| 3.35% Notes, Series CJ | December 2012 | March 2023 | $998.83 | 3.36% | $500 million | $500 million | 40 | Dec. 15, 2022 |
| 3.35% Notes, Series CK | April 2013 | April 2024 | $994.35 | 3.41% | $1.1 billion | $1.1 billion | 36 | Jan. 2, 2024 |
| 3.75% Notes, Series CQ | September 2014 | January 2025 | $997.75 | 3.78% | $800 million | $800 million | 38.5 | Oct. 17, 2024 |
| 3.75% Notes, Series CV | December 2015 | March 2026 | $992.14 | 3.84% | $600 million | $600 million | 53.5 | Dec. 10, 2025 |
| 2.75% Notes, Series CZ | July 2019 | July 2026 | $998.73 | 2.77% | $800 million | $800 million | 33 | May 8, 2026 |
| 2.80% U.S. Dollar Notes[4] | September 2016 | February 2027 | US$991.89 | 2.89% | US$600 million | US$600 million | 20 | Nov. 16, 2026 |
| 3.70% U.S. Dollar Notes[4] | March 2017 | September 2027 | US$998.95 | 3.71% | US$500 million | US$500 million | 20 | June 15, 2027 |
| 2.35% Notes, Series CAC | May 2020 | January 2028 | $997.25 | 2.39% | $600 million | $600 million | 48 | Nov. 27, 2027 |
| 3.625% Notes, Series CX | March 2018 | March 2028 | $989.49 | 3.75% | $600 million | $600 million | 37 | Dec. 1, 2027 |
| 3.30% Notes, Series CY | April 2019 | May 2029 | $991.75 | 3.40% | $1.0 billion | $1.0 billion | 43.5 | Feb. 2, 2029 |
| 3.15% Notes, Series CAA | December 2019 | February 2030 | $996.49 | 3.19% | $600 million | $600 million | 39.5 | Nov. 19, 2029 |
| 2.05% Notes, Series CAD | October 2020 | October 2030 | $997.93 | 2.07% | $500 million | $500 million | 38 | July 7, 2030 |
| 2.85% Sustainability-Linked Notes, Series CAF | June 2021 | November 2031 | $997.52 | 2.88%[5] | $750 million | $750 million | 34 | Aug. 13, 2031 |
| 4.40% Notes, Series CL | April 2013 | April 2043 | $997.68 | 4.41% | $600 million | $600 million | 47 | Oct. 1, 2042 |
| 5.15% Notes, Series CN | November 2013 | November 2043 | $995.00 | 5.18% | $400 million | $400 million | 50 | May 26, 2043 |
| 4.85% Notes, Series CP | Multiple[6] | April 2044 | $987.91[6] | 4.93%[6] | $500 million[6] | $900 million[6] | 46 | Oct. 5, 2043 |
| 4.75% Notes, Series CR | September 2014 | January 2045 | $992.91 | 4.80% | $400 million | $400 million | 51.5 | July 17, 2044 |
| 4.40% Notes, Series CU | March 2015 | January 2046 | $999.72 | 4.40% | $500 million | $500 million | 60.5 | July 29, 2045 |
| 4.70% Notes, Series CW | Multiple[7] | March 2048 | $998.06[7] | 4.71%[7] | $325 million[7] | $475 million[7] | 58.5 | Sept. 6, 2047 |
| 4.60% U.S. Dollar Notes[4] | June 2018 | November 2048 | US$987.60 | 4.68% | US$750 million | US$750 million | 25 | May 16, 2048 |
| 4.30% U.S. Dollar Notes[4] | May 2019 | June 2049 | US$990.48 | 4.36% | US$500 million | US$500 million | 25 | Dec. 15, 2048 |
| 3.95% Notes, Series CAB | Multiple[8] | February 2050 | $997.54[8] | 3.97%[8] | $400 million[8] | $800 million[8] | 57.5 | Aug. 16, 2049 |
| 4.10% Notes, Series CAE | April 2021 | April 2051 | $994.70 | 4.13% | $500 million | $500 million | 53 | Oct. 5, 2050 |

1 The effective interest rate is that which the notes would yield to an initial debt holder if held to maturity.

2 For Canadian dollar-denominated notes, the redemption price is equal to the greater of (i) the present value of the notes discounted at the Government of Canada yield plus the redemption present value spread calculated over the period to the redemption present value spread cessation date, or (ii) 100% of the principal amount thereof.
For U.S. dollar-denominated notes, the redemption price is equal to the greater of (i) the present value of the notes discounted at the U.S. Adjusted Treasury Rate plus the redemption present value spread calculated over the period to the redemption present value spread cessation date, or (ii) 100% of the principal amount thereof.

3 On July 16, 2021, we exercised our right to early redeem, on August 17, 2021, all of our 2.35% Notes, Series CT. The long-term debt prepayment premium recorded was $10 million before income taxes (see *Note 9*).

4 We have entered into foreign exchange derivatives (cross currency interest rate exchange agreements) that effectively converted the principal payments and interest obligations to Canadian dollar obligations as follows:

| Series | Interest rate fixed at | Canadian dollar equivalent principal | Exchange rate |
|---|---|---|---|
| 2.80% U.S. Dollar Notes | 2.95% | $792 million | $1.3205 |
| 3.70% U.S. Dollar Notes | 3.41% | $667 million | $1.3348 |
| 4.60% U.S. Dollar Notes | 4.41% | $974 million | $1.2985 |
| 4.30% U.S. Dollar Notes | 4.27% | $672 million | $1.3435 |

5 If we have not obtained a sustainability performance target verification assurance certificate for the fiscal year ended December 31, 2030, the note will bear interest at a rate of 3.85% for the period from November 14, 2030, through November 13, 2031. Similarly, if we redeem the notes and we have not obtained a sustainability performance target verification assurance certificate at the end of the fiscal year immediately preceding the date fixed for redemption, the interest accrued (if any) will be determined using a rate of 3.85%.

6 $500 million of 4.85% Notes, Series CP were issued in April 2014 at an issue price of $998.74 and an effective interest rate of 4.86%. This series of notes was reopened in December 2015 and a further $400 million of notes were issued at an issue price of $974.38 and an effective interest rate of 5.02%.

7 $325 million of 4.70% Notes, Series CW were issued in March 2017 at an issue price of $990.65 and an effective interest rate of 4.76%. This series of notes was reopened in February 2018 and a further $150 million of notes were issued at an issue price of $1,014.11 and an effective interest rate of 4.61% in March 2018.

8 $400 million of 3.95% Notes, Series CAB were issued in December 2019 at an issue price of $991.54 and an effective interest rate of 4.00%. This series of notes was reopened in May 2020 and a further $400 million of notes were issued at an issue price of $1,003.53 and an effective interest rate of 3.93%.

### (c) TELUS Corporation commercial paper

TELUS Corporation has an unsecured commercial paper program, which is backstopped by our $2.75 billion syndicated credit facility (see *(d)*) and is to be used for general corporate purposes, including capital expenditures and investments. This program enables us to issue commercial paper, subject to conditions related to debt ratings, up to a maximum aggregate amount at any one time of $1.9 billion equivalent (US$1.5 billion maximum) (2020 – $1.4 billion maximum). Foreign currency forward contracts are used to manage currency risk arising from issuing commercial paper denominated in U.S. dollars. Commercial paper debt is due within one year and is classified as a current portion of long-term debt, as the amounts are fully supported, and we expect that they will continue to be supported, by the revolving credit facility, which has no repayment requirements within the next year. As at December 31, 2021, we had $1.9 billion (2020 – $731 million) of commercial paper outstanding, all of which was denominated in U.S. dollars (US$1.5 billion; 2020 – US$574 million), with an effective average interest rate of 0.35%, maturing through May 2022.

### (d) TELUS Corporation credit facility

As at December 31, 2021, TELUS Corporation had an unsecured revolving $2.75 billion bank credit facility, expiring on April 6, 2026 (2020 – $2.25 billion bank credit facility, expiring on May 31, 2023), with a syndicate of financial institutions, which is to be used for general corporate purposes, including the backstopping of commercial paper.

The TELUS Corporation credit facility bears interest at prime rate, U.S. Dollar Base Rate, a bankers' acceptance rate or London interbank offered rate (LIBOR) (as such terms are used or defined in the credit facility), plus applicable margins. The credit facility contains customary representations, warranties and covenants, including two financial quarter-end ratio tests. These tests are that our leverage ratio must not exceed 4.25:1.00 and our operating cash flow to interest expense ratio must not be less than 2.00:1.00, all as defined in the credit facility.

Continued access to the TELUS Corporation credit facility is not contingent upon TELUS Corporation maintaining a specific credit rating.

| As at December 31 (millions) | 2021 | 2020 |
|---|---|---|
| Net available | $ 850 | $ 1,519 |
| Backstop of commercial paper | 1,900 | 731 |
| Gross available | $ 2,750 | $ 2,250 |

We had $193 million of letters of credit outstanding as at December 31, 2021 (2020 – $190 million), issued under various uncommitted facilities; such letter of credit facilities are in addition to the ability to provide letters of credit pursuant to our committed bank credit facility. Further, we had arranged $359 million of incremental letters of credit to allow us to participate in Innovation, Science and Economic Development Canada's 3500 MHz band spectrum auction that was held in June–July 2021, as further described in *Note 18(a)*. Concurrent with funding the purchase of the spectrum licences, these incremental letters of credit were extinguished.

### (e) TELUS Communications Inc. debentures

The Series 3 and 5 Debentures were issued by a predecessor corporation of TELUS Communications Inc., BC TEL, under a Trust Indenture dated May 31, 1990. The Series B Debentures were issued by a predecessor corporation of TELUS Communications Inc., AGT Limited, under a Trust Indenture dated August 24, 1994, and a supplemental trust indenture dated September 22, 1995.

| | | | | Principal face amount | | |
|---|---|---|---|---|---|---|
| Series[1] | Issued | Maturity | Issue price | Originally issued | Outstanding at financial statement date | Redemption present value spread (basis points) |
| 10.65% Debentures, Series 3 | June 1991 | June 2021 | $998.00 | $175 million | $NIL | N/A (non-redeemable) |
| 9.65% Debentures, Series 5[2] | April 1992 | April 2022 | $972.00 | $150 million | $249 million | N/A (non-redeemable) |
| 8.80% Debentures, Series B | September 1995 | September 2025 | $995.10 | $200 million | $200 million | 15[3] |

1 Interest is payable semi-annually.
2 Series 4 Debentures were exchangeable, at the holder's option, effective on April 8 of any year during the four-year period from 1996 to 1999, for Series 5 Debentures; $99 million of Series 4 Debentures were exchanged for Series 5 Debentures.
3 At any time prior to the maturity date set out in the table, the debentures are redeemable at our option, in whole at any time, or in part from time to time, on not fewer than 30 days' prior notice. The redemption price is equal to the greater of (i) the present value of the debentures discounted at the Government of Canada yield plus the redemption present value spread, or (ii) 100% of the principal amount thereof. In addition, accrued and unpaid interest, if any, will be paid to the date fixed for redemption.

The debentures became obligations of TELUS Communications Inc. pursuant to an amalgamation on January 1, 2001, are not secured by any mortgage, pledge or other charge, and are governed by certain covenants, including a negative pledge and a limitation on issues of additional debt, subject to a debt to capitalization ratio and an interest coverage test. Effective June 12, 2009, TELUS Corporation guaranteed the payment of the debentures' principal and interest.

### (f) TELUS International (Cda) Inc. credit facility

As at December 31, 2021, TELUS International (Cda) Inc. had a credit facility, secured by its assets, expiring on January 28, 2025, with a syndicate of financial institutions, joined in 2020 by TELUS Corporation. The credit facility is comprised of US$620 million (TELUS Corporation as a lender of approximately 7.5%) and US$230 million (TELUS Corporation as a lender of 12.5%) revolving components and amortizing US$600 million (TELUS Corporation as 12.5% lender) and US$250 million term loan components. The credit facility is non-recourse to TELUS Corporation. The outstanding revolving components and term loan components had a weighted average interest rate of 1.88% as at December 31, 2021.

| As at December 31 (millions) | | | 2021 | | | 2020 |
|---|---|---|---|---|---|---|
| | Revolving components[1] | Term loan components[2] | Total | Revolving components | Term loan components | Total |
| Available | US$ 725 | US$ N/A | US$ 725 | US$ 132 | US$ N/A | US$ 132 |
| Outstanding | | | | | | |
| Due to other | 109 | 737 | 846 | 653 | 775 | 1,428 |
| Due to TELUS Corporation | 16 | 71 | 87 | 65 | 75 | 140 |
| | US$ 850 | US$ 808 | US$ 1,658 | US$ 850 | US$ 850 | US$ 1,700 |

1 Revolving component available is gross of swingline draw of US$8.
2 We have entered into a receive-floating interest rate, pay-fixed interest rate exchange agreement that effectively converts our interest obligations on US$95 of the debt to a fixed rate of 2.64%.
Relative to amounts owed to the syndicate of financial institutions, excluding TELUS Corporation, we have entered into foreign exchange derivatives (cross currency interest rate exchange agreements) that effectively convert an amortizing amount of US$394 of the principal payments, and associated interest obligations, to European euro obligations with an effective fixed interest rate of 0.65% and an effective fixed economic exchange rate of US$1.0932:€1.00. These have been accounted for as a net investment hedge in a foreign operation (see *Note 4*).

The TELUS International (Cda) Inc. credit facility bears interest at prime rate, U.S. Dollar Base Rate, a bankers' acceptance rate or London interbank offered rate (LIBOR) (all such terms as used or defined in the credit facility), plus applicable margins. The credit facility contains customary representations, warranties and covenants, including two financial quarter-end ratio tests; the TELUS International (Cda) Inc. quarter-end net debt to operating cash flow ratio must not exceed: 5.25:1.00 through fiscal 2021, 4.50:1.00 during fiscal 2022 and 3.75:1.00 subsequently; the quarter-end operating cash flow to debt service (interest and scheduled principal repayment) ratio must not be less than 1.50:1.00; all as defined in the credit facility.

The term loan components are subject to an amortization schedule which requires that 5% of the principal advanced be repaid each year of the term of the agreement, with the balance due at maturity and December 22, 2022, for the US$250 million component, respectively.

### (g) Other

Other liabilities bear interest at 3.19%, are secured by the AWS-4 spectrum licences associated with these other liabilities and a real estate holding, and are subject to amortization schedules, so that the principal is repaid over the periods to maturity, the last period ending March 31, 2035.

### (h) Lease liabilities

Lease liabilities are subject to amortization schedules, so that the principal is repaid over various periods, including reasonably expected renewals. The weighted average interest rate on lease liabilities was approximately 4.05% as at December 31, 2021.

### (i) Long-term debt maturities

Anticipated requirements to meet long-term debt repayments, calculated for long-term debt owing as at December 31, 2021, are as follows:

| Composite long-term debt denominated in | Canadian dollars | | | U.S. dollars | | | | | Other currencies | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Currency swap agreement amounts to be exchanged | | | | |
| Years ending December 31 (millions) | Long-term debt, excluding leases | Leases *(Note 19)* | Total | Long-term debt, excluding leases | Leases *(Note 19)* | (Receive)[1] | Pay | Total | Leases *(Note 19)* | Total |
| 2022 | $ 266 | $ 370 | $ 636 | $ 2,234 | $ 30 | $ (1,929) | $ 1,940 | $ 2,275 | $ 37 | $ 2,948 |
| 2023 | 533 | 250 | 783 | 33 | 28 | (28) | 28 | 61 | 33 | 877 |
| 2024 | 1,119 | 219 | 1,338 | 33 | 15 | (28) | 28 | 48 | 27 | 1,413 |
| 2025 | 1,019 | 110 | 1,129 | 672 | 12 | (406) | 422 | 700 | 18 | 1,847 |
| 2026 | 1,420 | 86 | 1,506 | – | 13 | – | – | 13 | 16 | 1,535 |
| 2027–2031 | 4,163 | 264 | 4,427 | 1,395 | 8 | (1,395) | 1,459 | 1,467 | 40 | 5,934 |
| Thereafter | 4,663 | 279 | 4,942 | 1,585 | – | (1,585) | 1,646 | 1,646 | – | 6,588 |
| Future cash outflows in respect of composite long-term debt principal repayments | 13,183 | 1,578 | 14,761 | 5,952 | 106 | (5,371) | 5,523 | 6,210 | 171 | 21,142 |
| Future cash outflows in respect of associated interest and like carrying costs[2] | 6,616 | 329 | 6,945 | 2,238 | 19 | (2,204) | 2,219 | 2,272 | 32 | 9,249 |
| Undiscounted contractual maturities *(Note 4(c))* | $ 19,799 | $ 1,907 | $ 21,706 | $ 8,190 | $ 125 | $ (7,575) | $ 7,742 | $ 8,482 | $ 203 | $ 30,391 |

1 Where applicable, cash flows reflect foreign exchange rates as at December 31, 2021.
2 Future cash outflows in respect of associated interest and like carrying costs for commercial paper and amounts drawn under our credit facilities (if any) have been calculated based upon the rates in effect as at December 31, 2021.

# 27 Other long-term liabilities

| As at December 31 (millions) | Note | 2021 | 2020 |
|---|---|---|---|
| Contract liabilities | *24* | **$ 82** | $ 61 |
| Other | | **3** | 5 |
| Deferred revenues | | **85** | 66 |
| Pension benefit liabilities | *15* | **643** | 926 |
| Other post-employment benefit liabilities | | **66** | 64 |
| Restricted share unit liabilities | | **–** | 17 |
| Derivative liabilities | *4(h)* | **73** | 155 |
| Investment in real estate joint ventures | *21(b)* | **9** | 12 |
| Other | | **23** | 15 |
| | | **899** | 1,255 |
| Deferred customer activation and connection fees | *24* | **8** | 10 |
| | | **$ 907** | $ 1,265 |

# 28 Owners' equity

### (a) TELUS Corporation Common Share capital – general

Our authorized share capital is as follows:

| As at December 31 | 2021 | 2020 |
|---|---|---|
| First Preferred Shares | **1 billion** | 1 billion |
| Second Preferred Shares | **1 billion** | 1 billion |
| Common Shares | **4 billion** | 4 billion |

Only holders of Common Shares may vote at our general meetings, with each holder of Common Shares entitled to one vote per Common Share held at all such meetings so long as not less than 66⅔% of the issued and outstanding Common Shares are owned by Canadians. With respect to priority in the payment of dividends and in the distribution of assets in the event of our liquidation, dissolution or winding-up, whether voluntary or involuntary, or any other distribution of our assets among our shareholders for the purpose of winding up our affairs, preferences are as follows: First Preferred Shares; Second Preferred Shares; and finally Common Shares.

During the three-month period ended March 31, 2021, we issued approximately 51 million Common Shares for gross proceeds of $1.3 billion.

As at December 31, 2021, approximately 62 million Common Shares were reserved for issuance from Treasury under a dividend reinvestment and share purchase plan (see *Note 13(b)*); approximately 20 million Common Shares were reserved for issuance from Treasury under a restricted share unit plan (see *Note 14(b)*); and approximately 90 million Common Shares were reserved for issuance from Treasury under a share option plan (see *Note 14(d)*).

### (b) Purchase of TELUS Corporation Common Shares for cancellation pursuant to normal course issuer bid

As referred to in *Note 3*, we may purchase a portion of our Common Shares for cancellation pursuant to normal course issuer bids in order to maintain or adjust our capital structure. In June 2021, we received approval for a normal course issuer bid to purchase and cancel up to 16 million of our Common Shares (up to a maximum amount of $250 million) from June 4, 2021, to June 3, 2022.

### (c) Subsidiary with significant non-controlling interest

Our TELUS International (Cda) Inc. subsidiary is incorporated under the *Business Corporations Act* (British Columbia) and has geographically dispersed operations with principal places of business in Asia, Central America, Europe and North America.

In February 2021, TELUS International (Cda) Inc. made an initial public offering of subordinate voting shares; both TELUS Corporation and a non-controlling shareholder of TELUS International (Cda) Inc. individually also offered subordinate voting shares in conjunction with the initial public offering. In September 2021, non-controlling shareholders of TELUS International (Cda) Inc. individually offered subordinate voting shares in a secondary offering. Due to the voting rights associated with the remaining multiple voting shares held by TELUS Corporation, as at December 31, 2021, we retained a 70.9% voting and controlling interest and a 55.1% economic interest in TELUS International (Cda) Inc. subsequent to the public purchase of subordinate voting shares; as at December 31, 2020, TELUS Corporation held a 62.6% voting, controlling and economic interest. Changes in the ownership interests of our TELUS International (Cda) Inc. subsidiary during the year ended December 31, 2021, are set out in the following table.

| | Effects of initial public offering and secondary offering on recorded amounts of owners' equity | | | | |
|---|---|---|---|---|---|
| Year ended December 31, 2021 (millions) | Net cash proceeds | Income taxes | Net | Other | Total |
| Initial public offering of subordinate voting shares by TELUS International (Cda) Inc. | $ 630 | $ (10) | $ 640 | | |
| Secondary offering of TELUS International (Cda) Inc. subordinate voting shares by TELUS Corporation | 197 | 4 | 193 | | |
| | $ 827 | $ (6) | $ 833 | | |
| Contributed surplus | | | $ 440 | $ (10) | $ 430 |
| Non-controlling interests | | | 393 | 1 | 394 |
| | | | $ 833 | $ (9) | $ 824 |

**Summarized financial information**

Summarized financial information of our TELUS International (Cda) Inc. subsidiary is set out in the following table.

| As at, or for the years ended, December 31 (millions)[1] | 2021 | 2020 |
|---|---|---|
| **Statement of financial position[2]** | | |
| Current assets | **$ 874** | $ 740 |
| Non-current assets | **$ 3,804** | $ 4,016 |
| Current liabilities | **$ 1,098** | $ 679 |
| Non-current liabilities | **$ 1,475** | $ 2,660 |
| **Statement of income and other comprehensive income** | | |
| Revenue and other income | **$ 2,754** | $ 2,222 |
| Net income | **$ 99** | $ 141 |
| Comprehensive income | **$ 22** | $ 189 |
| **Statement of cash flows** | | |
| Cash provided by operating activities | **$ 347** | $ 353 |
| Cash used by investing activities | **$ (138)** | $ (2,511) |
| Cash provided by financing activities | **$ (252)** | $ 2,268 |

1 As required by IFRS-IASB, this summarized financial information excludes inter-company eliminations.
2 The December 31, 2020, balances have been adjusted to reflect finalization of purchase price allocations for the acquisition of Lionbridge AI in fiscal 2020, as explained further in *Note 18(c)*.

# 29 Contingent liabilities

## (a) Claims and lawsuits

**General**

A number of claims and lawsuits (including class actions and intellectual property infringement claims) seeking damages and other relief are pending against us and, in some cases, other mobile carriers and telecommunications service providers. As well, we have received notice of, or are aware of, certain possible claims (including intellectual property infringement claims) against us and, in some cases, other mobile carriers and telecommunications service providers.

It is not currently possible for us to predict the outcome of such claims, possible claims and lawsuits due to various factors, including: the preliminary nature of some claims; uncertain damage theories and demands; an incomplete factual record; uncertainty concerning legal theories and procedures and their resolution by the courts, at both the trial and the appeal levels; and the unpredictable nature of opposing parties and their demands.

However, subject to the foregoing limitations, management is of the opinion, based upon legal assessments and information presently available, that it is unlikely that any liability, to the extent not provided for through insurance or otherwise, would have a material effect on our financial position and the results of our operations, including cash flows, with the exception of the items enumerated following.

**Certified class actions**

Certified class actions against us include the following:

*Per minute billing class action*

In 2008, a class action was brought in Ontario against us alleging breach of contract, breach of the Ontario *Consumer Protection Act*, breach of the *Competition Act* and unjust enrichment, in connection with our practice of "rounding up" mobile airtime to the nearest minute and charging for the full minute. The action sought certification of a national class. In November 2014, an Ontario class only was certified by the Ontario Superior Court of Justice in relation to the breach of contract, breach of *Consumer Protection Act*, and unjust enrichment claims; all appeals of the certification decision have now been exhausted. At the same time, the Ontario Superior Court of Justice declined to stay the claims of our business customers, notwithstanding an arbitration clause in our customer service agreements with those customers. This latter decision was appealed and on May 31, 2017, the Ontario Court of Appeal dismissed our appeal. The Supreme Court of Canada granted us leave to appeal this decision and on April 4, 2019, granted our appeal and stayed the claims of business customers.

*Call set-up time class actions*

In 2005, a class action was brought against us in British Columbia alleging that we have engaged in deceptive trade practices in charging for incoming calls from the moment the caller connects to the network, and not from the moment the incoming call is connected to the recipient. In 2011, the Supreme Court of Canada upheld a stay of all of the causes of action advanced by the plaintiff in this class action, with one exception, based on the arbitration clause that was included in our customer service agreements. The sole exception was the cause of action based on deceptive or unconscionable practices under the British Columbia *Business Practices and Consumer Protection Act*, which the Supreme Court of Canada declined to stay. In January 2016, the British Columbia Supreme Court certified this class action in relation to the claim under the *Business Practices and Consumer Protection Act*. The class is limited to residents of British Columbia who contracted mobile services with us in the period from January 21, 1999, to April 2010. We have appealed the certification decision. A companion class action was brought against us in Alberta at the same time as the British Columbia class action. The Alberta class action duplicates the allegations in the British Columbia action, but has not proceeded to date and is not certified. Subject to a number of conditions, including court approval, we have now settled both the British Columbia and the Alberta class actions.

**Uncertified class actions**

Uncertified class actions against us include:

*9-1-1 class actions*

In 2008, a class action was brought in Saskatchewan against us and other Canadian telecommunications carriers alleging that, among other matters, we failed to provide proper notice of 9-1-1 charges to the public, have been deceitfully passing them off as government charges, and have charged 9-1-1 fees to customers who reside in areas where 9-1-1 service is not available. The plaintiffs advance causes of action in breach of contract, misrepresentation and false advertising and seek certification of a national class. A virtually identical class action was filed in Alberta at the same time, but the Alberta Court of Queen's Bench declared that class action expired against us as of 2009. No steps have been taken in this proceeding since 2016.

*Public Mobile class actions*

In 2014, class actions were brought against us in Quebec and Ontario on behalf of Public Mobile's customers, alleging that changes to the technology, services and rate plans made by us contravene our statutory and common law obligations. In particular, the Quebec action alleges that our actions constitute a breach of the Quebec *Consumer Protection Act*, the Quebec *Civil Code*, and the Ontario *Consumer Protection Act*. On June 28, 2021, the Quebec Superior Court approved the discontinuance of this claim against TELUS. The Ontario class action alleges negligence, breach of express and implied warranty, breach of the *Competition Act*, unjust enrichment, and waiver of tort. No steps have been taken in this proceeding since it was filed and served.

*Handset subsidy class action*

In 2016, a class action was brought in Quebec against us and other telecommunications carriers alleging that we breached the Quebec *Consumer Protection Act* and the *Civil Code of Quebec* by making false or misleading representations relating to the handset subsidy provided to our mobile customers, and by charging our mobile customers inflated rate plan prices and termination fees higher than those permitted under the *Act*. The claim was later amended to also seek compensation for amounts paid by class members to unlock their mobile devices. The authorization hearing was held on April 30 and May 1, 2019, and on July 15, 2019, the Quebec Superior Court dismissed the authorization application. The Plaintiff's appeal of this decision was dismissed by the Quebec Court of Appeal on July 23, 2021. The Plaintiff has not sought leave to appeal to the Supreme Court of Canada and the time for doing so has now expired. The action is therefore at an end.

**Summary**
We believe that we have good defences to the above matters. Should the ultimate resolution of these matters differ from management's assessments and assumptions, a material adjustment to our financial position and the results of our operations, including cash flows, could result. Management's assessments and assumptions include that reliable estimates of any such exposure cannot be made considering the continued uncertainty about: the nature of the damages that may be sought by the plaintiffs; the causes of action that are being, or may ultimately be, pursued; and, in the case of the uncertified class actions, the causes of action that may ultimately be certified.

### (b) Indemnification obligations
In the normal course of operations, we provide indemnification in conjunction with certain transactions. The terms of these indemnification obligations range in duration. These indemnifications would require us to compensate the indemnified parties for costs incurred as a result of failure to comply with contractual obligations, or litigation claims or statutory sanctions, or damages that may be suffered by an indemnified party. In some cases, there is no maximum limit on these indemnification obligations. The overall maximum amount of an indemnification obligation will depend on future events and conditions and therefore cannot be reasonably estimated. Where appropriate, an indemnification obligation is recorded as a liability. Other than obligations recorded as liabilities at the time of the related transactions, historically we have not made significant payments under these indemnifications. As at December 31, 2021, we had no liability recorded in respect of our indemnification obligations.

See *Note 21(b)* for details regarding our guarantees to the real estate joint ventures.

### (c) Concentration of labour
In 2021, we commenced collective bargaining with the Telecommunications Workers Union, United Steelworkers Local 1944, to renew a collective agreement that expired on December 31, 2021; the contract covered approximately 23% of our Canadian workforce as at December 31, 2021. The expired contract remains in effect while the parties are bargaining, until a new agreement is reached.

# 30 Related party transactions

### (a) Transactions with key management personnel
Our key management personnel have authority and responsibility for overseeing, planning, directing and controlling our activities and consist of our Board of Directors and our Executive Team.

Total compensation expense for key management personnel, and the composition thereof, is as follows:

| Years ended December 31 (millions) | **2021** | 2020[1] |
|---|---|---|
| Short-term benefits | **$ 16** | $ 14 |
| Post-employment pension[2] and other benefits | **13** | 8 |
| Share-based compensation[3] | **70** | 42 |
| | **$ 99** | $ 64 |

1 To reflect the expanded roles and responsibilities of Executive Team members who are not also Executive Leadership Team members, in fiscal 2021 we expanded our definition of key management personnel to include all Executive Team members, and we have applied such definition retrospectively.
2 Our Executive Team members are members of our *Pension Plan for Management and Professional Employees of TELUS Corporation* and certain other non-registered, non-contributory supplementary defined benefit and defined contribution pension plans.
3 We accrue an expense for the notional subset of our restricted share units with market performance conditions using a fair value determined by a Monte Carlo simulation. Restricted share units with an equity settlement feature are accounted for as equity instruments. The expense for restricted share units that do not ultimately vest is reversed against the expense that was previously recorded in their respect.

As disclosed in *Note 14*, we made initial awards of share-based compensation in 2021 and 2020, including, as set out in the following table, to our key management personnel. As most of these awards are cliff-vesting or graded-vesting and have multi-year requisite service periods, the related expense is being recognized rateably over a period of years and thus only a portion of the 2021 and 2020 initial awards are included in the amounts in the table above.

| Years ended December 31 | | | **2021** | | | 2020 |
|---|---|---|---|---|---|---|
| ($ in millions) | **Number of units** | **Notional value[1]** | **Grant-date fair value[1]** | Number of units | Notional value[1] | Grant-date fair value[1] |
| **TELUS Corporation** | | | | | | |
| Restricted share units | **1,273,308** | **$ 33** | **$ 36** | 981,088 | $ 25 | $ 33 |
| **TELUS International (Cda) Inc.** | | | | | | |
| Restricted share units | **437,857** | **15** | **15** | – | – | – |
| Share options | **167,693** | **1** | **1** | – | – | – |
| | | **16** | **16** | | – | – |
| | | **$ 49** | **$ 52** | | $ 25 | $ 33 |

1 The notional value of restricted share units is determined by multiplying the equity share price at the time of award by the number of units awarded; the grant-date fair value differs from the notional value because the fair values of some awards have been determined using a Monte Carlo simulation (see *Note 14(b)*). The notional value of share options has been determined using an option pricing model. No share options were awarded to our key management personnel in fiscal 2020.

The amount recorded for liability-accounted restricted share units and share options awards outstanding as at December 31, 2021 was $7 million (2020 – $10 million).

Our *Directors' Deferred Share Unit Plan* provides that, in addition to his or her annual equity grant of deferred share units, a director may elect to receive his or her annual retainer and meeting fees in deferred share units, TELUS Corporation Common Shares or cash. Deferred share units entitle directors to a specified number of TELUS Corporation Common Shares. Deferred share units accounted for as liabilities have been paid out when a director ceased to be a director, for any reason, at a time elected by the director in accordance with the *Directors' Deferred Share Unit Plan*; during the year ended December 31, 2021, no amount was paid out (2020 – $3 million). As at December 31, 2021 and 2020, no liability-accounted awards were outstanding.

During the year ended December 31, 2021, key management personnel exercised 215,973 TELUS International (Cda) Inc. share options (2020 – NIL), which had an intrinsic value of $7 million (2020 – NIL) at the time of exercise, reflecting a weighted average price at the date of exercise of $39.58 (2020 – N/A).

Employment agreements with members of the Executive Team typically provide for severance payments if an executive's employment is terminated without cause: generally 18–24 months of base salary, benefits and accrual of pension service in lieu of notice, and 50% of base salary in lieu of an annual cash bonus. In the event of a change in control, Executive Team members are not entitled to treatment any different than that given to our other employees with respect to non-vested share-based compensation.

### (b) Transactions with defined benefit pension plans

During the year ended December 31, 2021, we provided management and administrative services to our defined benefit pension plans; the charges for these services were on a cost recovery basis and amounted to $7 million (2020 – $7 million).

### (c) Transactions with real estate joint venture

During the years ended December 31, 2021 and 2020, we had transactions with the TELUS Sky real estate joint venture, which is a related party, as set out in *Note 21*. As at December 31, 2021, we had recorded lease liabilities of $95 million (2020 – $76 million) in respect of our TELUS Sky lease, and monthly cash payments are made in accordance with the lease agreement; one-third of those amounts is due to our economic interest in the real estate joint venture.

## 31 Additional statement of cash flow information

### (a) Statements of cash flows – operating activities and investing activities

| Years ended December 31 (millions) | Note | 2021 | 2020 |
|---|---|---|---|
| **Operating activities** | | | |
| Net change in non-cash operating working capital | | | |
| Accounts receivable | | **$ (290)** | $ (231) |
| Inventories | | **(41)** | 30 |
| Contract assets | | **(4)** | 298 |
| Prepaid expenses | | **(44)** | 79 |
| Accounts payable and accrued liabilities | | **289** | 189 |
| Income and other taxes receivable and payable, net | | **(77)** | (49) |
| Advance billings and customer deposits | | **62** | 54 |
| Provisions | | **23** | (100) |
| | | **$ (82)** | $ 270 |
| **Investing activities** | | | |
| Cash payments for capital assets, excluding spectrum licences | | | |
| Capital asset additions | | | |
| Gross capital expenditures | | | |
| Property, plant and equipment | *17* | **$ (3,188)** | $ (2,672) |
| Intangible assets subject to amortization | *18* | **(864)** | (640) |
| | | **(4,052)** | (3,312) |
| Additions arising from leases | *17* | **554** | 530 |
| Additions arising from non-monetary transactions | | **–** | 7 |
| Capital expenditures | *5* | **(3,498)** | (2,775) |
| Effect of asset retirement obligations | | **171** | (157) |
| | | **(3,327)** | (2,932) |
| Other non-cash items included above | | | |
| Change in associated non-cash investing working capital | | **401** | (50) |
| Non-cash change in asset retirement obligation | | **(171)** | 160 |
| | | **230** | 110 |
| | | **$ (3,097)** | $ (2,822) |

## (b) Changes in liabilities arising from financing activities

| (millions) | Beginning of period | Statement of cash flows: Issued or received | Statement of cash flows: Redemptions, repayments or payments | Non-cash changes: Foreign exchange movement *(Note 4(i))* | Non-cash changes: Other | End of period |
|---|---|---|---|---|---|---|
| **Year ended December 31, 2020** | | | | | | |
| **Dividends payable to holders of Common Shares** | $ 352 | $ – | $ (1,469) | $ – | $ 1,520 | $ 403 |
| Dividends reinvested in shares from Treasury | – | – | 539 | – | (539) | – |
| | $ 352 | $ – | $ (930) | $ – | $ 981 | $ 403 |
| **Short-term borrowings** | $ 100 | $ 215 | $ (223) | $ – | $ 8 | $ 100 |
| **Long-term debt** | | | | | | |
| TELUS Corporation senior notes | $ 14,479 | $ 1,500 | $ (900) | $ (60) | $ 2 | $ 15,021 |
| TELUS Corporation commercial paper | 1,015 | 1,782 | (2,116) | 50 | – | 731 |
| TELUS Communications Inc. debentures | 621 | – | – | – | 1 | 622 |
| TELUS International (Cda) Inc. credit facility | 431 | 1,600 | (191) | (27) | (9) | 1,804 |
| Other | 267 | – | (319) | – | 325 | 273 |
| Lease liabilities | 1,661 | – | (365) | 7 | 534 | 1,837 |
| Derivatives used to manage currency risk arising from U.S. dollar-denominated long-term debt – liability (asset) | (37) | 2,137 | (2,109) | 94 | 35 | 120 |
| | 18,437 | 7,019 | (6,000) | 64 | 888 | 20,408 |
| To eliminate effect of gross settlement of derivatives used to manage currency risk arising from U.S. dollar-denominated long-term debt | – | (2,137) | 2,137 | – | – | – |
| | $ 18,437 | $ 4,882 | $ (3,863) | $ 64 | $ 888 | $ 20,408 |
| **Year ended December 31, 2021** | | | | | | |
| **Dividends payable to holders of Common Shares** | $ 403 | **$ –** | **$ (1,665)** | **$ –** | **$ 1,711** | **$ 449** |
| Dividends reinvested in shares from Treasury | – | **–** | **620** | **–** | **(620)** | **–** |
| | $ 403 | **$ –** | **$ (1,045)** | **$ –** | **$ 1,091** | **$ 449** |
| **Short-term borrowings** | $ 100 | **$ 12** | **$ (2)** | **$ –** | **$ 4** | **$ 114** |
| **Long-term debt** | | | | | | |
| TELUS Corporation senior notes | $ 15,021 | **$ 1,250** | **$ (1,000)** | **$ (13)** | **$ –** | **$ 15,258** |
| TELUS Corporation commercial paper | 731 | **3,585** | **(2,378)** | **(38)** | **–** | **1,900** |
| TELUS Communications Inc. debentures | 622 | **–** | **(175)** | **–** | **1** | **448** |
| TELUS International (Cda) Inc. credit facility | 1,804 | **56** | **(797)** | **(4)** | **3** | **1,062** |
| Other | 273 | **–** | **(89)** | **–** | **124** | **308** |
| Lease liabilities | 1,837 | **–** | **(502)** | **1** | **540** | **1,876** |
| Derivatives used to manage currency risk arising from U.S. dollar-denominated long-term debt – liability (asset) | 120 | **2,406** | **(2,437)** | **10** | **(95)** | **4** |
| | 20,408 | **7,297** | **(7,378)** | **(44)** | **573** | **20,856** |
| To eliminate effect of gross settlement of derivatives used to manage currency risk arising from U.S. dollar-denominated long-term debt | – | **(2,406)** | **2,406** | **–** | **–** | **–** |
| | $ 20,408 | **$ 4,891** | **$ (4,972)** | **$ (44)** | **$ 573** | **$ 20,856** |

# Glossary

**4G (fourth generation):** Wireless technologies, including HSPA+, LTE, LTE advanced and LTE advanced pro, as defined by the International Telecommunications Union.

**5G (fifth generation):** The next generation of converged wireless technologies, expected to provide higher speeds, improved coverage and lower latency, all of which are critical as the number of connected devices continues to increase rapidly.

**Fibre-optic network:** Hair-thin glass fibres along which light pulses are transmitted. Optical fibre networks are used to transmit large amounts of data between locations at high upload and download speeds.

**Fibre to the x (FTTx):** A collective term for any broadband network architecture using optical fibre to replace all or part of the existing copper local loops. FTTH denotes fibre to the home, FTTP denotes fibre to the premises and FTTN denotes fibre to the node or neighbourhood.

**HSPA+ (High-speed packet access plus):** A 4G technology capable of delivering manufacturer-rated wireless data download speeds of up to 21 Mbps (typical speeds of 4 to 6 Mbps). HSPA+ dual-cell technology can double those download speeds.

**Incumbent local exchange carrier (ILEC):** An established telecommunications company providing local telephone service. Non-ILEC refers to the telecommunications operations of TELUS outside its traditional ILEC operating territories, where TELUS competes with the incumbent telephone company (e.g. Ontario and most of Quebec).

**Internet of Things (IoT):** A network of uniquely identifiable end points (or things) that interact without human intervention, most commonly over a wireless network. These systems collect, analyze and act on information in real time and can be deployed to enable the creation of smart connected businesses, homes, vehicles and cities.

**Internet protocol (IP):** A packet-based protocol for sending and receiving data across networks.

**IP-based network:** A network designed using IP and QoS (quality of service) technology to reliably and efficiently support all types of customer traffic, including voice, data and video. An IP-based network allows a variety of IP devices and advanced applications to communicate over a single common network.

**IP TV (internet protocol television):** A television service (offered as Optik TV and Pik TV at TELUS) that uses a two-way digital broadcast signal sent through a network by way of a streamed broadband connection to a dedicated set-top box (or through an app for Pik TV).

**Licensed assisted access (LAA):** An LTE feature that makes use of unlicensed spectrum in combination with licensed spectrum to deliver enhanced performance for mobile device users.

**LTE (long-term evolution):** The leading 4G global wireless technology standard. LTE advanced (LTE-A) and LTE advanced pro offer higher speeds and greater capacity, moving networks closer to 5G. LTE is capable of delivering manufacturer-rated wireless data download speeds of up to 150 Mbps (typical speeds of 12 to 45 Mbps), and LTE-A can offer speeds nearly 10 times higher (in select regions).

**Machine-to-machine (M2M):** Technologies and networked devices that are able to exchange information and perform actions without human intervention.

**Mobile virtual network operator (MVNO):** A mobile service operator that leases access to a wireless network from other carriers to resell services to end customers.

**Normal course issuer bid (NCIB):** A program that enables a company to purchase its own shares, typically for cancellation, through exchanges or private purchases over a set period of time.

**Over-the-top (OTT):** Content, services and applications in a video format, for which delivery occurs through a medium other than the established video delivery infrastructure.

**Passive optical network (PON):** A fibre-based transmission technology used for delivering broadband network access. GPON (gigabit-capable passive optical network) delivers data download speeds of up to 2.4 Gbps and upload speeds of up to 1.2 Gbps; XGS-PON (10-gigabit-capable symmetrical passive optical network) delivers data download and upload speeds of up to 2.5 Gbps.

**Small cell:** Low-powered radio access nodes that can operate in licensed and unlicensed spectrum within a limited range to provide densification and capacity to a macro wireless network.

**Spectrum:** The range of electromagnetic radio frequencies used in the transmission of voice, data and video. The capacity of a wireless network is in part a function of the amount of spectrum licensed and utilized by the carrier.

**Sustainability-linked bond:** A debt financing instrument with terms aligned to the borrower's performance against predetermined sustainability performance targets and principles.

**Virtual private network (VPN):** The extension of an encrypted, private network across a public network that allows users to securely send and receive data, as if users were directly connected to a private network.

**Voice over internet protocol (VoIP):** The transmission of voice signals over the internet or IP network.

For financial definitions, see Section 11 of Management's discussion and analysis.

# Investor information

## Stock exchanges and TELUS trading symbols

**Toronto Stock Exchange (TSX)**
TELUS Corporation: T CUSIP: 87971M103

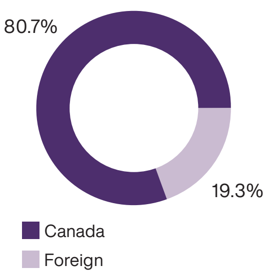
**New York Stock Exchange (NYSE)**
TELUS Corporation: TU CUSIP: 87971M103

**Member of**

- S&P/TSX Composite Index
- S&P/TSX 60 Index
- S&P/TSX Telecom Index
- MSCI World Communication Services Index
- MSCI World Telecom Services Index
- Dow Jones Sustainability North America Index
- STOXX Global ESG Leaders indices
- Euronext Vigeo Index: World 120
- Jantzi Social Index
- FTSE4Good Index

## Share ownership facts as at December 31, 2021

**Estimated share ownership**




- Total outstanding shares were 1,370,214,882
- TELUS team members held 34,147,343 shares in employee share plans, equivalent to 2.5% of the total number of outstanding shares, which collectively made team members our fourth largest TELUS shareholder
- TELUS shares are widely held between large institutional investors and smaller retail investors
- Registered shareholders of common shares totalled 36,733. The Canadian Depository for Securities (CDS) represents one registration and holds securities for many non-registered shareholders. We estimate that TELUS had more than 1,004,000 non-registered shareholders at year-end.

## Dividend policy and dividend growth programs

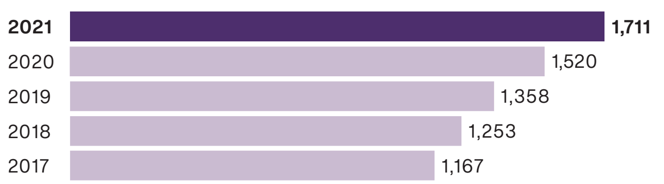
Dividends declared in 2021 were $1.2710, representing a 7.3% increase over the previous year.

Our long-term dividend payout ratio guideline is calculated as 60 to 75% of prospective free cash flow. In May 2019, we announced an intention to target ongoing semi-annual dividend increases, with the increase to be 7 to 10% annually, through to the end of 2022. This further extends our multi-year dividend growth program originally announced in May 2011 and extended for three-year periods in both May 2013 and May 2016, and provides investors with ongoing clarity with respect to our intentions regarding our dividend growth program. Since 2011, we have raised our dividend 21 times, bringing the total number of our dividend increases to 28 since 2004.

Notwithstanding this, dividend decisions will continue to be dependent on earnings and free cash flow and subject to the Board's assessment and determination of TELUS' financial situation, capital requirements and economic outlook on a quarterly basis. There can be no assurance that the Company will maintain its dividend growth program through 2022 or that its dividend growth program will be extended.

TELUS advises that, unless noted otherwise, all quarterly dividends paid since January 2006 are eligible dividends under the *Income Tax Act*. Under this legislation, Canadian residents may be entitled to enhanced dividend tax credits that reduce the income tax otherwise payable. For more information, visit **telus.com/dividends**.

**Total dividends declared to shareholders** ($ millions)




## Dividend reinvestment and share purchase plan

Investors may take advantage of the automatic dividend reinvestment and share purchase plan to acquire additional common shares without fees. Under this plan, eligible shareholders can have their dividends reinvested automatically into additional shares. TELUS may elect to purchase common shares in the open market or by issuance from treasury (less a discount, if any, of up to 5%). TELUS will provide advance notification to participants if and when an election is made to change the method of purchasing common shares, and if by treasury issuance, any discount offered or any change in the rate of discount. Effective October 1, 2019, until TELUS elects otherwise, TELUS offers shares from treasury at a 2% discount from the average market price.

We also offer a share purchase feature, under which eligible shareholders can, on a monthly basis, buy TELUS shares (maximum $20,000 per calendar year and minimum $100 per transaction) without brokerage commissions or service charges.

This plan is managed by Computershare Trust Company of Canada.

Visit telus.com/**drisp** or contact Computershare for information and enrolment forms

## 2022 expected dividend[1] and earnings dates

| | Ex-dividend dates[2] | Dividend record dates | Dividend payment dates | Earnings release dates |
|---|---|---|---|---|
| Quarter 1 | March 10 | March 11 | April 1 | May 6 |
| Quarter 2 | June 9 | June 10 | July 4 | August 5 |
| Quarter 3 | September 8 | September 9 | October 3 | November 4 |
| Quarter 4 | December 8 | December 9 | January 3, 2023 | February 9, 2023 |

1 Dividends are subject to Board of Directors' approval.
2 Shares purchased on this date forward will not be entitled to the dividend payable on the corresponding dividend payment date.

## Normal course issuer bid programs

Our current normal course issuer bid program, which is effective from June 4, 2021 to June 3, 2022, allows us to purchase our shares if and when we consider it opportunistic, based on our financial position and outlook and on the market price of our shares. The share purchase program is subject to the Board's assessment and determination and there can be no assurance that it will be completed or maintained.

Since May 2013, we have purchased a total of 140 million shares for $2.6 billion. No shares have been purchased or cancelled since 2018.

## Per-share data[1]

| | Applying IFRS 16 | | | Excluding IFRS 16 | |
|---|---|---|---|---|---|
| | **2021** | 2020 | 2019 | 2018 | 2017 |
| Basic earnings | **$ 1.23** | $ 0.95 | $ 1.45 | $ 1.34 | $ 1.31 |
| Dividends declared | **$ 1.2710** | $ 1.18495 | $ 1.12625 | $ 1.05 | $ 0.99 |
| Dividends declared as per cent of basic earnings | **103%** | 125% | 78% | 78% | 75% |
| Cash provided by operating activities | **$ 3.26** | $ 3.59 | $ 3.26 | $ 3.40 | $ 3.33 |
| Free cash flow[2] | **$ 0.58** | $ 1.13 | $ 0.77 | $ 1.01 | $ 0.81 |
| **Common shares** | | | | | |
| Closing price | **$ 29.79** | $ 25.21 | $ 25.14 | $ 22.63 | $ 23.81 |
| Dividend yield – calculated as dividends declared divided by closing price | **4.3%** | 4.7% | 4.5% | 4.6% | 4.1% |
| Price to earnings ratio – calculated as closing price divided by basic earnings | **24** | 27 | 17 | 17 | 18 |

1 Adjusted to reflect the two-for-one share split effective March 17, 2020.
2 See Section 11.1 of Management's discussion and analysis.

## Share prices and volumes[1]

### Toronto Stock Exchange

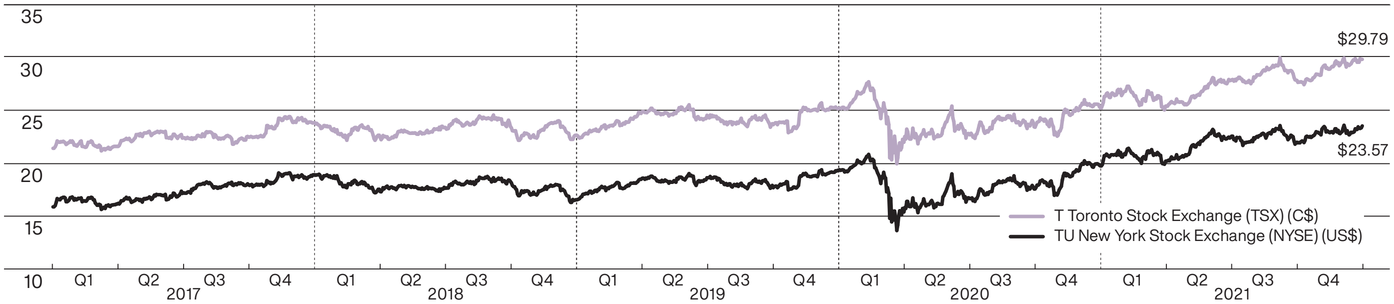
| **Common shares (T)** | | | | | **2021** | | | | | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|
| (C$ except volume) | **Year 2021** | **Q4** | **Q3** | **Q2** | **Q1** | Year 2020 | Q4 | Q3 | Q2 | Q1 |
| High | **30.04** | **30.04** | **29.99** | **28.14** | **27.54** | 27.74 | 26.02 | 24.74 | 25.42 | 27.74 |
| Low | **24.93** | **27.34** | **27.39** | **25.12** | **24.93** | 18.55 | 22.50 | 22.04 | 21.51 | 18.55 |
| Close | **29.79** | **29.79** | **27.84** | **27.80** | **25.03** | 25.21 | 25.21 | 23.43 | 22.77 | 22.25 |
| Volume (millions) | **658.2** | **135.5** | **124.2** | **152.7** | **245.8** | 667.2 | 150.0 | 125.8 | 155.2 | 236.2 |
| Dividend declared (per share) | **1.2710** | **0.3274** | **0.3162** | **0.3162** | **0.3112** | 1.18495 | 0.3112 | 0.29125 | 0.29125 | 0.29125 |

### New York Stock Exchange

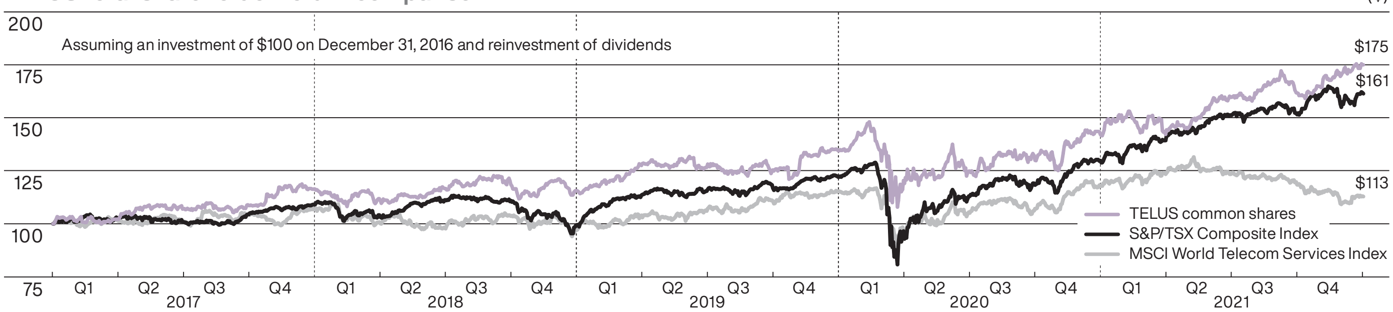
| **Common shares (TU)** | | | | | **2021** | | | | | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|
| (US$ except volume) | **Year 2021** | **Q4** | **Q3** | **Q2** | **Q1** | Year 2020 | Q4 | Q3 | Q2 | Q1 |
| High | **23.73** | **23.73** | **23.67** | **23.28** | **21.85** | 20.91 | 20.31 | 18.90 | 19.02 | 20.91 |
| Low | **19.74** | **21.76** | **21.48** | **19.98** | **19.74** | 13.54 | 16.87 | 16.22 | 15.20 | 13.54 |
| Close | **23.57** | **23.57** | **21.96** | **22.43** | **19.93** | 19.80 | 19.80 | 17.61 | 16.77 | 15.78 |
| Volume (millions) | **288.3** | **55.7** | **65.6** | **66.6** | **100.4** | 314.8 | 69.5 | 70.4 | 84.7 | 90.2 |
| Dividend declared (per share)[2] | **1.017** | **0.258** | **0.250** | **0.261** | **0.248** | 0.891 | 0.239 | 0.223 | 0.211 | 0.218 |

1 Adjusted to reflect the two-for-one share split effective March 17, 2020.
2 Converted using the foreign exchange rate as of the record date.

### TELUS shares – Five-year daily closing prices




### TELUS total shareholder return comparison




## TELUS Corporation senior notes

| | Coupon rate | Face value | Maturing |
|---|---|---|---|
| Canadian Dollar Notes | | | |
| Series CJ | 3.35% | $500 million | March 2023 |
| Series CK | 3.35% | $1.1 billion | April 2024 |
| Series CQ | 3.75% | $800 million | January 2025 |
| Series CV | 3.75% | $600 million | March 2026 |
| Series CZ | 2.75% | $800 million | July 2026 |
| Series CAC | 2.35% | $600 million | January 2028 |
| Series CX | 3.625% | $600 million | March 2028 |
| Series CY | 3.30% | $1.0 billion | May 2029 |
| Series CAA | 3.15% | $600 million | February 2030 |
| Series CAD | 2.05% | $500 million | October 2030 |
| Series CAF | 2.85% | $750 million | November 2031 |
| Series CL | 4.40% | $600 million | April 2043 |
| Series CN | 5.15% | $400 million | November 2043 |
| Series CP[1] | 4.85% | $900 million | April 2044 |
| Series CR | 4.75% | $400 million | January 2045 |
| Series CU | 4.40% | $500 million | January 2046 |
| Series CW[2] | 4.70% | $475 million | March 2048 |
| Series CAB[3] | 3.95% | $800 million | February 2050 |
| Series CAE | 4.10% | $500 million | April 2051 |
| U.S. Dollar Notes | 2.80% | US$600 million | February 2027 |
| U.S. Dollar Notes | 3.70% | US$500 million | September 2027 |
| U.S. Dollar Notes | 4.60% | US$750 million | November 2048 |
| U.S. Dollar Notes | 4.30% | US$500 million | June 2049 |

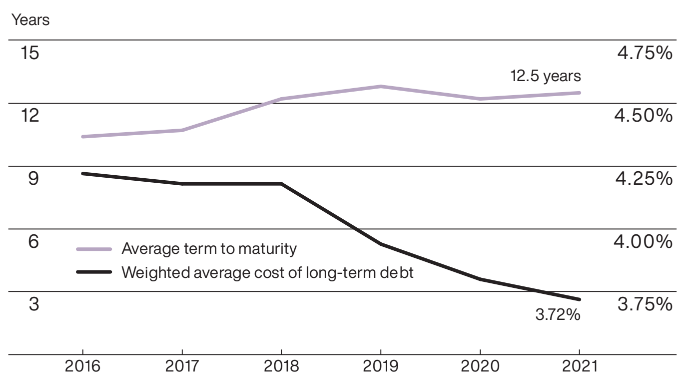
1 Includes $500 million originally issued in April 2014 and $400 million issued in December 2015.
2 Includes $325 million originally issued in March 2017 and $150 million issued in February 2018.
3 Includes $400 million originally issued in December 2019 and $400 million issued in May 2020.

## Credit rating summary

| As of December 31, 2021 | DBRS Ltd. | Standard & Poor's Rating Services | Moody's Investors Service | Fitch Ratings |
|---|---|---|---|---|
| **TELUS Corporation** | | | | |
| Notes | BBB (high) | BBB+ | Baa1 | BBB+ |
| Commercial paper | R-2 (high) | A-2 | P-2 | – |
| **TELUS Communications Inc.** | | | | |
| Debentures | BBB (high) | BBB+ | – | BBB+ |

## Long-term debt

### Average term to maturity and weighted average cost of our long-term debt[1]




1 Excluding commercial paper, the revolving component of the TELUS International credit facility, lease liabilities and other long-term debt.

**Details of our long-term debt**

At the end of 2021, the average term to maturity of our long-term debt (excluding commercial paper, the revolving component of the TELUS International credit facility, lease liabilities and other long-term debt) was 12.5 years, compared to 12.2 years at the end of 2020. Additionally, the weighted average cost of our long-term debt (excluding commercial paper, the revolving component of the TELUS International credit facility, lease liabilities and other long-term debt) was 3.72% at the end of 2021, compared to 3.80% at the end of 2020. For a detailed list of long-term debt of the Company and our subsidiaries, see Note 26 of the Consolidated financial statements.

## Key TELUS events for investors in 2021

- Completed an equity offering issuing 51.3 million common shares, raising approximately $1.3 billion to be used to accelerate our investments in fibre and 5G broadband connectivity, as well as in digitization to enhance customer experiences
- Entered a strategic alliance with Google Cloud to co-innovate on new services and solutions that support digital transformation within key industries, including communications technology, healthcare, agriculture, security and connected home
- Issued the first sustainability-linked bond in Canada, raising $750 million of senior unsecured 2.85% notes maturing in November 2031, linking our cost of borrowing to our science-based target of reducing scope 1 and 2 greenhouse gas emissions by 46% over 2019 levels by 2030
- Issued $500 million of senior unsecured 4.10% notes maturing in April 2051 and early redeemed $1 billion in senior unsecured 2.35% notes with a March 2022 maturity
- Acquired 142 licences of 3500 MHz band spectrum equating to 16.4 MHz of spectrum for a total purchase price of $1.95 billion
- Entered into a multi-year agreement with General Motors Canada (GM) that will connect GM's next-generation vehicles to our 5G network
- Advanced our agriculture business through the acquisitions of Blacksmith Applications Holdings and Conservis, and the assets of Herdtrax
- Announced the sale of our financial solutions business for $500 million, with net proceeds to be used to support strategic growth investments and debt retirement
- Expanded strategic partnership with IBM to provide enterprises with fast, secure and reliable 5G industry solutions
- Our subsidiary, TELUS International (TI), completed an initial public offering (IPO) and secondary offering of 42.6 million subordinate voting shares in February. The offerings raised aggregate gross proceeds of approximately $1.4 billion, representing the largest technology IPO in TSX history
- TI successfully completed a public secondary offering of approximately 16.6 million subordinate voting shares in September at a price of US$34.00 per share by certain selling shareholders, including Baring Private Equity Asia. TELUS Corporation did not participate in the offering.

## Awards

- Earned the top spot in major independent network awards, including Opensignal, Ookla and Tutela, for the coverage, speed, reliability or experience of our network
- Recognized as the fastest internet service provider (ISP) among major ISPs in Canada by PCMag
- Received the COVID-19 Response and Recovery Award from the Disaster Recovery Institute (DRI) Canada for 2021
- Named one of Strategy Magazine's 2021 Brands of the Year
- Received the 2021 Excellence in Governance Award in the category of Sustainability (joint winner) from the Governance Professionals of Canada
- Acknowledged for corporate social responsibility in the:
  - Dow Jones Sustainability North America Index for the 21st consecutive year
  - Corporate Knights 2022 Global 100 Most Sustainable Corporations in the World index for the 10th time
  - Corporate Knights Best 50 Corporate Citizens in Canada for the 15th time
- Recognized for employer excellence by:
  - Ranking as one of the top Canadian companies on the Forbes World's Best Employers 2021 list
  - Receiving the BEST Award for excellence in employee learning and development from the Association for Talent Development for the 16th time
  - Placing first in the Canadian Telecom Summit's Canadian ICT Employer of Choice Award
  - Mediacorp Canada as one of Canada's Top 100 Employers for the 13th time
  - Mediacorp Canada as one of Canada's Best Diversity Employers for the 12th time
  - Mediacorp Canada as one of Canada's Greenest Employers for the eighth time.

## Analyst coverage

As of January 2022, 16 equity analysts covered TELUS. For a full list, see analyst coverage on **telus.com/investors**.

## Information for security holders outside of Canada

Cash dividends paid to shareholders resident in countries with which Canada has an income tax convention are usually subject to Canadian non-resident withholding tax of 15%. If you have any questions, contact Computershare. For individual investors who are U.S. citizens and/or U.S. residents, quarterly dividends paid on TELUS shares are considered qualified dividends under the Internal Revenue Code and may be eligible for special U.S. tax treatment.

## Information for security holders of TELUS International

| | | |
|---|---|---|
| **TSX** | TELUS International: TIXT | CUSIP: 87975H100 |
| **NYSE** | TELUS International: TIXT | CUSIP: 87975H100 |

For information on TELUS International, including financial-related filings and investor events, please visit telusinternational.com/**investors**.

## Foreign ownership monitoring – non-Canadian common shares

Under federal legislation, total non-Canadian ownership of common shares of Canadian telecommunications companies, including TELUS, is limited to 33⅓%.

For registered shareholders and shares trading on the TSX, a reservation system controls and monitors this level. This system requires non-Canadian purchasers of common shares to obtain a reservation number from Computershare by contacting the Reservations Unit at 1-877-267-2236 (toll-free) or **telusreservations@computershare.com**. The purchaser is notified within two hours if common shares are available for registration.

For shares trading on the NYSE, non-Canadian ownership is monitored by utilizing the Depository Trust & Clearing Corporation's SEG-100 Account program. All TELUS common shares held by non-Canadians must be transferred to this account (no reservation application is required).

## Mergers and acquisitions – shareholder impacts

Visit **telus.com/m&a** for information on how your shareholdings have been affected by various merger and acquisition transactions. Information is also available regarding capital gains, valuation dates and share prices for 1971 and 1994.

### For more information

For questions on:

- Direct registration system (DRS) advice or accounts
- Dividend payments and the dividend reinvestment and share purchase plan
- Change of address and e-delivery of shareholder documents
- Transfer or loss of share certificates and estate settlements
- Exchange of share certificates due to a merger or acquisition

### Contact the transfer agent and registrar

Computershare Trust Company of Canada
1-800-558-0046 or 1 (514) 982-7129 (outside North America)
email: **telus@computershare.com**
visit: **computershare.com**

For questions regarding:

- Additional financial or statistical information
- Industry and Company developments
- The latest news releases and investor presentations

### Contact TELUS Investor Relations

1-800-667-4871 or 1 (604) 643-4113 (outside North America)
email: **ir@telus.com**
visit: **telus.com/investors**

### TELUS executive office

510 West Georgia Street
Vancouver, British Columbia
Canada V6B 0M3
(604) 697-8044

### TELUS general information

1-800-308-5992
(604) 432-2151

### Auditors

Deloitte LLP

### Ethics Line

As part of our ethics policy, this hotline allows team members and others to anonymously and confidentially raise accounting, internal control and ethical inquiries or complaints.
1-888-265-4112
visit: **telus.ethicspoint.com**

## Help us preserve the world our children will inherit

Sign up for electronic delivery of shareholder documents and help us protect the environment for future generations.

The benefits of e-delivery include access to important Company documents in a convenient, timely and environmentally friendly way that also reduces our environmental impact, as well as printing and mailing costs. Approximately 61,000 of our shareholders currently receive the annual report by e-delivery.

To help make a difference, sign up for e-delivery of TELUS information at **telus.com/electronicdelivery**.

## Stay connected with TELUS

TELUS Corporation
510 West Georgia Street
Vancouver,
British Columbia
Canada V6B 0M3
(604) 697-8044

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# Invest in the power of our purpose

### Our social purpose
Leveraging our global-leading technology and compassion to drive social change and enable remarkable outcomes

### Putting customers first
Empowering our highly engaged team to deliver outstanding customer experiences over our leading broadband networks

### Fostering a brighter future
Strengthening our leadership position across the healthcare and agriculture value chains to deliver better health outcomes and ensure a safer food supply for people around the world

### Execution excellence
Delivering consistent and leading operational execution in a dynamic and evolving environment

### Proven track record of growth
Driving consistent profitable revenue and customer growth by leveraging our world-class networks, leading customer service and attractive bundled product offerings

### Unique and diversified asset mix
Advancing our long-term growth strategy through technology-oriented growth engines, including TELUS International, TELUS Health and TELUS Agriculture

### Commitment to operational efficiency
Amplifying our efficiency and effectiveness efforts to improve our cost structure and better serve our growing customer base

### Technology leadership
Enhancing our world-class 5G and PureFibre networks to enable a superior customer experience and empower all Canadians to thrive in the digital world

### Strong financial profile
Maintaining a robust balance sheet and investment grade credit ratings, enabling ready access to capital markets

### Returning capital to shareholders
Executing on our multi-year dividend growth program, returning $1.7 billion to our shareholders in 2021

### Leading disclosure
Providing extensive and transparent financial, corporate governance and sustainability disclosure

This is **Exhibit "86"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

# MANAGEMENT DISCUSSION AND ANALYSIS 2021

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## CORPORATE PROFILE

Quebecor Inc. is a holding company that owns all of the shares of Quebecor Media Inc., one of Canada's largest telecommunications and media groups. Quebecor Media Inc.'s subsidiaries operate in the following business segments: Telecommunications, Media, and Sports and Entertainment. Unless the context otherwise requires, in this Management Discussion and Analysis, "Quebecor" and the "Corporation" refer to Quebecor Inc. and its subsidiaries, and "Quebecor Media" refers to Quebecor Media Inc. and its subsidiaries.

Through its Quebecor Media subsidiary, Quebecor is a leading Canadian telecommunications and media company engaged in the following lines of business: mobile and wireline telecommunications; Internet access; television; over-the-top ("OTT") video business telecommunications solutions; broadcasting; soundstage and equipment rental; audiovisual content production and distribution; newspaper publishing and distribution; digital news and entertainment platforms; music streaming; book and magazine publishing and distribution; music production and distribution; out-of-home advertising; operation and management of a world-class arena and an entertainment venue; ownership and management of Quebec Major Junior Hockey League ("QMJHL") teams; concert production, and management and promotion of sporting and cultural events. Through its Videotron Ltd. ("Videotron") subsidiary, Quebecor Media is a leading mobile and wireline communications provider. Quebecor Media also holds leading positions through its Media segment and its Sports and Entertainment segment in the creation, promotion and distribution of entertainment and news, and related Internet services, that are designed to appeal to audiences in every demographic category. Quebecor Media continues to pursue a convergence strategy to capture synergies within its portfolio of properties and to leverage the value of its content across multiple distribution platforms.

All amounts are stated in Canadian dollars ("CAN") unless otherwise indicated.

The Corporation's financial statements are prepared in accordance with International Financial Reporting Standards ("IFRS").

The Corporation uses non-standardized IFRS financial measures such as adjusted EBITDA, adjusted income from continuing operating activities, adjusted cash flows from operations (formerly "cash flows from operations"), free cash flows from continuing operating activities and consolidated net debt leverage ratio, as well as key performance indicators such as revenue-generating unit ("RGU") and average billing per unit ("ABPU"). Definitions of the non-IFRS measures and key performance indicators used by the Corporation are provided in the "Non-IFRS Measures" and "Key Performance Indicators" sections below.

### COVID-19 pandemic

The COVID 19 pandemic has had a significant impact on the economic environment in Canada and around the world. In order to limit the spread of the virus, the Québec government has imposed a number of restrictions and special preventive measures since the beginning of this health crisis, including the suspension of some business activities. Since March 2020, this health crisis has curtailed the operations of many of Quebecor's business partners and has led to a significant slowdown in some of the Corporation's segments. Among other impacts, depending on circumstances, the restrictions and preventive measures imposed by the Québec government have caused a reduction in volume at Videotron's retail outlets; a reduction in advertising revenues, in sports events broadcast by the TVA Sports specialty channel and in film and audiovisual content activity in the Media segment; and the cancellation of most shows and events in the Sports and Entertainment segment. Due to the decrease in their revenues, most of the business units in the Media segment and Sports and Entertainment segment qualified for the Canadian Emergency Wage Subsidy, and subsidies totalling $12.2 million were recorded in 2021 as a reduction in employee costs ($49.6 million in 2020).

The impact of the COVID-19 health crisis on the operating results of the Corporation's business segments in 2021 is analyzed in greater detail in the "Segmented Analysis" section below. It is difficult at this stage to foresee all the consequences of this crisis, including the potential effects of another major wave. The public health crisis could have a material adverse impact on the growth of the Corporation's operating results and cash flows in the short and medium terms. As a result, the growth recorded during the quarters preceding the health crisis may not be indicative of future growth.

## HIGHLIGHTS

**2021 financial year**

**Revenues:** $4.55 billion, a $236.6 million (5.5%) increase.

**Adjusted EBITDA[1]:** $1.97 billion, a $20.6 million (1.1%) increase, despite the $12.6 million unfavourable impact of recognition of a one-time item in the Telecommunications segment in 2020.

**Net income attributable to shareholders:** $578.4 million ($2.38 per basic share) in 2021, a decrease of $28.8 million ($0.03 per basic share).

**Adjusted income from continuing operating activities[1]:** $621.9 million ($2.55 per basic share) in 2021, an increase of $27.4 million ($0.19 per basic share).

**Adjusted cash flows from operations[1]:** $1.38 billion in 2021, a $69.7 million (5.3%) increase.

**Cash flows provided by continuing operating activities:** $1.18 billion in 2021, a $248.9 million (-17.4%) decrease.

**Fourth quarter 2021**

**Revenues:** $1.18 billion, a $37.1 million (3.2%) increase.

**Adjusted EBITDA:** $498.8 million, a $28.0 million (-5.3%) decrease.

**Net income attributable to shareholders:** $160.5 million ($0.67 per basic share) in the fourth quarter of 2021, an favourable variance of $0.7 million ($0.03 per basic share).

**Adjusted income from continuing operating activities:** $157.6 million ($0.66 per basic share) in the fourth quarter of 2021, a decrease of $7.4 million.

**Adjusted cash flows from operations:** $370.6 million, a $25.4 million (7.4%) increase.

**Cash flows provided by continuing operating activities:** $323.1 million, a $53.9 million (-14.3%) decrease.

[1] See “Non-IFRS Financial Measures” below.

**Table 1**
**Consolidated summary of income, cash flows and balance sheet**
(in millions of Canadian dollars, except per basic share data)

| | Years ended December 31 | | | Three months ended December 31 | |
|---|---|---|---|---|---|
| | **2021** | 2020 | 2019 | **2021** | 2020 |
| **Income** | | | | | |
| Revenues | | | | | |
| Telecommunications | **$ 3,735.0** | **$** 3,622.6 | $ 3,480.4 | $ **953.1** | **$** 940.9 |
| Media | **776.0** | 650.5 | 738.0 | **212.4** | 185.8 |
| Sports and Entertainment | **167.0** | 158.0 | 192.2 | **53.2** | 48.8 |
| Inter-segment | **(123.6)** | (113.3) | (116.8) | **(34.8)** | (28.7) |
| | **4,554.4** | 4,317.8 | 4,293.8 | **1,183.9** | 1,146.8 |
| Adjusted EBITDA (negative adjusted EBITDA): | | | | | |
| Telecommunications | **1,875.7** | 1,864.4 | 1,803.4 | **466.5** | 481.7 |
| Media | **83.4** | 82.2 | 74.8 | **28.8** | 45.6 |
| Sports and Entertainment | **20.4** | 8.7 | 7.3 | **4.2** | 2.1 |
| Head Office | **(6.3)** | (2.7) | (6.0) | **(0.7)** | (2.6) |
| | **1,973.2** | 1,952.6 | 1,879.5 | **498.8** | 526.8 |
| Depreciation and amortization | **(783.8)** | (803.2) | (750.4) | **(197.6)** | (213.5) |
| Financial expenses | **(333.4)** | (328.2) | (327.5) | **(79.5)** | (79.1) |
| Gain (loss) on valuation and translation of financial instruments | **14.4** | 8.0 | (6.5) | **7.2** | (0.9) |
| Restructuring of operations and other items | **(4.1)** | (39.2) | (28.6) | **(7.8)** | (6.1) |
| Loss on debt refinancing | **(80.9)** | – | – | – | – |
| Income taxes | **(197.0)** | (205.8) | (205.7) | **(56.6)** | (58.1) |
| Income (loss) from discontinued operations | – | 33.2 | 97.5 | – | (0.6) |
| **Net income** | **$ 588.4** | **$** 617.4 | $ 658.3 | $ **164.5** | **$** 168.5 |
| | | | | | |
| Income from continuing operations attributable to shareholders | **$ 578.4** | $ 574.0 | $ 555.3 | **$ 160.5** | $ 160.4 |
| Net income attributable to shareholders | **578.4** | 607.2 | 652.8 | **160.5** | 159.8 |
| Adjusted income from continuing operating activities | **621.9** | 594.5 | 581.0 | **157.6** | 165.0 |
| Per basic share: | | | | | |
| Income from continuing operations attributable to shareholders | **2.38** | 2.28 | 2.17 | **0.67** | 0.64 |
| Net income attributable to shareholders | **2.38** | 2.41 | 2.55 | **0.67** | 0.64 |
| Adjusted income from continuing operating activities | **2.55** | 2.36 | 2.27 | **0.66** | 0.66 |

| | Years ended December 31 | | | Three months ended December 31 | |
|---|---|---|---|---|---|
| | **2021** | 2020 | 2019 | **2021** | 2020 |
| **Additions to property, plant and equipment and to intangible assets:** | | | | | |
| Telecommunications | **$ 537.1** | $ 596.1 | $ 678.1 | **$ 108.2** | $ 164.6 |
| Media | **44.9** | 38.0 | 50.0 | **17.3** | 14.8 |
| Sports and Entertainment | **4.3** | 3.4 | 4.9 | **1.7** | 0.9 |
| Head Office | **4.8** | 2.7 | 2.4 | **1.0** | 1.3 |
| | **591.1** | 640.2 | 735.4 | **128.2** | 181.6 |
| **Acquisition of spectrum licences** | **830.0** | – | 255.8 | **664.0** | – |
| **Cash flows:** | | | | | |
| Adjusted cash flows from operations | | | | | |
| Telecommunications | **1,338.6** | 1,268.3 | 1,125.3 | **358.3** | 317.1 |
| Media | **38.5** | 44.2 | 24.8 | **11.5** | 30.8 |
| Sports and Entertainment | **16.1** | 5.3 | 2.4 | **2.5** | 1.2 |
| Head Office | **(11.1)** | (5.4) | (8.4) | **(1.7)** | (3.9) |
| | **1,382.1** | 1,312.4 | 1,144.1 | **370.6** | 345.2 |
| Cash flows provided by continuing operating activities | **1,182.6** | 1,431.5 | 1,211.8 | **323.1** | 377.0 |
| **Dividends declared** | **267.6** | 201.1 | 100.3 | **65.8** | 49.8 |
| **Dividends declared per basic share** | **1.10** | 0.80 | 0.39 | **0.28** | 0.20 |
| **Balance sheet:** | | | | | |
| Cash and cash equivalents | **$ 64.7** | $ 136.7 | $ 14.0 | $ | |
| Working capital | **50.4** | (70.4) | (161.4) | | |
| Net assets related to derivative financial instruments | **382.3** | 597.1 | 677.7 | | |
| Total assets | **10,763.0** | 9,861.6 | 9,725.9 | | |
| Total long-term debt | **6,554.0** | 5,786.4 | 5,986.1 | | |
| Lease liabilities (current and long term) | **183.2** | 173.3 | 137.9 | | |
| Convertible debentures, including embedded derivatives | **141.6** | 156.5 | 165.8 | | |
| Equity attributable to shareholders | **1,255.6** | 1,112.6 | 977.5 | | |
| Equity | **1,378.8** | 1,214.1 | 1,072.1 | | |
| **Consolidated net debt leverage ratio**[1] | **3.19x** | 2.68x | 2.91x | | |

**Telecommunications**

- The Telecommunications segment grew its revenues by $112.4 million (3.1%) and its adjusted EBITDA by $11.3 million (0.6%) in 2021.
- Videotron increased its revenues from mobile services and equipment ($73.2 million or 8.0%), Internet access ($70.0 million or 6.2%) and wireline equipment ($52.3 million or 34.5%) in 2021.
- Net increase of 41,700 revenue-generating units (“RGUs”) (0.7%) in 2021, including 120,800 connections (8.2%) to the mobile telephony service and 44,000 subscriptions (2.4%) to the Internet access service.

[1] See “Non-IFRS Financial Measures” below.

- On September 9, 2021, Videotron and TVA Sports announced a partnership with the Lions de Trois-Rivières, the new ECHL hockey team. The new Trois-Rivières arena is named the "Colisée Vidéotron" and TVA Sports is the exclusive official broadcaster of the Lions' home games as they begin their first season.
- On August 17, 2021, Videotron launched Vrai, a new Québec subscription platform that will meet the strong demand for unscripted lifestyle, documentary and entertainment content. In its first year, Vrai offered thousands of hours of all-French, on-demand content, including more than a hundred new original Québec productions.
- On July 29, 2021, Quebecor announced an investment of nearly $830.0 million in the acquisition by Videotron of 294 blocks of spectrum in the 3500 MHz band across the country. More than half of the investment is concentrated in four Canadian provinces outside Québec: Ontario, Manitoba, Alberta and British Columbia.
- On June 4, 2021, Jean-François Pruneau resigned as President and Chief Executive Officer of Videotron to pursue personal investment projects. Pierre Karl Péladeau, President and Chief Executive Officer of Quebecor, took over as President of Videotron.
- On May 12, 2021, Videotron announced the roll-out of its 5G network in Québec City, following the successful launch in Montréal in December 2020. With its increased speed, expanded connectivity and minimal latency, 5G will open up a world of possibilities for Québec City customers.
- On April 15, 2021, the Canadian Radio-television and Telecommunications Commission ("CRTC") announced that some telecommunications providers may be given access to the wireless networks of Canada's major carriers in order to offer Canadians greater choice and more options at affordable prices. As a result, regional carriers that invest in network infrastructure and spectrum will be able to offer competitive services as mobile virtual network operators in regions where competition is limited.
- On April 1, 2021, Videotron announced the acquisition of Cablovision Warwick Inc. ("Cablovision Warwick") and its network, which has been serving the municipalities of Warwick, Kingsey Falls and Saint-Félix-de-Kingsey in the Centre-du-Québec region for more than four decades. Cablovision Warwick's customers will therefore have access to Videotron's network and its line of products and services.
- On March 22, 2021, Videotron entered into agreements with the Québec government and the government of Canada jointly aimed at achieving government targets for the roll-out of high-speed Internet services in various regions of Québec. Under these agreements, Videotron is expanding its high-speed Internet network to connect approximately 37,000 more households and the governments have undertaken to provide financial assistance in the amount of approximately $258.0 million, which will be used in its entirety for the extension of Videotron's network. In accordance with the terms and conditions of the agreements, a $216.2 million advance was received from the government at program commencement and recorded as restricted cash, with a corresponding amount as a deferred subsidy, on the Corporation's consolidated balance sheet. In 2021, $53.8 million of these deferred subsidies were recognized as a reduction of additions to property, plant and equipment, upon the realization of the required investments.

**Media**

- The Media segment grew its revenues by $125.5 million (19.3%) and its adjusted EBITDA by $1.2 million (1.5%) in 2021.
- On September 15, 2021, Quebecor unveiled the new QUB digital platform, which brings together all of its news and entertainment content in one place. Available on the Internet and via a mobile app, QUB is differentiated by its vast quantity of multi-source, multi-format content, including text, music, video and audio, available live or on demand on a single platform to support discoverability.
- On July 16, 2021, TVA Group Inc. ("TVA Group") announced that the studios of Canadian film and television industry leader MELS will be enlarged with the construction of MELS 4, with the support of Investissement Québec and the City of Montréal. The project will strengthen MELS' position on the market for foreign blockbusters and series.
- On April 14, 2021, France Lauzière took time off from her professional duties for family reasons. On October 29, 2021, Ms. Lauzière resigned from her position as President and Chief Executive Officer of TVA Group and Chief Content Officer of Quebecor Content, for the same reasons. After joining the Corporation in 2001, she was instrumental in strengthening TVA's dominant position as Québec's television leader. Ms. Lauzière remains available to work with the company on strategic projects and to contribute her expertise in content. Pierre Karl Péladeau, President and Chief Executive Officer of Quebecor, continues to serve as Acting President of TVA Group and Quebecor Content.

**Sports and Entertainment**

- The Sports and Entertainment segment grew its revenues by $9.0 million (5.7%) and its adjusted EBITDA by $11.7 million in 2021.
- On October 6, 2021, Event Management Gestev Inc., an entity in the Sports and Entertainment segment, became the new manager of the Cabaret du Casino de Montréal. It is now operating the acoustically superior multipurpose venue and presenting unique programming for thousands of guests.
- On February 1, 2021, the Sports and Entertainment segment acquired Les Disques Audiogramme inc. ("Disques Audiogramme"), the largest independent French-language record label in North America, which also includes Éditorial Avenue, Canada's largest French-language music publisher, in order to continue supporting talented Québec artists and promoting the dissemination of Québec music.

**Investing and financing operations**

- On February 23, 2022, the Board of Directors of Quebecor declared a quarterly dividend of $0.30 per share on its Class A Multiple Voting Shares ("Class A Shares") and Class B Subordinate Voting Shares ("Class B Shares"), a 9% increase.
- On February 15, 2022, TVA Group amended its $75.0 million secured revolving credit facility to extend its term from February 2022 to February 2023 and amend certain terms and conditions.
- In December 2021, Investissement Québec granted TVA Group an interest free unsecured loan for a maximum amount of $25.0 million in order to support the construction of MELS' fourth production studio. The loan contains certain restrictive covenants as well as typical representations and warranties. As of December 31, 2021, no amount was drawn on the unsecured loan.
- On July 6, 2021, Videotron completed the early redemption of the entirety of its 5.000% Senior Notes due July 15, 2022, in aggregate principal amount of US$800.0 million, at a redemption price of 104.002% of their principal amount, in accordance with a notice issued on June 3, 2021. The related hedges in an asset position were also unwound.
- On July 5, 2021, Quebecor Media completed the early redemption of the entirety of its 6.625% Senior Notes due January 15, 2023, in aggregate principal amount of $500.0 million, at a redemption price of 107.934% of their principal amount, in accordance with a notice issued on June 3, 2021.
- On June 17, 2021, Videotron issued $750.0 million aggregate principal amount of 3.625% Senior Notes due June 15, 2028, for net proceeds of $743.2 million, net of financing costs of $6.8 million. Videotron also issued US$500.0 million aggregate principal amount of 3.625% Senior Notes due June 15, 2029, for net proceeds of $599.6 million, net of financing costs of $5.8 million.
- On April 1, 2021, Alithya Group Inc ("Alithya"), a strategy and digital transformation leader, acquired the firm R3D Conseil inc, ("R3D Conseil") of which Quebecor was one of the main shareholders. As part of this transaction, Quebecor obtained 11.9% of Alithya's share capital and 6.7% of voting rights related to Alithya's issued and outstanding shares. The corresponding $19.6 million gain on disposal was accounted for in the second quarter of 2021. This transaction also includes purchase commitments from Quebecor for Alithya's services totalling approximately $360.0 million as part of a 10-year commercial agreement.
- On January 22, 2021, Videotron issued $650.0 million aggregate principal amount of 3.125% Senior Notes maturing on January 15, 2031, for net proceeds of $644.0 million, net of financing costs of $6.0 million.

## TREND INFORMATION

Competition continues to intensify in the mobile and wireline telephony, Internet access, television and OTT markets. Due to ongoing technological developments, the distinction between those platforms is fading rapidly and the Corporation expects increasing competition from non-traditional businesses across its key business segments. There is also competition from wholesale Internet resellers, which purchase high-speed access services from large companies in order to offer customers their own services. Thus, the subscriber growth recorded in the Telecommunications sector in past years is not necessarily representative of future growth.

Moreover, the Telecommunications segment has in the past required substantial capital for the upgrade, expansion and maintenance of its mobile and wireline networks and the launch and expansion of new or additional services to support growth in its customer base and demand for increased bandwidth capacity and other services. The Corporation expects that additional capital expenditures will be required in the short and medium terms to expand and maintain the Telecommunications segment’s systems and services, including expenditures relating to the cost of its mobile services infrastructure, maintenance and enhancement, as well as costs relating to the roll-out of LTE-Advanced/5G technologies. In addition, the demand for wireless data services has been growing constantly and is projected to continue to grow. The anticipated levels of data traffic will represent an increasing challenge to the current mobile network’s ability to support this traffic. The Corporation will have to acquire additional spectrum in the future to meet the growing demand.

Some of Quebecor Media’s lines of business are cyclical in nature. They are dependent on advertising and, particularly in the newspaper and magazine businesses, on circulation sales. Operating results are therefore sensitive to prevailing economic conditions.

The Media industry has been experiencing fundamental and permanent structural changes. Generalized audience fragmentation has prompted many advertisers to review their media placement strategies and to turn a significant part of their advertising budgets over to international competitors operating solely in digital media. In the broadcasting industry, audiences are increasingly fragmented as viewing habits have shifted toward Internet-based content delivery platforms that allow users greater control over content and timing, such as OTT video services. The Corporation’s Media segment has taken steps in order to maintain its leadership position and offer audiences and advertisers alike the best available content, when they want it and on the media platform they want.

Moreover, newspaper and magazine circulation as measured by copies sold has been declining over the past several years in the industry. The traditional run of press advertising for major multimarket retailers has been declining due to a shift in marketing strategy toward other media and to retail industry consolidation. To respond to such competition, the Media segment’s operations have developed their Internet presence through branded websites, including specialized websites.

The Sports and Entertainment segment has made significant investments in its efforts to develop the business. The Corporation expects that additional capital expenditures and other investments will be required in order to expand the Sports and Entertainment segment.

In the books and music businesses, digital technology has disrupted buying and consuming habits, particularly with the emergence of vehicles such as music streaming and ebooks, which compete with conventional formats. The Corporation recently developed its own music streaming service, which prominently features Québec music in addition to its international catalogue.

## INTEREST IN SUBSIDIARIES

As of December 31, 2021, Quebecor held all the shares of Quebecor Media.

Table 2 shows Quebecor Media’s equity interest in its main subsidiaries at December 31, 2021.

**Table 2**
**Quebecor Media’s interest (direct and indirect) in its main subsidiaries**
**As of December 31, 2021**

| | Percentage of vote | Percentage of equity |
|---|---|---|
| Videotron Ltd. | 100.0 % | 100.0 % |
| TVA Group Inc. | 99.9 % | 68.4 % |
| MediaQMI Inc. | 100.0 % | 100.0 % |
| QMI Spectacles inc. | 100.0 % | 100.0 % |

Quebecor Media’s interest in its subsidiaries has not varied over the past three years.

## 2021/2020 FINANCIAL YEAR COMPARISON

### Analysis of consolidated results of operations and cash flows of Quebecor

**Revenues:** $4.55 billion, a $236.6 million (5.5%) increase.

- Revenues increased in Telecommunications ($112.4 million or 3.1% of segment revenues), Media ($125.5 million or 19.3%), and Sports and Entertainment ($9.0 million or 5.7%).

**Adjusted EBITDA:** $1.97 billion, a $20.6 million (1.1%) increase.

- Adjusted EBITDA increased in Sports and Entertainment ($11.7 million or 134.5% of segment adjusted EBITDA), Telecommunications ($11.3 million or 0.6%), despite the $12.6 million unfavourable impact of recognition of a one-time item in 2020, and Media ($1.2 million or 1.5%).
- The change in the fair value of Quebecor and Quebecor Media stock options and the value of Quebecor stock-price-based share units resulted in an $8.7 million favourable variance in the Corporation's stock-based compensation charge in 2021 compared with 2020.

**Net income attributable to shareholders:** $578.4 million ($2.38 per basic share) in 2021, compared with $607.2 million ($2.41 per basic share) in 2020, a decrease of $28.8 million ($0.03 per basic share).

- The main unfavourable variances were:
  - $80.9 million unfavourable variance related to debt refinancing;
  - $33.2 million decrease in income from discontinued operations;
  - $5.2 million increase in financial expenses.
- The main favourable variances were:
  - $35.1 million favourable variance in restructuring of operations and other items;
  - $20.6 million increase in adjusted EBITDA;
  - $19.4 million decrease in the depreciation and amortization charge;
  - $8.8 million decrease in the income tax expense;
  - $6.4 million favourable variance related to gains on valuation and translation of financial instruments, including $5.6 million without any tax consequences.

**Adjusted income from continuing operating activities:** $621.9 million ($2.55 per basic share) in 2021, compared with $594.5 million ($2.36 per basic share) in 2020, an increase of $27.4 million ($0.19 per basic share).

**Adjusted cash flows from operations:** $1.38 billion, a $69.7 million (5.3%) increase due to the $49.1 million decrease in additions to property, plant and equipment and to intangible assets, and the $20.6 million increase in adjusted EBITDA.

**Cash flows provided by continuing operating activities:** $1.18 billion, a $248.9 million decrease due primarily to the unfavourable net change in non-cash balances related to operating activities and the increase in current income taxes.

**Depreciation and amortization charge:** $783.8 million in 2021, a $19.4 million decrease due mainly to the impact of decreased investment in property, plant and equipment and intangible assets in the Telecommunications segment, including lower spending related to the leasing of set-top boxes.

**Financial expenses:** $333.4 million in 2021, a $5.2 million increase due primarily to higher average indebtedness, partially offset by the impact of the lower average interest rate on long-term debt.

**Gain on valuation and translation of financial instruments:** $14.4 million in 2021, a $6.4 million favourable variance due to a favourable variance, without any tax consequences, in gains on embedded derivatives related to convertible debentures.

**Charge for restructuring of operations and other items:** $4.1 million in 2021, a $35.1 million favourable variance.

- A $25.3 million charge was recognized in 2021 in connection with cost-reduction measures in the Corporation's various segments ($31.6 million in 2020). In addition, a $3.1 million gain on other items was recognized in 2021 ($0.9 million in 2020). A $1.5 million charge for impairment of assets was recognized in connection with various restructuring initiatives in 2021 ($8.5 million in 2020).
- On April 1, 2021, Alithya acquired R3D Conseil, of which Quebecor was one of the main shareholders. The corresponding $19.6 million gain on disposal was recognized in 2021.

**Loss on debt refinancing:** $80.9 million in 2021.

On June 3, 2021, Quebecor Media issued a redemption notice for its Senior Notes in aggregate principal amount of $500.0 million, bearing interest at 6.625% and due January 15, 2023, at a redemption price of 107.934% of their principal amount. Videotron also issued a redemption notice for its Senior Notes in aggregate principal amount of US$800.0 million, bearing interest at 5.000% and due July 15, 2022, at a redemption price of 104.002% of their principal amount. As a result, an $80.9 million net loss was recorded in the consolidated statement of income in 2021.

**Income tax expense:** $197.0 million in 2021 (effective tax rate of 26.5%), compared with $205.8 million in 2020 (effective tax rate of 26.4%), an $8.8 million favourable variance caused mainly by the impact of the decrease in taxable income. The effective tax rate is calculated considering only taxable and deductible items.

## SEGMENTED ANALYSIS

### Telecommunications

In Quebecor Media's Telecommunications segment, Videotron is a leading cable operator in Canada and the largest in Québec by wireline RGU. Videotron offers advanced mobile telephony services, including high-speed Internet access, mobile television and many other functionalities supported by smartphones. Videotron also offers Internet access services; digital television distribution services, including video-on-demand, pay-per-view and pay TV; wireline telephony services; and an OTT service. As well, Videotron includes Videotron Business, a full-service business telecommunications provider that offers mobile and wireline telephony, high-speed data transmission, Internet access and television services. Videotron also offers Helix, a technology platform that has revolutionized entertainment and home management with features including voice remote, ultra-intelligent Wi-Fi and support for home automation, all tailored to customer needs and preferences.

### 2021 operating results

**Revenues:** $3.74 billion in 2021, a $112.4 million (3.1%) increase.

- Revenues from mobile telephony services increased $54.0 million (8.2%) to $712.5 million, due primarily to an increase in the number of subscriber connections.
- Revenues from Internet access services increased $70.0 million (6.2%) to $1.20 billion, due mainly to an increase in average per-subscriber revenues and subscriber base growth.
- Revenues from television services decreased $67.5 million (-7.5%) to $836.1 million, mainly because of a decrease in average per-subscriber revenues and a decrease in the subscriber base.
- Revenues from wireline telephony services decreased $19.9 million (-5.9%) to $318.5 million, mainly because of the impact of the net decrease in subscriber connections, partially offset by higher average per-connection revenues.
- Revenues from mobile equipment sales to customers increased $19.2 million (7.5%) to $276.4 million, mainly because of price increases, partially offset by a decrease in the number of mobile devices sold.
- Revenues from wireline equipment sales to customers increased $52.3 million (34.5%) to $204.0 million, mainly because of higher volume and prices for equipment sales related to the Helix platform.
- Other revenues increased $4.3 million (2.4%) to $186.1 million.

**ABPU:** Videotron's total ABPU was $50.33 in 2021 compared with $49.94 in 2020, a $0.39 (0.8%) increase. Mobile ABPU was $49.73 in 2021, compared with $50.85 in 2020, a $1.12 (-2.2%) decrease due in part to the popularity of bring-your-own-device ("BYOD") plans.

**Customer statistics**

*RGUs* – The total number of RGUs was 6,189,600 at December 31, 2021, an increase of 41,700 (0.7%) in 2021 compared with an increase of 71,700 in 2020 (Table 3).

*Mobile telephony* – The number of subscriber connections to the mobile telephony service stood at 1,601,900 at December 31, 2021, an increase of 120,800 (8.2%) in 2021 compared with an increase of 150,600 in 2020 (Table 3).

*Internet access* – The number of subscribers to the Internet access service stood at 1,840,800 at December 31, 2021, an increase of 44,000 (2.4%) in 2021 compared with an increase of 69,500 in 2020 (Table 3).

*Television* – The number of subscribers to television services stood at 1,418,600 at December 31, 2021, a decrease of 57,000 (-3.9%) in 2021 compared with a decrease of 56,200 in 2020 (Table 3).

*Wireline telephony* – The number of subscriber connections to the wireline telephony service stood at 824,900 at December 31, 2021, a decrease of 99,800 (-10.8%) in 2021 compared with a decrease of 102,600 in 2020 (Table 3).

*OTT video* – The number of subscribers to the OTT video service stood at 503,400 at December 31, 2021, an increase of 33,700 (7.2%) in 2021 compared with an increase of 10,400 in 2020 (Table 3).

**Table 3**
**Telecommunications segment year-end RGUs (2017-2021)**
(in thousands of customers)

| | **2021** | 2020 | 2019 | 2018 | 2017 |
|---|---|---|---|---|---|
| Mobile telephony | **1,601.9** | 1,481.1 | 1,330.5 | 1,153.8 | 1,024.0 |
| Internet | **1,840.8** | 1,796.8 | 1,727.3 | 1,704.5 | 1,666.5 |
| Television | **1,418.6** | 1,475.6 | 1,531.8 | 1,597.3 | 1,640.5 |
| Wireline telephony | **824.9** | 924.7 | 1,027.3 | 1,113.9 | 1,188.5 |
| OTT video | **503.4** | 469.7 | 459.3 | 420.8 | 361.6 |
| **Total** | **6,189.6** | 6,147.9 | 6,076.2 | 5,990.3 | 5,881.1 |

**Adjusted EBITDA:** $1.88 billion, a $11.3 million (0.6%) increase due primarily to:

- impact of the net revenue increase, net of the cost of equipment sold.

Partially offset by:

- increases in some operating expenses, including engineering, advertising, IT and administrative expenses;
- $12.6 million unfavourable variance related to recognition of a one-time item in 2020.

**Cost/revenue ratio:** Employee costs and purchases of goods and services for all Telecommunications segment operations, expressed as a percentage of revenues, were 49.8% in 2021 compared with 48.5% in 2020. The increase was due primarily to the impact of recognition of a one-time item in 2020 and increases in some operating expenses.

**Adjusted cash flows from operations:** $1.34 billion in 2021 compared with $1.27 billion in 2020 (Table 14). The $70.3 million (5.5%) increase was due to a $48.4 million decrease in additions to intangible assets, including decreased investment in IT systems, an $11.3 million increase in Adjusted EBITDA and a $10.6 million decrease in additions to property, plant and equipment.

## Media

In the Media segment, TVA Group operates the largest French-language private television network in North America. TVA Group is the sole owner of 6 of the 10 television stations in the TVA Network, as well as the specialty channels TVA Sports, LCN, addik$^{TV}$, Prise 2, Yoopa, CASA, MOI ET CIE, Évasion and Zeste. TVA Group also holds interests in two other TVA Network affiliates. As well, TVA Group is engaged in commercial production and custom publishing through its Communications Qolab inc. (“Communications Qolab”) subsidiary. In addition to linear television, TVA Network and the specialty channels broadcast on-demand and streaming content over multiplatform applications, including the TVA+ website and mobile app, which provide free access to TVA Network programs, some specialty channel content, and original content.

Through its subsidiaries, TVA Group owns MELS Studios and Postproduction G.P. and MELS Dubbing Inc., providers of soundstage, equipment and mobile unit rental, postproduction, dubbing and visual effects services to the film and television industries.

Through the companies in the Incendo Media inc. group, TVA Group is engaged in the production and distribution of television programs, movies and series for international markets.

TVA Group publishes more than 50 magazine titles in various categories, including show business, television, fashion and decorating. It also markets digital products associated with the various magazine brands.

The Media segment also operates two paid daily newspapers, *Le Journal de Montréal* and *Le Journal de Québec*, seven days a week. The websites of the paid dailies, journaldemontreal.com and journaldequebec.com, which provide real-time access to the news on mobiles and tablets, lead the news sites in their markets with more than 4.6 million unique visitors per month (source: ComScore Inc., monthly average unduplicated, January to December 2021). According to corporate figures, the aggregate circulation of the paid newspapers as of December 31, 2021 was approximately 1.4 million copies per week in print and electronic formats.

In addition, the Media segment includes NumériQ inc.(“NumériQ”), which brings together digital strategy and content production assets that are harnessed to create digital platforms and content for the Corporation’s various platforms, and operates a number of other digital brands, including *Le Guide de l’auto, Le sac de chips, Pèse sur Start, Silo 57* and *24heures.ca*. NumériQ owns the QUB platform, which offers all the news entertainment content of Quebecor's brands in one place. NumériQ also owns QUB radio, an online and mobile audio platform with a live radio stream and a library of podcasts, and the QUB musique music streaming platform.

The Corporation's apps and websites log a combined total of more than 6.8 million unique visitors per month in Canada (source: ComScore Inc., November 2021).

The Media segment is also engaged in printing newspapers, distributing newspapers and magazines, and out-of-home advertising. In addition, the segment includes QMI Agency, a news agency that provides content to all Quebecor Media properties; Quebecor Media Expertise, which offers Media segment customers integrated, diversified and complete advertising services; Quebecor Content, which contributes to the creation, development, acquisition and distribution of television content and formats; and Elmire Inc., a digital marketing agency.

## 2021 operating results

**Revenues:** $776.0 million in 2021, a $125.5 million (19.3%) increase.

- Advertising revenues increased by $68.5 million (24.0%), mainly because of higher advertising revenues at TVA Network and the specialty channels.
- Other revenues increased by $54.6 million (33.2%), mainly because of higher revenues from film production and audiovisual services, increased volume at Communications Qolab, and higher revenues from TVA Network and from production and distribution services.
- Subscription revenues increased by $2.4 million (1.2%).

**Adjusted EBITDA:** $83.4 million in 2021, a $1.2 million (1.5%) increase due primarily to:

- impact of the revenue increase.

Partially offset by:

- higher broadcast content costs, mainly because of the resumption of play in the National Hockey League ("NHL") in 2021 and the recovery in television activity in general;
- higher labour costs, essentially as a result of increased volume and the impact of the ending of the segment's eligibility for the government measures introduced to deal with the COVID-19 pandemic.

**Cost/revenue ratio:** Employee costs and purchases of goods and services for the Media segment's operations, expressed as a percentage of revenues, were 89.3% in 2021 compared with 87.4% in 2020. The increase was mainly due to a net increase in broadcast content costs and higher labour costs.

**Adjusted cash flows from operations:** $38.5 million in 2021 compared with $44.2 million in 2020 (Table 14). The $5.7 million decrease was mainly due to a $6.9 million increase in additions to property, plant and equipment and to intangible assets.

## Sports and Entertainment

The Sports and Entertainment segment includes management and operation of the Videotron Centre under an agreement between Quebecor Media and Québec City for usage and naming rights to the arena that was ratified in 2011 and runs through 2040. The segment leases the arena, exploits advertising space, generates sponsorship revenues and operates the food concessions at events. The segment's activities also include the production and coproduction of shows presented at the Videotron Centre and other venues. In addition, the Sports and Entertainment segment operates sports and cultural events manager Event Management Gestev Inc., which is the official imprint for shows and events produced in Québec by Quebecor Media.

The Sports and Entertainment segment includes the activities of the QMJHL hockey teams Armada de Blainville-Boisbriand and Remparts de Québec.

The Sports and Entertainment segment also owns the Théâtre Capitole, a performance venue in Québec City, where the segment rents out the space, exploits the advertising spaces, generates sponsorship revenues and may act as copromoter of some events.

Since the fall of 2021, the segment has also managed the Casino de Montréal's performance space under a renewable annual contract. It is the presenter of shows at the venue.

As well, the Sports and Entertainment segment includes educational publisher CEC Publishing Inc.; Sogides Group Inc., which is engaged in general literature publishing through its 18 publishing houses; and Messageries A.D.P. inc., which distributes print books and ebooks, and which is the exclusive distributor for more than 260 Québec and European French-language publishers.

The Sports and Entertainment segment is engaged in music recording and video production (Disques Musicor and MP3) and concert and event production (Musicor Spectacles). In 2021, Musique Select discontinued its distribution and sub-distribution activities for both physical media and digital content.

Also in 2021, the Sports and Entertainment segment acquired Disques Audiogramme, the largest independent French-language record label in North America.

## 2021 operating results

**Revenues:** $167.0 million in 2021, a $9.0 million (5.7%) increase due primarily to higher revenues from book distribution and publishing, including educational publishing, and from hockey activities, partially offset by a decrease in revenues from music, mainly because of the discontinuation of physical distribution operations and lower concert revenues.

**Adjusted EBITDA:** $20.4 million in 2021, an $11.7 million increase due primarily to the impact of the revenue increase.

**Adjusted cash flows from operations:** $16.1 million in 2021 compared with $5.3 million in 2020 (Table 14). The $10.8 million increase was due primarily to the $11.7 million increase in adjusted EBITDA.

## 2021/2020 FOURTH QUARTER COMPARISON

### Analysis of consolidated results of operations and cash flows of Quebecor

**Revenues:** $1.18 billion, a $37.1 million (3.2%) increase.

- Revenues increased in Telecommunications ($12.2 million or 1.3% of segment revenues), Media ($26.6 million or 14.3%), and Sports and Entertainment ($4.4 million or 9.0%).

**Adjusted EBITDA:** $498.8 million, a $28.0 million (-5.3%) decrease.

- Adjusted EBITDA decreased in Telecommunications ($15.2 million or -3.2% of segment adjusted EBITDA) and in Media ($16.8 million or -36.8%).
- Adjusted EBITDA increased in Sports and Entertainment ($2.1 million).
- The change in the fair value of Quebecor and Quebecor Media stock options and in the value of Quebecor stock-price-based share units resulted in a $5.6 million favourable variance in the Corporation's stock-based compensation charge in the fourth quarter of 2021 compared with the same period of 2020.

**Net income attributable to shareholders:** $160.5 million ($0.67 per basic share) in the fourth quarter of 2021, compared with $159.8 million ($0.64 per basic share) in the same period of 2020, a favourable variance of $0.7 million ($0.03 per basic share).

- The main favourable variances were:
  - $15.9 million decrease in the depreciation and amortization charge;
  - $8.1 million favourable variance in gains and losses on valuation and translation of financial instruments, including $7.4 million without any tax consequences;
  - $4.7 million favourable variance in non-controlling interest;
- The unfavourable variance was mainly due to:
  - $28.0 million decrease in adjusted EBITDA.

**Adjusted income from continuing operating activities:** $157.6 million ($0.66 per basic share) in the fourth quarter of 2021, compared with $165.0 million ($0.66 per basic share) in the same period of 2020, a decrease of $7.4 million.

**Adjusted cash flows from operations:** $370.6 million, a $25.4 million (7.4%) increase due primarily to a $27.1 million decrease in additions to property, plant and equipment and a $26.3 million decrease in additions to intangible assets, partially offset by the $28.0 million decrease in adjusted EBITDA.

**Cash flows from continuing operating activities:** $323.1 million, a $53.9 million decrease due primarily to the increase in current income taxes and the decrease in adjusted EBITDA, partially offset by the favourable net change in non-cash balances related to operating activities.

**Depreciation and amortization charge:** $197.6 million in the fourth quarter of 2021, a $15.9 million decrease due mainly to the impact of investments in property, plant and equipment and in intangible assets in the Telecommunications segment, including lower spending related to the leasing of set-top boxes.

**Financial expenses:** $79.5 million in the fourth quarter of 2021, a $0.4 million increase caused by higher average indebtedness and an unfavourable variance in losses and gains on foreign currency translation of short-term monetary items. Reductions in financial expenses were mainly due to the impact of lower average interest rates on long-term debt.

**Gain on valuation and translation of financial instruments:** $7.2 million in the fourth quarter of 2021 compared with a $0.9 million loss in the same period of 2020. The $8.1 million favourable variance was due to a $7.4 million favourable variance, without any tax consequences, in gains and losses on embedded derivatives related to convertible debentures.

**Charge for restructuring of operations and other items:** $7.8 million in the fourth quarter of 2021, a $1.7 million unfavourable variance.

- A $7.5 million charge was recognized in the fourth quarter of 2021 in connection with cost-reduction initiatives in the Corporation's various segments ($5.4 million in the fourth quarter of 2020). In addition, a $0.4 million gain on other items was recognized in 2021 ($0.5 million in 2020). In the fourth quarter of 2021, a $0.7 million charge for impairment of assets was also recognized in connection with various restructuring initiatives ($1.2 million in the fourth quarter of 2020).

**Income tax expense:** $56.6 million in the fourth quarter of 2021 (effective tax rate of 26.5%), compared with $58.1 million in the same period of 2020 (effective tax rate of 25.6%), a $1.5 million favourable variance caused essentially by the impact of the decrease in taxable income.

## SEGMENTED ANALYSIS

### Telecommunications

**Revenues:** $953.1 million, a $12.2 million (1.3%) increase due essentially to the same factors as those noted above under "2021/2020 financial year comparison."

- Revenues from the mobile telephony service increased $15.2 million (8.9%) to $185.4 million.
- Revenues from Internet access services increased $9.3 million (3.2%) to $301.6 million.
- Revenues from television services decreased $16.2 million (-7.4%) to $203.8 million.
- Revenues from the wireline telephony service decreased $5.6 million (-6.7%) to $77.7 million.
- Revenues from mobile equipment sales to customers increased $3.5 million (4.5%) to $80.9 million.
- Revenues from wireline equipment sales to customers increased $4.8 million (9.4%) to $55.8 million.
- Other revenues increased $1.2 million (2.6%) to $47.9 million.

**ABPU:** Videotron's total ABPU was $49.94 in the fourth quarter of 2021, compared with $50.21 in the same period of 2020, a $0.27 (-0.5%) decrease. Mobile ABPU was $48.57 in the fourth quarter of 2021, compared with $50.52 in the same period of 2020, a $1.95 (-3.9%) decrease due in part to the popularity of BYOD plans.

**Customer statistics**

*RGUs* – 43,000 (0.7%) unit increase in the fourth quarter of 2021 compared with an increase of 43,000 in the same period of 2020.

*Mobile telephony* – 30,600 (1.9%) subscriber-connection increase in the fourth quarter of 2021 compared with an increase of 28,500 in the same period of 2020.

*Internet access* – 8,100 (0.4%) subscriber increase in the fourth quarter of 2021 compared with an increase of 27,000 in the same period of 2020.

*Television* – 9,400 (-0.7%) subscriber decrease in the fourth quarter of 2021 compared with a decrease of 6,200 in the same period of 2020.

*Wireline telephony* – 22,500 (-2.7%) subscriber-connection decrease in the fourth quarter of 2021 compared with a decrease of 23,100 in the same period of 2020.

*OTT video* – 36,200 (7.7%) subscriber increase in the fourth quarter of 2021 compared with an increase of 16,800 in the same period of 2020.

**Adjusted EBITDA:** $466.5 million, a $15.2 million (-3.2%) decrease due primarily to:

- increases in some operating expenses, including IT, administrative, engineering and advertising costs;
- impact of increases in the cost of equipment sold.

**Cost/revenue ratio:** Employee costs and purchases of goods and services for all Telecommunications segment operations, expressed as a percentage of revenues, were 51.1% in the fourth quarter of 2021 compared with 48.8% in the same period of 2020. The increase was mainly due to increases in some operating expenses and in the cost of equipment sold.

**Adjusted cash flows from operations:** $358.3 million in the fourth quarter of 2021 compared with $317.1 million in the same period of 2020 (Table 14). The $41.2 million increase was caused by a $28.9 million decrease in additions to property, plant and equipment due to a general slowdown in investment following a review of the strategic priorities, and a $27.5 million decrease in additions to intangible assets, also due to the strategic priorities review, partially offset by the $15.2 million decrease in adjusted EBITDA.

## Media

**Revenues:** $212.4 million in the fourth quarter of 2021, a $26.6 million (14.3%) increase.

- Advertising revenues increased by $16.9 million (19.5%), mainly because of higher advertising revenues at TVA Network and the specialty channels.
- Other revenues increased by $9.7 million (20.0%), mainly because of increased volume at Communications Qolab and higher revenues from production and distribution services.

**Adjusted EBITDA:** $28.8 million in the fourth quarter of 2021, a $16.8 million (-36.8%) decrease due primarily to:

- higher broadcast content costs, mainly because of the resumption of play in the NHL in the fourth quarter of 2021 and the recovery in television activity in general;

Partially offset by:

- impact of the revenue increase.

**Cost/revenue ratio:** Employee costs and purchases of goods and services for the Media segment's operations, expressed as a percentage of revenues, were 86.4% in the fourth quarter of 2021 compared with 75.5% in the same period of 2020. The increase was mainly due to an increase in broadcast content costs.

**Adjusted cash flows from operations:** $11.5 million in the fourth quarter of 2021 compared with $30.8 million in the same period of 2020 (Table 14). The $19.3 million decrease was mainly due to the $16.8 million decrease in adjusted EBITDA and a $2.5 million increase in additions to property, plant and equipment and to intangible assets.

## Sports and Entertainment

**Revenues:** $53.2 million in the fourth quarter of 2021, a $4.4 million (9.0%) increase due primarily to higher revenues from hockey, music, and book distribution and publishing, partially offset by lower revenues from concerts and sporting events.

**Adjusted EBITDA:** $4.2 million in the fourth quarter of 2021, a $2.1 million increase due primarily to the impact of the increase in revenues.

**Adjusted cash flows from operations:** $2.5 million in the fourth quarter of 2021 compared with $1.2 million in the same period of 2020 (Table 14). The $1.3 million increase was due to the $2.1 million increase in adjusted EBITDA, partially offset by a $0.8 million increase in additions to property, plant and equipment and to intangible assets.

## 2020/2019 FINANCIAL YEAR COMPARISON

### Analysis of consolidated results of operations and cash flows of Quebecor

**Revenues:** $4.32 billion, a $24.0 million (0.6%) increase.

- Revenues increased in Telecommunications ($142.2 million or 4.1% of segment revenues).
- Revenues decreased in Media ($87.5 million or -11.9% of segment revenues) and in Sports and Entertainment ($34.2 million or -17.8%).

**Adjusted EBITDA:** $1.95 billion, a $73.1 million (3.9%) increase.

- Adjusted EBITDA increased in Telecommunications ($61.0 million or 3.4% of segment adjusted EBITDA), Media ($7.4 million or 9.9%), and Sports and Entertainment ($1.4 million or 19.2%).
- There was a favourable variance at Head Office ($3.3 million).
- The change in the fair value of Quebecor Media stock options resulted in a $1.5 million favourable variance in the stock-based compensation charge in 2020 compared with 2019. The change in the fair value of Quebecor stock options and in the value of Quebecor stock-price-based share units resulted in a $7.2 million favourable variance in the Corporation's stock-based compensation charge in 2020.

**Net income attributable to shareholders:** $607.2 million ($2.41 per basic share) in 2020, compared with $652.8 million ($2.55 per basic share) in 2019, a decrease of $45.6 million ($0.14 per basic share).

- The main unfavourable variances were:
  - $64.3 million decrease in income from discontinued operations;
  - $52.8 million increase in the depreciation and amortization charge;
  - $10.6 million unfavourable variance in the charge for restructuring of operations and other items.
- The main favourable variances were:
  - $73.1 million increase in adjusted EBITDA;
  - $14.5 million favourable variance in gains and losses on valuation and translation of financial instruments, including $15.0 million without any tax consequences.

**Adjusted income from continuing operating activities:** $594.5 million ($2.36 per basic share) in 2020, compared with $581.0 million ($2.27 per basic share) in 2019, an increase of $13.5 million ($0.09 per basic share).

**Adjusted cash flows from operations:** $1.31 billion in 2020, a $168.3 million (14.7%) increase due to a $67.8 million decrease in additions to property, plant and equipment, a $27.4 million decrease in additions to intangible assets, and the $73.1 million increase in adjusted EBITDA.

**Cash flows provided by continuing operating activities:** $1.43 billion in 2020, a $219.7 million (18.1%) increase due primarily to the favourable net change in non-cash balances related to operating activities and the increase in adjusted EBITDA, partially offset by the increase in current income taxes and the increase in the cash portion related to restructuring of operations and other items.

**Depreciation and amortization charge:** $803.2 million in 2020, an $52.8 million increase due mainly to the impact of investments in property, plant and equipment and in intangible assets in the Telecommunications segment, including the amortization of intangible assets related to investments in the Helix platform, and the impact of the revision of the depreciation period for some capital assets in the Telecommunications segment in consideration of technological developments, partially offset by lower spending related to the leasing of set-top boxes.

**Financial expenses:** $328.2 million in 2020, a $0.7 million increase. The impact of higher average interest on the long-term debt was offset by lower average indebtedness.

**Gain on valuation and translation of financial instruments:** $8.0 million in 2020 compared with a $6.5 million loss in 2019. The $14.5 million favourable variance was due to a $15.0 million favourable variance, without any tax consequences, in the gain on embedded derivatives related to convertible debentures.

**Charge for restructuring of operations and other items:** $39.2 million in 2020 compared with $28.6 million in 2019, a $10.6 million increase.

- A $30.7 million net restructuring charge was recognized in 2020 in connection with cost-reduction initiatives in the Corporation's various segments ($9.8 million in 2019). An $8.5 million charge for impairment of assets was also recognized in 2020 in connection with restructuring initiatives ($18.8 million in 2019).

**Income tax expense:** $205.8 million in 2020 (effective tax rate of 26.4%), compared with $205.7 million in 2019 (effective tax rate of 26.6%), a $0.1 million unfavourable variance.

## CASH FLOWS AND FINANCIAL POSITION

This section provides an analysis of the Corporation's sources and uses of cash flows, as well as a financial position analysis as of the balance sheet date. This section should be read in conjunction with the discussion of trends under "Trend Information" above, the risk analysis in the "Risks and Uncertainties" section below, and the discussion of the Corporation's financial risks under "Financial Instruments and Financial Risk Management" below.

### Operating activities

**Cash flows provided by continuing operating activities:** $1.18 billion in 2021 compared with $1.43 billion in 2020.

The $248.9 million decrease was mainly due to:

- $227.1 million unfavourable net change in non-cash balances related to operating activities, due primarily to unfavourable variances in accounts receivable, income tax payable, accounts payable and accrued charges, prepaid expenses and inventory, partially offset by the favourable variance in contract assets and deferred revenues;
- $48.2 million increase in current income taxes;
- $5.4 million increase in the cash portion of financial expenses.

Partially offset by:

- $20.6 million increase in adjusted EBITDA;
- $9.6 million favourable variance in the cash portion of restructuring of operations and other items.

The unfavourable net change in non-cash items related to operating activities and the increase in current income taxes had an unfavourable impact on cash flows provided by continuing operating activities in 2021 compared with 2020, while the increase in profitability had a favourable impact.

**Working capital:** $50.4 million at December 31, 2021 compared with negative $70.4 million at December 31, 2020. The $120.8 million favourable variance was due primarily to an increase in accounts receivable and inventory, partially offset by a decrease in cash and cash equivalents and in contract assets.

### Investing activities

**Cash flows used for additions to property, plant and equipment:** $429.3 million in 2021 compared with $447.2 million in 2020. The $17.9 million decrease mainly reflects a $13.5 million favourable net change in current non-cash items.

**Cash flows used for additions to intangible assets:** $1.02 billion in 2021 compared with $205.9 million in 2020. The $812.8 million increase mainly reflects Videotron's acquisition of spectrum licences in the 3500 MHz band for a total of $830.0 million.

**Proceeds from disposal of assets:** $7.7 million in 2021 compared with $4.4 million in 2020.

**Net business acquisitions:** $21.0 million in 2021 compared with $47.1 million in 2020. The $26.1 million decrease reflects, in part, the acquisition of Télédistribution Amos inc. in 2020 in the Telecommunications segment.

**Business disposals:** $0.2 million in 2020.

## Free cash flows from continuing operating activities[1]

**Free cash flows from continuing operating activities:** $572.3 million in 2021 compared with $782.8 million in 2020 (Table 15).

The $210.5 million decrease was mainly due to:

- $248.9 million decrease in cash flows provided by continuing operating activities;

Partially offset by:

- $17.9 million decrease in cash flows used for additions to property, plant and equipment;
- $17.2 million decrease in cash flows used for additions to intangible assets, excluding the spectrum licences.

## Financing activities

**Consolidated debt** (long-term debt plus bank indebtedness): $749.3 million increase in 2021; $214.8 million reduction in net assets related to derivative financial instruments.

- Additions to debt in 2021 essentially consisted of:
  - issuance on January 22, 2021 by Videotron of $650.0 million aggregate principal amount of 3.125% Senior Notes maturing on January 15, 2031 for net proceeds of $644.0 million, net of financing costs of $6.0 million;
  - issuance on June 17, 2021 by Videotron of $750.0 million aggregate principal amount of 3.625% Senior Notes maturing on June 15, 2028, for net proceeds of $743.2 million, net of financing costs of $6.8 million. Videotron also issued US$500.0 million aggregate principal amount of 3.625% Senior Notes maturing on June 15, 2029, for net proceeds of $599.6 million, net of financing costs of $5.8 million;
  - $285.0 million increase in Videotron's drawings on its secured revolving credit facility.
- Debt reductions in 2021 essentially consisted of:
  - early redemption by Videotron on July 6, 2021 of the entirety of its 5.000% Senior Notes due July 15, 2022, in aggregate principal amount of US$800.0 million, at a redemption price of 104.002% of their principal amount, in accordance with a notice issued on June 3, 2021;
  - early redemption by Quebecor Media on July 5, 2021 of the entirety of its 6.625% Senior Notes due January 15, 2023, in aggregate principal amount of $500.0 million, at a redemption price of 107.934% of their principal amount, in accordance with a notice issued on June 3, 2021;
  - $22.6 million favourable impact of exchange rate fluctuations. The consolidated debt reduction attributable to this item was offset by the decrease in the asset (or increase in the liability) related to derivative financial instruments;
  - $15.1 million decrease in TVA Group's drawings on its secured revolving credit facility.
- Assets and liabilities related to derivative financial instruments totalled a net asset of $597.1 million at December 31, 2020 compared with $382.3 million at December 31, 2021. The $214.8 million decrease was mainly due to:
  - unwinding of Videotron's hedges in an asset position in connection with the early redemption on July 6, 2021 of its 5.000% Senior Notes in aggregate principal amount of US$800.0 million;
  - unfavourable impact of exchange rate fluctuations on the value of derivative financial instruments;
  - unfavourable impact of interest rate trends in Canada, compared with the United States, on the fair value of derivative financial instruments.
- On February 15, 2022, TVA Group amended its $75.0 million secured revolving credit facility to extend its term from February 2022 to February 2023 and amend certain terms and conditions.

[1] See "Non-IFRS Financial Measures" below.

- In December 2021, Investissement Québec granted TVA Group an interest free unsecured loan for a maximum amount of $25.0 million in order to support the construction of MELS' fourth production studio. The loan contains certain restrictive covenants as well as typical representations and warranties. As of December 31, 2021, no amount was drawn on the unsecured loan.

## Financial Position

**Net available liquidity:** $1.57 billion at December 31, 2021 for Quebecor and its wholly owned subsidiaries, consisting of $1.51 billion in available unused revolving credit facilities and $56.5 million in cash and cash equivalents.

**Consolidated debt** (long-term debt plus bank indebtedness): $6.52 billion at December 31, 2021, a $749.3 million increase compared with December 31, 2020; $214.8 million reduction in net assets related to derivative financial instruments (see "Financing activities" above).

- Consolidated debt essentially consisted of Videotron's $5.38 billion debt ($4.11 billion at December 31, 2020); TVA Group's $12.0 million debt ($28.8 million at December 31, 2020); Quebecor Media's $1.09 billion debt ($1.59 billion at December 31, 2020); and Quebecor's $44.5 million debt ($45.9 million at December 31, 2020).

As at December 31, 2021, minimum principal payments on long-term debt in the coming years are as follows:

**Table 4**
**Minimum principal payments on Quebecor's long-term debt**
**12 months ending December 31**
(in millions of Canadian dollars)

| | | |
|---|---|---|
| 2022 | $ | 56.5 |
| 2023 | | 1,374.2 |
| 2024 | | 758.2 |
| 2025 | | 400.0 |
| 2026 | | 375.0 |
| 2027 and thereafter | | 3,590.1 |
| **Total** | **$** | **6,554.0** |

From time to time, Quebecor may (but is under no obligation to) seek to retire or purchase its outstanding securities, including debentures, in open market purchases, privately negotiated transactions, or otherwise. Such repurchases, if any, will depend on its liquidity position and requirements, prevailing market conditions, contractual restrictions and other factors. The amounts involved may be material.

The weighted average term of Quebecor's consolidated debt was approximately 5.1 years as of December 31, 2021, compared with 4.3 years as of December 31, 2020). After taking into account hedging instruments, the debt consisted of approximately 91.7% fixed-rate debt (96.1% at December 31, 2020) and 8.3% floating-rate debt (3.9% at December 31, 2020).

Management of the Corporation believes that cash flows and available sources of financing should be sufficient to cover committed cash requirements for capital investments, working capital, interest payments, income tax payments, debt and lease repayments, pension plan contributions, share repurchases, and dividend payments to shareholders. The Corporation believes it will be able to meet future debt maturities, which are staggered over the coming years.

Pursuant to its financing agreements, the Corporation is required to maintain certain financial ratios and comply with certain financial covenants. At December 31, 2021, the Corporation was in compliance with all required financial ratios and restrictive covenants in its financing agreements.

## Dividends declared

On February 23, 2022, the Board of Directors of Quebecor declared a quarterly dividend of $0.30 per share on its Class A Multiple Voting Shares (“Class A Shares”) and Class B Subordinate Voting Shares (“Class B Shares”), payable on April 5, 2022 to shareholders of record at the close of business on March 11, 2022.

## Convertible debentures

In accordance with the terms of the trust indenture governing the convertible debentures, the quarterly dividend declared on November 3, 2021 on Quebecor Class B Shares triggered an adjustment to the floor price and ceiling price then in effect. Accordingly, effective November 18, 2021, the conversion features of the convertible debentures are subject to an adjusted floor price of approximately $25.49 per share (that is, a maximum number of approximately 5,883,572 Class B Shares corresponding to a ratio of $150.0 million to the adjusted floor price) and an adjusted ceiling price of approximately $31.87 per share (that is, a minimum number of approximately 4,706,858 Class B Shares corresponding to a ratio of $150.0 million to the adjusted ceiling price).

## Board of directors

After a period of reflection in recent months, Mr. Normand Provost announced that he was leaving his position as director after 17 years on the board of directors of Quebecor Media and 8 years on the board of the Corporation. Over the years, Mr. Provost has notably acted as a member of the Executive Committee of Quebecor Media and as Chairman of the Audit and Risk Management Committee of the Corporation, Quebecor Media and Videotron.

## Analysis of consolidated balance sheet at December 31, 2021

**Table 5**
**Consolidated balance sheet of Quebecor**
**Analysis of main variances between December 31, 2021 and 2020**
(in millions of Canadian dollars)

| | **Dec. 31, 2021**[1] | Dec. 31, 2020 | Difference | Main reasons for difference |
|---|---|---|---|---|
| **Assets** | | | | |
| Cash and cash equivalents | **$ 64.7** | $ 136.7 | $ (72.0) | Cash flows used in investing activities |
| Accounts receivable | **745.1** | 563.6 | 181.5 | Impact of current variances in activities, including increased financing of equipment sales, and current portion of government credits receivable for major capital projects |
| Contract assets | **129.4** | 174.9 | (45.5) | Increased financing of equipment sales |
| Inventories | **282.6** | 250.7 | 31.9 | Impact of current variances in activity |
| Property, plant and equipment | **3,058.7** | 3,189.2 | (130.5) | Depreciation for the period less additions to property, plant and equipment |
| Intangible assets | **2,344.1** | 1,466.7 | 877.4 | Acquisition of spectrum in the 3500 MHz band, additions to intangible assets and business acquisitions, less amortization for the period |
| Derivative financial instruments[2] | **382.3** | 597.1 | (214.8) | See “Financing activities” |
| Other assets | **521.1** | 433.8 | 87.3 | Impact of current variances in operating activities, including the impact of increased financing of equipment sales, and the impact of investing activities |
| **Liabilities** | | | | |
| Income taxes[3] | **40.1** | 65.1 | (25.0) | Current disbursements less current income taxes for the period |
| Long-term debt, including short-term portion and bank indebtedness | **6,524.4** | 5,775.1 | 749.3 | See “Financing activities” |
| Other liabilities | **293.2** | 422.8 | (129.6) | Gain on remeasurement of defined benefit plans less upward adjustment of liabilities related to dismantling of assets |

1 The “restricted cash” and “deferred subsidies” line items are combined for purposes of the analysis.
2 Long-term assets less long-term liabilities.
3 Current liabilities less current assets.

# ADDITIONAL INFORMATION

## Contractual obligations

At December 31, 2021, material contractual obligations of operating activities included: capital repayment and interest on long-term debt; convertible debentures and lease liabilities; capital asset purchases and other commitments; and obligations related to derivative financial instruments, less estimated future receipts on derivative financial instruments. Table 6 below shows a summary of these contractual obligations.

**Table 6**
**Contractual obligations of Quebecor as of December 31, 2021**
(in millions of Canadian dollars)

| | Total | Under 1 year | 1-3 years | 3-5 years | 5 years or more |
|---|---|---|---|---|---|
| Long-term debt[1] | **$ 6,554.0** | $ 56.5 | $ 2,132.4 | $ 775.0 | $ 3,590.1 |
| Convertible debentures[2] | **150.0** | – | 150.0 | – | – |
| Interest payments[3] | **1,375.7** | 254.1 | 453.3 | 338.5 | 329.8 |
| Lease liabilities | **183.2** | 36.1 | 59.4 | 28.8 | 58.9 |
| Interest payments on lease liabilities | **43.9** | 7.3 | 10.5 | 7.0 | 19.1 |
| Additions to property, plant and equipment and other commitments | **1,473.8** | 322.1 | 449.9 | 315.1 | 386.7 |
| Derivative financial instruments[4] | **(332.8)** | 1.6 | (354.2) | – | 19.8 |
| **Total contractual obligations** | **$ 9,447.8** | **$ 677.7** | **$ 2,901.3** | **$ 1,464.4** | **$ 4,404.4** |

1 The carrying value of long-term debt excludes changes in the fair value of long-term debt related to hedged interest rate risk and financing costs.
2 Based on the market value at December 31, 2021 of a number of shares obtained by dividing the outstanding principal amount by the market price of a Quebecor Class B share at that date, subject to a floor price of approximately $25.49 per share and a ceiling price of approximately $31.87. The Corporation may also redeem convertible debentures by issuing the corresponding number of its Class B Shares.
3 Estimated interest payable on long-term debt and convertible debentures, based on interest rates, hedging of interest rates and hedging of foreign exchange rates as of December 31, 2021.
4 Estimated future receipts, net of future disbursements, related to foreign exchange hedging on the principal of U.S.-dollar-denominated debt using derivative financial instruments.

### *Significant commitments included in Table 6*

Videotron has 20-year service sharing and exchange agreements with Rogers Communications Inc. to build out and operate an LTE network in Québec and the Ottawa area. It also has an agreement with Comcast Corporation to develop an innovative Internet Protocol Television ("IPTV") delivery solution, as well as agreements for the roll-out of LTE-A and 5G technologies and the purchase of mobile devices. As at December 31, 2021, the balance of those commitments stood at $425.2 million.

The Quebecor Out of Home division has agreements with various Québec transit commissions for the installation and maintenance of bus shelters, and for advertising rights on bus shelters and buses. As at December 31, 2021, the balance of those commitments stood at $96.3 million.

In the normal course of business, the Media segment, through TVA Group, contracts commitments regarding broadcast rights for television programs, sporting events and films, as well as distribution rights for audiovisual content. As at December 31, 2021, the balance of those commitments stood at $459.4 million.

### Pension plan contributions

The expected employer contributions to the Corporation’s defined benefit pension plans and post-retirement benefit plans will be $38.2 million in 2022, based on the most recent financial actuarial reports filed (contributions of $39.8 million were paid in 2021).

### Related party transactions

During the year ended December 31, 2021, the Corporation incurred expenses to affiliated corporations in the amount of $13.3 million ($12.6 million in 2020), which included the purchase of goods and services, and acquired property, plant and equipment and intangible assets from affiliated corporations in the amount of $4.6 million (nil in 2020). The Corporation also made sales to affiliated corporations in the amount of $7.8 million in 2021 ($3.7 million in 2020). These transactions were accounted for at the consideration agreed between parties.

### Off-balance sheet arrangements

*Guarantees*

In the normal course of business, the Corporation enters into numerous agreements containing guarantees, including the following:

*Business and asset disposals*

In the sale of all or part of a business or an asset, in addition to possible indemnification relating to failure to perform covenants and breach of representations or warranties, the Corporation may agree to indemnify against claims related to the past conduct of the business. Typically, the term and amount of such indemnification will be limited by the agreement. The nature of these indemnification agreements prevents the Corporation from estimating the maximum potential liability it could be required to pay to guaranteed parties. The Corporation has not accrued any amount in respect of these items on the consolidated balance sheets.

*Outsourcing companies and suppliers*

In the normal course of its operations, the Corporation enters into contractual agreements with outsourcing companies and suppliers. In some cases, the Corporation agrees to provide indemnifications in the event of legal procedures initiated against them. In other cases, the Corporation provides indemnification to counterparties for damages resulting from the outsourcing companies and suppliers. The nature of the indemnification agreements prevents the Corporation from estimating the maximum potential liability it could be required to pay. No amount has been accrued on the consolidated balance sheets with respect to these indemnifications.

## Capital stock

In accordance with Canadian financial reporting standards, Table 7 presents information on the Corporation's capital stock as at February 3, 2022. In addition, 2,319,600 share options were outstanding as of February 3, 2022.

**Table 7**
**Capital stock**
(in shares and millions of Canadian dollars)

| | February 3, 2022 | |
|---|---|---|
| | **Issued and outstanding** | **Book value** |
| Class A Shares | **76,984,034** | **$ 8.6** |
| Class B Shares | **162,273,507** | **$ 956.6** |

On August 4, 2021, the Corporation authorized a normal course issuer bid for a maximum of 1,000,000 Class A Shares representing approximately 1.3% of issued and outstanding Class A Shares, and for a maximum of 6,000,000 Class B Shares representing approximately 3.6% of issued and outstanding Class B Shares as of July 30, 2021. The purchases can be made from August 15, 2021 to August 14, 2022, at prevailing market prices on the open market through the facilities of the Toronto Stock Exchange or other alternative trading systems. All shares purchased under the bid will be cancelled.

On August 6, 2021, the Corporation entered into an automatic securities purchase plan ("the plan") with a designated broker whereby shares may be repurchased under the plan at times when such purchases would otherwise be prohibited pursuant to regulatory restrictions or self-imposed blackout periods. The plan received prior approval from the Toronto Stock Exchange. It came into effect on August 15, 2021 and will terminate on the same date as the normal course issuer bid.

Under the plan, before entering a self-imposed blackout period, the Corporation may, but is not required to, ask the designated broker to make purchases under the normal course issuer bid. Such purchases shall be made at the discretion of the designated broker, within parameters established by the Corporation prior to the blackout periods. Outside the blackout periods, purchases will be made at the discretion of the Corporation's management.

In 2021, the Corporation purchased and cancelled 8,914,650 Class B Shares for a total cash consideration of $282.4 million (6,457,050 Class B Shares for a total cash consideration of $201.2 million in 2020). The excess of $229.8 million of the purchase price over the carrying value of Class B Shares repurchased was recorded as a reduction of retained earnings ($163.1 million in 2020).

## Risks and Uncertainties

The Corporation operates in the telecommunications, media, and sports and entertainment industries, which entails a variety of risk factors and uncertainties. The Corporation's operating environment and financial results may be materially affected by the risks and uncertainties discussed below.

***Increased competition from non-traditional sources***

The Corporation faces technological substitution across all its key business segments. Due to ongoing technological developments, the distinction between broadcasting, Internet and wireline and mobile telephony platforms is fading rapidly. For instance, content producers and providers are leveraging their content rights and pursuing strategies to deploy their own OTT distribution platforms in order to reach consumers directly via the Internet. By doing so, content producers and providers are less dependent on content aggregators, such as Videotron. The Internet, including through mobile devices, provides an important broadcasting and distribution service. More specifically, an increasing number of the Corporation's customers are using mobile devices as their primary means of video entertainment; therefore, in direct competition with its television and wireline Internet access services. In addition, mobile operators, through the development of their mobile networks, offer wireless and fixed wireless Internet services, which compete with the Corporation's wireline Internet access service. Due to the converging nature of technological advances, the Corporation expects increasing competition from non-traditional businesses, which may affect its overall business strategy and could adversely affect its business, financial condition and results of operations.

***Competition and technological development***

In its television business, the Corporation competes against incumbent local exchange carriers ("ILECs") and third-party Internet access ("TPIA") providers. These competitors have rolled out their own IPTV service in the vast majority of the territory in which the Corporation operates.

The rapidly growing landscape of OTT content providers, many of which having substantial financial resources, now compete directly for viewership and a share of the monthly entertainment spend. Furthermore, the OTT content providers' attractive price points (which are in part due to the fact that they do not contribute financially to the Canadian traditional television business model or Internet infrastructure and are not subject to Canadian Radio-television and Telecommunications Commission ("CRTC") regulations) may make the Corporation's traditional offer less appealing for its customers and may affect its ability to retain and acquire customers. Consequently, this could place the Corporation at a competitive disadvantage, lead to increased operational costs and have an adverse effect on its business, prospects, revenues, financial condition and results of operations.

Furthermore, the Corporation faces competition from illegal providers of television services and illegal access to non-Canadian direct broadcast satellite ("DBS") signal (also called grey market piracy), as well as from signal theft of DBS that enables customers to access programming services from U.S. and Canadian DBS without paying any fees (also called black market piracy).

In its Internet access business, the Corporation faces competition from several resellers who have access to the wholesale TPIA service mandated by the CRTC. These TPIA providers may also provide telephony and networking applications and have entered the IPTV market. Their market share is significant and growing, especially in Québec and Ontario, the two regions in Canada where they have been particularly active and aggressively pricing their services.

On May 27, 2021, the CRTC issued a decision to TPIA providers adopting the interim wholesale rates set on October 6, 2016 as final rates, with certain modifications, including the removal of the supplementary markup of 10% for incumbent local exchange carriers. From May 28, 2021 to August 25, 2021, several TPIA providers petitioned the Governor in Council to, among other things, restore the lower rates set in the 2019 Order as final. On June 28, 2021, one of these TPIA providers also filed a motion with the Federal Court of Appeal seeking leave to appeal the May 27, 2021 decision. A coalition comprised of the five largest cable carriers, including Videotron, filed comments in relation to these petitions on September 22, 2021 and November 1, 2021. The same coalition will defend the CRTC decision at the Federal Court of Appeal.

The Corporation also competes against other ISPs offering residential and commercial Internet access services as well as fixed wireless access and open Wi-Fi networks in some cities. The main competitors are the ILECs that offer Internet access through digital subscriber line, fibre to the node and fibre to the home technologies, in certain cases offering download speeds comparable, or superior to the Corporation's. In addition, satellite operators such as Xplornet, Telesat and Starlink are increasing their existing high-speed Internet access capabilities with the launch of high-throughput satellites, targeting households in low population density and remote locations and claiming future download speeds comparable to the Corporation's low and medium download speeds. Finally, certain municipalities also plan to build and operate their own broadband networks. They plan to do so through public/private partnership arrangements, competing directly with the Corporation in some of its local markets.

The Corporation's wireline business has numerous competitors, including ILECs, competitive local exchange carriers, mobile telephony service operators and other providers of Voice over Internet Protocol ("VoIP") and cloud-based telephony. Some of these competitors are not facility-based and therefore have much lower infrastructure costs. In addition, Internet protocol-based products and services are generally subject to downward pricing pressure, lower margins and technological evolution, all of which could have an adverse effect on the Corporation's business, prospects, revenues, financial condition and results of operations.

In its mobile telephony business, the Corporation competes against a mix of market participants, some of them active in its territory in some or all of the products it offers, with others offering only mobile telephony services. In addition, users of mobile voice and data systems may find their communication needs satisfied by other current adjunct technologies, such as Wi-Fi, "hotspots" or trunk radio systems, which have the technical capability to handle mobile data communication and mobile telephone calls. There can be no assurance that current or future competitors will not provide network capacity and/or services comparable or superior to those the Corporation provides or may in the future provide, or at lower prices, or adapt more quickly to evolving industry trends or changing market requirements or introduce competing services. For instance, some providers of mobile telephony services (including incumbent carriers) have deployed and have been operating for many years lower-cost mobile telephony brands in order to acquire additional market share. Furthermore, CRTC's recent decision ordering the national incumbent wireless carriers to provide mobile virtual network operator ("MVNO") access services to regional wireless carriers for a period of seven years stands to have significant impact on the Corporation's competitive environment, as the Corporation could see the emergence of new MVNO competitors. the Corporation may not be able to compete successfully in the future against existing and such potential new competitors; increased competition could have a material adverse effect on its business, prospects, revenues, financial condition and results of operations.

Finally, many of its competitors are offering special bundling discounts to customers who subscribe to two or more of their services (television, Internet access, wireline and mobile telephony services). Should the Corporation fail to keep its existing customers and lose them to such competitors, it may end up losing a subscriber for multiple services as a result of its bundling strategy. This could have an adverse effect on its business, prospects, revenues, financial condition, and results of operations.

Fierce price competition in all the Corporation's businesses and across the industries in which it operates, combined with the declining demand for certain traditional products, may affect the Corporation's ability to raise the price of its products and services commensurately with increases in its operating costs, as it has done in the past. This could have an adverse effect on its business, revenues, financial condition, and results of operations.

***Capital to address significant and rapid technological changes***

New technologies in the telecommunication industry, including 5G technology, are evolving faster than the historical industry investment cycle. Their introduction and pace of adoption could result in requirements for additional immediate capital investments not currently planned, as well as shorter estimated useful lives for certain of the Corporation's existing assets. The Corporation's strategy of maintaining a competitive position in the suite of products and services it offers and of launching new products and services requires capital investments in its networks, information technology systems and infrastructure, as well as the acquisition of spectrum to support growth in its customer base and its demands for increased bandwidth capacity and other services.

The Corporation must continually invest in its services, networks and technologies due to the rapid evolution of technologies, or it may be required to acquire, develop or integrate new technologies. Improvements in its services depend on many factors. The cost of the acquisition, development or implementation of new technologies and spectrum could be significant and the Corporation's ability to fund such acquisition, development or implementation may be limited, which could have a material adverse effect on its ability to successfully compete in the future. Any such difficulty or inability to compete could have a material adverse effect on its business, reputation, prospects, financial condition and results of operations.

In the past, the Corporation has required substantial capital for the upgrade, expansion and maintenance of its networks and the launch and deployment of new or additional services. The Corporation expects that additional capital expenditures will continue to be required in the short-term, mid-term and long-term in order to maintain, expand geographically and enhance its networks systems and services, including expenditures relating to the deployment of LTE-Advanced/5G mobile technologies. Moreover, additional investments in the Corporation's business may not translate into incremental revenues, cash flows or profitability.

***Epidemics, pandemics and other public health emergencies***

The COVID-19 pandemic has had a significant impact on the economic environment in Canada and around the world. The overall impact on the Corporation's business and activities is still uncertain and cannot be evaluated with precision despite recent developments relating to vaccines, considering future developments such as the spread of the virus, the expected date of termination of the crisis, the risks associated with potential future waves of the virus, its impact on consumer spending, labour shortages due to the virus, the continuing disruption in the supply chain and the effectiveness or the strictness of the actions taken by the federal and Québec governments to manage the pandemic. Public and private sector regulations, policies and other measures aimed at reducing the spread of the COVID-19 pandemic include the suspension of business activities deemed non-essential when needed, restrictions on the movement of personnel, the promotion of physical and social distancing, lockdown orders, border closures, travel bans, self-imposed quarantine periods, self-isolation, and the adoption of work-from-home and online education by companies, schools and institutions.

Potential adverse impacts of the COVID-19 pandemic include, but are not limited to: (i) a reduction in demand for the Corporation's products or services, or an increase in delinquent or unpaid bills, due to job losses and associated financial hardship; (ii) a decline in revenues as a result of services provided at no cost to customers; (iii) a decline in access fees for speciality television services and exclusive on-demand content due to the postponement or cancellation of sporting events; (iv) the temporary suspension of the Corporation's content production activities, a reduction in the availability of external content, and therefore a reduction in the Corporation's ability to provide the content and programming that its customers expect; (v) a downgrade or cancellation of customer services; (vi) issues delivering the Corporation's products and services; (vii) lost revenues due to the significant economic challenges that small and medium-sized business customers are facing; (viii) lower advertising revenues and reduced film and audiovisual content activity in the Media segment; (ix) delays or cancellations of shows and events, and interruption of music and book distribution activities in the Sports and Entertainment segment; (x) uncertainty associated with the costs and availability of resources required to provide appropriate levels of service to customers; (xi) additional capital expenditures, and uncertainty associated with costs, delays and the availability of resources required to maintain, upgrade or expand Videotron's network in order to accommodate increased network usage, and to expand its self-install and self-serve programs in order to attract new customers; (xii) unexpected increase of user data demand and increased pressure on Videotron's network capacity, which could negatively affect its network's performance, availability, speed, consistency and its ability to provide services; (xiii) the ability of certain suppliers and vendors to provide products and services to the Corporation; (xiv) the impact of legislation, regulations and other government interventions in response to the COVID-19 pandemic; (xv) the negative impact on global credit and capital markets; and (xvi) the ability to access capital markets at a reasonable cost or at all. Any of these risks and uncertainties could have a material adverse impact on the Corporation's business, prospects, results of operations and financial condition.

The outbreak of the COVID-19 pandemic has resulted in significant economic interventions by the federal, provincial, and municipal governments throughout Canada, which include, notably, grants, wage subsidies, incentives, increased assistance programs and loans, as well as temporary relief measures put in place by regulatory agencies to support certain economic activities, industries or major employers. There can be no assurance that these economic mitigation measures will continue at their present levels or at all.

***Ongoing access to spectrum***

Wireless, video and broadband services are undergoing rapid and significant technological changes and a dramatic increase in usage – in particular, from the demand for faster and seamless usage of video and data across mobile and fixed devices. It is projected that this demand will continue to accelerate, driven by the following increases: levels of broadband penetration; need for personal connectivity and networking; teleworking; affordability of mobile devices; multimedia-rich services and applications; and unlimited data plans. The anticipated levels of data traffic will represent a growing challenge to the current mobile network's ability to serve this traffic. The Corporation will have to acquire additional spectrum in order to address this increased demand. The ability to acquire additional spectrum at a reasonable price or at all is dependent on competition level as well as the spectrum auction timing and rules. In previous auctions, ISED Canada has used, and the Corporation has benefited from, certain measures to support competition, which notably included set-asides and spectrum aggregation limits ensuring that a minimum amount of spectrum was effectively reserved for eligible facilities-based telecommunication service providers that were not national incumbent wireless carriers. There can be no assurance that these pro-competition measures will be used again by ISED Canada in future auctions, or that the Corporation will be or remain eligible to benefit from such measures. If the Corporation is not successful in acquiring additional spectrum it may need on reasonable terms, or not at all, that could have a material adverse effect on its business, prospects and financial condition.

***Roaming agreements***

The Corporation has entered into roaming agreements with multiple carriers around the world and has thereby established worldwide coverage for its customers. Should it be unable to extend its worldwide coverage, or to renew or substitute for these roaming agreements on acceptable terms, the Corporation may be placed at a competitive disadvantage, which could adversely affect its ability to operate its mobile business successfully and profitably. In addition, if the Corporation is unable to renew, or substitute for, these roaming agreements on a timely basis and at an acceptable cost, its cost structure could materially increase, and, consequently, its business, prospects, revenues, financial condition and results of operations could be adversely affected.

***Increasing proportion of customers with no fixed-term contracts***

Given rising costs of mobile devices and marginal technological advancements in mobile devices, consumers tend to keep their mobile devices for longer periods of time, thereby increasing the proportion of wireless customers without fixed term contracts. Such customers are under no contractual obligation to remain with a specific carrier for a fixed term. Moreover, the Corporation customers who bring their own device receive wireless services without entering into fixed term contracts. In addition, new technologies now embedded in a growing number of mobile devices, including the eSIM or embedded-SIM, will, once widely adopted, allow customers to switch between carriers without the use of a carrier-provided SIM card. This could have a material adverse effect on the Corporation's churn rate and, consequently, on its business, prospects, revenues, financial condition and results of operations.

***Inventory obsolescence***

The Corporation's various products in inventory generally have a relatively short lifecycle due to frequent technological changes. If it cannot effectively manage inventory levels based on product demand, or minimum order quantities from its suppliers, this could increase the risk of inventory obsolescence and could have an adverse effect on its business, financial condition and results of operations. Moreover, equipment provisioning delay has amplified with the worldwide electronic components shortage induced by the COVID-19 pandemic, which may lead to an increase in inventory and add significance to this risk.

***Capital expenditures***

There can be no assurance that the Corporation will be able to generate or otherwise obtain the funds to implement its business strategies and finance its capital expenditure programs or other investment requirements, whether through cash from operations, additional borrowings or other sources of funding. If the Corporation is unable to generate sufficient funds or obtain additional financing on acceptable terms, it may be unable to implement its business strategies or proceed with the capital expenditures and investments required to maintain its leadership position, and its business, financial condition, results of operations, reputation, and prospects could be materially adversely affected.

***Access to support structures***

The Corporation requires access to the support structures of hydroelectric and telephone utilities and it needs municipal rights of way to deploy its cable and mobile networks. Where access to the structures of telephone utilities cannot be secured, the Corporation may apply to the CRTC to obtain a right of access under the *Telecommunications Act* (Canada) (the "*Telecommunications Act*"). The Corporation has entered into comprehensive support structure access agreements with all the major hydroelectric companies and all the major telecommunications companies in its service territory. Should the Corporation seek to renew or to renegotiate these agreements, it cannot guarantee that these agreements will continue to be available on their respective terms, on acceptable terms, or at all, which may place the Corporation at a competitive disadvantage and which may have a material adverse effect on its business and prospects.

***Successful implementation of business and operating strategies***

The Corporation's business strategies are based on leveraging an integrated platform of media assets. Its strategies include offering multiplatform advertising solutions, generating and distributing content across a spectrum of media properties and assets, launching and deploying additional value-added products and services, pursuing cross-promotional opportunities, enhancing its advanced wireline and wireless networks, expanding our network service offering in the rest of Canada, developing high quality and premium content, further integrating the operations of its subsidiaries, leveraging geographic clustering, and maximizing customer satisfaction across its business. The Corporation may not be able to implement these strategies successfully or realize their anticipated results fully or at all, and their implementation may be more costly or challenging than initially planned. In addition, its ability to successfully implement these strategies could be adversely affected by a number of factors beyond its control, including operating difficulties, increased dependence on third-party suppliers and service providers, increased ongoing operating costs, regulatory developments, general or local economic conditions, increased competition, technological changes, any restrictive measures put in place in order to contain an outbreak of a contagious disease or other adverse public health development, and other factors described in this section. Any material failure to implement its strategies could have an adverse effect on its reputation, business, financial condition, prospects, and results of operations, as well as on its ability to meet its obligations, including its ability to service its indebtedness.

As part of its strategy, in recent years, the Corporation has entered into certain agreements with third parties under which it is committed to making significant operating and capital expenditures in the future in order to offer new products and services to its customers. It can provide no assurance that it will be successful in developing such new products and services in relation to these engagements, including the marketing of new revenue sources.

In July 2021, the Corporation announced an investment of nearly $830.0 million in the acquisition by Videotron of 294 blocks of spectrum in the 3.5 GHz band. In an effort to implement its operation expansion strategy, more than half of the investment was concentrated in southern and eastern Ontario, Manitoba, Alberta and British Columbia. All spectrum was awarded to Videotron on

December 17, 2021, following final payment. In addition, a competitor contested the award of spectrum in Manitoba, Alberta and British Columbia in Federal Court, alleging that Videotron did not qualify for the auction in those regions. No decision on the merits has been made yet. The Corporation can provide no assurance that the award of spectrum in these three provinces will not be overturned by the Court and that it will be successful in implementing its operation expansion strategy in the rest of Canada.

***Consumer trends to abandon traditional telephony and television services***

The recent trend towards mobile substitution (when users cancel their wireline telephony services and opt exclusively for mobile telephony services) is largely the result of the increasing mobile penetration rate in Canada. In addition, there is also a consumer trend to abandon, substitute or reduce traditional television services for Internet access services allowing customers to stream directly from broadcasters and OTT content providers. Consequently, the Corporation may not be successful in converting its existing wireline telephony and television subscriber base to its mobile telephony services, its Internet access services or its OTT entertainment platforms, which could have a material adverse effect on its business, prospects, revenues, results of operations and financial condition.

***Rapid growth***

The Corporation has experienced substantial growth in its business and has significantly expanded its operations over the years. It has sought in the past, and may, in the future, seek to further expand the types of businesses and geographic areas in which it operates, under appropriate conditions. The Corporation can provide no assurance that it will be successful in either developing or fulfilling the objectives of any such business expansion.

In addition, the Corporation's expansion may require it to incur significant costs or divert significant resources and may limit its ability to pursue other strategic and business initiatives, which could have an adverse effect on its business, prospects, results of operations and financial condition. Furthermore, if the Corporation is not successful in managing its growth, or if the Corporation is required to incur significant or unforeseen costs, its business, prospects, results of operations and financial condition could be adversely affected.

***Success in the development of its Sports and Entertainment business***

The Corporation has made and is continuing to make significant investments in an effort to develop its Sports and Entertainment business. Some of these investments require significant expenditures and management attention. The success of such investments involves numerous risks that could adversely affect its growth and profitability, including the following risks: that investments may require substantial financial resources that otherwise could be used in the development of its other businesses; that the Corporation will not be able to achieve the benefits it expects from its investments in the same timeline as its other businesses; and, specifically with regards to the Videotron Centre, that it might not be able to maximize its profitability due to the fact that it does not have a main tenant nor operate in a major market, which makes it harder to attract international talents.

***Implementation of changes to the structure of its business***

The Corporation has and will continue to implement changes to the structure of its business due to many factors, such as a system replacement or upgrade, a process redesign, the necessity of a corporate restructuring and the integration of business acquisitions or existing business units. These changes must be managed carefully in order to ensure that the Corporation captures the intended benefits. The implementation process may negatively impact overall customer experience and may lead to greater-than-expected operational challenges, employee turnover, operating costs and expenses, customer losses, and business disruption for the Corporation, all of which could adversely affect its business and its ability to gain the anticipated benefits.

***Key personnel***

The Corporation's success depends to a large extent on the continued services of its senior management and its ability to retain skilled employees. There is intense competition for qualified management and skilled employees, and the Corporation's failure to recruit, train and retain such employees could have a material adverse effect on its business, prospects, results of operations and financial condition. In addition, in order to implement and manage its businesses and operating strategies effectively, the Corporation must sustain a high level of efficiency and performance, maintain content quality, continually enhance its operational and management systems, and continue to effectively attract, train, motivate and manage its employees. If the Corporation is not successful in these efforts, it may have a material adverse effect on its business, prospects, results of operations and financial condition.

***Competition for advertising, circulation revenues/audience***

The media industry has experienced fundamental and permanent structural changes. The growth of the Internet has presented alternative content distribution options that compete with traditional media, and an increasing number of non-traditional providers are developing technologies to satisfy the demand for entertainment and information content. Furthermore, the Corporation's customers have an increased control over the manner, content and timing of their media consumption, including through new technologies that give consumers greater flexibility to fast forward or skip advertisements within the Corporation's programming. These alternative technologies and new content distribution options have increased audience fragmentation, reduced the Corporation's Media segment business' audience, readership and circulation levels and have had an adverse effect on advertising revenues from local, regional and national advertisers.

Advertising revenue is the primary source of revenue for the Corporation's Media segment. As a result of those structural changes, competition for advertising spend in traditional media comes mainly from digital media technologies, which have introduced a wide variety of media distribution platforms for consumers and advertisers. These new competitors also include digital advertising giants with greater financial resources and a controlling share of the online advertising market thus reducing demand in some segments of The Corporation's traditional media advertising inventories. In addition, foreign digital advertising giants currently operate in Canada without being subject to its fiscal environment, therefore increasing the Corporation's competitive disadvantage. Furthermore, the international consolidation of advertising agencies is disrupting the demand model as some of its clients now negotiate through these consolidated positions, therefore putting additional pressure on market prices.

The continuous technological improvements to the Internet and the access to unlimited data, combined with higher download speeds, may continue to divert a portion of the Corporation's Media segment business' existing customer base from traditional media to digital media technology, which could adversely impact the demand for its services. The ability of the Corporation's Media segment to succeed over the long-term depends on various factors, including the Corporation's ability to attract advertisers and consumers to its own digital platforms. In addition, even if successful, the Corporation can provide no assurance that it will be able to recover the costs associated with the implementation of these digital initiatives through incremental revenues, cash flows or profitability.

As the media market continues to change and fragment, the Corporation expects its readership, circulation and audience to reduce and its advertising revenues, business, prospects, results of operations and financial condition could be materially adversely affected.

Finally, the Corporation's revenues and operating results in these businesses depend on the relative strength of the economy in the Corporation's principal markets, as well as the strength or weakness of local, regional and national economic factors. Since a significant portion of the Corporation's advertising revenues is derived from retail, automotive and consumer packaged goods sector advertisers, weakness in these sectors has had and may continue to have an adverse impact on the revenues and results of operations of the Corporation's Media segment.

***Distribution, production and acquisition of original programming***

The financial performance of its television, Club illico, Vrai, video on demand and mobile services depends in large part on the Corporation's ability to distribute a wide range of appealing video programming on its platforms and on its ability to produce and acquire original content on an ongoing basis.

In its telecommunications business, the Corporation obtains television programming rights from suppliers pursuant to programming contracts. In recent years, these suppliers have become vertically integrated and are now more limited in number. The Corporation may be unable to maintain key programming contracts at commercially reasonable rates for television programming. Loss of programming contracts, the Corporation's inability to obtain programming at reasonable rates or its inability to pass rate increases through to its customers could have a material adverse effect on its business, prospects, results of operations and financial condition.

Increased competition in the television, OTT and video on demand industry from local and foreign OTT content providers with access to substantial financial resources may result in a competitive disadvantage from a content perspective and may have a material adverse effect on the Corporation's business, prospects, revenues, financial conditions and results of operations. Notably, on September 28, 2017, the Minister of Canadian Heritage and Netflix concluded an arrangement pursuant to which Netflix undertakes to invest a minimum of $500 million in original productions in Canada over the next five years. This arrangement may exert upward pressure on content price.

Furthermore, on February 2, 2022, the federal government introduced Bill C-11 which proposes to amend the Broadcasting Act (Canada) (the "Broadcasting Act") in order to include foreign OTT content providers in Canada's regulatory framework. Similarly to Netflix's arrangement, such bill would force these providers to promote Canadian cultural products and make material expenditures in order to support local cultural production. If adopted, this bill could increase competition and put greater pressure on the price of Canadian content.

***Launch of new products and services***

The Corporation is investing in the launch of new products and services. During the period preceding or immediately following the launch of a new product or service, revenues are generally relatively modest, while initial operating expenses may prove more substantial. Furthermore, although the Corporation believes in the potential associated with this strategy, there is a possibility that the anticipated profitability could take several years to materialize or may never materialize.

***Single-clustered network***

The Corporation provides its television, Internet access, wireline telephony and mobile telephony services through a primary headend and a series of local headends in a single-clustered network. Despite available emergency backup or replacement sites, automatic failover systems, and disaster recovery measures, a failure in the Corporation's primary headend, including exogenous threats, such as cyber-attacks, natural disasters, sabotage or terrorism, or dependence on certain external infrastructure providers (such as electric utilities), could prevent it from delivering some of its products and services throughout its networks until the failure has been resolved, which may result in significant customer dissatisfaction, loss of revenues and potential civil litigation, and could have a material adverse effect on its financial condition.

***Reputation***

The Corporation has generally enjoyed a good reputation among the public. Its ability to maintain its existing customer relationships and to attract new customers depends to a large extent on its reputation. While the Corporation has put in place certain mechanisms to mitigate the risk that its reputation may be tarnished, including good governance practices and a Code of Ethics, there can be no assurance that these measures will be effective to prevent violations or perceived violations of the law or ethical business practices. The loss or tarnishing of its reputation could have a material adverse effect on its business, prospects, financial condition and results of operations.

***Protection of personal data***

The ordinary course of the Corporation's businesses involves the receipt, collection, storage and transmission of sensitive data, including its proprietary business information and that of its customers, and personally identifiable information of its customers and employees, whether in its systems, infrastructure, networks and processes, or those of its suppliers. The Corporation faces risks inherent in protecting the security of such personal data. In particular, the Corporation faces a number of challenges in protecting the data contained and hosted on its systems, or those belonging to its suppliers, including from advertent or inadvertent actions or inactions by its employees, as well as in relation to compliance with applicable laws, rules and regulations relating to the collection, use, disclosure and security of personal information, including any requests from regulatory and government authorities relating to such data. Although the Corporation has developed and maintains systems, processes and security controls that are designed to protect personally identifiable information of its clients, employees or business partners, the Corporation may be unable to prevent the improper disclosure, loss, misappropriation of, unauthorized access to, or other security breaches relating to such data that the Corporation stores or processes or that its suppliers store or process. As a result, the Corporation may incur significant costs, be subject to investigations, sanctions and litigation, including under laws that protect the privacy of personal information, and the Corporation may suffer damage to its business, competitive position and reputation, which could have a material adverse effect on its financial condition.

On September 22, 2021, Québec's National Assembly adopted Bill 64, *An Act to modernize legislative provisions as regards the protection of personal information* which will come into force on September 22, 2023, except for certain provisions which will come into force in 2022. The bill modifies the obligations of public bodies and private sector enterprises by modernizing framework applicable to the protection of personal information and imposes new obligations on the Corporation. Bill 64 adds important deterrent powers to the authorities in charge of their application. Federal and provincial legislation in the area of privacy and personal information is constantly evolving and is expected to undergo significant changes in the coming years. The Corporation does not expect compliance with this legislation to threaten its business, but it may incur significant costs to update its security systems, processes and controls, which could have a material adverse effect on its financial condition.

***Cybersecurity***

Although the Corporation has implemented and regularly reviews and updates processes and procedures to protect against customers and business service interruption, unauthorized access to or use of sensitive data, including data of its customers, and to prevent data loss or theft, and although ever-evolving cyber-threats require the Corporation to continually evaluate and adapt its systems, infrastructure, networks and processes, the Corporation cannot assure that its systems, infrastructure, networks and processes, as well as those of its suppliers, will be adequate to safeguard against unauthorized access by third parties or errors by employees or by third-party suppliers. The Corporation is also at risk from increasingly sophisticated phishing attacks, SIM swaps, fraudulent ports and other types of frauds. If the Corporation is subject to a significant cyber-attack or breach, unauthorized access, errors of third-party suppliers or other security breaches, the Corporation may incur significant costs, be subject to investigations, sanctions and litigation, including under laws that protect the privacy of personal information, and the Corporation may suffer damage to its business, competitive position and reputation, which could have a material adverse effect on its financial condition.

The costs associated with a major cyber-attack could also include expensive incentives offered to existing customers and business partners to retain their business, increased expenditures on cybersecurity measures and the use of alternate resources, lost revenues and customers from business interruption and litigation. The Corporation's contractual risk transfers do not eliminate the risk completely and the potential costs associated with these attacks could exceed the scope and limits of the insurance coverage it maintains.

***Protection from piracy***

The Corporation may not be able to protect its services and data from piracy. It may be unable to prevent electronic attacks to gain unauthorized access to its networks, digital programming, and Internet access services. It uses encryption technology to protect its television signals and OTT service from unauthorized access and to control programming access based on subscription packages. It may not be able to deploy adequate technology to prevent unauthorized access to its networks, programming and data, which may have an adverse effect on its customer base and lead to a possible decline in revenues, as well as to significant remediation costs and legal claims.

***Malicious and abusive Internet practices***

The Corporation's customers utilize its cable, mobile and fibre-optic connectivity business networks to access the Internet and, as a consequence, the Corporation or its customers may become a victim of common malicious and abusive Internet activities, such as unsolicited mass advertising (or spam) and dissemination of viruses, worms and other destructive or disruptive software. These activities could have adverse consequences on its networks and its customers, including deterioration of service, excessive call volume to call centres, and damage to its customers' or its own equipment and data. Significant incidents could lead to customer dissatisfaction and, ultimately, to a loss of customers or revenues, in addition to increased costs to service customers and protect its networks. Any significant loss of cable, mobile or fibre-optic connectivity business customers, or a significant increase in the costs of serving those customers, could adversely affect its reputation, business, prospects, results of operations, and financial condition.

***Dependence on information technology systems***

The day-to-day operation of the Corporation's business is highly dependent on information technology systems, including those of certain third-party suppliers, some of which are based in territories with potential geopolitical risk. Furthermore, its business relies on the use of numerous distinct information technology systems, billing systems, sales channels, databases as well as different rate plans, promotions and product offerings, which make its operations increasingly complex and may unfavourably impact its response time to market trends and the risk of billing or service errors. An inability to maintain and enhance its existing IT systems or obtain new systems to accommodate additional customer growth or to support new products and services could have an adverse impact on its ability to acquire new subscribers, retain existing customers, produce accurate and timely billing, generate revenue growth, manage operating expenses and carry out operations without interruption; all of which may have a material adverse effect on its business, prospects, results of operations and financial condition.

The Corporation has entered into strategic relationships with service providers to ensure that the technology it adopts and invests in is the best in class in its industry. An inability to maintain these relationships or difficulties implementing its technology roadmap could result in higher capital requirements, prolonged development timelines and substandard performance of its products and services.

Products and services supplied to the Corporation by third-party suppliers may contain latent security issues, including, but not limited to, software and hardware security issues, that would not be apparent upon a diligent inspection. Failure to identify and remedy those issues may result in significant customer dissatisfaction, loss of revenues, and could adversely impact its results of operations and financial condition.

***Third-party suppliers and providers***

The Corporation depends on third-party suppliers and providers for certain services, hardware, licensed technological platforms and equipment that are, or may become, critical to its operations and network evolution. These materials and services include end-user terminals such as set-top boxes, gateways, Wi-Fi routers, mobile telephony handsets, network equipment such as wireline and telephony modems, servers and routers, fibre-optic cable and equipments, telephony switches, inter-city links, support structures, licensed technological platforms, external cloud-based services and network functions, services and operational software, the "backbone" telecommunications network for its Internet access, telephony services and mobile services, and construction services for the expansion of and upgrades to its wireline and wireless networks. These services, platforms and equipment are each available from a single or limited number of suppliers and the Corporation therefore faces the risks of supply disruption, including due to geopolitical events, external events such as climate change related impacts, epidemics, pandemics or other public health issues, business difficulties, restructuring, or supply-chain issues. If no supplier can provide the Corporation with the equipment and services it requires, or that comply with evolving Internet and telecommunications standards or that are compatible with its other equipment and software interfaces, its business, financial condition and results of operations could be materially adversely affected. In addition, if the Corporation is unable to obtain critical equipment, software, services or other items on a timely basis and at an acceptable cost, its ability to offer its products and services at competitive pricing and roll out advanced services may be delayed, and its business, financial condition and results of operations could be materially adversely affected.

Moreover, as there is a limited number of manufacturers of mobile devices and customer premises equipment (“CPE”), there is a risk that the Corporation will not be able to maintain agreements for their existing supply on commercially reasonable terms. The rising mobile device and CPE costs as well as the potential delays in delivery mobile devices and CPE, in a price-sensitive market, could negatively impact the Corporation’s revenues, financial condition and results of operations, as it may not be able to pass on to customers a corresponding increase in the price of its products. Furthermore, some of the Corporation’s competitors benefit from higher purchasing volumes which provide them the ability to negotiate better prices and faster deliveries from manufacturers.

In addition, the Corporation obtains proprietary content critical to its operations through licensing arrangements with content providers. Some providers may seek to increase fees or impose technological requirements to protect their proprietary content. If the Corporation is unable to renegotiate commercially acceptable arrangements with these content providers, comply with their technological requirements or find alternative sources of equivalent content, its business, financial condition and results of operations could be materially adversely affected.

***Litigation and other claims***

In the normal course of business, the Corporation is involved in various legal proceedings and other claims relating to the conduct of its business, including class actions. Although, in the opinion of management, the outcome of current pending claims and other litigation is not expected to have a material adverse effect on the Corporation’s reputation, results of operations, liquidity or financial condition, a negative outcome in respect of any such claim or litigation could have the said adverse effect. Moreover, the cost of defending against lawsuits and the diversion of management’s attention could be significant.

***Intellectual property rights***

The Corporation relies on its intellectual property, such as copyrights, trademarks and trade secrets, as well as licenses and other agreements with its vendors and other third parties, to use various technologies, conduct its operations and sell its products and services. Legal challenges to its intellectual property rights, or the ones of third-party suppliers, and claims of intellectual property infringement by third parties could require that it enters into royalty or licensing agreements on unfavourable terms, incur substantial monetary liability, or be enjoined preliminarily or permanently from further use of the intellectual property in question or from the continuation of its businesses as currently conducted. The Corporation may need to change its business practices if any of these events occur, which may limit its ability to compete effectively and could have an adverse effect on its results of operations. In the event that it believes any such challenges or claims are without merit, they can nonetheless be time-consuming and costly to defend and divert management’s attention and resources away from its businesses. Moreover, if the Corporation is unable to obtain or continue to obtain licenses from its vendors and other third parties on reasonable terms, its businesses could be adversely affected.

Piracy and other unauthorized uses of content are made easier, and the enforcement of the Corporation’s intellectual property rights is made more challenging, by technological advances. The steps the Corporation has taken to protect its intellectual property may not prevent the misappropriation of its proprietary rights. The Corporation may not have the ability in certain jurisdictions to adequately protect intellectual property rights. Moreover, others may independently develop processes and technologies that are competitive to the Corporation’s. Also, the Corporation may not be able to discover or determine the extent of any unauthorized use of its proprietary rights. Unauthorized use of its intellectual property rights may increase the cost of protecting these rights or reduce its revenues. The Corporation cannot be sure that any legal actions against such infringers will be successful, even when its rights have been infringed.

***Strikes, other labour protests and health risks affecting employees***

The Corporation is not currently subject to any labour dispute. Nevertheless, it can neither predict the outcome of current or future negotiations relating to labour disputes, union representation or renewal of collective bargaining agreements, nor guarantee that the Corporation will not experience future work stoppages, strikes or other forms of labour protests pending the outcome of any current or future negotiations. If its unionized workers engage in a strike or any other form of work stoppage, it could experience a significant disruption to its operations, damage to its property and/or interruption to its services, which could adversely affect its business, assets, financial condition, results of operations and reputation. Even should the Corporation not experience strikes or other forms of labour protests, the outcome of labour negotiations could adversely affect its business and results of operations. Such could be the case if current or future labour negotiations or contracts were to further restrict its ability to maximize the efficiency of its operations. In addition, its ability to make short-term adjustments to control compensation and benefit costs is limited by the terms of its collective bargaining agreements.

Health threats to employees resulting from epidemics, pandemics or other health issues could adversely affect the Corporation’s business, assets, financial conditions, results of operations and reputation.

The COVID-19 pandemic has accelerated the Corporation's adoption of a remote work policy establishing guidelines for its employees when working from home. Remote work arrangements of its employees and those of certain of its suppliers could introduce additional operating risks including, but not limited to, confidentiality risks, privacy risks, information security risks, health and safety risks and impair the Corporation's ability to manage its business. This situation could also result in an increase in the number of legal proceedings and other claims related to the pursuit of its activities outside of its usual premises.

***Pension plan liability***

The economic cycles, employee demographics and changes in regulations could have a negative impact on the funding of the Corporation's defined benefit pension plans and related expenditures. There is no guarantee that the expenditures and contributions required to fund these pension plans will not increase in the future and therefore negatively impact its operating results and financial condition. Risks related to the funding of defined benefit plans may materialize if total obligations with respect to a pension plan exceed the total value of its trust assets. Shortfalls may arise due to lower-than-expected returns on investments, changes in the assumptions used to assess the pension plan's obligations, and actuarial losses.

***Exchange rate fluctuations***

Most of the Corporation's revenues and expenses are denominated in CAN dollars. However, certain expenditures, such as the purchase of set-top boxes, gateways, modems, mobile devices, the payment of royalties to certain business providers or service providers, and certain capital expenditures, including certain costs related to the development and maintenance of its mobile network, are paid in U.S. dollars. Those costs are only partially hedged, so a significant increase in the U.S. dollar could have an adverse effect on its results of operations and financial condition.

Also, a substantial portion of its debt is denominated in U.S. dollars, and interest, principal and premium, if any, are payable in U.S. dollars. For the purposes of financial reporting, any change in the value of the CAN dollar against the U.S. dollar during a given financial reporting period would result in a foreign exchange gain or loss on the translation of any unhedged U.S.-dollar-denominated debt into CAN dollars. Consequently, reported earnings and debt could fluctuate materially as a result of foreign exchange gains or losses. The Corporation has entered into transactions to hedge the exchange rate risk with respect to its U.S.-dollar-denominated debt outstanding at December 31, 2021, and it intends to enter into such transactions for new U.S.-dollar-denominated debt in the future. These hedging transactions could, in certain circumstances, prove economically ineffective and may not be successful in protecting it against exchange rate fluctuations, or it may be required to provide cash and other collateral in the future in order to secure its obligations with respect to such hedging transactions, or it may be unable to enter into such transactions on favourable terms, or at all, in the future or, pursuant to the terms of these hedging transactions, its counterparties thereto may owe the Corporation significant amounts of money and may be unable to honour such obligations, all of which could have an adverse effect on its results of operations and financial condition.

In addition, certain cross-currency interest rate swaps entered into by the Corporation include an option that allows each party to unwind the transaction on a specific date at the then settlement amount.

The Corporation holds interests in certain foreign companies. A significant adverse change in the value of the currencies of these foreign companies, the Turkish Lira and the Euro, could have an adverse impact on the results of operations and the financial condition of the Corporation.

The fair value of the derivative financial instruments that the Corporation is party to is estimated using period-end market rates and reflects the amount it would receive or pay if the instruments were terminated and settled at those dates, as adjusted for counterparties' non-performance risk. At December 31, 2021, the net aggregate fair value of its cross-currency interest rate swaps and foreign exchange forward contracts was in a net asset position of $382.3 million on a consolidated basis. These swaps have been set up with major Canadian and US banks.

Some of the Corporation's suppliers source their products out of the U.S.; therefore, although the Corporation pays those suppliers in CAN dollars, the prices it pays for such commodities or products may be affected by fluctuations in the exchange rate. The Corporation may in the future enter into transactions to hedge its exposure to the exchange rate risk related to the prices of some of those commodities or products. However, fluctuations in the exchange rate for purchases that are not hedged could affect the prices the Corporation pays for such purchases and could have an adverse effect on its results of operations and financial condition.

***Volatility***

The capital and credit markets have experienced significant volatility and disruption in the past, resulting in periods of upward pressure on the cost of new debt capital and severe restrictions in credit availability for many companies. In such periods, the disruptions and volatility in the capital and credit markets have also resulted in higher interest rates or greater credit spreads on the issuance of debt securities and increased costs under credit facilities. Disruptions and volatility in the capital and credit markets could increase Quebecor's interest expense, thereby adversely affecting its results of operations and financial position.

Quebecor's access to funds under its existing credit facilities is dependent on the ability of the financial institutions that are parties to those facilities to meet their funding commitments. Those financial institutions may not be able to meet their funding commitments if they experience shortages of capital and liquidity, or if they experience excessive volumes of borrowing requests within a short period of time. Moreover, the obligations of the financial institutions under Quebecor's credit facilities are several and not joint and, as a result, a funding default by one or more institutions does not need to be made up by the others.

Some of Quebecor's debt has a variable rate of interest linked to various interest rate benchmarks, such as the London Inter-Bank Offered Rate ("LIBOR") or the Canadian Dollar Offered Rate ("CDOR"). It is expected that interest rates benchmarks such as LIBOR and CDOR will be reformed or will be discontinued and replaced with alternative interest rate benchmark rates which meet new regulatory and market requirements. The consequence of this development cannot be entirely predicted but could include an increase in the cost of its variable rate indebtedness.

Extended periods of volatility and disruptions in the capital and credit markets as a result of uncertainty, pandemics, epidemics and other public health issues, ongoing changes or increases in regulation of financial institutions, reduced financing alternatives or failures of significant financial institutions, could adversely affect Quebecor's access to the liquidity and affordability of funding needed for its businesses in the longer term. Such disruptions could require Quebecor to take measures to maintain a cash balance until markets stabilize or until alternative credit arrangements or other funding for its business needs can be arranged. Market disruptions and broader economic challenges may lead to lower demand for certain of Quebecor's products, a declining level of retail and commercial activity and increased incidences of customer inability to pay or to timely pay for the services or products it provides. Events such as these could adversely impact Quebecor's results of operations, cash flows, financial condition and prospects.

***Asset impairment charges***

In the past, the Corporation has recorded asset impairment charges which have been material in some cases. Subject to the realization of various factors, including, but not limited to, weak economic or market conditions, the Corporation may be required to record in the future, in accordance with IFRS accounting valuation principles, additional non-cash impairment charges if the carrying value of an asset in its financial statements is in excess of its recoverable value. Any such asset impairment charge could be material and may adversely affect its future reported results of operations and equity, although such charges would not affect its cash flows.

***Acquisitions, dispositions, business combinations, or joint ventures***

From time to time, the Corporation engages in discussions and activities with respect to possible acquisitions, dispositions, business combinations, or joint ventures intended to complement or expand its business, some of which may be significant transactions and involve significant risks and uncertainties. The Corporation may not realize the anticipated benefit from any of the transactions it pursues and may have difficulty incorporating or integrating any acquired business. Regardless of whether it consummates any such transaction, the negotiation of a potential transaction (including associated litigation), as well as the integration of any acquired business, could require the Corporation to incur significant costs and cause diversion of management's time and resources and disrupt its business operations. The Corporation could face several challenges in the consolidation and integration of information technology, accounting systems, personnel and operations.

If the Corporation decides to sell individual properties or other assets or businesses, it will benefit from the net proceeds realized from such sales. However, its revenues may suffer in the long term due to the disposition of a revenue-generating asset, the timing of such dispositions may be poor, causing it to fail to realize the full value of the disposed asset or the terms of such dispositions may be overly restrictive to us or may result in unfavorable post-closing price adjustments if some conditions are not met, all of which may diminish its ability to repay its indebtedness at maturity.

Any of the foregoing could have a material adverse effect on its business, financial condition, operating results, liquidity, and prospects.

***Competition and consolidation of retail locations in the Telecommunications business***

In the Corporation's Telecommunications business, the competition to offer products in the best available commercial retail spaces is fierce. Some of its telecommunications business competitors have pursued a strategy of selling their products through independent retailers, in major retail chains and convenience stores, via telemarketing campaigns and via home delivery to extend their presence on the market and some of its competitors have also acquired certain independent retailers and created new distribution networks. This could result in limiting the customer reach of the Corporation's retail network and places it at a competitive disadvantage, which could have an adverse effect on its business, prospects, results of operations and financial condition.

***Rising adoption of web-based and application-based channels***

To better meet the changing habits and expectations of consumers and businesses, the Corporation's telecommunications business' competitors are rapidly developing digital platforms, which allow them to sell and distribute their products on web-based or application-based channels and to shift customer interaction to digital platforms driving more self-help, self-install and self-service. If the Corporation does not succeed in implementing and pursuing its own digital strategy and fails to evolve its customer experience in line with customers' demands, this could place the Corporation at a competitive disadvantage, which could have an adverse effect on its business, prospects, results of operations and financial condition.

***Government acts and regulations risks***

The Corporation's operations are subject to extensive government regulation and policy-making in Canada. Laws and regulations govern the issuance, amendment, renewal, transfer, suspension, revocation and ownership of broadcast programming and distribution licenses. With respect to distribution, regulations govern, among other things, the distribution of Canadian and non-Canadian programming services and the maximum fees to be charged to the public in certain circumstances. The Corporation's broadcasting distribution and telecommunications operations (including Internet access service) are regulated respectively by the *Broadcasting Act* and the *Telecommunications Act* and regulations thereunder. The CRTC, which administers the *Broadcasting Act* and the *Telecommunications Act*, has the power to grant, amend, suspend, revoke and renew broadcasting licenses, approve certain changes in corporate ownership and control, and make regulations and policies in accordance with the *Broadcasting Act* and the *Telecommunications Act*, subject to certain directions from the federal cabinet. The Corporation's wireless and wireline operations are also subject to technical requirements, license conditions and performance standards under the *Radiocommunication Act* (Canada) (the "*Radiocommunication Act*"), which is administered by ISED Canada.

Changes to the laws, regulations and policies governing the Corporation's operations, the introduction of new laws, regulations, policies or terms of license, the issuance of new licenses, including additional spectrum licenses, to its competitors, or changes in the treatment of the tax deductibility of advertising expenditures, could have an impact on customer buying practices and/or a material adverse effect on its business (including how it provides products and services), prospects, results of operations and financial condition. In addition, the Corporation may incur increased costs in order to comply with existing and newly adopted laws and regulations or penalties for any failure to comply.

The CRTC launched a comprehensive review of the wireless market. The Canadian Government had requested that the CRTC consider competition, affordability, consumer interests and innovation in its decisions. In a recent decision, the CRTC ordered the national incumbent wireless carriers to provide MVNO access services to regional wireless carriers for a period of seven years. This decision stands to have significant impact on the Corporation's competitive environment, as the Corporation could see the emergence of new MVNO competitors. The Corporation may not be able to compete successfully in future against existing and such potential competitors. This material increase in competition in the Corporation's mobile telephony business could have a material adverse effect on its business, prospects, revenues, financial condition, and results of operations.

In addition, laws relating to communications, data protection, e-commerce, direct marketing and digital advertising and the use of public records have become more prevalent in recent years. Existing and proposed legislation and regulations, including changes in the manner in which such legislation and regulations are interpreted by courts in Canada, the United States and other jurisdictions may impose limits on the collection and use of certain kinds of information. Furthermore, the CRTC and ISED Canada have the power to impose monetary sanctions for failure to comply with current regulations.

***TPIAs access to our cable network***

The largest cable operators in Canada, including Videotron, have been required by the CRTC to provide TPIA providers with access to their networks at mandated cost-based rates. Numerous TPIA providers are interconnected to the Corporation's cable network and are thereby providing retail Internet access services as well as, in some cases, retail VoIP and IP-based television distribution services.

Since 2015, the CRTC has reemphasized in a series of decisions the importance it gives to mandated wholesale access arrangements as a driver of competition in the retail Internet access market. Among other things, the CRTC has ordered all of the major telephone and cable companies, including Videotron, to provide new disaggregated wholesale access services, which are to replace existing aggregated wholesale access services after a transition period. These new disaggregated services will include mandated access to high-speed services provided over fibre-access facilities, including the fibre-access facilities of the large incumbent telephone companies. Implementation of these new wholesale services could permit Internet resellers to enhance their service offerings in the retail market, thereby affecting the Corporation's competitive position as well its ability to recover the cost of providing underlying network services.

***License renewals***

Videotron's AWS-1 licenses were renewed in December 2018 for a 20-year term. Videotron's other spectrum licenses, including in the AWS-3, 700 MHz, 2500 MHz, 600 MHz and 3500 MHz bands, are issued for 20-year terms from their respective dates of issuance. At the end of these terms, the Corporation expects that new licenses will be issued for subsequent terms through a renewal process, unless a breach of licence conditions has occurred, a fundamental reallocation of spectrum to a new service is required, or in the event that an overriding policy need arises. The process for issuing or renewing licenses, including the terms and conditions of the new licenses and whether license fees should apply for a subsequent license term, are expected to be determined by ISED Canada.

If, at the end of their respective term, the licenses are not renewed on acceptable terms, or at all, the Corporation's ability to continue to offer its wireless services, or to offer new services, may be negatively impacted, or its cost structure could materially increase, and, consequently, it could have a material adverse effect on its business, prospects, results of operations and financial condition.

***Government programs***

The Corporation benefits from several government programs developed to support major investment projects, the deployment of high-speed Internet services in various regions of Québec, the production and distribution of televisual and cinematographic products, and magazine publishing in Canada, including federal and provincial refundable tax credits. There can be no assurance that the local cultural incentive programs that the Corporation may access in Canada will continue to be available in the future or will not be reduced, amended or eliminated. Any future reductions or other changes in the policies or rules of application in Canada or in any of its provinces in connection with these government incentive programs, including any change in the Québec or the federal programs providing for refundable tax credits, could, among other things, increase the cost of acquiring Canadian content or investment projects affected by these programs and influence the programming of content broadcast or the Corporation's decision to initiate certain investment projects, including incur capital expenditures for the extension of its wireline and mobile networks, which could have a material adverse effect on its results of operations and financial condition. Canadian content programming is also subject to certification by various agencies of the federal government. If programming fails to so qualify, the Corporation would not be able to use the programs to meet Canadian content programming obligations and might not qualify for certain Canadian tax credits and government incentives.

In addition, the Canadian and provincial governments currently provide grants, incentives and tax credits to attract foreign producers and support domestic film and television production. Many of the major studios and other key customers of the Corporation's film production and audiovisual services business, content producers for its broadcasting operations, as well as its production and distribution business, finance a portion of their production budgets through these grants, incentives and tax credits. There can be no assurance that these grants, incentives and tax credits will continue at their present levels or at all, and if they are reduced or discontinued, the level of activity in the motion picture and television industries may be reduced, as a result of which the Corporation's results of operations and financial condition might be adversely affected.

The successful tax credit model of Québec and other provinces in Canada has been copied by other jurisdictions. Some producers may select locations other than Québec to take advantage of other tax credit programs. Other factors, such as director or star preference, may also have the effect of productions being shot in a location other than Québec and may therefore have a material adverse effect on the Corporation's business, results of operations and financial condition.

***Environmental laws and regulations and climate change***

The Corporation is subject to a variety of environmental laws and regulations. Some of its facilities are subject to federal, provincial, state and municipal laws and regulations concerning, for example, emissions to the air, water and sewer discharge, the handling and disposal of hazardous materials and waste, including electronic waste, recycling, soil remediation of contaminated sites, or otherwise relating to the protection of the environment. In addition, laws and regulations relating to workplace safety and worker health, which, among other things, regulate employee exposure to hazardous substances in the workplace, also govern the Corporation's operations. Failure to comply with present or future laws or regulations could result in substantial liability for the Corporation.

Environmental laws and regulations and their interpretation have changed rapidly in recent years and may continue to do so in the future. For instance, most Canadian provinces have implemented Extended Producer Responsibility regulations in order to encourage sustainability practices such as the "Ecological recovery and reclamation of electronic products", which sets certain recovery targets and which may require the Corporation to monitor and adjust its practices in the future. Evolving public expectations with respect to the environment and increasingly stringent laws and regulations could result in increased costs of compliance, and failure to recognize and adequately respond to them could result in fines, regulatory scrutiny, or have a significant effect on the Corporation's reputation and brands.

The Corporation's properties, as well as areas surrounding those properties, particularly those in areas of long-term industrial use, may have had historic uses, or may have current uses, in the case of surrounding properties, which may affect its properties and require further study or remedial measures. The Corporation cannot provide assurance that all environmental liabilities have been determined, that any prior owner of its properties did not create a material environmental condition not known to the Corporation, that a material environmental condition does not otherwise exist on any of its properties, or that expenditure will not be required to deal with known or unknown contamination.

The Corporation owns, through its subsidiaries, certain properties located on partially remediated former landfills. The operation and ownership of these properties carry inherent risks of environmental and health and safety liabilities, including for personal injuries, property damage, release of hazardous materials, remediation and clean-up costs and other environmental damages. The Corporation may, from time to time, be involved in administrative and judicial proceedings relating to such matters, which could have a material adverse effect on its business, financial condition and results of operations.

Finally, the effects of global climate change are increasing the severity and frequency of extreme weather-related events and will potentially result in increased operational and capital costs. Some of the more significant climate-related risks that were identified include potential increased operational costs to maintain the Corporation's network operations during extreme weather events, and potential increased capital costs as a result of damage to its facilities and/or equipment, and disruption of operations. The effects of global climate change may in turn also affect the Corporation's team members' ability to manage the Corporation, and affect the communities in which it operates, which could have a material adverse effect on its business, financial condition, and results of operations.

***Concerns about alleged health risks relating to radiofrequency emissions***

All the Corporation's cell sites comply with applicable laws and it relies on its suppliers to ensure that the network equipment and customer equipment supplied to it meet all applicable regulatory and safety requirements. Nevertheless, some studies have alleged links between radiofrequency emissions from certain wireless devices and cell sites and various health problems, or possible interference with electronic medical devices, including hearing aids and pacemakers. There is no definitive evidence of harmful effects from exposure to radiofrequency emissions when the limits imposed by applicable laws and regulations are complied with. Additional studies of radiofrequency emissions are ongoing and there is no certainty as to the results of any such future studies.

The current concerns over radiofrequency emissions or perceived health risks of exposure to radiofrequency emissions could lead to additional governmental regulation, diminished use of wireless services, including Videotron's, or product liability lawsuits that might arise or have arisen. Any of these could have a material adverse effect on the Corporation's business, prospects, revenues, financial condition and results of operations.

***Indebtedness***

Quebecor currently has a substantial amount of debt and significant interest payment requirements. As at December 31, 2021, it had $6.52 billion of consolidated long-term debt (long-term debt plus bank indebtedness). Quebecor's indebtedness could have significant consequences, including the following:

- increase its vulnerability to general adverse economic and industry conditions;
- require it to dedicate a substantial portion of its cash flow from operations to making interest and principal payments on its indebtedness, reducing the availability of its cash flow to fund capital expenditures, working capital and other general corporate purposes;
- limit its flexibility in planning for, or reacting to, changes in its businesses and the industries in which Quebecor operates;
- place it at a competitive disadvantage compared to competitors with less debt or greater financial resources; and
- limit, along with the financial and other restrictive covenants in its indebtedness, its ability to, among other things, borrow additional funds on commercially reasonable terms, if at all.

Although Quebecor has significant indebtedness, as at December 31, 20201, it had more than $1.58 billion available for additional borrowings under its existing credit facilities on a consolidated basis, and the indentures governing its outstanding Senior Notes would permit it to incur substantial additional indebtedness in the future. If Quebecor incurs additional debt, the risks it now faces as a result of its leverage could intensify.

***Restrictive covenants***

Quebecor's debt instruments contain a number of operating and financial covenants, which may vary depending on their respective governing terms, restricting its ability to, among other things:

- borrow money or sell preferred stock;
- create liens;
- pay dividends on or redeem or repurchase stock;
- make certain types of investments;
- restrict dividends or other payments by some subsidiaries;
- enter into transactions with affiliates;

- issue guarantees of debt; and
- sell assets or merge with other companies.

If Quebecor is unable to comply with these covenants and is unable to obtain waivers from its creditors, then it would be unable to make additional borrowings under its credit facilities. Its indebtedness under these agreements would be in default and that could, if not cured or waived, result in an acceleration of such indebtedness and cause cross-defaults under its other debt, including Senior Notes. If Quebecor's indebtedness is accelerated, it may not be able to repay its indebtedness or borrow sufficient funds to refinance it, and any such prepayment or refinancing could adversely affect Quebecor's financial condition. In addition, if Quebecor incurs additional debt in the future or refinances existing debt, it may be subject to additional covenants, which may be more restrictive than those to which it is currently subject. Even if Quebecor is able to comply with all applicable covenants, the restrictions on its ability to manage its business at its sole discretion could adversely affect its business by, among other things, limiting its ability to take advantage of financings, mergers, acquisitions and other corporate opportunities that Quebecor believes would be beneficial.

***Holding corporation***

Quebecor is a holding corporation and a substantial portion of its assets is the capital stock of its subsidiaries. As a holding corporation, Quebecor conducts substantially all of its business through its subsidiaries, which generate substantially all of its revenues. Consequently, Quebecor's cash flow and ability to service its debt obligations are dependent on the cash flows of its existing and future subsidiaries and the distribution of this cash flow to Quebecor, or on loans, advances or other payments made by those entities to Quebecor. The ability of those entities to pay dividends or make loans, advances or payments to Quebecor will depend on their operating results and will be subject to applicable laws and contractual restrictions contained in the instruments governing their debt. Quebecor Media and Videotron have several series of debt securities outstanding, and the Quebecor Media, Videotron and TVA Group have credit facilities that limit their ability to distribute cash. In addition, if its existing or future subsidiaries incur additional debt in the future or refinance existing debt, Quebecor may be subject to additional contractual restrictions contained in the instruments governing that debt, which may be more restrictive than those to which it is currently subject.

The ability of its subsidiaries to generate sufficient cash flows from operations to allow Quebecor to make scheduled payments on its debt obligations will depend on their future financial performance, which will be affected by a range of economic, competitive and business factors as well as by structural changes, many of which are outside its or their control. If the cash flows and earnings of Quebecor's operating subsidiaries and the amount that they are able to distribute to Quebecor as dividends or otherwise are not sufficient for Quebecor, it may not be able to satisfy its debt obligations. If it is unable to satisfy its debt obligations, it may have to undertake alternative financing plans, such as refinancing or restructuring its debt, selling assets, reducing or delaying capital investments, or seeking to raise additional capital. It can provide no assurance that any such alternative refinancing would be possible; that any assets could be sold, or, if sold, the timing of the sales and the amount of proceeds realized from those sales; that additional financing could be obtained on acceptable terms, if at all; or that additional financing would be permitted under the terms of its various debt instruments then in effect. Inability to generate sufficient cash flows to satisfy Quebecor's debt obligations, or to refinance those obligations on commercially reasonable terms, could have a material adverse effect on its business, prospects, results of operations and financial condition.

***Ability to refinance***

Quebecor may be required from time to time to refinance some of its existing debt at or prior to maturity. Quebecor and its subsidiaries' ability to obtain additional financing to repay such existing debt at maturity will depend on a number of factors, including prevailing market conditions, credit availability and operating performance. There can be no assurance that any such financing will be available to Quebecor on favourable terms, or at all.

***Provisions in the Articles that could discourage or prevent a takeover***

Provisions in the Corporation's Articles and Bylaws could make it more difficult for a third party to acquire it, even if doing so would be beneficial in the opinion of the holders of Quebecor's Class B Shares. Those provisions principally include:

- the multiple voting feature of Quebecor's Class A Shares; and
- the election structure of the Board of Directors, whereby holders of Class A Shares elect 75% of the Corporation's directors, while holders of Class B Shares elect 25%.

The existence of these provisions could have the effect of delaying, preventing or deterring a change in control of Quebecor, could deprive its shareholders of an opportunity to receive a premium for their Class B Shares as part of a sale of Quebecor, and might ultimately affect the market price of its shares.

***Interests of holders of Quebecor's Class A Shares that may conflict with the interests of other shareholders***

The Class B Shares have one vote per share, while the Class A Shares have 10 votes per share on all matters to be voted on by shareholders, with the exception of matters where the holders of shares of a single class are entitled to vote separately. As of December 31, 2021 approximately 74.3% of the combined voting power of all outstanding shares is controlled by a majority shareholder, and the exercise of the voting rights attached to those shares makes it possible to decide or significantly influence all issues submitted to a shareholder vote, including the election of Class A directors and approval of significant corporate transactions, such as amendments to the Corporation's Articles, mergers, amalgamations, or the sale of all or substantially all of its assets.

The holders of the Class A Shares may also have interests that differ from those of the other shareholders and may vote in a way with which other shareholders disagree and which may be adverse to their interests. This concentration of voting power may have the effect of delaying, preventing, or deterring a change in control of Quebecor; could deprive its shareholders of an opportunity to receive a premium for their Class B Shares as part of a sale of Quebecor, and might ultimately affect the market price of its shares.

## Financial Instruments and Financial Risk Management

The Corporation's financial risk-management policies have been established in order to identify and analyze the risks faced by the Corporation, to set appropriate risk limits and controls, and to monitor risks and adherence to limits. Risk-management policies are reviewed regularly to reflect changes in market conditions and in the Corporation's activities.

The Corporation uses a number of financial instruments, mainly cash and cash equivalents, restricted cash, trade receivables, contract assets, long-term investments, bank indebtedness, trade payables, accrued liabilities, long-term debt, convertible debentures, lease liabilities and derivative financial instruments. As a result of its use of financial instruments, the Corporation is exposed to credit risk, liquidity risk and market risks relating to foreign exchange fluctuations and interest rate fluctuations.

In order to manage its foreign exchange and interest rate risks, the Corporation uses derivative financial instruments: (i) to set in CAN dollars future payments on debts denominated in U.S. dollars (interest and principal) and certain purchases of inventories and other capital expenditures denominated in a foreign currency; and (ii) to achieve a targeted balance of fixed- and floating rate debt. The Corporation does not intend to settle its derivative financial instruments prior to their maturity as none of these instruments is held or issued for speculative purposes.

**Table 8**
Description of derivative financial instruments at December 31, 2021
(in millions of dollars)

### Foreign exchange forward contracts

| Maturity | CAN dollar average exchange rate per one U.S. dollar | Notional amount sold | Notional amount bought |
|---|---|---|---|
| **Videotron** | | | |
| Less than 1 year | 1.2578 | $ 177.4 | US$ 141.0 |

| Hedged item | Hedging instrument | | | |
|---|---|---|---|---|
| | Period covered | Notional amount | Annual interest rate on notional amount in CAN dollars | CAN dollar exchange rate on interest and capital payments per one U.S. dollar |
| **Quebecor Media** | | | | |
| 5.750% Senior Notes due 2023 | 2016 to 2023 | US$ 431.3 | 7.27% | 0.9792 |
| 5.750% Senior Notes due 2023 | 2012 to 2023 | US$ 418.7 | 6.85% | 0.9759 |
| **Videotron** | | | | |
| 5.375% Senior Notes due 2024 | 2014 to 2024 | US$ 158.6 | Bankers' acceptance 3 months + 2.67% | 1.1034 |
| 5.375% Senior Notes due 2024 | 2017 to 2024 | US$ 441.4 | 5.62% | 1.1039 |
| 5.125% Senior Notes due 2027 | 2017 to 2027 | US$ 600.0 | 4.82% | 1.3407 |
| 3.625% Senior Notes due 2029 | 2021 to 2029 | US$ 500.0 | 4.04% | 1.2109 |

### Cross-currency swaps

Certain cross-currency swaps entered into by the Corporation include an option that allows each party to unwind the transaction on a specific date at the then settlement amount.

The gains on valuation and translation of financial instruments for 2021 and 2020 are summarized in Table 10.

**Table 9**
**Gain on valuation and translation of financial instruments**
(in millions of Canadian dollars)

| | **2021** | 2020 |
|---|---|---|
| Gain on embedded derivatives related to convertible debentures | **$ (14.9)** | $ (9.3) |
| Other | **0.5** | 1.3 |
| | **$ (14.4)** | $ (8.0) |

A $0.4 million gain on cash flow hedges was recorded under other comprehensive income in 2021 ($17.1 million loss in 2020).

## Fair Value of Financial Instruments

The fair value of long-term debt and convertible debentures is estimated based on quoted market prices when available or on valuation models. When the Corporation uses valuation models, the fair value is estimated using discounted cash flows using year-end market yields or the market value of similar instruments with the same maturity.

The fair value of derivative financial instruments recognized on the consolidated balance sheets is estimated as per the Corporation's valuation models. These models project future cash flows and discount the future amounts to a present value using the contractual terms of the derivative financial instrument and factors observable in external market data, such as period-end swap rates and foreign exchange rates. An adjustment is also included to reflect non-performance risk, impacted by the financial and economic environment prevailing at the date of the valuation, in the recognized measure of the fair value of the derivative financial instruments by applying a credit default premium, estimated using a combination of observable and unobservable inputs in the market, to the net exposure of the counterparty or the Corporation.

The fair value of embedded derivatives related to convertible debentures is determined by option pricing models using market inputs, including volatility, discount factors and the underlying instrument's implicit interest rate and credit premium.

The carrying value and fair value of long-term debt, convertible debentures and derivative financial instruments as of December 31, 2021 and December 31, 2020 were as follows:

**Table 10**
**Fair value of long-term debt, convertible debentures and derivative financial instruments**
(in millions of Canadian dollars)

| | | **2021** | | 2020 |
|---|---|---|---|---|
| **Asset (liability)** | **Carrying value** | **Fair value** | Carrying value | Fair value |
| **Long-term debt**[1] | **$ (6,554.0)** | **$ (6,660.4)** | $ (5,786.4) | $ (6,216.1) |
| **Convertible debentures**[2] | **(139.5)** | **(139.5)** | (153.5) | (153.5) |
| **Derivative financial instruments**[3] | | | | |
| Foreign exchange forward contracts | **0.9** | **0.9** | (8.0) | (8.0) |
| Cross-currency swaps | **381.4** | **381.4** | 605.1 | 605.1 |

1 The carrying value of long-term debt excludes the fair value of long-term debt related to hedged interest rate risk and financing costs.

2 The carrying value and fair value of convertible debentures consist of the principal amount and the value of the conversion features related to the floor and ceiling prices, recognized as embedded derivatives.

3 The net fair value of derivative financial instruments designated as cash flow hedges is an asset position of $348.1 million as of December 31, 2021 ($552.5 million at December 31, 2020) and the net fair value of derivative financial instruments designated as fair value hedges is an asset position of $34.2 million as of December 31, 2021 ($44.6 million at December 31, 2020).

Due to the judgment used in applying a wide range of acceptable techniques and estimates in calculating fair value amounts, fair values are not necessarily comparable among financial institutions or other market participants and may not be realized in an actual sale or on the immediate settlement of the instrument.

## Credit risk management

Credit risk is the risk of financial loss to the Corporation if a customer or counterparty to a financial asset fails to meet its contractual obligations and arises principally from amounts receivable from customers, including contract assets.

The gross carrying amounts of financial assets represent the maximum credit exposure. As of December 31, 2021, the gross carrying amount of trade receivables and contract assets, including their long-term portions, was $913.4 million ($790.2 million as of December 31, 2020).

In the normal course of business, the Corporation continuously monitors the financial condition of its customers and reviews the credit history of each new customer. The Corporation uses its customers' historical terms of payment and acceptable collection periods for each customer class, as well as changes in its customers' credit profiles, to define default to collect amounts receivable from customers, including contract assets.

As of December 31, 2021, no customer balance represented a significant portion of the Corporation's consolidated trade receivables. The Corporation is using the expected credit losses method to estimate its provision for credit losses, which considers the specific credit risk of its customers, the expected lifetime of its financial assets, historical trends and economic conditions As of December 31, 2021, the provision for expected credit losses represented 2.0% of the gross amount of trade receivables and contract assets (2.6% as of December 31, 2020), while 6.9% of trade receivables were 90 days past their billing date (5.0% as of December 31, 2020).

The following table shows changes to the provision for expected credit losses for the years ended December 31, 2021 and 2020:

| | | **2021** | | 2020 |
|---|---|---|---|---|
| Balance at beginning of year | **$** | **20.8** | $ | 19.6 |
| Changes in expected credit losses charged to income | | **17.2** | | 17.4 |
| Write-off | | **(19.5)** | | (16.2) |
| **Balance at end of year** | **$** | **18.5** | $ | 20.8 |

The Corporation believes that its product lines and the diversity of its customer base are instrumental in reducing its credit risk, as well as the impact of fluctuations in product-line demand. The Corporation does not believe that it is exposed to an unusual level of customer credit risk.

As a result of its use of derivative financial instruments, the Corporation is exposed to the risk of non-performance by a third party. When the Corporation enters into derivative contracts, the counterparties (either foreign or Canadian) must have credit ratings at least in accordance with the Corporation's risk-management policy and are subject to concentration limits. These credit ratings and concentration limits are monitored on an ongoing basis, but at least quarterly.

## Liquidity risk management

Liquidity risk is the risk that the Corporation will not be able to meet its financial obligations as they fall due or the risk that those financial obligations will have to be met at excessive cost. The Corporation manages this exposure through staggered debt maturities. The weighted average term of the Corporation's consolidated debt was approximately 5.1 years as of December 31, 2021, compared with 4.3 years at December 31, 2020.

## Market risk

Market risk is the risk that changes in market prices due to foreign exchange rates, interest rates and/or equity prices will affect the value of the Corporation's financial instruments. The objective of market risk management is to mitigate and control exposures within acceptable parameters while optimizing the return on risk.

### *Foreign currency risk*

Most of the Corporation's consolidated revenues and expenses, other than interest expense on U.S.-dollar-denominated debt, purchases of set-top boxes, gateways, modems, mobile devices and certain capital expenditures, are received or denominated in CAN dollars. A significant portion of the interest, principal and premium, if any, payable on its debt is payable in U.S. dollars. The Corporation has entered into transactions to hedge the foreign currency risk exposure on its U.S.-dollar-denominated debt obligations outstanding as of December 31, 2021, and to hedge its exposure on certain purchases of set-top boxes, gateways, modems, mobile devices and capital expenditures. Accordingly, the Corporation's sensitivity to variations in foreign exchange rates is economically limited.

The estimated sensitivity on income and on other comprehensive income, before income taxes, of a variance of $0.10 in the year-end exchange rate of a CAN dollar per one U.S. dollar used to calculate the fair value of financial instruments as of December 31, 2021 is as follows:

| **Increase (decrease)** | | **Income** | | **Other comprehensive income** |
|---|---|---|---|---|
| Increase of $0.10 | **$** | **0.7** | **$** | **35.1** |
| Decrease of $0.10 | | **(0.7)** | | **(35.1)** |

A variance of $0.10 in the 2021 average exchange rate of CAN dollar per one U.S. dollar would have resulted in a variance of $8.8 million on the value of unhedged purchases of goods and services and $6.6 million on the value of unhedged acquisitions of tangible and intangible assets in 2021.

A variance of 10% in the exchange rate of CAN dollar per one Turkish Lira as of December 31, 2021 would have resulted in a variance of $3.2 million of the loss on translation of investments in foreign associates in the consolidated statements of comprehensive income.

*Interest rate risk*

Some of the Corporation's bank credit facilities bear interest at floating rates based on the following reference rates: (i) Bankers' acceptance rate, (ii) LIBOR, (iii) Canadian prime rate, and (iv) U.S. prime rate. The Senior Notes issued by the Corporation bear interest at fixed rates. The Corporation has entered into cross-currency swap agreements in order to manage cash flow risk exposure. After taking into account hedging instruments, the debt consisted of approximately 91.7% fixed-rate debt, compared with 96.1% at December 31, 2020, and 8.3% floating-rate debt, compared with 3.9% at December 31, 2020.

The estimated sensitivity on interest payments of a 100 basis-point variance in the year-end Canadian Bankers' acceptance rate as of December 31, 2021 was $5.2 million.

The estimated sensitivity on income and on other comprehensive income, before income taxes, of a 100 basis-point variance in the discount rate used to calculate the fair value of financial instruments, other than convertible debentures and embedded derivatives related to convertible debentures, as of December 31, 2021, as per the Corporation's valuation models, is as follows:

| **Increase (decrease)** | **Income** | **Other comprehensive income** |
|---|---|---|
| Increase of 100 basis points | **$ (0.7)** | **$ (5.2)** |
| Decrease of 100 basis points | **0.7** | **5.2** |

## Capital management

The Corporation's primary objective in managing capital is to maintain an optimal capital base in order to support the capital requirements of its various businesses, including growth opportunities.

In managing its capital structure, the Corporation takes into account the asset characteristics of its subsidiaries and planned requirements for funds, leveraging their individual borrowing capacities in the most efficient manner to achieve the lowest cost of financing. Management of the capital structure involves the issuance and repayment of debt and convertible debentures, the issuance and repurchase of shares, the use of cash flows generated by operations, and the level of distributions to shareholders. The Corporation has not significantly changed its strategy regarding the management of its capital structure since the last financial year.

The Corporation's capital structure is composed of equity, bank indebtedness, long-term debt, convertible debentures, embedded derivatives related to convertible debentures, lease liabilities, derivative financial instruments and cash and cash equivalents. The capital structure as of December 31, 2021 and 2020 is as follows:

**Table 11**
**Capital structure of Quebecor**
(in millions of Canadian dollars)

| | 2021 | 2020 |
|---|---|---|
| Bank indebtedness | **$ –** | $ 1.7 |
| Long-term debt | **6,524.4** | 5,773.4 |
| Convertible debentures | **150.0** | 150.0 |
| Embedded derivatives related to convertible debentures | **(8.4)** | 6.5 |
| Lease liabilities | **183.2** | 173.3 |
| Derivative financial instruments | **(382.3)** | (597.1) |
| Cash and cash equivalents | **(64.7)** | (136.7) |
| Net liabilities | **6,402.2** | 5,371.1 |
| Equity | **$ 1,378.8** | $ 1,214.1 |

The Corporation is not subject to any externally imposed capital requirements other than certain restrictions under the terms of its borrowing agreements, which relate, among other things, to permitted investments, intercompany transactions, and the declaration and payment of dividends or other distributions.

## Contingencies and legal disputes

In the context of disputes between the Corporation and a competitor, legal proceedings have been initiated by the Corporation and against the Corporation. At this stage of proceedings, management of the Corporation is in the opinion that the outcome is not expected to have a material adverse effect on the Corporation’s results or on its financial position.

There are also a number of other legal proceedings against the Corporation that are pending. Generally, management of the Corporation establishes provisions for claims or actions considering the facts of each case. The Corporation cannot determine when and if any payment will be made related to these legal proceedings.

In August 2021, a competitor launched legal proceedings in Federal Court contesting the awarding of licences in the 3500 MHZ band in Western Canada to Videotron. This case is currently before the Court.

On August 15, 2019, the CRTC issued an order to finalize the rates, retroactively to March 31, 2016, at which the large cable and telephone companies provide aggregated wholesale access to their high-speed Internet networks. The interim rates in effect since 2016 had been invoiced to resellers and accounted for in the Corporation’s consolidated financial statements on the basis of the effective date of March 31, 2016. The new proposed rates were substantially lower than the interim rates. On May 27, 2021, the CRTC restored, in a final decision, the interim rates that had been in effect since 2016. Accordingly, no adjustments are necessary to the consolidated financial statements.

## Critical Accounting Policies and Estimates

### *Revenue recognition*

The Corporation accounts for a contract with a customer only when all of the following criteria are met:

- the parties to the contract have approved the contract (in writing, orally or in accordance with other customary business practices) and are committed to perform their respective obligations;
- the entity can identify each party’s rights regarding the goods or services to be transferred;
- the entity can identify the payment terms for the goods or services to be transferred;
- the contract has commercial substance (i.e. the risk, timing or amount of the entity’s future cash flows is expected to change as a result of the contract); and
- it is probable that the entity will collect the consideration to which it is entitled in exchange for the goods or services to be transferred to the customer.

The portion of revenues that is invoiced and unearned is presented as "Deferred revenue" in the consolidated balance sheets. Deferred revenue is usually recognized as revenue in the subsequent year.

Telecommunications

The Telecommunications segment provides services under multiple deliverable arrangements, mainly for mobile contracts in which the sale of mobile devices is bundled with telecommunication services over the contract term. The total consideration from a contract with multiple deliverables is allocated to all performance obligations in the contract based on the stand-alone selling price of each obligation. The total consideration can be comprised of an upfront fee or a number of monthly installments for the equipment sale and a monthly fee for the telecommunication service. Each performance obligation of multiple deliverable arrangements is then separately accounted for based on its allocated consideration amount.

The Corporation does not adjust the amount of consideration allocated to the equipment sale for the effects of a financing component since this component is not significant.

The Telecommunications segment recognizes each of its main activities' revenues as follows:

- operating revenues from subscriber services, such as television distribution, Internet access, wireline and mobile telephony, and OTT video services are recognized when services are provided;
- revenues from equipment sales to subscribers are recognized when the equipment is delivered;
- operating revenues related to service contracts are recognized in income on a straight-line basis over the period in which the services are provided; and
- wireline connection and mobile activation revenues are deferred and recognized respectively as revenues over the period of time the customer is expected to remain a customer of the Corporation and over the contract term.

When a mobile device and a service are bundled under a single mobile contract, the term of the contract is generally 24 months.

The portion of mobile revenues earned without being invoiced is presented as contract assets in the consolidated balance sheets. Contract assets are realized over the term of the contract.

Media

The Media segment recognizes each of its main activities' revenues as follows:

- advertising revenues are recognized when the advertising is aired on television, is featured in newspapers or magazines or is displayed on the digital properties or on transit shelters;
- revenues from subscriptions to specialty television channels or to online publications are recognized on a monthly basis at the time service is provided or over the period of the subscription;
- revenues from the sale or distribution of newspapers and magazines are recognized upon delivery, net of provisions for estimated returns based on historical rate of returns;
- soundstage and equipment rental revenues are recognized over the rental period;
- revenues derived from speciality film and television services are recognized when services are provided; and
- revenues from distribution of audiovisual content are recognized when the content has been delivered and accepted in accordance with the conditions of the licence or distribution agreement.

Sports and Entertainment

The Sports and Entertainment segment recognizes each of its main activities' revenues as follows:

- revenues from the sale or distribution of books and entertainment products are recognized upon delivery, net of provisions for estimated returns based on historical rate of returns;
- revenues from venue rental, ticket sales (including season tickets) and sales from food concessions are recognized when the events take place and/or goods are sold, as the case may be;
- revenues from the rental of suites are recognized ratably over the period of the agreement;
- revenues from the sale of advertising in the form of venue signage or sponsorships are recognized ratably over the period of the agreement; and
- revenues derived from sporting and cultural event management are recognized when services are provided.

*Impairment of assets*

For the purposes of assessing impairment, assets are grouped in cash-generating units (“CGUs”), which represent the lowest levels for which there are separately identifiable cash inflows generated by those assets. The Corporation reviews, at each balance sheet date, whether events or circumstances have occurred to indicate that the carrying amounts of its long-lived assets with finite useful lives may be less than their recoverable amounts. Goodwill, intangible assets having an indefinite useful life, and intangible assets not yet available for use are tested for impairment each financial year, as well as whenever there is an indication that the carrying amount of the asset, or the CGU to which an asset has been allocated, exceeds its recoverable amount. The recoverable amount is the higher of the fair value less costs of disposal and the value in use of the asset or the CGU. Fair value less costs of disposal represents the amount an entity could obtain at the valuation date from the asset’s disposal in an arm’s length transaction between knowledgeable, willing parties, after deducting the costs of disposal. The value in use represents the present value of the future cash flows expected to be derived from the asset or the CGU.

The Corporation uses the discounted cash flow method to estimate the recoverable amount, consisting of future cash flows derived primarily from the most recent budget and three-year strategic plan approved by the Corporation’s management and presented to the Board of Directors. These forecasts considered each CGU’s past operating performance and market share as well as economic trends, along with specific and market industry trends and corporate strategies. A perpetual growth rate is used for cash flows beyond the three-year strategic plan period. The discount rate used by the Corporation is a pre-tax rate derived from the weighted average cost of capital pertaining to each CGU, which reflects the current market assessment of: (i) the time value of money; and (ii) the risk specific to the assets for which the future cash flow estimates have not been risk-adjusted. The perpetual growth rate was determined with regard to the specific markets in which the CGUs participate.

An impairment loss is recognized in the amount by which the carrying amount of an asset or a CGU exceeds its recoverable amount. When the recoverable amount of a CGU to which goodwill has been allocated is lower than the CGU’s carrying amount, the related goodwill is first impaired. Any excess amount of impairment is recognized and attributed to assets in the CGU, prorated to the carrying amount of each asset in the CGU.

An impairment loss recognized in prior periods for long-lived assets with finite useful lives and intangible assets having an indefinite useful life, other than goodwill, can be reversed through the consolidated statement of income to the extent that the resulting carrying value does not exceed the carrying value that would have been the result had no impairment loss been recognized previously.

When determining the recoverable amount of an asset or CGU, assessment of the information available at the valuation date is based on management’s judgment and may involve estimates and assumptions. Furthermore, the discounted cash flow method used in determining the recoverable amount of an asset or CGU relies on the use of estimates such as the amount and timing of cash flows, expected variations in the amount or timing of those cash flows, the time value of money as represented by the risk-free rate, and the risk premium associated with the asset or CGU.

Therefore, the judgment used in determining the recoverable amount of an asset or CGU may affect the amount of the impairment loss to be recorded to an asset or CGU, as well as the potential reversal of the impairment charge in the future.

Based on the data and assumptions used in its last impairment test, the Corporation believes that there is no significant amount of long-lived assets with finite useful lives, or goodwill and intangible assets with indefinite useful lives, on its books at this time that present a significant risk of impairment in the near future.

The net book value of goodwill as at December 31, 2021 was $2.72 billion, and the net book value of intangible assets with indefinite useful lives as at December 31, 2021 was $1.57 billion.

*Indefinite useful life of spectrum licences*

Management has concluded that spectrum licences have an indefinite useful life. This conclusion was based on an analysis of factors, such as the Corporation’s financial ability to renew the spectrum licences, the competitive, legal and regulatory landscape, and future expectations regarding the use of the spectrum licences. The determination that spectrum licences have an indefinite useful life therefore involves judgment, which could have an impact on the amortization charge recorded in the consolidated statements of income if management were to change its conclusion in the future.

*Derivative financial instruments and hedge accounting*

The Corporation uses various derivative financial instruments to manage its exposure to fluctuations in foreign currency exchange rates and interest rates. The Corporation does not hold or use any derivative financial instruments for speculative purposes. Under hedge accounting, the Corporation documents all hedging relationships between hedging instruments and hedged items, as well as its strategy for using hedges and its risk-management objective. It also designates its derivative financial instruments as either fair value hedges or cash flow hedges when they qualify for hedge accounting. The Corporation assesses the effectiveness of its hedging relationships at initiation and on an ongoing basis.

The Corporation generally enters into the following types of derivative financial instruments.

- The Corporation uses foreign exchange forward contracts to hedge foreign currency rate exposure on anticipated equipment or inventory purchases in a foreign currency. These foreign exchange forward contracts are designated as cash flow hedges.
- The Corporation uses cross-currency swaps to hedge (i) foreign currency rate exposure on interest and principal payments on foreign currency denominated debt and/or (ii) fair value exposure on certain debt resulting from changes in interest rates. The cross-currency swaps that set all future interest and principal payments on U.S.-dollar-denominated debt in fixed CAN dollars, in addition to converting an interest rate from a floating rate to a floating rate or from a fixed rate to a fixed rate, are designated as cash flow hedges. The cross-currency swaps are designated as fair value hedges when they set all future interest and principal payments on U.S.-dollar-denominated debt in fixed CAN dollars, in addition to converting the interest rate from a fixed rate to a floating rate.
- The Corporation has established a hedge ratio of one for one for all its hedging relationships as the underlying risks of its hedging derivatives are identical to the hedged item risks.

The Corporation measures and records the effectiveness of its hedging relationships as follows.

- For cash flow hedges, the hedge effectiveness is tested and measured by comparing changes in the fair value of the hedging derivative with the changes in the fair value of a hypothetical derivative that simulates cash flows of the hedged items .
- For fair value hedges, the hedge effectiveness is tested and measured by comparing changes in the fair value of the hedging derivative with the changes in the fair value of the hedged item attributable to the hedged risk.
- Most of the Corporation's hedging relationships are not generating material ineffectiveness. The ineffectiveness, if any, is recorded in the consolidated statements of income as a gain or loss on valuation and translation of financial instruments.

Under hedge accounting, the Corporation applies the following accounting policies.

- For derivative financial instruments designated as fair value hedges, changes in the fair value of the hedging derivative recorded in income are substantially offset by changes in the fair value of the hedged item to the extent that the hedging relationship is effective. When a fair value hedge is discontinued, the carrying value of the hedged item is no longer adjusted and the cumulative fair value adjustments to the carrying value of the hedged item are amortized to income over the remaining term of the original hedging relationship.
- For derivative financial instruments designated as cash flow hedges, the effective portion of a hedge is reported in other comprehensive income until it is recognized in income during the same period in which the hedged item affects income, while the ineffective portion is immediately recognized in income. When a cash flow hedge is discontinued, the amounts previously recognized in accumulated "other comprehensive income" are reclassified to income when the variability in the cash flows of the hedged item affects income.

Any change in the fair value of derivative financial instruments recorded in income is included in gain or loss on valuation and translation of financial instruments. Interest expense on hedged long-term debt is reported at the hedged interest and foreign currency rates.

Derivative financial instruments that do not qualify for hedge accounting, including derivatives that are embedded in financial or non-financial contracts that are not closely related to the host contracts, are reported on a fair value basis on the consolidated balance sheets. Any change in the fair value of these derivative financial instruments is recorded in the consolidated statements of income as a gain or loss on valuation and translation of financial instruments.

*Convertible debentures*

The convertible debentures are accounted for as a financial liability and the cap and floor conversion price features are accounted for separately as embedded derivatives. The embedded derivatives are measured at fair value and any subsequent change in the fair value is recorded in the consolidated statements of income as a gain or loss on valuation and translation of financial instruments.

*Pension plans and postretirement benefits*

The Corporation offers defined contribution pension plans and defined benefit pension plans to some of its employees.

Quebecor Media's defined benefit obligations with respect to defined benefit pension plans and postretirement benefits are measured at present value and assessed on the basis of a number of economic and demographic assumptions which are established with the assistance of Quebecor Media's actuaries. Key assumptions relate to the discount rate, the rate of increase in compensation, retirement age of employees, healthcare costs, and other actuarial factors. Defined benefit pension plan assets are measured at fair value and consist mainly of equities and corporate and government fixed-income securities.

Remeasurements of the net defined benefit liability or asset are recognized immediately in other comprehensive income.

Recognition of a net benefit asset is limited under certain circumstances to the amount recoverable, which is primarily based on the present value of future contributions to the plan, to the extent that the Corporation can unilaterally reduce those future contributions. In addition, an adjustment to the net benefit asset or the net benefit liability can be recorded to reflect a minimum funding liability in a certain number of the Corporation's pension plans. The assessment of the amount recoverable in the future and the minimum funding liability is based on a number of assumptions, including future service costs and future plan contributions.

The Corporation considers all the assumptions used to be reasonable in view of the information available at this time. However, variances from certain of those assumptions may have a significant impact on the costs and obligations of pension plans and postretirement benefits in future periods.

*Share-based compensation*

Stock-based awards to employees that call for settlement in cash, deferred share units ("DSUs") or performance share units ("PSUs"), or that call for settlement in cash at the option of the employee, as stock options awards, are accounted for at fair value and classified as a liability. The compensation cost is recognized in expenses over the vesting period. Changes in the fair value of stock-based awards between the grant date and the measurement date result in a change in the liability and compensation cost.

The fair value of DSUs and PSUs is based on the underlying share price at the date of valuation. The fair value of stock option awards is determined by applying an option pricing model, taking into account the terms and conditions of the grant and assumptions such as the risk-free interest rate, distribution yield, expected volatility, and the expected remaining life of the option.

*Provisions*

Provisions are recognized (i) when the Corporation has a present legal or constructive obligation as a result of a past event and it is probable that an outflow of economic benefits will be required to settle the obligation, and (ii) when the amount of the obligation can be reliably estimated. Restructuring costs, comprised primarily of termination benefits, are recognized when a detailed plan for the restructuring exists and a valid expectation has been raised in those affected that the plan will be carried out.

Provisions are reviewed at each consolidated balance sheet date and changes in estimates are reflected in the consolidated statements of income in the reporting period in which the changes occur.

The amount recognized as a provision is the best estimate of the expenditures required to settle the present obligation at the balance sheet date or to transfer it to a third party at that time and it is adjusted for the effect of time value when material. The amount recognized for onerous contracts is the lower of the cost necessary to fulfill the obligations, net of expected economic benefits deriving from the contracts, and any indemnity or penalty arising from failure to fulfill those obligations.

No amounts are recognized for obligations that are possible but not probable or for those for which an amount cannot be reasonably estimated.

*Contract costs*

Incremental and direct costs, such as costs to obtain a contract, mainly sales commissions, or the cost of connecting a subscriber to the Corporation's telecommunication network, are included in contract costs and amortized over the period of time the customer is expected to maintain its service or over the contract term. The amortization of contract costs is included in purchase of goods and services in the consolidated statements of income.

*Provision for expected credit losses*

The Corporation maintains a provision to cover anticipated credit losses from customers who are unable to pay their debts. The provision is reviewed periodically, considering the specific credit risk of its customers, the expected lifetime of its financial assets, historical trends and economic conditions.

*Business acquisitions*

A business acquisition is accounted for by the acquisition method. The cost of an acquisition is measured at the fair value of the consideration given in exchange for control of the business acquired at the acquisition date. This consideration can be comprised of cash, assets transferred, financial instruments issued, or future contingent payments. The identifiable assets and liabilities of the acquired business are recognized at their fair value at the acquisition date. Goodwill is measured and recognized as the excess of the fair value of the consideration paid over the fair value of the recognized identifiable assets acquired and liabilities assumed.

Determining the fair value of certain acquired assets, assumed liabilities and future contingent considerations requires judgment and involves complete and absolute reliance on estimates and assumptions. The Corporation primarily uses the discounted future cash flows approach to estimate the value of acquired intangible assets.

The estimates and assumptions used in the allocation of the purchase price at the date of acquisition may also have an impact on the amount of an impairment charge to be recognized, if any, after the date of acquisition, as discussed above under “Impairment of assets.”

*Contingent considerations and future conditional adjustments*

Contingent considerations and future conditional adjustments arising from business acquisition or disposal are measured and accounted for at their fair value. The fair value is estimated based on a present value model requiring management to assess the probabilities that the conditions on which the contingent considerations and future conditional adjustments are based will be met in the future. The assessment of these contingent and conditional potential outcomes requires judgment from management and could have an impact on the initial amount of contingent considerations or future conditional adjustments recognized and on any subsequent changes in fair value recorded in the consolidated statements of income.

*Interpretation of laws and regulations*

Interpretation of laws and regulations, including those of the CRTC and tax regulations, requires judgment from management and could have an impact on revenue recognition, provisions, income taxes and capital expenditures in the consolidated financial statements.

*Tax credits and government assistance*

The Corporation has access to several government programs designed to support large investment projects, the roll-out of high-speed Internet services in various regions of Québec, production and distribution of televisual products and movies, as well as music products, magazine and book publishing in Canada. In addition, most of the business units in the Media segment and Sports and Entertainment segment have qualified for the Emergency Wage Subsidy program available during the health crisis. The Corporation also receives tax credits mainly related to its research and development activities, publishing activities and digital activities. Government financial assistance is accounted for as revenue or as a reduction in related costs, whether capitalized and amortized or expensed, in the year the costs are incurred and when management has reasonable assurance that the conditions of the government programs are being met.

*Income taxes*

Deferred income taxes are accounted for using the liability method. Under this method, deferred income tax assets and liabilities are recognized for the estimated future tax consequences attributable to differences between the carrying amounts of existing assets and liabilities in the consolidated financial statements and their respective tax bases. Deferred income tax assets and liabilities are measured using enacted or substantively enacted tax rates in effect for the year in which those temporary differences are expected to be recovered or settled. The effect of a change in tax rates on deferred income tax assets and liabilities is recognized in income in the period that includes the substantive enactment date. A deferred tax asset is recognized initially when it is probable that future taxable income will be sufficient to use the related tax benefits and may be reduced subsequently, if necessary, to an amount that is more likely than not to be realized.

The assessment of deferred income taxes is judgmental in nature and is dependent on assumptions and estimates as to the availability and character of future taxable income. The ultimate amount of deferred income tax assets realized could be slightly different from that recorded, since it is influenced by the Corporation’s future operating results.

The Corporation is under audit at all times by various tax authorities in each of the jurisdictions in which it operates. A number of years may elapse before a particular matter for which management has established a reserve is audited and resolved. The number of years between each tax audit varies depending on the tax jurisdiction. Management believes that its estimates are reasonable and reflect the probable outcome of known tax contingencies, although the outcome is difficult to predict.

*Leases*

The Corporation recognizes, for most of its leases, a right-of-use asset and a lease liability at the commencement of a lease. The right-of-use asset and the lease liability are initially measured at the present value of lease payments over the lease term, less incentive payments received, using the Corporation incremental borrowing rate or the interest rate implicit in the lease at that date. The term of the lease is comprised of the initial lease term and any additional period for which it is reasonably certain that the Corporation will exercise its extension option.

Right-of-use assets are depreciated over the shorter of the lease term or the useful life of the underlying asset.

Interest on lease liabilities is recorded in the consolidated statements of income as financial expenses and principal payments on the lease liability are presented as part of financing activities in the consolidated statements of cash flows.

## Non-IFRS financial measures

The financial measures not standardized under IFRS that are used by the Corporation to assess its financial performance, such as adjusted EBITDA, adjusted income from continuing operating activities, adjusted cash flows from operations, free cash flows from continuing operating activities and consolidated net debt leverage ratio, are not calculated in accordance with, or recognized by IFRS. The Corporation’s method of calculating these non-IFRS financial measures may differ from the methods used by other companies and, as a result, the non-IFRS financial measures presented in this document may not be comparable to other similarly titled measures disclosed by other companies.

### Adjusted EBITDA

In its analysis of operating results, the Corporation defines adjusted EBITDA, as reconciled to net income under IFRS, as net income before depreciation and amortization, financial expenses, gain (loss) on valuation and translation of financial instruments, restructuring of operations and other items, loss on debt refinancing, income tax, and income (loss) from discontinued operations. Adjusted EBITDA as defined above is not a measure of results that is consistent with IFRS. It is not intended to be regarded as an alternative to IFRS financial performance measures or to the statement of cash flows as a measure of liquidity. It should not be considered in isolation or as a substitute for measures of performance prepared in accordance with IFRS. The Corporation uses adjusted EBITDA in order to assess the performance of its investment in Quebecor Media. The Corporation’s management and Board of Directors use this measure in evaluating its consolidated results as well as the results of the Corporation’s operating segments. This measure eliminates the significant level of impairment and depreciation/amortization of tangible and intangible assets and is unaffected by the capital structure or investment activities of the Corporation and its business segments.

Adjusted EBITDA is also relevant because it is a component of the Corporation’s annual incentive compensation programs. A limitation of this measure, however, is that it does not reflect the periodic costs of tangible and intangible assets used in generating revenues in the Corporation’s segments. The Corporation also uses other measures that do reflect such costs, such as adjusted cash flows from operations and free cash flows from continuing operating activities. The Corporation’s definition of adjusted EBITDA may not be the same as similarly titled measures reported by other companies.

Table 12 provides a reconciliation of adjusted EBITDA to net income as disclosed in Quebecor’s consolidated financial statements. The consolidated financial information for the three-month periods ended December 31, 2021 and 2020 presented in Table 12 below is drawn from the Corporation’s unaudited quarterly consolidated financial statements.

**Table 12**
**Reconciliation of the adjusted EBITDA measure used in this report to the net income measure used in the consolidated financial statements**
(in millions of Canadian dollars)

| | | Years ended December 31 | | Three months ended December 31 | |
|---|---|---|---|---|---|
| | **2021** | 2020 | 2019 | **2021** | 2020 |
| Adjusted EBITDA (negative adjusted EBITDA): | | | | | |
| Telecommunications | **$ 1,875.7** | $ 1,864.4 | $ 1,803.4 | **$ 466.5** | $ 481.7 |
| Media | **83.4** | 82.2 | 74.8 | **28.8** | 45.6 |
| Sports and Entertainment | **20.4** | 8.7 | 7.3 | **4.2** | 2.1 |
| Head Office | **(6.3)** | (2.7) | (6.0) | **(0.7)** | (2.6) |
| | **1,973.2** | 1,952.6 | 1,879.5 | **498.8** | 526.8 |
| Depreciation and amortization | **(783.8)** | (803.2) | (750.4) | **(197.6)** | (213.5) |
| Financial expenses | **(333.4)** | (328.2) | (327.5) | **(79.5)** | (79.1) |
| Gain (loss) on valuation and translation of financial instruments | **14.4** | 8.0 | (6.5) | **7.2** | (0.9) |
| Restructuring of operations and other items | **(4.1)** | (39.2) | (28.6) | **(7.8)** | (6.1) |
| Loss on debt refinancing | **(80.9)** | – | – | **–** | – |
| Income taxes | **(197.0)** | (205.8) | (205.7) | **(56.6)** | (58.1) |
| Income (loss) from discontinued operations | **–** | 33.2 | 97.5 | **–** | (0.6) |
| **Net income** | **$ 588.4** | $ 617.4 | $ 658.3 | **$ 164.5** | $ 168.5 |

## Adjusted income from continuing operating activities

The Corporation defines adjusted income from continuing operating activities, as reconciled to net income attributable to shareholders under IFRS, as net income attributable to shareholders before gain (loss) on valuation and translation of financial instruments, restructuring of operations and other items, and loss on debt refinancing, net of income tax related to adjustments and net income attributable to non-controlling interest related to adjustments, and before income (loss) from discontinued operations attributable to shareholders. Adjusted income from continuing operating activities, as defined above, is not a measure of results that is consistent with IFRS. It should not be considered in isolation or as a substitute for measures of performance prepared in accordance with IFRS. The Corporation uses adjusted income from continuing operating activities to analyze trends in the performance of its businesses. The above-listed items are excluded from the calculation of this measure because they impair the comparability of financial results. Adjusted income from continuing operating activities is more representative for forecasting income. The Corporation's definition of adjusted income from continuing operating activities may not be identical to similarly titled measures reported by other companies.

Table 13 provides a reconciliation of adjusted income from continuing operating activities to the net income attributable to shareholders' measure used in Quebecor's consolidated financial statements. The consolidated financial information for the three-month periods ended December 31, 2021 and 2020 presented in Table 13 below is drawn from the Corporation's unaudited quarterly consolidated financial statements.

**Table 13**

**Reconciliation of the adjusted income from continuing operating activities measure used in this report to the net income attributable to shareholders' measure used in the consolidated financial statements**

(in millions of Canadian dollars)

| | Years ended December 31 | | | Three months ended December 31 | |
|---|---|---|---|---|---|
| | **2021** | 2020 | 2019 | **2021** | 2020 |
| Adjusted income from continuing operating activities | **$ 621.9** | $ 594.5 | $ 581.0 | **$ 157.6** | $ 165.0 |
| Gain (loss) on valuation and translation of financial instruments | **14.4** | 8.0 | (6.5) | **7.2** | (0.9) |
| Restructuring of operations and other items | **(4.1)** | (39.2) | (28.6) | **(7.8)** | (6.1) |
| Loss on debt refinancing | **(80.9)** | – | – | **–** | – |
| Income taxes related to adjustments[1] | **26.1** | 9.1 | 8.0 | **2.5** | 2.1 |
| Net income attributable to non-controlling interest related to adjustments | **1.0** | 1.6 | 1.4 | **1.0** | 0.3 |
| Discontinued operations | **–** | 33.2 | 97.5 | **–** | (0.6) |
| **Net income attributable to shareholders** | **$ 578.4** | $ 607.2 | $ 652.8 | **$ 160.5** | $ 159.8 |

[1] Includes impact of fluctuations in income tax applicable to adjusted items, either for statutory reasons or in connection with tax transactions.

**Adjusted cash flows from operations and free cash flows from continuing operating activities**

*Adjusted cash flows from operations*

Adjusted cash flows from operations represents adjusted EBITDA, less additions to property, plant and equipment and to intangible assets (excluding licence acquisitions and renewals). Adjusted cash flows from operations represents funds available for interest and income tax payments, expenditures related to restructuring programs, business acquisitions, licence acquisitions and renewals, payment of dividends, repayment of long-term debt and lease liabilities, and share repurchases. Adjusted cash flows from operations is not a measure of liquidity that is consistent with IFRS. It is not intended to be regarded as an alternative to IFRS financial performance measures or to the statement of cash flows as a measure of liquidity. Adjusted cash flows from operations is used by the Corporation's management and Board of Directors to evaluate the cash flows generated by the operations of all of its segments, on a consolidated basis, in addition to the operating cash flows generated by each segment. Cash flows from operations are also relevant because they are a component of the Corporation's annual incentive compensation programs. The Corporation's definition of adjusted cash flows from operations may not be identical to similarly titled measures reported by other companies.

*Free cash flows from continuing operating activities*

Free cash flows from continuing operating activities represents cash flows provided by continuing operating activities calculated in accordance with IFRS, less cash flows used for additions to property, plant and equipment and to intangible assets (excluding expenditures related to licence acquisitions and renewals), plus proceeds from disposal of assets. Free cash flows from continuing operating activities is used by the Corporation's management and Board of Directors to evaluate cash flows generated by the Corporation's operations. Free cash flows from continuing operating activities represents available funds for business acquisitions, licence acquisitions and renewals, payment of dividends, repayment of long-term debt and lease liabilities, and share repurchases. Free cash flows from continuing operating activities is not a measure of liquidity that is consistent with IFRS. It is not intended to be regarded as an alternative to IFRS financial performance measures or to the statement of cash flows as a measure of liquidity. The Corporation's definition of free cash flows from continuing operating activities may not be identical to similarly titled measures reported by other companies.

Tables 14 and 15 provide a reconciliation of adjusted cash flows from operations and free cash flows from continuing operating activities to cash flows provided by continuing operating activities reported in the consolidated financial statements. The consolidated financial information for the three-month periods ended December 31, 2021 and 2020 presented in tables 14 and 15 is drawn from the Corporation's unaudited quarterly consolidated financial statements.

**Table 14**
**Adjusted cash flows from operations**
(in millions of Canadian dollars)

| | Years ended December 31 | | | Three months ended December 31 | |
|---|---|---|---|---|---|
| | **2021** | 2020 | 2019 | **2021** | 2020 |
| **Adjusted EBITDA (negative adjusted EBITDA):** | | | | | |
| Telecommunications | **$ 1,875.7** | $ 1,864.4 | $ 1,803.4 | **$ 466.5** | $ 481.7 |
| Media | **83.4** | 82.2 | 74.8 | **28.8** | 45.6 |
| Sports and Entertainment | **20.4** | 8.7 | 7.3 | **4.2** | 2.1 |
| Head Office | **(6.3)** | (2.7) | (6.0) | **(0.7)** | (2.6) |
| | **1,973.2** | 1,952.6 | 1,879.5 | **498.8** | 526.8 |
| **Minus** | | | | | |
| Additions to property, plant and equipment:[1] | | | | | |
| Telecommunications | **(391.5)** | (402.1) | (459.3) | **(75.0)** | (103.9) |
| Media | **(20.3)** | (14.3) | (24.0) | **(9.7)** | (7.6) |
| Sports and Entertainment | **(0.8)** | (0.6) | (1.3) | **(0.4)** | (0.4) |
| Head Office | **(1.5)** | (1.5) | (1.7) | **0.1** | (0.2) |
| | **(414.1)** | (418.5) | (486.3) | **(85.0)** | (112.1) |
| Additions to intangible assets:[2] | | | | | |
| Telecommunications | **(145.6)** | (194.0) | (218.8) | **(33.2)** | (60.7) |
| Media | **(24.6)** | (23.7) | (26.0) | **(7.6)** | (7.2) |
| Sports and Entertainment | **(3.5)** | (2.8) | (3.6) | **(1.3)** | (0.5) |
| Head Office | **(3.3)** | (1.2) | (0.7) | **(1.1)** | (1.1) |
| | **(177.0)** | (221.7) | (249.1) | **(43.2)** | (69.5) |
| **Adjusted cash flows from operations** | | | | | |
| Telecommunications | **1,338.6** | 1,268.3 | 1,125.3 | **358.3** | 317.1 |
| Media | **38.5** | 44.2 | 24.8 | **11.5** | 30.8 |
| Sports and Entertainment | **16.1** | 5.3 | 2.4 | **2.5** | 1.2 |
| Head Office | **(11.1)** | (5.4) | (8.4) | **(1.7)** | (3.9) |
| | **$ 1,382.1** | $ 1,312.4 | $ 1,144.1 | **$ 370.6** | $ 345.2 |

[1] **Reconciliation to cash flows used for additions to property, plant and equipment as per consolidated financial statements:**

| | Years ended December 31 | | | Three months ended December 31 | |
|---|---|---|---|---|---|
| | **2021** | 2020 | 2019 | **2021** | 2020 |
| Additions to property, plant and equipment | **$ (414.1)** | $ (418.5) | $ (486.3) | **$ (85.0)** | $ (112.1) |
| Net variance in current operating items related to additions to property, plant and equipment (excluding government credits receivable for major capital projects) | **(15.2)** | (28.7) | (15.3) | **(6.6)** | (10.3) |
| Cash flows used for additions to property, plant and equipment | **$ (429.3)** | $ (447.2) | $ (501.6) | **$ (91.6)** | $ (122.4) |

[2] **Reconciliation to cash flows used for additions to intangible assets as per consolidated financial statements:**

| | Years ended December 31 | | | Three months ended December 31 | |
|---|---|---|---|---|---|
| | **2021** | 2020 | 2019 | **2021** | 2020 |
| Additions to intangible assets | **$ (177.0)** | $ (221.7) | $ (249.1) | **$ (43.2)** | $ (69.5) |
| Net variance in current operating items related to additions to intangible assets (excluding government credits receivable for major capital projects) | **(11.7)** | 15.8 | 8.0 | **1.1** | 48.7 |
| Cash flows used for licence acquisitions | **(830.0)** | – | (255.8) | **(664.0)** | – |
| Cash flows used for additions to intangible assets | **$ (1,018.7)** | $ (205.9) | $ (496.9) | **$ (706.1)** | $ (20.8) |

**Table 15**
**Free cash flows from continuing operating activities and cash flows provided by continuing operating activities reported in the consolidated financial statements**
(in millions of Canadian dollars)

| | Years ended December 31 | | | Three months ended December 31 | |
|---|---|---|---|---|---|
| | **2021** | 2020 | 2019 | **2021** | 2020 |
| **Adjusted cash flows from operations from Table 14** | **$ 1,382.1** | $ 1,312.4 | $ 1,144.1 | **$ 370.6** | $ 345.2 |
| **Plus (minus)** | | | | | |
| Cash portion of financial expenses | **(325.5)** | (320.1) | (319.4) | **(77.8)** | (77.1) |
| Cash portion related to restructuring of operations and other items | **(22.0)** | (31.6) | (9.8) | **(7.5)** | (5.4) |
| Current income taxes | **(256.9)** | (208.7) | (107.9) | **(65.6)** | (27.7) |
| Other | **8.6** | 3.7 | 2.9 | **2.7** | (0.2) |
| Net change in non-cash balances related to operating activities | **(187.1)** | 40.0 | (229.3) | **(26.0)** | (38.6) |
| Net variance in current operating items related to additions to property, plant and equipment (excluding government credits receivable for major capital projects) | **(15.2)** | (28.7) | (15.3) | **(6.6)** | (10.3) |
| Net variance in current operating items related to additions to intangible assets (excluding government credits receivable for major capital projects) | **(11.7)** | 15.8 | 8.0 | **1.1** | 48.7 |
| **Free cash flows from continuing operating activities** | **572.3** | 782.8 | 473.3 | **190.9** | 234.6 |
| **Plus (minus)** | | | | | |
| Cash flows used for additions to property, plant and equipment | **429.3** | 447.2 | 501.6 | **91.6** | 122.4 |
| Cash flows used for additions to intangible assets (excluding licence acquisitions and renewals) | **188.7** | 205.9 | 241.1 | **42.1** | 20.8 |
| Proceeds from disposal of assets | **(7.7)** | (4.4) | (4.2) | **(1.5)** | (0.8) |
| **Cash flows provided by continuing operating activities** | **$ 1,182.6** | $ 1,431.5 | $ 1,211.8 | **$ 323.1** | $ 377.0 |

## Consolidated net debt leverage ratio

The consolidated net debt leverage ratio represents consolidated net debt, excluding convertible debentures, divided by the trailing 12-month adjusted EBITDA. Consolidated net debt, excluding convertible debentures, represents total long-term debt plus bank indebtedness, lease liabilities, the current portion of lease liabilities and liabilities related to derivative financial instruments, less assets related to derivative financial instruments and cash and cash equivalents. The consolidated net debt leverage ratio serves to evaluate the Corporation's financial leverage and is used by management and the Board of Directors in its decisions on the Corporation's capital structure, including its financing strategy, and in managing debt maturity risks. The consolidated net debt leverage ratio excludes convertible debentures because, subject to certain conditions, those debentures can be repurchased at the Corporation's discretion by issuing Quebecor Class B Shares. Consolidated net debt leverage ratio is not a measure established in accordance with IFRS. It is not intended to be used as an alternative to IFRS measures or the balance sheet to evaluate its financial position. The Corporation's definition of consolidated net debt leverage ratio may not be identical to similarly titled measures reported by other companies.

Table 16 provides the calculation of consolidated net debt leverage ratio and the reconciliation to balance sheet items reported in Quebecor's consolidated financial statements.

**Table 16**
**Consolidated net debt leverage ratio**
(in millions of Canadian dollars)

| | **Dec. 31, 2021** | Dec. 31, 2020 | Dec. 31, 2019 |
|---|---|---|---|
| **Total long-term debt**[1] | **$ 6,554.0** | $ 5,786.4 | $ 5,986.1 |
| **Plus (minus)** | | | |
| Lease liabilities | **147.1** | 139.0 | 106.6 |
| Current portion of lease liabilities | **36.1** | 34.3 | 31.3 |
| Bank indebtedness | **–** | 1.7 | 29.4 |
| Assets related to derivative financial instruments | **(405.6)** | (625.5) | (679.8) |
| Liabilities related to derivative financial instruments | **23.3** | 28.4 | 2.1 |
| Cash and cash equivalents | **(64.7)** | (136.7) | (14.0) |
| Consolidated net debt excluding convertible debentures | **6,290.2** | 5,227.6 | 5,461.7 |
| Divided by: | | | |
| Trailing 12-month adjusted EBITDA | **$ 1,973.2** | $ 1,952.6 | $ 1,879.5 |
| **Consolidated net debt leverage ratio** | **3.19x** | 2.68x | 2.91x |

1 Excluding changes in the fair value of long-term debt related to hedged interest rate risk and financing costs.

## Key performance indicators

### Revenue-generating unit

The Corporation uses RGU, an industry metric, as a key performance indicator. An RGU represents, as the case may be, subscriptions to the Internet access, television and OTT video services, and subscriber connections to the mobile and wireline telephony services. RGU is not a measurement that is consistent with IFRS and the Corporation's definition and calculation of RGU may not be the same as identically titled measurements reported by other companies or published by public authorities.

### Average billing per unit

The Corporation uses ABPU, an industry metric, as a key performance indicator. This indicator is used to measure monthly average subscription billing per RGU. ABPU is not a measurement that is consistent with IFRS and the Corporation's definition and calculation of ABPU may not be the same as identically titled measurements reported by other companies.

Mobile ABPU is calculated by dividing the average subscription billing for mobile telephony services by the average number of mobile RGUs during the applicable period, and then dividing the resulting amount by the number of months in the applicable period.

Total ABPU is calculated by dividing the combined average subscription billing for Internet access, television, OTT video, mobile and wireline telephony services by the total average number of RGUs from Internet access, television, mobile and wireline telephony services during the applicable period, and then dividing the resulting amount by the number of months in the applicable period.

## Controls and procedures

In accordance with Regulation 52-109 on Certification of Disclosure in Issuers' Annual and Interim Filings, the effectiveness of the Corporation's disclosure controls and procedures ("DCP") and "Internal control over financial reporting" ("ICFR") has been evaluated. Based on this evaluation, the President and Chief Executive Officer and the Chief Financial Officer concluded that DCP and ICFR were effective as of the end of the financial year ended December 31, 2021, and that the DCP design provides reasonable assurance that material information relating to the Corporation, including its consolidated subsidiaries, is made known to them by others within those entities, particularly during the period in which the annual filings are being prepared, and the information that the Corporation must present in its annual documents, its interim documents or in other documents it files or submits under securities regulations is recorded, processed, condensed and presented within the timeframes prescribed by this legislation. Moreover, the design of ICFR provides reasonable assurance of the reliability of the Corporation’s financial reporting and of the preparation of its financial statements, for the purpose of financial reporting, in accordance with the IFRS.

Finally, no change to ICFR that has had or is liable to have a material effect was identified by the Corporation’s management during the financial period beginning October 1, 2021 and ending December 31, 2021.

### Additional information

The Corporation is a reporting issuer subject to the securities laws of all Canadian provinces and is therefore required to file financial statements, a proxy circular and an annual information form with the various securities commissions. Copies of those documents are available free of charge from the Corporation on request at www.quebecor.com and on the SEDAR website at www.sedar.com.

### Cautionary statement regarding forward-looking statements

The statements in this report that are not historical facts are forward-looking statements and are subject to significant known and unknown risks, uncertainties and assumptions that could cause the Corporation’s actual results for future periods to differ materially from those set forth in forward-looking statements. Forward-looking statements may be identified by the use of the conditional or by forward-looking terminology such as the terms “plans,” “expects,” “may,” “anticipates,” “intends,” “estimates,” “projects,” “seeks,” “believes,” or similar terms, variations of such terms or the negative of such terms. Some important factors that could cause actual results to differ materially from those expressed in these forward-looking statements include, but are not limited to:

- Quebecor Media’s ability to continue successfully developing its network and the facilities that support its mobile services;
- general economic, financial or market conditions and variations in the businesses of local, regional and national advertisers in Quebecor Media’s newspapers, television outlets and other media properties;
- the intensity of competitive activity in the industries in which Quebecor operates;
- fragmentation of the media landscape;
- new technologies that might change consumer behaviour with respect to Quebecor Media’s product suites;
- unanticipated higher capital spending required for developing Quebecor Media’s network or to address the continued development of competitive alternative technologies, or the inability to obtain additional capital to continue the development of Quebecor’s business;
- Quebecor’s ability to implement its business and operating strategies successfully and to manage its growth and expansion;
- disruptions to the network through which Quebecor Media provides its television, Internet access, mobile and wireline telephony and OTT video services, and its ability to protect such services against piracy, unauthorized access and other security breaches;
- labour disputes or strikes;
- service interruptions resulting from equipment breakdown, network failure, the threat of natural disasters, epidemics, pandemics and other public-health crisis, including the COVID-19 pandemic, and political instability in some countries;
- impact of emergency measures implemented by various levels of government;
- changes in Quebecor Media’s ability to obtain services and equipment critical to its operations;
- changes in laws and regulations, or in their interpretations, which could result, among other things, in the loss (or reduction in value) of Quebecor Media’s licences or markets, or in an increase in competition, compliance costs or capital expenditures;
- Quebecor Media’s ability to successfully develop its Sports and Entertainment segment and other expanding lines of business in its other segments;
- Quebecor’s substantial indebtedness, the tightening of credit markets, and the restrictions on its business imposed by the terms of its debt; and
- interest rate fluctuations that could affect a portion of Quebecor’s interest payment requirements on long-term debt.

The forward-looking statements in this document are made to provide investors and the public with a better understanding of the Corporation’s circumstances and are based on assumptions it believes to be reasonable as of the day on which they are made. Investors and others are cautioned that the foregoing list of factors that may affect future results is not exhaustive and that undue reliance should not be placed on any forward-looking statements. For more information on the risks, uncertainties and assumptions that could cause the Corporation’s actual results to differ from current expectations, please refer to the “Trend Information,” Risks and Uncertainties" and "Financial Instruments and Financial Risk Management" sections above, and the Corporation's other public filings, available at www.sedar.com and www.quebecor.com.

The forward-looking statements in this Management Discussion and Analysis reflect the Corporation's expectations as of February 23, 2022, and are subject to change after this date. The Corporation expressly disclaims any obligation or intention to update or revise any forward-looking statements, whether as a result of new information, future events or otherwise, except as required by applicable securities laws.

Montréal, Québec

February 23, 2022

# QUEBECOR INC.
## SELECTED FINANCIAL DATA

Years ended December 31, 2021, 2020 and 2019
(in millions of Canadian dollars, except per share data)

| | 2021 | 2020 | 2019 |
|---|---|---|---|
| **Operations** | | | |
| Revenues | **$ 4,554.4** | $ 4,317.8 | $ 4,293.8 |
| Adjusted EBITDA | **1,973.2** | 1,952.6 | 1,879.5 |
| Adjusted cash flows from operations | **1,382.1** | 1,312.4 | 1,144.1 |
| Contribution to net income attributable to shareholders: | | | |
| Continuing operations | **621.9** | 594.5 | 581.0 |
| Gain (loss) on valuation and translation of financial instruments | **15.7** | 7.5 | (6.1) |
| Unusual items | **(59.2)** | (28.0) | (19.6) |
| Discontinued operations | **-** | 33.2 | 97.5 |
| Net income attributable to shareholders | **578.4** | 607.2 | 652.8 |
| **Basic data per share** | | | |
| Contribution to net income attributable to shareholders: | | | |
| Continuing operations | **$ 2.55** | $ 2.36 | $ 2.27 |
| Gain (loss) on valuation and translation of financial instruments | **0.06** | 0.03 | (0.02) |
| Unusual items | **(0.23)** | (0.11) | (0.08) |
| Discontinued operations | **-** | 0.13 | 0.38 |
| Net income attributable to shareholders | **2.38** | 2.41 | 2.55 |
| Weighted average number of shares outstanding (in millions) | **243.5** | 251.6 | 255.6 |
| **Diluted data per share** | | | |
| Contribution to net income attributable to shareholders: | | | |
| Continuing operations | **$ 2.52** | $ 2.33 | $ 2.24 |
| Dilution impact | **-** | - | 0.03 |
| Loss on valuation and translation of financial instruments | **-** | - | (0.02) |
| Unusual items | **(0.23)** | (0.11) | (0.08) |
| Discontinued operations | **-** | 0.13 | 0.38 |
| Net income attributable to shareholders | **2.29** | 2.35 | 2.55 |
| Diluted weighted average number of shares (in millions) | **248.3** | 256.3 | 255.8 |

# QUEBECOR INC.

## SELECTED QUARTERLY FINANCIAL DATA

(in millions of Canadian dollars, except per share data)

| | | | | 2021 | | | | 2020 |
|---|---|---|---|---|---|---|---|---|
| | **Dec. 31** | **Sept. 30** | **June 30** | **March 31** | Dec. 31 | Sept. 30 | June 30 | March 31 |
| **Revenues** | **$ 1,183.9** | **$ 1,148.2** | **$ 1,131.2** | **$ 1,091.1** | $ 1,146.8 | $ 1,111.7 | $ 1,003.8 | $ 1,055.5 |
| **Adjusted EBITDA** | **498.8** | **520.3** | **501.4** | **452.7** | 526.8 | 513.4 | 475.7 | 436.7 |
| **Adjusted cash flows from operations** | **370.6** | **365.8** | **338.1** | **307.6** | 345.2 | 346.1 | 326.1 | 295.0 |
| Contribution to net income attributable to shareholders: | | | | | | | | |
| Continuing operating activities | **157.6** | **176.1** | **158.3** | **129.9** | 165.0 | 173.1 | 144.9 | 111.5 |
| Gain (loss) on valuation and translation of financial instruments | **7.6** | **6.1** | **7.3** | **(5.3)** | (0.4) | (18.3) | 4.5 | 21.7 |
| Unusual items | **(4.7)** | **(9.1)** | **(42.1)** | **(3.3)** | (4.2) | (13.9) | (7.0) | (2.9) |
| Discontinued operations | **-** | **-** | **-** | **-** | (0.6) | - | 32.5 | 1.3 |
| **Net income attributable to shareholders** | **160.5** | **173.1** | **123.5** | **121.3** | 159.8 | 140.9 | 174.9 | 131.6 |
| **Basic data per share** | | | | | | | | |
| Contribution to net income attributable to shareholders: | | | | | | | | |
| Continuing operating activities | **$ 0.66** | **$ 0.73** | **$ 0.65** | **$ 0.52** | $ 0.66 | $ 0.69 | $ 0.57 | $ 0.44 |
| Gain (loss) on valuation and translation of financial instruments | **0.03** | **0.02** | **0.03** | **(0.02)** | - | (0.07) | 0.02 | 0.08 |
| Unusual items | **(0.02)** | **(0.04)** | **(0.18)** | **(0.01)** | (0.02) | (0.06) | (0.03) | (0.01) |
| Discontinued operations | **-** | **-** | **-** | **-** | - | - | 0.13 | 0.01 |
| **Net income attributable to shareholders** | **0.67** | **0.71** | **0.50** | **0.49** | 0.64 | 0.56 | 0.69 | 0.52 |
| Weighted average number of shares outstanding (in millions) | **239.8** | **242.7** | **245.0** | **246.7** | 249.1 | 250.5 | 252.8 | 254.0 |
| **Diluted data per share** | | | | | | | | |
| Contribution to net income attributable to shareholders: | | | | | | | | |
| Continuing operating activities | **$ 0.65** | **$ 0.72** | **$ 0.64** | **$ 0.52** | $ 0.66 | $ 0.68 | $ 0.57 | $ 0.42 |
| Dilution impact | **-** | **-** | **-** | **-** | - | 0.01 | - | - |
| Loss on valuation and translation of financial instruments | **-** | **-** | **-** | **(0.02)** | - | (0.07) | - | - |
| Unusual items | **(0.02)** | **(0.04)** | **(0.17)** | **(0.01)** | (0.02) | (0.06) | (0.03) | (0.01) |
| Discontinued operations | **-** | **-** | **-** | **-** | - | - | 0.12 | 0.01 |
| **Net income attributable to shareholders** | **0.63** | **0.68** | **0.47** | **0.49** | 0.64 | 0.56 | 0.66 | 0.42 |
| Weighted average number of diluted shares outstanding (in millions) | **244.6** | **247.5** | **249.9** | **246.9** | 253.8 | 250.7 | 258.6 | 259.9 |

This is **Exhibit "87"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

This is **Exhibit "88"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

This is **Exhibit “89”** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

This is **Exhibit "90"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

This is **Exhibit "91"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

This is **Exhibit "92"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Raha Mohammad

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

Industry Canada Industrie Canada

October 2015
Issue 4

Spectrum Management and Telecommunications

# Service Areas for Competitive Licensing

Canada

# Contents

## 1. Introduction

This document contains descriptions of the service areas that Industry Canada uses for all competitive[1] licensing processes.[2] These processes include spectrum auctions and comparative review processes. This document incorporates minor adjustments to all service areas as a result of the modernization of the Department's Spectrum Management System (SMS) in 2015.

The radio authorization, which will be associated with the use of spectrum in these areas, is the spectrum licence, which was introduced with the amendment of the *Radiocommunication Act* in June 1996. A spectrum licence is defined as an authorization "in respect of the utilization of specified radio frequencies within a defined geographic area."

## 2. Background

As part of the above-mentioned SMS modernization, the Department changed the way in which service areas for competitive and user-defined licensing have been constructed since the mid-1990s. Specifically, Industry Canada changed the definition of the building block of these geographic areas, called the spectrum "grid cell," from a 25 $km^2$ hexagonal shaped block to a 1 minute latitude × 1 minute longitude square block. This change from hexagonal grid cells to square grid cells is outlined in *Canada Gazette* notice DGSO-004-15, *Spectrum Management System Modernization: Changes to the Definition of Competitive and User-Defined Service Areas for Spectrum Licences* (www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11031.html). The changes are the result of a consultation process undertaken in DGSO-001-15, *Consultation on Changes to the Definition of Competitive and User-Defined Service Areas for Spectrum Licences* (www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10943.html).

## 3. Service Area Definitions

As different wireless services and applications are best suited to different sizes of service areas, four tiers of service areas have been established:

- **Tier 1** is a single national service area covering the entire territory of Canada.
- **Tier 2** consists of 14 provincial and large regional service areas covering the entire territory of Canada. Two additional Tier 2 areas, created for the Province of Alberta and the Province of

[1] Includes various licensing processes including auctions and first-come first-served.
[2] In mid-2015, all service areas that the Department uses for all competitive licensing processes were slightly adjusted as part of the modernization of the Spectrum Management System.

Saskatchewan, generally adhere to the Alberta-Saskatchewan interprovincial border and maintain the territorial integrity of each province. These two Tier 2 service areas do not have associated Tier 3 and Tier 4 service areas.

- **Tier 3** consists of 59 smaller regional service areas covering the entire territory of Canada.
- **Tier 4** comprises 172 localized service areas covering the entire territory of Canada.

The Tier 4 localized service area boundaries were initially developed using contiguous groupings of Statistics Canada's 1996 census subdivisions.[3] During development, service area borderlines were placed through lesser populated and more remote areas, wherever possible, in order to minimize potential interference problems. Tier 3 boundaries are based on groupings of Tier 4 localized service areas. Similarly, Tier 2 provincial and large regional service areas are based on groupings of Tier 3 service areas.

The two Tier 2 areas, Province of Saskatchewan (2-017) and Province of Alberta (2-018) were created for the 700 MHz auction held in 2014. In general, these tier areas represent the geographic areas of each of these two provinces without the deviations indicated below in Section 4 — Minor Deviations From the Provincial Borders.

An additional group of service areas was developed to accommodate the transition of non-auctioned Cellular and Personal Communications Services (PCS) licences from apparatus-based licences to spectrum licences and generally corresponding to the wireline services areas of the telephone companies operating in Quebec, Ontario and British Columbia. These service areas are known as Local Telephone Service Areas (TEL).

With the exception of the Local Telephone Service Areas, service areas were designed with borders drawn in remote, less populated areas, to the extent possible, in order to minimize potential interference problems.

Service areas were "converted" into areas based on a grouping of the spectrum grid cell building blocks in order to facilitate their electronic storage and representation. The minimum size of the grid cell is 1 minute latitude × 1 minute longitude and these are employed along service area boundaries, which will offer sufficient granularity such that the variations between the borders of the grid-cell defined areas and the underlying census divisions and subdivision(s) will be minimal. Larger square grid cells, e.g. 3 minute × 3 minute cells or 15 minute × 15 minute cells, are implemented for interiors of service areas where fine granularity is not required.

The following pages provide tier service area maps and tables with population values based on data supplied by Statistics Canada. Electronic versions of service area maps are available on

[3] Census subdivision (CSD) is the general term that applies to municipalities or their equivalent (Ref. Statistics Canada – Cat. No. 92-351-UIE 1996 Census Dictionary – Final Edition).

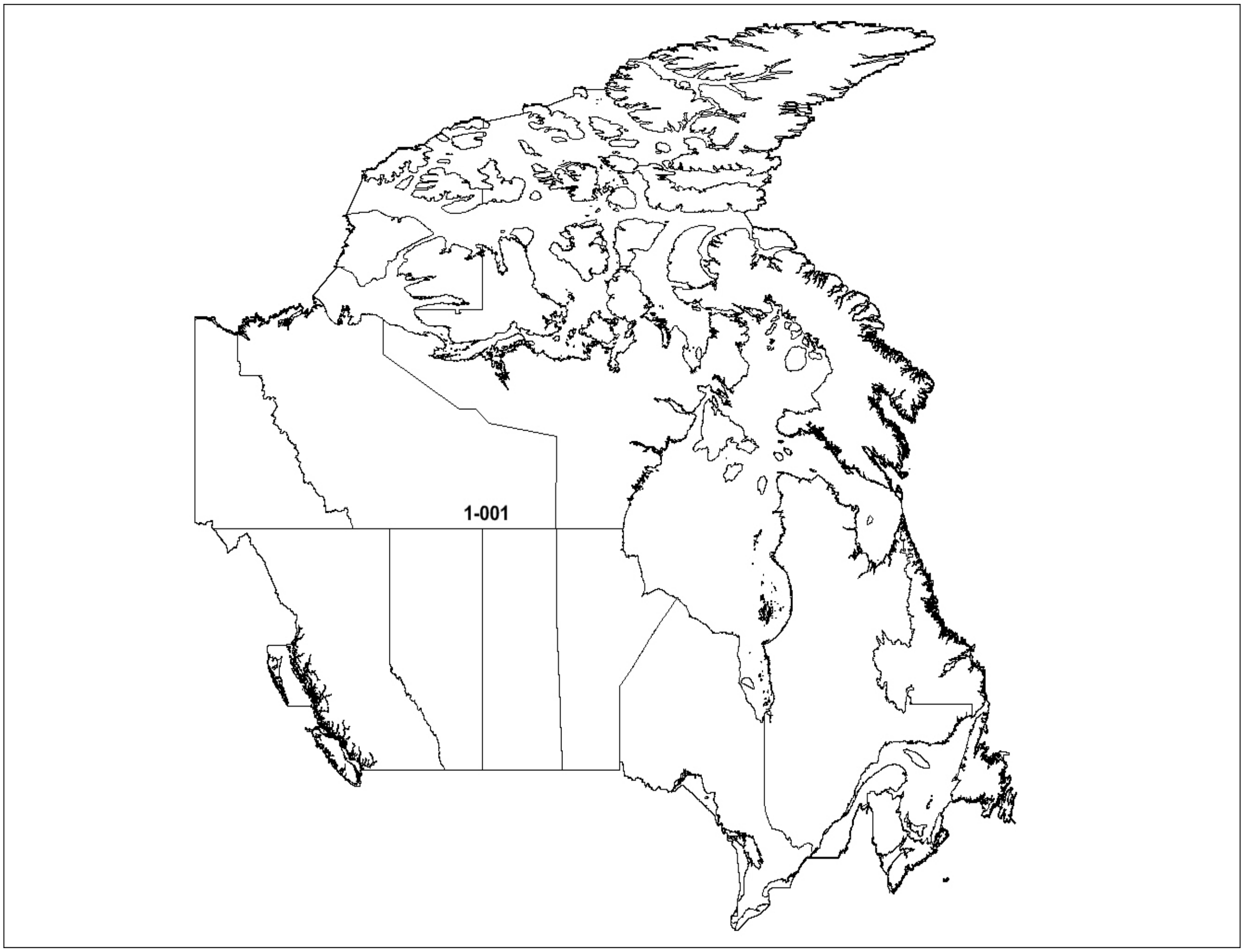
Industry Canada's Spectrum Management and Telecommunications website (www.ic.gc.ca/eic/site/smt-gst.nsf/eng/h_sf01627.html).

### 3.1 Tier 1

**Table 1 — Tier 1 Service Area**

| Tier Area | Service Area Name | 2001 Population | 2006 Population | 2011 Population | Tier 2 Service Areas |
|---|---|---|---|---|---|
| 1-001 | Canada | 30,006,263 | 31,609,529 | 33,470,818 | 2-001, 2-002, 2-003, 2-004, 2-005, 2-006, 2-007, 2-008, 2-009, 2-010, 2-011, 2-012, 2-013, 2-014 (2-017 and 2-018) |

**Figure 1: Tier 1 Service Area Map**


1-001

### 3.2 Tier 2

**Table 2 — Service Areas**

| Tier Area | Service Area Name | 2001 Population | 2006 Population | 2011 Population | Tier 3 Service Areas |
|---|---|---|---|---|---|
| 2-001 | Newfoundland and Labrador | 513,293 | 505,735 | 514,711 | 3-001 |
| 2-002 | Nova Scotia and Prince Edward Island | 1,043,276 | 1,049,284 | 1,061,900 | 3-002, 3-003, 3-004 |
| 2-003 | New Brunswick | 728,685 | 728,196 | 749,623 | 3-005, 3-006, 3-007 |
| 2-004 | Eastern Quebec | 1,590,787 | 1,613,126 | 1,668,504 | 3-008, 3-009, 3-010 |
| 2-005 | Southern Quebec | 5,151,123 | 5,415,082 | 5,683,127 | 3-011, 3-012, 3-013, 3-014 |
| 2-006 | Eastern Ontario and Outaouais | 2,122,115 | 2,222,625 | 2,347,556 | 3-015, 3-016, 3-018, 3-019, 3-020, 3-021, 3-022, 3-023 |
| 2-007 | Northern Quebec | 187,204 | 185,898 | 190,271 | 3-017 |
| 2-008 | Southern Ontario | 8,811,356 | 9,485,855 | 10,091,045 | 3-024, 3-025, 3-026, 3-027, 3-028, 3-029, 3-030, 3-031, 3-032, 3-033 |
| 2-009 | Northern Ontario | 785,189 | 784,279 | 773,104 | 3-034, 3-035, 3-036, 3-037, 3-038 |
| 2-010 | Manitoba | 1,119,784 | 1,148,381 | 1,208,253 | 3-039, 3-040 |
| 2-011 | Saskatchewan | 975,023 | 964,433 | 1,029,497 | 3-041, 3-042, 3-043 |
| 2-012 | Alberta | 2,978,381 | 3,293,928 | 3,648,798 | 3-044, 3-045, 3-046, 3-047, 3-048, 3-049 |
| 2-013 | British Columbia | 3,907,565 | 4,113,797 | 4,399,805 | 3-050, 3-051, 3-052, 3-053, 3-054, 3-055, 3-056, 3-057, 3-058 |
| 2-014 | Yukon, Northwest Territories and Nunavut | 92,483 | 98,910 | 104,625 | 3-059 |
| 2-017 | Province of Saskatchewan | 976,054 | 964,718 | 1,029,751 | N/A |
| 2-018 | Province of Alberta | 2,977,350 | 3,293,643 | 3,648,544 | N/A |

**Figure 2a: Tier 2 Service Areas Map**

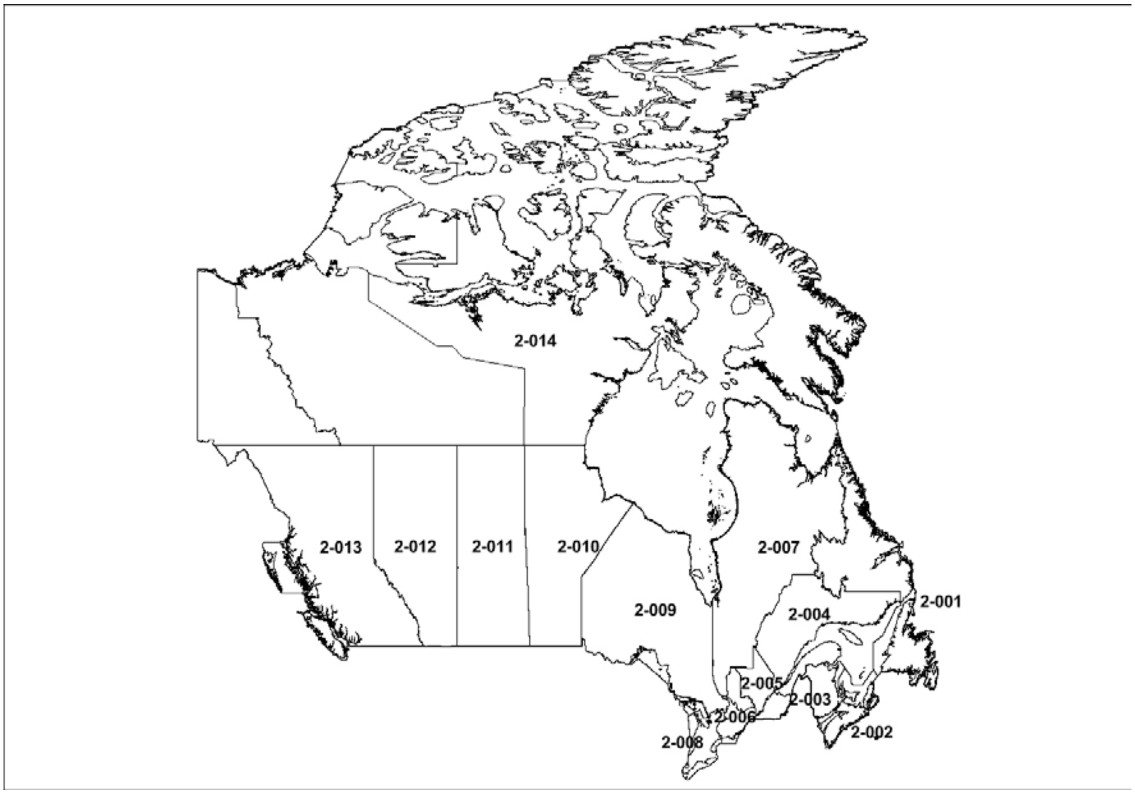
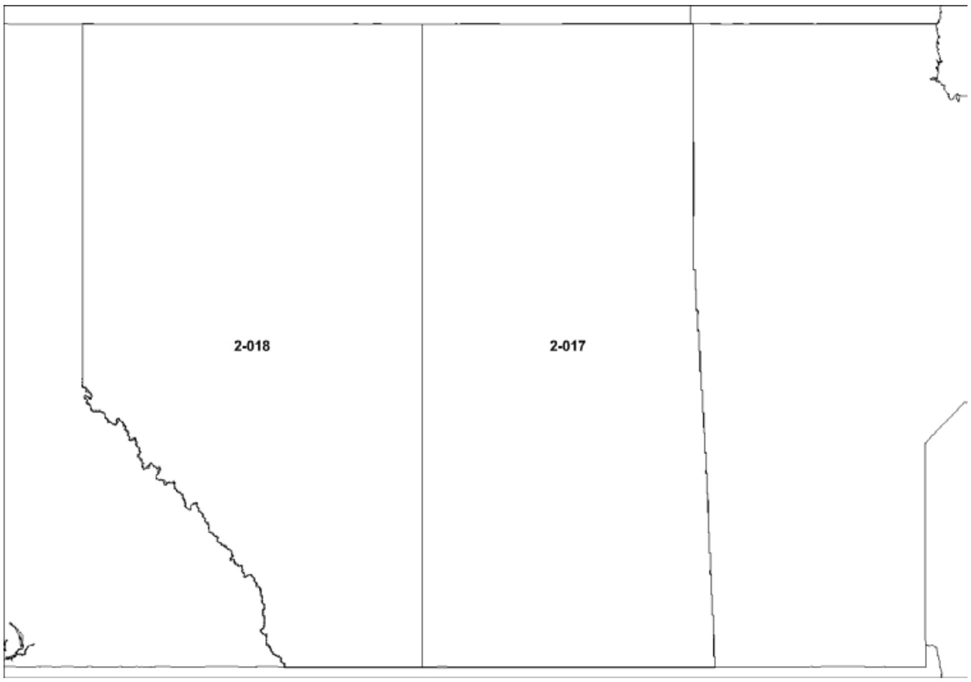


**Figure 2b: Tier 2-017 and Tier 2-018 Service Areas
(Adhere to Provincial Borders of Saskatchewan and Alberta)**



### 3.3 Tier 3

**Table 3 — Service Areas**

| Tier Area | Service Area Name | 2001 Population | 2006 Population | 2011 Population | Tier 4 Service Areas |
|---|---|---|---|---|---|
| 3-001 | Newfoundland and Labrador | 513,293 | 505,735 | 514,711 | 4-001, 4-002, 4-003, 4-004, 4-005 |
| 3-002 | Prince Edward Island | 135,294 | 135,851 | 140,204 | 4-006, 4-007 |
| 3-003 | Mainland Nova Scotia | 761,038 | 771,883 | 786,472 | 4-008, 4-009, 4-010, 4-011, 4-012, 4-013 |
| 3-004 | Cape Breton | 146,944 | 141,551 | 135,224 | 4-014 |
| 3-005 | Southern New Brunswick | 167,212 | 166,904 | 172,318 | 4-015, 4-016 |
| 3-006 | Western New Brunswick | 209,230 | 209,621 | 217,159 | 4-017, 4-020, 4-021 |
| 3-007 | Eastern New Brunswick | 352,244 | 351,671 | 360,145 | 4-018, 4-019, 4-022 |
| 3-008 | Bas du fleuve | 298,441 | 296,928 | 295,707 | 4-023, 4-024, 4-025, 4-026 |
| 3-009 | Québec | 917,858 | 948,944 | 1,004,543 | 4-027, 4-029, 4-030, 4-031 |
| 3-010 | Chicoutimi-Jonquière | 374,488 | 367,254 | 368,254 | 4-028, 4-065, 4-063, 4-064 |
| 3-011 | Eastern Townships | 509,293 | 526,626 | 543,370 | 4-032, 4-033, 4-034, 4-035, 4-039, 4-040, 4-041, 4-042, 4-043, 4-045 |
| 3-012 | Trois-Rivières | 750,277 | 778,607 | 810,080 | 4-036, 4-037, 4-038, 4-044, 4-047, 4-048, 4-049, 4-050 |
| 3-013 | Montréal | 3,783,840 | 3,989,578 | 4,204,850 | 4-046, 4-051 |
| 3-014 | Upper Outaouais | 107,713 | 120,271 | 124,827 | 4-052, 4-054 |
| 3-015 | Ottawa / Outaouais | 1,266,303 | 1,335,129 | 1,442,822 | 4-053, 4-055 |
| 3-016 | Pembroke | 107,212 | 109,843 | 112,950 | 4-056, 4-057 |
| 3-017 | Abitibi | 187,204 | 185,898 | 190,271 | 4-058, 4-059, 4-060, 4-061, 4-062, 4-066 |
| 3-018 | Cornwall | 66,003 | 66,518 | 67,288 | 4-067 |
| 3-019 | Brockville | 82,774 | 84,204 | 84,038 | 4-068, 4-069 |
| 3-020 | Kingston | 162,799 | 168,863 | 175,895 | 4-070 |
| 3-021 | Belleville | 184,128 | 190,276 | 195,564 | 4-071, 4-072 |
| 3-022 | Cobourg | 59,981 | 62,719 | 62,837 | 4-073 |
| 3-023 | Peterborough | 192,915 | 205,074 | 206,161 | 4-074, 4-075 |
| 3-024 | Huntsville | 72,262 | 78,002 | 78,789 | 4-076, 4-096 |
| 3-025 | Toronto | 5,636,262 | 6,129,634 | 6,646,250 | 4-077 |
| 3-026 | Barrie | 592,340 | 646,845 | 673,893 | 4-095, 4-078, 4-081, 4-094 |

| Tier Area | Service Area Name | 2001 Population | 2006 Population | 2011 Population | Tier 4 Service Areas |
|---|---|---|---|---|---|
| 3-027 | Guelph/Kitchener | 607,230 | 659,547 | 696,463 | 4-079, 4-080 |
| 3-028 | Listowel/Goderich/ Stratford | 133,308 | 132,996 | 133,542 | 4-088, 4-082 |
| 3-029 | Niagara-St. Catharines | 354,607 | 366,746 | 367,803 | 4-083, 4-084 |
| 3-030 | London/Woodstock/ St. Thomas | 765,098 | 799,820 | 832,095 | 4-085, 4-086, 4-087 |
| 3-031 | Chatham | 106,606 | 106,466 | 100,110 | 4-089, 4-091 |
| 3-032 | Windsor/Leamington | 376,693 | 395,533 | 390,154 | 4-090 |
| 3-033 | Strathroy | 166,949 | 170,266 | 171,946 | 4-092, 4-093 |
| 3-034 | North Bay | 122,524 | 125,172 | 126,606 | 4-097, 4-098 |
| 3-035 | Sault Ste. Marie | 135,260 | 133,382 | 132,116 | 4-106, 4-099, 4-105 |
| 3-036 | Sudbury | 172,912 | 175,301 | 177,314 | 4-100 |
| 3-037 | Kirkland Lake | 119,716 | 115,729 | 114,167 | 4-101, 4-102, 4-103 |
| 3-038 | Thunder Bay | 234,777 | 234,695 | 222,900 | 4-109, 4-107, 4-108, 4-104 |
| 3-039 | Winnipeg | 947,526 | 978,640 | 1,033,768 | 4-110, 4-111, 4-112, 4-113, 4-115, 4-117, 4-118 |
| 3-040 | Brandon | 172,258 | 169,741 | 174,484 | 4-114, 4-116 |
| 3-041 | Regina | 349,582 | 343,576 | 366,473 | 4-119, 4-120, 4-123, 4-124 |
| 3-042 | Moose Jaw | 104,263 | 99,016 | 100,244 | 4-121, 4-122 |
| 3-043 | Saskatoon | 521,178 | 521,840 | 562,780 | 4-127, 4-130, 4-128, 4-126,4-125 |
| 3-044 | Edmonton | 1,198,195 | 1,315,034 | 1,464,088 | 4-140, 4-145, 4-146, 4-144, 4-143, 4-142, 4-141, 4-129 |
| 3-045 | Medicine Hat/Brooks | 175,661 | 183,170 | 190,825 | 4-131, 4-133, 4-139 |
| 3-046 | Lethbridge | 156,163 | 163,656 | 177,304 | 4-132 |
| 3-047 | Calgary | 1,091,697 | 1,235,721 | 1,390,228 | 4-136, 4-135, 4-134 |
| 3-048 | Red Deer | 198,484 | 223,785 | 240,348 | 4-138, 4-137 |
| 3-049 | Grande Prairie | 158,181 | 172,561 | 186,005 | 4-148, 4-147 |
| 3-050 | Kootenays | 132,908 | 129,975 | 134,352 | 4-149, 4-150 |
| 3-051 | Okanagan/Columbia | 368,618 | 392,038 | 415,223 | 4-159, 4-151, 4-163, 4-162 |
| 3-052 | Vancouver | 2,310,032 | 2,463,406 | 2,684,515 | 4-152, 4-153, 4-157, 4-158 |
| 3-053 | Victoria | 390,004 | 414,254 | 432,549 | 4-154 |
| 3-054 | Nanaimo | 165,016 | 177,135 | 185,404 | 4-155 |
| 3-055 | Courtenay | 105,950 | 109,183 | 114,583 | 4-156 |
| 3-056 | Thompson/Cariboo | 174,338 | 173,815 | 179,998 | 4-160, 4-161, 4-164, 4-165 |
| 3-057 | Prince George | 200,013 | 189,465 | 187,639 | 4-168, 4-166, 4-167 |
| 3-058 | Dawson Creek | 60,687 | 64,525 | 65,542 | 4-169 |
| 3-059 | Yukon, Northwest Territories and Nunavut | 92,483 | 98,910 | 104,625 | 4-171, 4-172, 4-170 |

**Figure 3a: Tier 3 Service Areas Map**

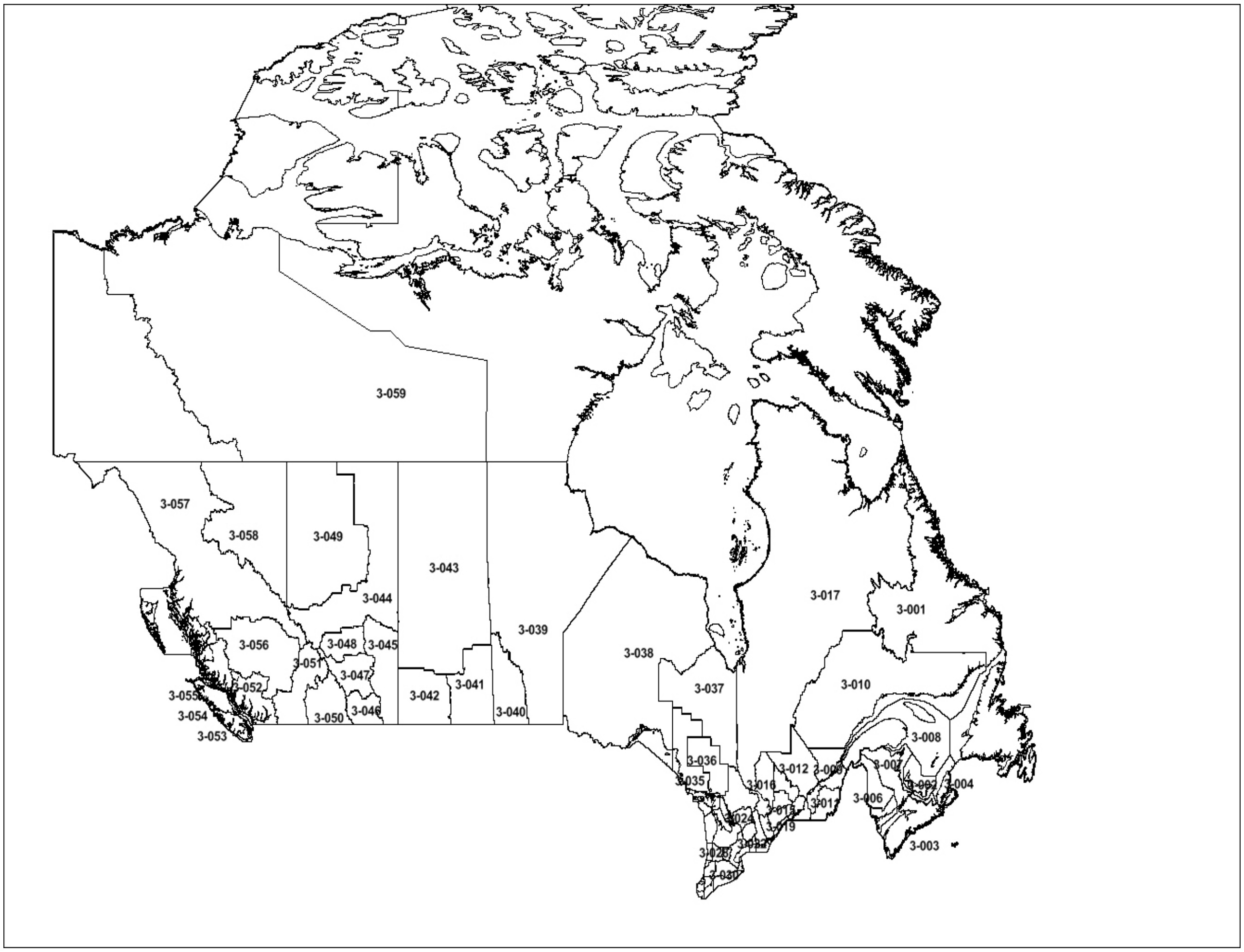
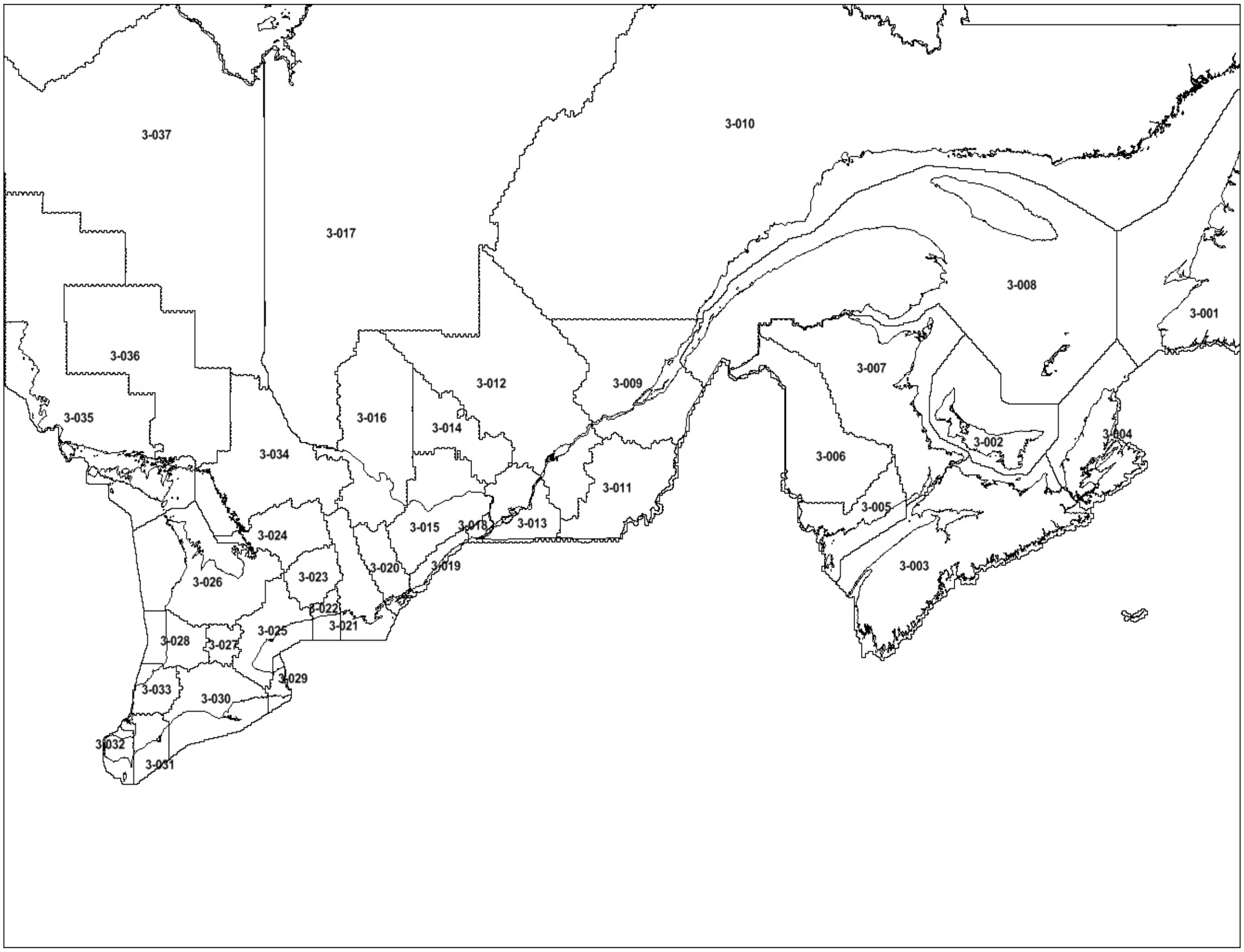


**Figure 3b: Tier 3 Service Areas Map (Detailed View of Southern Ontario to Nova Scotia)**



## 3.4 Tier 4

**Table 4 — Service Areas**

| Tier Area | Service Area Name | 2001 Population | 2006 Population | 2011 Population |
|---|---|---|---|---|
| 4-001 | St. John’s | 223,382 | 230,190 | 245,932 |
| 4-002 | Placentia | 19,429 | 18,191 | 16,441 |
| 4-003 | Gander/Grand Falls/Windsor | 159,539 | 150,698 | 146,818 |
| 4-004 | Corner Brook/Stephenville | 82,705 | 80,024 | 78,598 |
| 4-005 | Labrador | 28,238 | 26,632 | 26,922 |
| 4-006 | Charlottetown | 86,821 | 87,451 | 91,985 |
| 4-007 | Summerside | 48,473 | 48,400 | 48,219 |
| 4-008 | Yarmouth | 62,555 | 60,751 | 57,742 |
| 4-009 | Bridgewater/Kentville | 140,034 | 140,368 | 140,206 |
| 4-010 | Halifax | 389,330 | 402,675 | 422,034 |
| 4-011 | Truro | 56,063 | 57,285 | 57,307 |
| 4-012 | Amherst | 36,073 | 35,484 | 34,905 |
| 4-013 | Antigonish/New Glasgow | 76,984 | 75,320 | 74,279 |
| 4-014 | Sydney | 146,944 | 141,551 | 135,224 |
| 4-015 | Saint John | 140,239 | 140,376 | 146,112 |
| 4-016 | St. Stephen | 26,973 | 26,528 | 26,206 |
| 4-017 | Fredericton | 152,426 | 155,121 | 163,718 |
| 4-018 | Moncton | 151,201 | 159,944 | 172,563 |
| 4-019 | Miramichi/Bathurst | 169,215 | 162,902 | 159,491 |
| 4-020 | Grand Falls | 28,523 | 27,167 | 26,434 |
| 4-021 | Edmundston | 28,280 | 27,333 | 27,008 |
| 4-022 | Campbellton | 31,827 | 28,825 | 28,091 |
| 4-023 | Matane | 118,331 | 117,037 | 116,151 |
| 4-024 | Mont-Joli | 41,772 | 40,555 | 39,410 |
| 4-025 | Rimouski | 52,024 | 53,181 | 55,043 |
| 4-026 | Rivière-du-Loup | 86,315 | 86,155 | 85,102 |
| 4-027 | La Malbaie | 29,391 | 29,210 | 29,287 |
| 4-028 | Chicoutimi-Jonquière | 217,168 | 212,985 | 215,853 |
| 4-029 | Montmagny | 59,563 | 58,669 | 57,905 |
| 4-030 | Québec | 780,749 | 812,588 | 865,499 |
| 4-031 | Sainte-Marie | 48,154 | 48,476 | 51,853 |
| 4-032 | Saint-Georges | 67,261 | 68,897 | 70,299 |
| 4-033 | Lac Mégantic | 25,045 | 25,290 | 24,977 |
| 4-034 | Thetford Mines | 42,889 | 42,954 | 42,644 |

| Tier Area | Service Area Name | 2001 Population | 2006 Population | 2011 Population |
|---|---|---|---|---|
| 4-035 | Plessisville | 22,030 | 21,969 | 22,441 |
| 4-036 | La Tuque | 16,292 | 16,505 | 16,396 |
| 4-037 | Trois-Rivières | 252,449 | 254,761 | 261,017 |
| 4-038 | Louiseville | 22,193 | 22,281 | 22,277 |
| 4-039 | Asbestos | 30,299 | 30,379 | 30,367 |
| 4-040 | Victoriaville | 49,239 | 51,061 | 54,163 |
| 4-041 | Coaticook | 13,307 | 13,434 | 13,434 |
| 4-042 | Sherbrooke | 216,129 | 229,166 | 240,705 |
| 4-043 | Windsor | 16,267 | 16,171 | 16,332 |
| 4-044 | Drummondville | 96,533 | 101,670 | 107,470 |
| 4-045 | Cowansville | 26,827 | 27,305 | 28,008 |
| 4-046 | Farnham | 27,926 | 26,764 | 28,652 |
| 4-047 | Granby | 87,052 | 93,397 | 100,769 |
| 4-048 | St-Hyacinthe | 83,717 | 85,789 | 89,257 |
| 4-049 | Sorel | 56,312 | 56,503 | 57,815 |
| 4-050 | Joliette | 135,729 | 147,701 | 155,079 |
| 4-051 | Montréal | 3,755,915 | 3,962,813 | 4,176,198 |
| 4-052 | Sainte-Agathe-des-Monts | 61,728 | 71,554 | 75,902 |
| 4-053 | Hawkesbury | 62,372 | 63,588 | 63,850 |
| 4-054 | Mont-Laurier/Maniwaki | 45,985 | 48,717 | 48,925 |
| 4-055 | Ottawa/Outaouais | 1,203,931 | 1,271,540 | 1,378,972 |
| 4-056 | Pembroke | 77,679 | 79,398 | 82,043 |
| 4-057 | Arnprior/Renfrew | 29,533 | 30,445 | 30,906 |
| 4-058 | Rouyn-Noranda | 40,605 | 40,603 | 41,762 |
| 4-059 | Notre-Dame-du-Nord | 17,361 | 17,083 | 16,493 |
| 4-060 | La Sarre | 20,040 | 19,566 | 19,817 |
| 4-061 | Amos | 24,977 | 24,763 | 24,834 |
| 4-062 | Val D'Or | 43,464 | 43,135 | 44,180 |
| 4-063 | Roberval/Saint-Félicien | 61,572 | 60,021 | 59,365 |
| 4-064 | Baie-Comeau | 48,305 | 47,361 | 45,869 |
| 4-065 | Port-Cartier/Sept-Îles | 47,444 | 46,888 | 47,167 |
| 4-066 | Chibougamau | 40,757 | 40,747 | 43,185 |
| 4-067 | Cornwall | 66,003 | 66,518 | 67,288 |
| 4-068 | Brockville | 69,998 | 71,041 | 71,078 |
| 4-069 | Gananoque | 12,777 | 13,163 | 12,961 |
| 4-070 | Kingston | 162,799 | 168,863 | 175,895 |
| 4-071 | Napanee | 39,521 | 40,492 | 42,687 |
| 4-072 | Belleville | 144,607 | 149,783 | 152,877 |

| Tier Area | Service Area Name | 2001 Population | 2006 Population | 2011 Population |
|---|---|---|---|---|
| 4-073 | Cobourg | 59,981 | 62,719 | 62,837 |
| 4-074 | Peterborough | 151,110 | 160,516 | 161,498 |
| 4-075 | Lindsay | 41,806 | 44,558 | 44,663 |
| 4-076 | Minden | 17,752 | 19,084 | 19,518 |
| 4-077 | Toronto | 5,636,262 | 6,129,634 | 6,646,250 |
| 4-078 | Alliston | 99,214 | 106,320 | 113,688 |
| 4-079 | Guelph/Kitchener | 580,878 | 631,767 | 668,108 |
| 4-080 | Fergus | 26,351 | 27,780 | 28,355 |
| 4-081 | Kincardine | 173,856 | 180,457 | 181,398 |
| 4-082 | Listowel/Goderich | 83,699 | 82,892 | 83,266 |
| 4-083 | Fort Erie | 28,538 | 30,283 | 30,344 |
| 4-084 | Niagara-St. Catharines | 326,069 | 336,463 | 337,458 |
| 4-085 | Haldimand/Dunnville | 36,052 | 37,100 | 37,037 |
| 4-086 | London/Woodstock/St. Thomas | 607,210 | 633,981 | 654,522 |
| 4-087 | Brantford | 121,836 | 128,740 | 140,536 |
| 4-088 | Stratford | 49,609 | 50,104 | 50,276 |
| 4-089 | Chatham | 73,561 | 74,151 | 71,296 |
| 4-090 | Windsor/Leamington | 376,693 | 395,533 | 390,154 |
| 4-091 | Wallaceburg | 33,045 | 32,315 | 28,813 |
| 4-092 | Sarnia | 124,784 | 126,118 | 125,916 |
| 4-093 | Strathroy | 42,165 | 44,148 | 46,029 |
| 4-094 | Barrie | 275,102 | 312,626 | 330,234 |
| 4-095 | Midland | 44,168 | 47,442 | 48,573 |
| 4-096 | Gravenhurst/Bracebridge | 54,511 | 58,918 | 59,271 |
| 4-097 | North Bay | 103,145 | 104,378 | 105,681 |
| 4-098 | Parry Sound | 19,379 | 20,794 | 20,925 |
| 4-099 | Elliot Lake | 31,026 | 29,601 | 29,826 |
| 4-100 | Sudbury | 172,912 | 175,301 | 177,314 |
| 4-101 | Kirkland Lake | 34,442 | 33,432 | 32,793 |
| 4-102 | Timmins | 43,897 | 43,301 | 43,453 |
| 4-103 | Kapuskasing | 41,377 | 38,996 | 37,921 |
| 4-104 | Kenora/Sioux Lookout | 61,856 | 64,298 | 56,600 |
| 4-105 | Iron Bridge | 22,512 | 20,974 | 20,081 |
| 4-106 | Sault Ste. Marie | 81,723 | 82,808 | 82,209 |
| 4-107 | Marathon | 29,376 | 26,591 | 24,905 |
| 4-108 | Thunder Bay | 121,469 | 122,309 | 121,054 |
| 4-109 | Fort Frances | 22,076 | 21,497 | 20,342 |
| 4-110 | Steinbach | 45,969 | 49,981 | 57,846 |

| Tier Area | Service Area Name | 2001 Population | 2006 Population | 2011 Population |
|---|---|---|---|---|
| 4-111 | Winnipeg | 722,170 | 741,741 | 779,623 |
| 4-112 | Lac du Bonnet | 53,678 | 57,056 | 57,332 |
| 4-113 | Morden/Winkler | 38,684 | 41,531 | 47,558 |
| 4-114 | Brandon | 92,482 | 93,178 | 98,608 |
| 4-115 | Portage la Prairie | 20,073 | 20,053 | 20,407 |
| 4-116 | Dauphin | 79,776 | 76,563 | 75,877 |
| 4-117 | Creighton/Flin Flon | 22,899 | 21,854 | 21,665 |
| 4-118 | Thompson | 44,052 | 46,424 | 49,338 |
| 4-119 | Estevan | 44,587 | 42,880 | 45,956 |
| 4-120 | Weyburn | 21,632 | 20,406 | 22,306 |
| 4-121 | Moose Jaw | 56,827 | 54,064 | 54,537 |
| 4-122 | Swift Current | 47,436 | 44,952 | 45,707 |
| 4-123 | Yorkton | 66,780 | 62,214 | 63,232 |
| 4-124 | Regina | 216,583 | 218,076 | 234,979 |
| 4-125 | Saskatoon | 237,338 | 244,908 | 273,106 |
| 4-126 | Watrous | 29,478 | 27,131 | 27,758 |
| 4-127 | Battleford | 91,965 | 89,382 | 94,838 |
| 4-128 | Prince Albert | 130,699 | 126,698 | 130,853 |
| 4-129 | Lloydminster | 29,818 | 32,532 | 35,242 |
| 4-130 | Northern Saskatchewan | 31,699 | 33,721 | 36,225 |
| 4-131 | Medicine Hat/Brooks | 89,050 | 96,953 | 102,085 |
| 4-132 | Lethbridge | 156,163 | 163,656 | 177,304 |
| 4-133 | Stettler/Oyen/Wainwright | 52,124 | 50,835 | 50,619 |
| 4-134 | High River | 59,250 | 80,238 | 98,512 |
| 4-135 | Strathmore | 38,271 | 41,487 | 43,489 |
| 4-136 | Calgary | 994,176 | 1,113,996 | 1,248,227 |
| 4-137 | Red Deer | 151,532 | 174,094 | 187,919 |
| 4-138 | Wetaskiwin/Ponoka | 46,951 | 49,691 | 52,429 |
| 4-139 | Camrose | 34,487 | 35,382 | 38,121 |
| 4-140 | Vegreville | 14,408 | 14,692 | 15,440 |
| 4-141 | Edmonton | 942,461 | 1,039,159 | 1,164,368 |
| 4-142 | Edson/Hinton | 45,023 | 46,912 | 47,684 |
| 4-143 | Bonnyville | 74,197 | 76,503 | 79,901 |
| 4-144 | Whitecourt | 27,270 | 29,875 | 30,665 |
| 4-145 | Barrhead | 22,028 | 22,301 | 23,325 |
| 4-146 | Fort McMurray | 42,989 | 53,060 | 67,462 |
| 4-147 | Peace River | 82,633 | 83,998 | 86,443 |
| 4-148 | Grande Prairie | 75,548 | 88,563 | 99,562 |

| Tier Area | Service Area Name | 2001 Population | 2006 Population | 2011 Population |
|---|---|---|---|---|
| 4-149 | East Kootenay | 56,278 | 55,441 | 56,646 |
| 4-150 | West Kootenay | 76,629 | 74,534 | 77,707 |
| 4-151 | Kelowna | 299,042 | 319,599 | 342,572 |
| 4-152 | Vancouver | 2,200,915 | 2,347,864 | 2,564,492 |
| 4-153 | Hope | 21,875 | 24,030 | 24,763 |
| 4-154 | Victoria | 390,004 | 414,254 | 432,549 |
| 4-155 | Nanaimo | 165,016 | 177,135 | 185,404 |
| 4-156 | Courtenay | 105,950 | 109,183 | 114,583 |
| 4-157 | Powell River | 26,887 | 26,784 | 26,780 |
| 4-158 | Squamish/Whistler | 60,355 | 64,729 | 68,481 |
| 4-159 | Merritt | 15,367 | 15,826 | 15,676 |
| 4-160 | Kamloops | 92,045 | 95,915 | 101,949 |
| 4-161 | Ashcroft | 16,531 | 15,658 | 15,592 |
| 4-162 | Salmon Arm | 47,070 | 49,692 | 50,209 |
| 4-163 | Golden | 7,139 | 6,921 | 6,765 |
| 4-164 | Williams Lake | 41,124 | 39,320 | 38,447 |
| 4-165 | Quesnel/Red Bluff | 24,638 | 22,921 | 24,010 |
| 4-166 | Skeena | 63,929 | 59,027 | 56,717 |
| 4-167 | Prince George | 95,340 | 92,348 | 91,950 |
| 4-168 | Smithers | 40,744 | 38,090 | 38,973 |
| 4-169 | Dawson Creek | 60,687 | 64,525 | 65,542 |
| 4-170 | Yukon | 28,391 | 29,090 | 33,926 |
| 4-171 | Nunavut | 26,740 | 28,699 | 29,597 |
| 4-172 | Northwest Territories | 37,352 | 41,121 | 41,102 |

**Figure 4a: Tier 4 Service Areas Map (British Columbia to Manitoba, Including Yukon, Northwest Territories and Nunavut)**

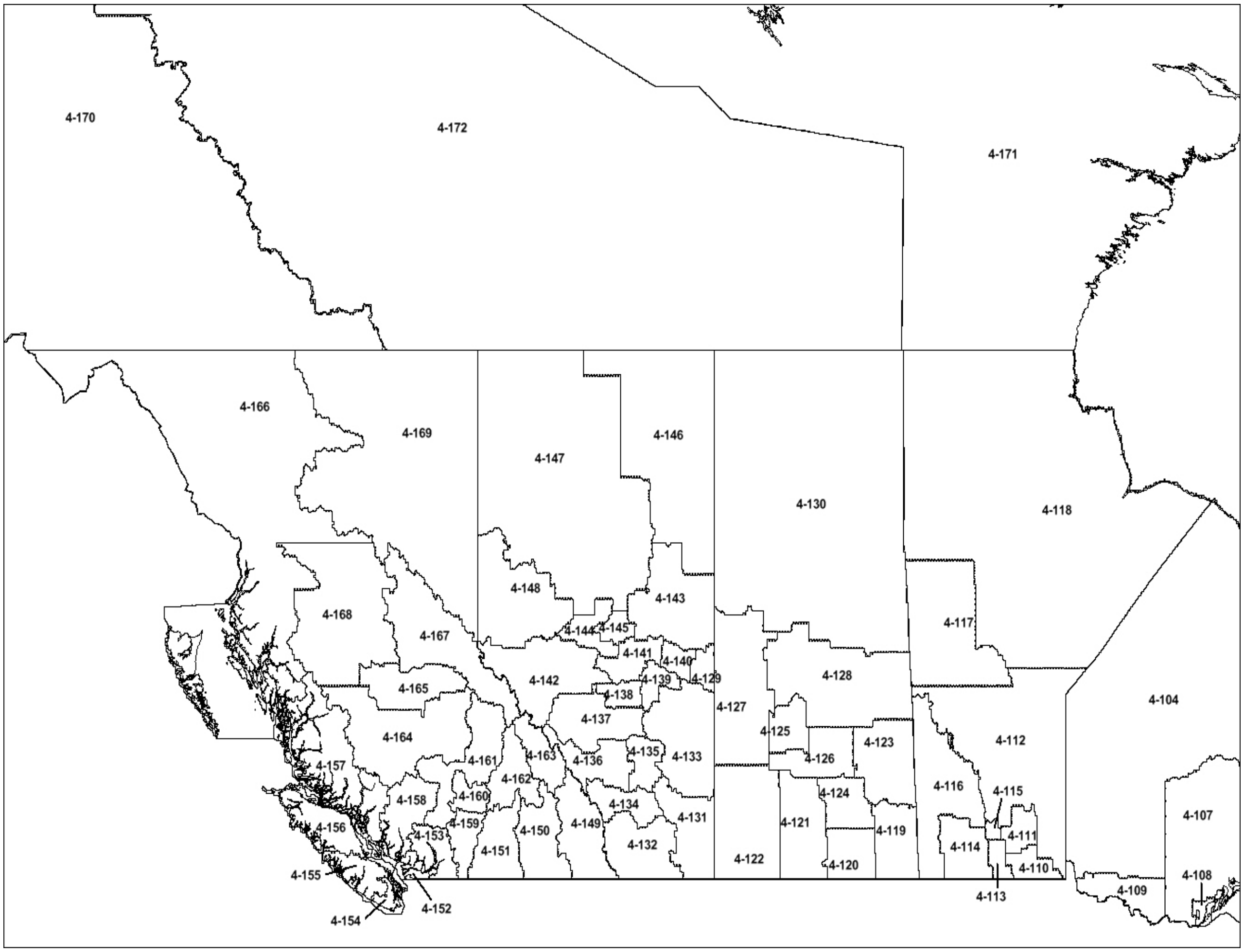
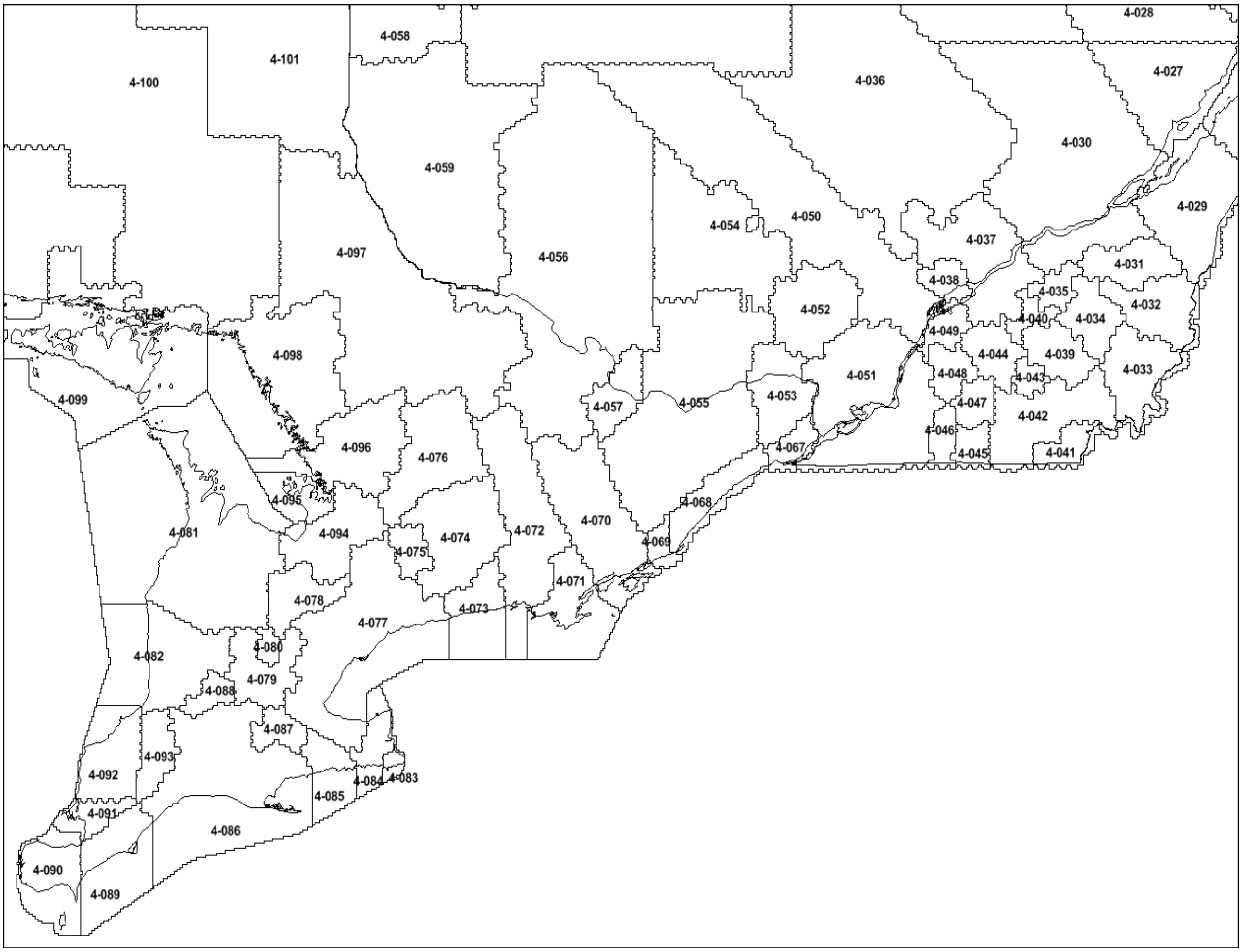


**Figure 4b: Tier 4 Service Areas Map (Ontario to Newfoundland and Labrador)**

**Figure 4c: Tier 4 Service Areas Map (Detailed View of Southern Ontario and Quebec)**



## 3.5 TEL Areas

**Table 5 — Service Areas**

| TEL Area | Service Area Name | 2001 Population | 2006 Population | 2011 Population |
|---|---|---|---|---|
| TEL-002 | Sept-Îles and Gaspésie, Beauce, Saint-Georges, Sainte-Clotilde-de-Beauce | 509,472 | 509,552 | 520,463 |
| TEL-004 | Valcourt | 11,189 | 11,507 | 12,160 |
| TEL-005 | La Baie | 1,139 | 1,069 | 1,019 |
| TEL-006 | Courcelles | 995 | 929 | 988 |
| TEL-007 | Lambton | 2,179 | 2,125 | 2,167 |
| TEL-008 | Nantes | 1,432 | 1,413 | 1,354 |
| TEL-009 | St-Victor | 2,468 | 2,518 | 2,429 |
| TEL-010 | Warwick | 10,735 | 10,660 | 10,616 |
| TEL-011 | Acton | 4,187 | 4,115 | 4,329 |
| TEL-012 | St-Ephrem | 2,587 | 2,579 | 2,504 |
| TEL-013 | St-Liboire | 4,400 | 4,271 | 4,522 |
| TEL-014 | Etchemin, Nicolet, Saint-Ludger | 34,188 | 34,268 | 34,125 |
| TEL-015 | Sainte-Rosalie, Notre-Dame-du-Bon-Conseil | 13,992 | 14,160 | 14,439 |
| TEL-016 | St-Paulin | 9,835 | 10,198 | 10,030 |
| TEL-017 | Québec, Charlevoix, Saguenay, Saint-Jean-Chrysostome, Bas Saint-Laurent, Saint-Nicolas, Saint-Étienne, Deschaillons, Fortierville, Villeroy, Île d'Orléans, Tring-Jonction, Lac-aux-Sables, Sainte-Agathe-de-Lotbinière, Bellechasse | 1,094,282 | 1,118,724 | 1,165,378 |

| TEL Area | Service Area Name | 2001 Population | 2006 Population | 2011 Population |
|---|---|---|---|---|
| TEL-018 | Aylmer,<br>Manitoulin Island East,<br>Bruce Peninsula North,<br>Coldwater, Cambray | 36,801 | 37,840 | 38,764 |
| TEL-021 | Watford | 6,916 | 6,485 | 6,173 |
| TEL-022 | Port Elgin | 19,125 | 19,421 | 19,946 |
| TEL-024 | Thunder Bay | 123,820 | 123,238 | 122,090 |
| TEL-025 | Dryden | 6,514 | 6,640 | 6,301 |
| TEL-026 | Kenora | 11,821 | 10,464 | 10,474 |
| TEL-027 | Woodstock, Port Franks | 8,855 | 10,734 | 10,419 |
| TEL-028 | Cottam | 4,095 | 4,706 | 4,603 |
| TEL-029 | Grand Bend | 6,785 | 7,311 | 7,379 |
| TEL-030 | Goderich | 9,411 | 8,863 | 9,324 |
| TEL-031 | Lansdowne | 3,476 | 3,719 | 3,624 |
| TEL-032 | Mornington | 5,927 | 6,113 | 6,193 |
| TEL-033 | Millbrook | 5,816 | 6,054 | 5,888 |
| TEL-034 | Keene | 3,370 | 3,515 | 3,364 |
| TEL-035 | North Frontenac | 2,347 | 2,396 | 2,377 |
| TEL-036 | North Renfrew | 4,106 | 3,736 | 3,906 |
| TEL-037 | Moosonee, Iroquois Falls,<br>Marten River, Temagami | 4,228 | 2,117 | 4,006 |
| TEL-038 | Forest | 9,457 | 9,472 | 9,257 |
| TEL-039 | Kirkton, Uniondale | 9,538 | 9,358 | 9,283 |
| TEL-040 | Moose Creek | 1,684 | 1,534 | 1,475 |
| TEL-042 | Clinton | 7,001 | 6,672 | 6,630 |
| TEL-043 | Westport | 2,807 | 3,133 | 2,954 |
| TEL-044 | Mildmay | 14,022 | 13,462 | 13,155 |
| TEL-045 | Southern British Columbia,<br>Dawson Creek Area | 3,882,832 | 4,088,212 | 4,375,576 |
| TEL-046 | Fort Nelson Area | 10,166 | 11,620 | 10,488 |
| TEL-047 | Prince Rupert | 14,506 | 12,778 | 12,493 |
| TEL-048 | Rainy River District | 23,700 | 22,888 | 21,805 |

| TEL Area | Service Area Name | 2001 Population | 2006 Population | 2011 Population |
|---|---|---|---|---|
| TEL-055 | Sioux Narrows-<br>East Hawk Lake-Minaki | 5,766 | 7,291 | 7,579 |
| TEL-057 | Grand Bend | 4,287 | 5,296 | 5,391 |
| TEL-062 | Cochrane | 6,397 | 5,585 | 5,451 |
| TEL-063 | Northeastern Ontario and Highway 144 | 109,666 | 105,155 | 102,951 |
| TEL-064 | Algoma, Hornepayne | 9,961 | 7,724 | 7,562 |
| TEL-066 | Oxdrift, East Dryden | 4,918 | 3,972 | 3,570 |
| TEL-068 | Lake Superior North,<br>Sioux Lookout to Raith,<br>Highway 105, Greenstone | 38,223 | 34,039 | 31,968 |
| TEL-069 | Southern, Northern, Eastern Ontario | 10,762,825 | 11,502,772 | 12,195,881 |
| TEL-070 | Zurich | 2,556 | 2,145 | 2,095 |
| TEL-071 | Northeastern Ontario | 109,968 | 105,716 | 103,546 |
| TEL-072 | Yukon Territory less Whitehorse | 9,518 | 8,779 | 10,857 |
| TEL-073 | Whitehorse, Northwest Territories and Nunavut | 83,161 | 90,435 | 94,113 |
| TEL-074 | Southern, Northern, Eastern Ontario, Algoma, Hornepayne | 10,756,199 | 11,494,809 | 12,187,685 |
| TEL-076 | Nipigon-Armstrong-Whitefish Lake | 5,982 | 7,021 | 6,291 |
| TEL-078 | Deception Bay | 1,430 | 1,133 | 1,250 |
| TEL-079 | Southern, Northern, Eastern Ontario | 10,901,628 | 11,657,707 | 12,353,123 |
| TEL-080 | Southern Quebec,<br>Québec, Charlevoix,<br>Saguenay, Bas Saint-Laurent,<br>Thetford Mines, Plessisville,<br>Saint-Rosaire, Victoriaville,<br>Saint-Barnabé South,<br>Saint-Valérien-de-Milton, | 6,231,443 | 6,536,466 | 6,870,866 |

| TEL Area | Service Area Name | 2001 Population | 2006 Population | 2011 Population |
|---|---|---|---|---|
| | Saint-Jacques-de-Horton, Hudson's Bay | | | |
| TEL-081 | Abitibi and James Bay, Mont-Laurier, Les Bois-Francs, Saint-Ours, Magdalen Islands, Clarendon, Bedford, Drummondville-Sud, Château-Richer, Frontenac | 353,541 | 355,101 | 363,408 |
| TEL-082 | Sept-Îles and Gaspésie, Beauce | 468,122 | 467,524 | 476,507 |
| TEL-083 | Grassy Narrows, Koko Lake, Folyet | 2,887 | 2,269 | 2,225 |
| TEL-084 | Saint-Georges, Sept-Îles, Gaspésie | 519,671 | 519,666 | 530,200 |
| TEL-085 | Québec | 698,613 | 726,589 | 771,887 |
| TEL-086 | Montréal | 3,733,753 | 3,937,919 | 4,148,370 |
| TEL-087 | Ottawa-Gatineau | 959,262 | 1,010,582 | 1,104,372 |

**Figure 5a: Map of TEL Areas in Ontario and Quebec**

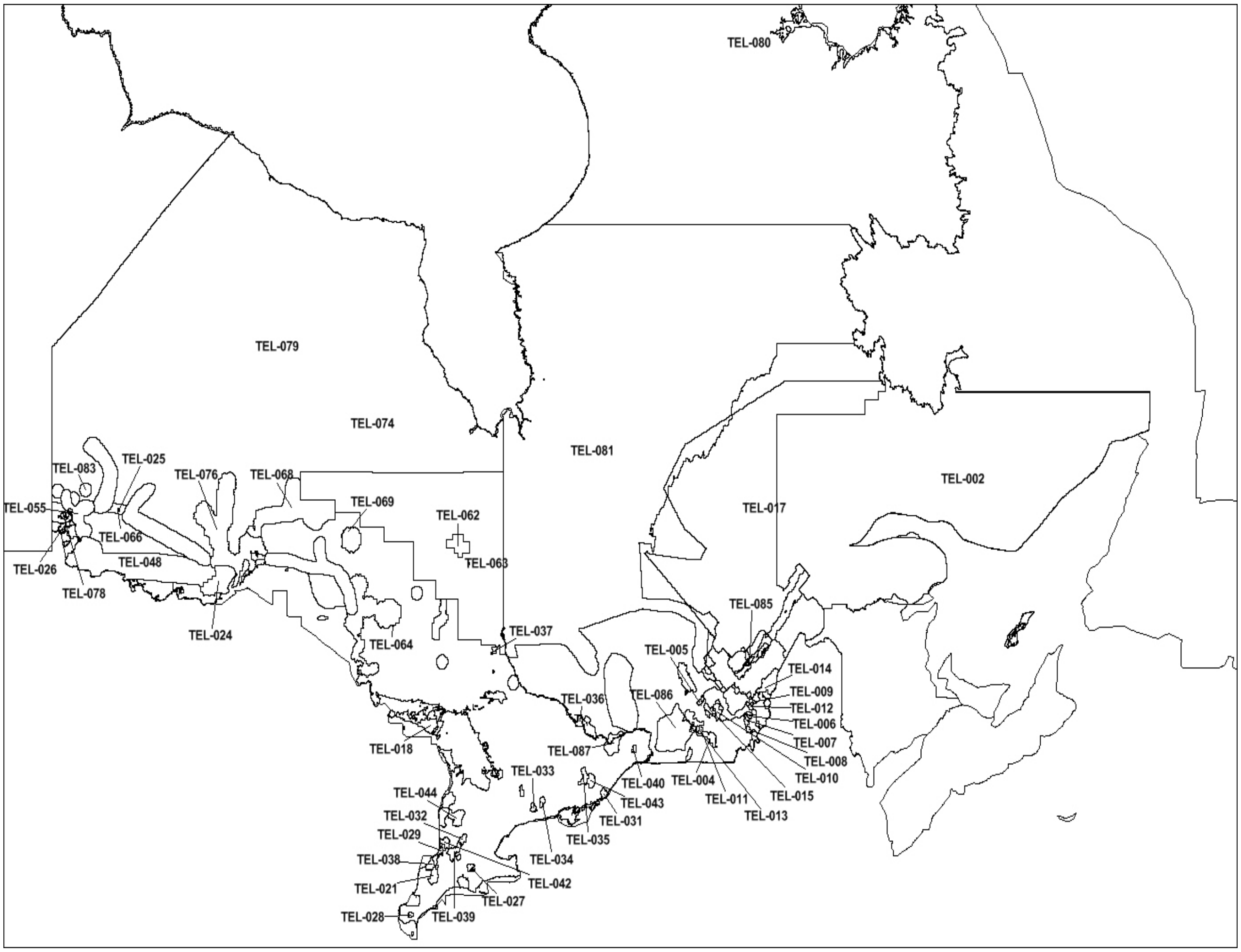
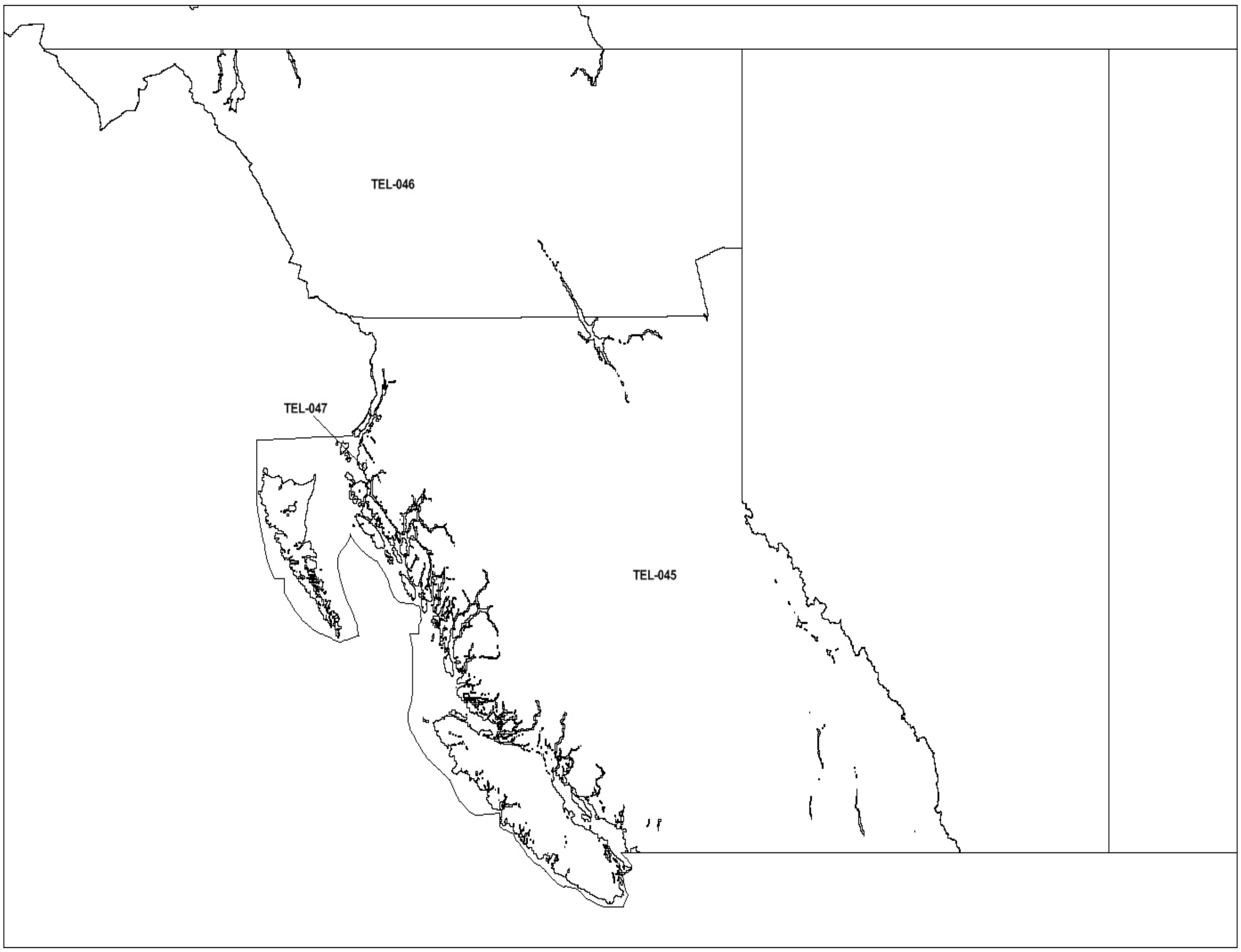


**Figure 5b: Map of TEL Areas in British Columbia**

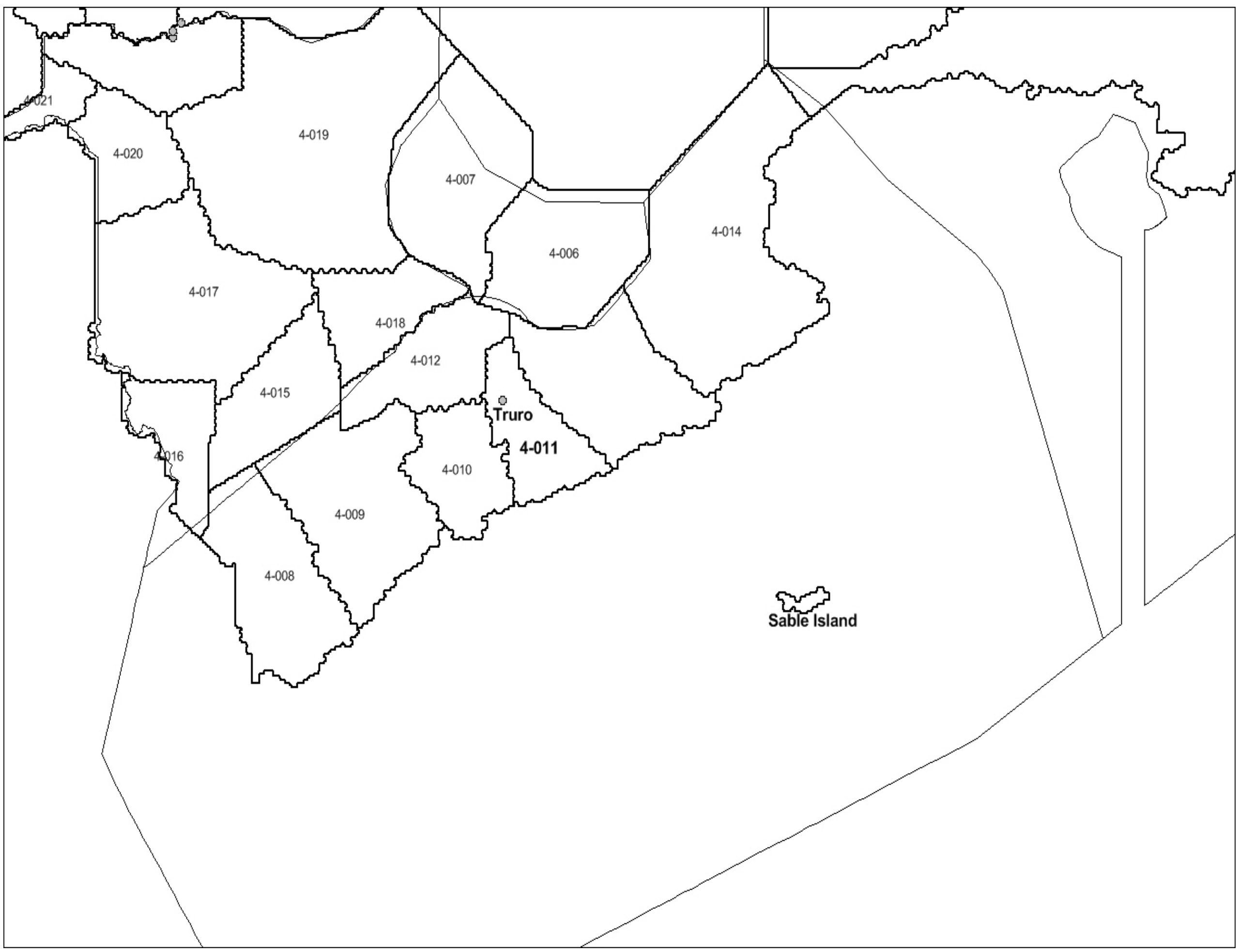


## 4. Minor Deviations From Provincial Borders

The Tier 4 service area boundaries are based on 1996 Statistics Canada census divisions, and comprise 172 areas covering all of Canada. Some minor deviations are made around provincial borders to reflect certain wireline service areas and also to avoid having a service area boundary cut through a population centre, so as to minimize potential interference problems.

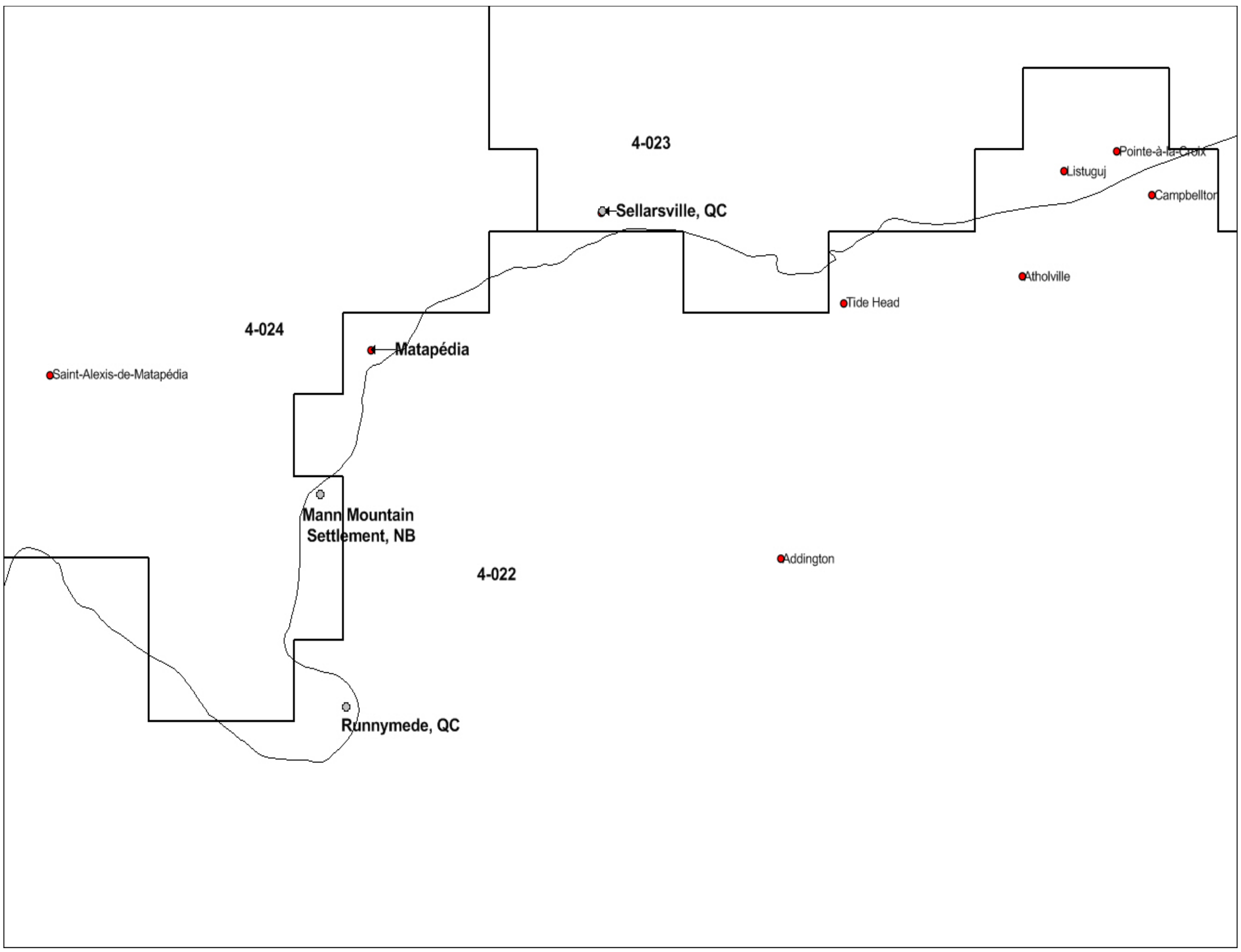
The Tier 4 service area minor deviations from provincial borders are as follows (see figures 6a, 6b and 6c):

**Figure 6a: Sable Island (Nova Scotia)**



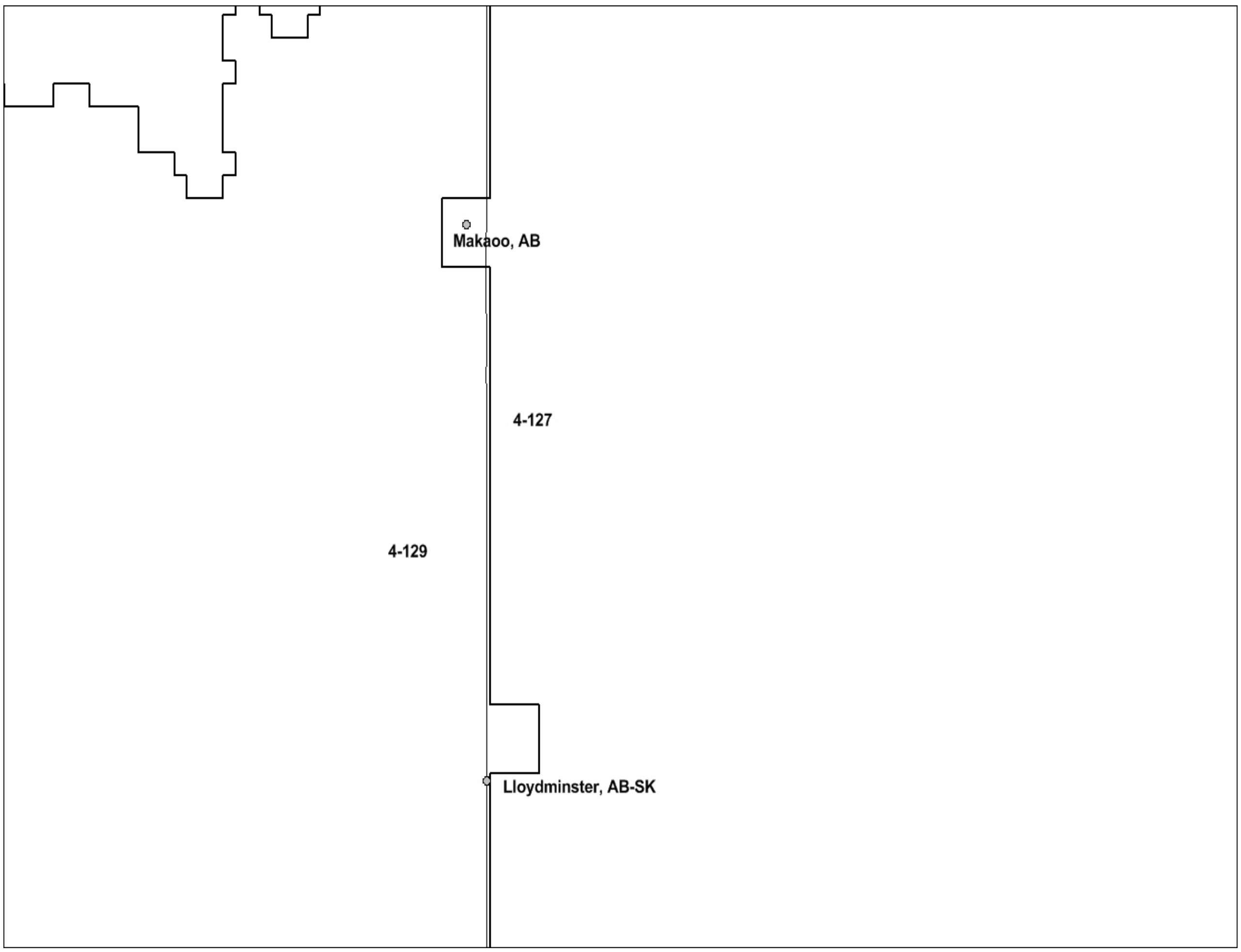
- A portion of the Matapédia 1996 Census subdivision used to create the service area 4-024 Mont-Joli (Eastern Quebec) has been captured by service area 4-022 Campbellton (New Brunswick). Consequently, the towns of Runnymede, Quebec, and Matapédia, Quebec, are included in service area 4-022 Campbellton (New Brunswick), whereas the town of Mann Mountain Settlement, New Brunswick is included in service area 4-024 Mont-Joli (Eastern Quebec).

**Figure 6b: Matapédia (Quebec)**



- A large rural portion of the Makaoo Census subdivision, which lies in both Alberta and Saskatchewan, is included in service area 4-127 Battleford (Saskatchewan). The City of Lloydminster in Saskatchewan is included in service area 4-129 Lloydminster (Alberta).

**Figure 6c: Lloydminster (Alberta and Saskatchewan) and Makaoo (Alberta)**



This is **Exhibit "93"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

October 2, 2017

**Via Email:** ic.spectrumauctions-encheresduspectre.ic@canada.ca

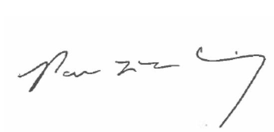
Senior Director
Spectrum Licensing and Auction Operations
Innovation, Science and Economic Development Canada
235 Queen Street 6th Floor
Ottawa, ON K1A 0H5

**Re: Consultation on a Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band, Notice No. SLPB-005-17**

1. Shaw Communications Inc. ("Shaw") is pleased to submit the attached comments to Innovation, Science and Economic Development Canada (the "Department") in response to the Department's *Consultation on a Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band,* Notice No. SLPB-005-17. We have also attached, as Appendix A to our submission, a paper written by Professor Peter Cramton.

2. Shaw appreciates the opportunity to provide its comments and looks forward to participating in this proceeding. If you have any questions please contact the undersigned.

Yours truly,



Paul Cowling
Vice President,
Legal & Regulatory Affairs
Shaw Communications Inc.
Tel: 416.649.5202
Regulatory@sjrb.ca

**Notice No. SLPB-005-17**
***Canada Gazette* – Part 1, Vol. 151, No. 33**
**(published August 19, 2017)**

# ***Consultation on a Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band,*** **Notice No. SLPB-005-17**

## Comments

## of

## SHAW COMMUNICATIONS INC.

**October 2, 2017**

## TABLE OF CONTENTS

## I. INTRODUCTION AND EXECUTIVE SUMMARY

1. The following constitutes the initial comments of Shaw Communications Inc. ("Shaw"), on behalf of itself and Freedom Mobile Inc., to Innovation, Science and Economic Development Canada (the "Department" or "ISED") in connection with the proceeding initiated by *Consultation on a Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band,* Notice No. SLPB-005-17 (the "Consultation Document").

2. This Consultation is critically important to the future of mobile wireless connectivity and competition in Canada. A competitive wireless market is, in turn, fundamental to the social, cultural and economic future of Canada. As Canadians strive to give life to the Government's Innovation Agenda, and as our connectivity needs escalate and evolve into the era of 5G and the Internet of Things, the Department must ensure that it adopts spectrum policies that promote a dynamic and sustainably competitive market. We applaud and fully support the direction taken by the Consultation Document. If new competitors, such as Shaw, are able to secure sufficient low-frequency spectrum through the 600 MHz auction as soon as possible, we will have the certainty we need to design and build a strong mobile network alternative.

3. In Canada, a truly competitive mobile wireless environment is only beginning to develop. Three mobile wireless incumbents – Bell, Rogers and Telus – dominate the market with 90% of subscribers and 92% of revenues. Canadians do not get the value and choices they increasingly need as their reliance on mobile data escalates. In many areas of Canada, a strong alternative to the incumbents has not yet emerged, but the evidence clearly demonstrates that the presence of a strong competitor drives pricing discipline, service innovation and choice. Canadians need and deserve this alternative to the incumbents both today and in the future.

4. Shaw is ready, able and willing to step up and complete the job of creating a strong alternative to the incumbents. Although we are a new competitor in the wireless market, we have decades of experience as a network builder and a long track record of customer-focused innovation, including: BlueSky TV,[1] a completely new platform in the Canadian video market; Internet 150,[2] which delivers leading internet speeds at affordable prices to large and small Canadian communities; Shaw Go WiFi,[3] Canada's leading carrier grade Wi-Fi network; and a suite of innovative, enterprise grade IT

[1] Shaw Communications Inc. ("Shaw"), *Blue Sky TV* < online: https://www.shaw.ca/television/blueskytv/ >.
[2] Shaw, < online: https://www.shaw.ca/store/internet/internetPackageDetails.jsp?prodId=prod1480004 >.
[3] Shaw, *Shaw Go WiFi* < online: https://www.shaw.ca/Wifi/ >.

products designed for Canada's small business segment.[4] We have a bold vision to bring this same spirit of innovation to the future of mobile connectivity in Canada.

5. Shaw's commitment is clear in our actions – we have spent billions of dollars in less than two years on our wireless initiative. We are expanding and enhancing our network to create the most valuable mobile experiences possible with our limited spectral resources – in particular, we have launched LTE-Advanced,[5] the most sophisticated mobile technology commercially available. However, without sufficient low-frequency spectrum, such as 600 MHz spectrum, we will always be disadvantaged on cost-effectiveness, speed, quality, capacity and coverage. No matter how innovative we are operationally or technologically, or how many billions of dollars we spend, without comparable quantities of low-frequency spectrum, we will be forever hobbled in our competitive efforts against the incumbents. On the other hand, if Shaw and other strong new competitors in the market are equipped with the proper tools to challenge incumbent dominance, a new, dynamic wireless environment can finally take hold in Canada.

6. Spectrum is a fundamental barrier to competition in the wireless marketplace. Without spectrum, which is a finite public resource administered by ISED, a mobile wireless carrier cannot operate. Spectrum concentration in Canada corresponds with market power. In Shaw's western Canadian operating footprint, the incumbents control nearly 80% of licensed commercial mobile spectrum. When we look at spectrum frequencies below 1 GHz, the level of concentration is even worse, with incumbents controlling over 91% of the available licensed spectrum, which is directly proportional to their revenue share (92%) and subscriber share (90%). A significant proportion of this low-frequency spectrum was awarded to the incumbents for free, setting the stage for a severe imbalance in the competitive position of the national and regional wireless incumbent providers versus that of any new competitor.

7. In particular, the incumbents that acquired their 850 MHz spectrum for free were able to deploy the spectrum without the additional financial constraints of the substantial expense associated with acquiring spectrum through competitive auction processes. In stark contrast, Freedom Mobile needed to spend hundreds of millions of dollars in an auction even before it could turn its mind to the financial demands of network deployment. On top of that challenge, Freedom also needed to start building its network using only AWS-1 spectrum even though, as explained below, 850 MHz and other low-frequency spectrum is much better suited to providing the coverage required for the

[4] Shaw, *Advanced Solutions* < online: http://business.shaw.ca/Advanced-Solutions?intcid=ib-Cspot4-homepage-2016-09-06-advancedsolutions >.

[5] LTE-Advanced incorporates numerous enhancements to LTE, including advanced antenna techniques: MIMO, higher order modulation and the ability to aggregate LTE carriers.

foundation of mobile networks. It is therefore no wonder that Freedom is still in the early stages of building out its network.

8. This Consultation regarding the 600 MHz band represents a last chance to correct the significant low-frequency spectrum imbalance in Canada, as there is no foreseeable source of additional low-frequency spectrum on the horizon. For these and other reasons explained below, Shaw therefore believes that the amount of set-aside spectrum should be even greater: in Shaw's view, the Department must set-aside 40 MHz of the available 600 MHz spectrum for bidding solely by Canada's new mobile competitors. Given their widely-acknowledged dominance of the national mobile wireless market, Bell, Rogers and Telus cannot be eligible to bid on the set-aside spectrum. At the same time, the set aside should be available for bidding by those who have demonstrated their ability to become a strong alternative to the incumbents. As proposed by the Department, eligibility should be limited to telecom carriers (wireless or wireline) that have a substantial presence in the relevant Tier 2 serving area. However, Shaw also believes that eligibility for the set-aside spectrum should be limited to players that have established themselves in the mobile market in Canada: in addition to having a facilities-based access network presence in the relevant Tier 2 area, set-aside bidders must also have a substantial, operating mobile network somewhere in Canada, but not necessarily in the relevant Tier 2 area.

9. If the Department does not seize this rare opportunity and implement a sufficient set-aside for strong, new competitors, there will never be an alternative in the market that will be able to challenge the dominance of the incumbents. This follows logically from the following key facts:

(a) Low-frequency spectrum is extremely valuable to mobile network builders. These signals travel across greater distances and through thick walls and other surfaces. This significantly improves the efficiency, cost-effectiveness and quality of network deployments. The corollary of this is that having a significant low-frequency disadvantage translates into a network, cost and service disadvantage. These disadvantages will be felt even more acutely as we move into the next stage of connectivity innovation with 5G and the Internet of Things.

(b) Given the value of low-frequency spectrum and the evident low-frequency spectrum advantage that the incumbents enjoy, it naturally follows that the incumbents have the incentive to foreclose new competitors from gaining access to an equitable amount of low-frequency spectrum. As explained further in our submissions below, and as substantiated in the appended paper authored by Professor Peter Cramton, there is strong evidence of this foreclosure risk: incumbents are incented and able to pay a premium that will ensure new competitors are not able to access the fundamentally important low-frequency spectrum that can support a truly competitive offering. Without regulatory intervention to mitigate this risk, incumbents will be able to effectively block new competitors from challenging the incumbents' market dominance.

10. The low-frequency spectrum disadvantage affects new competitors in all geographic areas, and in all aspects of their network builds. However, it is particularly apparent in deployments outside of densely populated urban areas. Without sufficient low-frequency spectrum, the business case for building networks outside of large cities becomes significantly more challenging. As a result, the prospects of sustainable competition in less populated areas will worsen considerably without a set-aside for eligible new competitors. In Shaw's view, all Canadians deserve real choice in mobile wireless services, including the Canadians that reside outside of our large cities. Choice and competition will drive affordability, as well as the network innovation required to provide the infrastructure for our digital economy in all areas of the country.

11. Shaw and other new facilities-based competitors in the wireless market have shown their commitment, ability and effectiveness in bringing competitive discipline to an uncompetitive market. These players have made great strides since the 2008 AWS-1 auction, by investing billions of dollars in alternative network facilities and punching well above their weight through innovation and choice at competitive prices, all to the benefit of Canadians. These achievements are all the more noteworthy because the barriers to competition have been significant – a seemingly insurmountable head-start advantage for the incumbents spanning decades, discriminatory roaming practices and ongoing uncertainty over wholesale roaming rates, unreasonable terms and conditions of access to public good support structures and, of course, severe spectrum disadvantages. This Consultation can decisively eliminate one of the most critical barriers to true competition in Canada by closing the gap between new competitor and incumbent low-frequency spectrum holdings. We respectfully ask ISED to implement the bold measures required to give life to our vision of a completely new and dynamic mobile wireless ecosystem in Canada.

12. Canadians deserve better than what our mobile wireless market is delivering today, and we have only seen a glimpse of the enormous potential that a strong alternative in the market can offer. This Consultation offers the best and last hope for an impactful regulatory solution to the severe imbalance between the low-frequency holdings of incumbents and new competitors. We need to ensure that this spectrum gets in the hands of those new competitors who can use it, without undermining vigorous bidding or the potential for new competitors to build out and expand. We also need to ensure that the spectrum set-aside does not have the effect of perpetuating a second-class status for new competitors. In order to offer a true alternative now and into the future, new competitors need to be placed on a footing that is as equal as possible to the incumbents. This is

challenging: even with a 40 MHz set aside, the wireless incumbents will still enjoy a low-frequency spectrum advantage. However, a 40 MHz set-aside is as close as we can get to near-parity of low-frequency spectrum holdings between new competitors and the wireless incumbents.

13. ISED's decision in this Consultation will change competition in Canada, either favourably or by forever confining competitors to a perpetual state of trying to catch up to the incumbents whose dominance was established through the gift of free low-frequency cellular spectrum. Our proposed modifications to the set-aside quantity and eligibility requirements are designed to further promote the likelihood of a truly dynamic competitive market over the long term. This will set the stage for: accelerated progress to achieving the Government's Innovation Agenda and promoting the competitiveness of our economy; enhancing the affordability, quality and variety of wireless services across the country; and creating strong and sustainable choices in mobile connectivity for Canadians throughout the country, including those who live outside of the large cities.

14. Apart from the set-aside, we would note the following with respect to other aspects of the Consultation:

(a) Shaw supports the Department's proposals for the 600 MHz spectrum licence conditions, other than certain exceptions described in our responses to the Consultation Document's questions. In particular, Shaw supports the proposed deployment obligations. As highlighted throughout this submission, 600 MHz spectrum is particularly well-suited to deployment outside of large cities, and the proposed deployment requirements will ensure that Canadians get the service and competition they deserve.

(b) Shaw is generally supportive of the proposed auction format design given the circumstances of this auction. In our detailed responses to the questions, we have provided some additional commentary.

(c) We note the unique circumstances surrounding the availability of 600 MHz spectrum for mobile use, and the transition of over-the-air broadcasters required to facilitate that use. However, in Shaw's view, it is important that we do not delay the auction – even if the spectrum is not available for immediate deployment, new competitors need the certainty of low frequency access to plan for, and design, our network coverage. To this end, Shaw is requesting that the Department hold the auction as soon as possible.

(d) Even without an accelerated auction, it appears that all successful bidders will likely be required to pay the full auction proceeds, and have their licence terms begin, without the ability to use those licences. This is not in the interest of carriers or that of the public. As an alternative to this approach, Shaw offers for the Department's consideration, the following proposal. As a result of any lag in time between the usability of the spectrum licences, due to the transition of broadcasters in Canada or the United States, licence winners would pay the initial 50% of auction proceeds within 10 days of the date when provisional licence winners are announced. The remaining 50% would be payable only when the auctioned 600 MHz spectrum won by the licensee becomes available for use on a Tier 2 basis. In order to ensure that ISED has complete security over the balance of the auction proceeds, provisional licence winners would be required to deliver a letter of credit covering this outstanding balance.

15. The remainder of this submission outlines the arguments and evidence in support of Shaw's set-aside and eligibility proposals, including our responses to ISED's specific questions in the Consultation Document.

## II. SUSTAINABLE, DYNAMIC WIRELESS COMPETITION WILL FOSTER THE GOVERNMENT'S AGENDA FOR CANADA

16. Recognizing the shift that has taken place in our economy and society to the digital world, as well as the need to increase Canada's competitiveness on the global stage, the Government has embarked on an ambitious Innovation Agenda.[6] This Consultation offers the Government an opportunity to take a significant step toward achieving the goals of this agenda, which is premised on Canada having world-class connectivity infrastructure. An advanced telecommunications system will foster the use of digital technologies, improving the overall productivity and competitiveness of our businesses and entrepreneurs, and driving growth. It will also make possible the development and adoption of transformative new platforms and applications, such as artificial intelligence. However, this dynamic, new ecosystem cannot develop unless there are connectivity services that exhibit the same level of dynamism. If the incumbents continue to dominate, we run the risk of perpetuating today's static mobile market and holding Canada back.

17. At 90% and 92% respectively, subscriber and revenue market shares of the three national incumbents have remained essentially unchanged for the eight years ending December 31, 2015.[7] More recent data as of the end of the second quarter of 2017 suggest that the national wireless incumbents continue their hold on over 90% market share. Specifically, Bell controlled 29.02% of

[6] Government of Canada, *Canada: A Nation of Innovators,* June 2016 < online: https://www.ic.gc.ca/eic/site/062.nsf/eng/h_00009.html >.

[7] See Canadian Radio-television and Telecommunications Commission ("CRTC"), *Communications Monitoring Report, 2009*, August 2009, Figure 5.5.7 (subscriber share) and Figure 5.5.8 (revenue share); and CRTC, *Communications Monitoring Report, 2016*, October 2016, Figure 5.5.5 (subscriber share) and Figure 5.5.6 (revenue share), hereinafter "CMR 2016".

subscribers, Rogers controlled 33.90% and TELUS controlled 28.36%.[8] The Competition Bureau has confirmed that coordinated pricing takes place between the three national incumbents,[9] while other indicators, such as average monthly churn rates[10] and subscriber penetration rates[11] similarly reflect the deficiency of competition in the market.

18. Strong, sustainable competition would not only position Canada and the Canadian economy for long-term success in the global, innovation economy, it will also improve the lives of all Canadians, regardless of their income levels or where they live. Competition is the key driver of affordability, as it promotes pricing discipline and more valuable offerings to consumers.

(a) The Competition Bureau has recently highlighted that prices are lower in markets with a strong, regional competitor that can bring pricing discipline and an alternative to the wireless incumbents.[12]

(b) Similarly, prices for mobile services are lower in cities where there is an alternative, strong facilities-based provider to the incumbents.[13]

(c) Indeed, as the Department has stated, new facilities-based competitors in the market have begun to deliver innovation and consumer choice at competitive prices, given the empirical evidence from the market, not least of which is that "average new entrants offer prices up to 36% less than the national incumbents"[14] and that lower prices that have been observed

[8] The Canadian Wireless Telecommunications Association, "Wireless phone subscribers in Canada, 2017" *Facts & Figures* < online: https://www.cwta.ca/wp-content/uploads/2017/08/Sub-Stats-2017-Quarter-2.pdf >.

[9] Competition Bureau, *Competition Bureau statement regarding Bell's acquisition of MTS*, 15 February 2017 < online: http://www.competitionbureau.gc.ca/eic/site/cb-bc.nsf/eng/04200.html >, hereinafter, "Competition Bureau Bell Statement".

[10] The average monthly churn rates for the three national carriers are also exceptionally low, hovering at around 1.3% to 1.6%, which is even lower than they were in 2011: see CMR 2016, Table 5.5.9.

[11] Statista reports that Canada has the lowest subscriber penetration rates of all the countries included in the survey: see Martin Armstrong, "Smartphones Aren't as Ubiquitous as You Think," *Statista*, 25 April 2017, < online: https://www.statista.com/chart/9096/smartphones-arent-as-ubiquitous-as-you-think/ >. Within Canada itself, there are many regional disparities in subscriber penetration rates. For example, there are many potential customers that have yet to subscribe to a mobile service: see CMR 2016, Figure 5.5.9.

[12] See Competition Bureau Bell Statement: the Bureau conducted a thorough pricing analysis and found that mobile wireless pricing is substantially lower in areas where a strong regional competitor is present.

[13] See Dr. Eric Emch (Bates White Economic Consulting), "An assessment of wholesale roaming policy in Canada: The relationship between competition, regulation, investment and access," 8 September 2017, report prepared for Shaw Communications Inc. in the proceeding initiated by Telecom Notice of Consultation CRTC 2017-259, Section III.A.6, Figure 1, hereinafter, "Emch (2017)", based on NLG Nordicity Group Ltd., *2016 Price Comparison Study of Telecommunications Services in Canada and Select Foreign Jurisdictions,* prepared for the CRTC, pages 79 to 83 (Table C.2.1, Table C.2.2, Table C.2.3, Table C.2.4 and Table C.2.5) < online: http://www.crtc.gc.ca/eng/publications/reports/compar/compar2016.htm >, hereinafter, "Nordicity 2016 Price Comparison Study". Overall, Nordicity found that new entrants' prices for mobile wireless telecommunications services were lower than the incumbents' by a range of 25% to 36% for service basket Levels 1, 2, 3, 4 and 5: Nordicity 2016 Price Comparison Study, page 32.

[14] ISED, *Consultation on a Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band*, August 2017, SLPB-005-17, , paragraph 17, hereinafter, "Consultation Document".

in some markets is "caused by the presence of a strong regional competitor" in such markets.[15]

19. There are also many examples of the customer responsiveness and choice that facilities-based competition can engender in the marketplace. As a new facilities-based mobile carrier, Freedom Mobile was among the first to offer unlimited calling and data plans and to reduce overage charges, offering the WINDTab as an alternative to the incumbents' generally uniform offerings.

20. The benefits of strong, facilities-based competition are also clearly evident in the experience of other countries, most notably the United Kingdom and the United States,[16] where consumers generally have access to four facilities-based wireless carriers, and the markets are characterised by falling prices, increased quality and diversity in services and high levels of investment.[17]

21. Given the evidence of the need for more competitive pressure in Canada's mobile wireless market, and the salutary effects of the presence of a strong-facilities based player, the obvious question is why new competitors in Canada continue to struggle in their efforts to counter the dominance of the incumbents. The answer lies in a list of significant barriers to competition, including challenges in negotiating the sharing of radio antenna sites and reasonable roaming rates and arrangements and, of course, a huge spectrum disadvantage. To their credit, the Department and the CRTC have made some progress in addressing some of these barriers, but there is still so much work yet to be done:

    (a) In 2012, the Department decided to make a number of important amendments to its rules for mandatory roaming and tower and site sharing on the basis that it had taken "a considerable amount of time," for new entrants to conclude roaming agreements with the incumbents and that their experience in negotiating tower and site sharing arrangements was even "less successful, considering the number of agreements negotiated and the time that it has taken to reach those agreements."[18] New competitors, such as Shaw, continue to face timing, economic and other challenges in securing reasonable access to sites and towers, which hinders the build-out and enhancement of our networks.

    (b) In 2014, Parliament and the CRTC intervened in response to discriminatory practices and the exercise of market power by the incumbents in the wholesale roaming market. A new

[15] Consultation Document, paragraph 22.
[16] Emch (2017), Section VII.C, paragraph 84.
[17] Emch (2017), Section VII.A.2, paragraphs 62 and 63, Section VII.A.3, paragraphs 64 and 65 and Section VII.A.4, paragraphs 66 to 70 (US experience) and Section VII.B.2, paragraph 79, Section VII.B.3, paragraphs 80 and 81 and Section VII.B.4, paragraphs 82 and 83 (UK experience).
[18] Industry Canada, *Proposed Revisions to the Frameworks for Mandatory Roaming and Antenna Tower and Site Sharing,* March 2012 < online: http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10250.html >.

regulatory regime for wholesale roaming has emerged from this intervention. However, the framework and the associated tariff rates remain subject to review in ongoing CRTC proceedings.[19] In particular, the launch of the CRTC's Wi-Fi First review[20] has introduced significant uncertainty in the policy environment and marketplace, calling into question the business and network deployment plans on which Freedom had been poised to act. The Wi-Fi First Review raises the significant risk that new facilities-based competitors, such as Shaw, will not only be disadvantaged relative to the incumbents, but that they would also face significant disadvantages in the market relative to resale-based models. This is because resale-based models face no investment burden, unlike Shaw and other facilities-based new competitors, who have invested billions in spectrum and the on-going build-out of their networks. Depending on the outcome of the Wi-Fi First Review, and in particular whether resale-based models would unjustifiably gain access to regulated roaming rates without making any investments in Canadian connectivity, the continued build-out of alternative wireless network facilities and the prospects for sustainable competition in Canada are at risk.

(c) Finally, ISED has established pro-competitive measures in a number of spectrum auctions held over the last ten years that have endeavoured to reduce spectrum concentration among the incumbents. Beginning ten years ago, the Department adopted a set-aside for new entrants in the 2008 AWS-1 auction, followed up by another set-aside in the 2015 AWS-3 spectrum auction, as well as band-specific spectrum cap mechanisms in each of the 2014 700 MHz auction and the 2015 2500 MHz spectrum auction. Notwithstanding these measures, spectrum concentration remains one of the most challenging barriers to competition.

## III. SPECTRUM CONCENTRATION IN CANADA IS A FUNDAMENTAL BARRIER TO VIBRANT COMPETITION

22. A mobile wireless carrier cannot operate a network without spectrum. Commercial licenced mobile spectrum is generally divided into high- (for example, 2500 MHz), mid- (for example, AWS-1 and PCS), and low-frequencies (for example, 850 MHz, 700 MHz and 600 MHz). It is widely accepted that adequate low-frequency spectrum (less than 1 GHz) is extremely important to mobile network builders, particularly in the early stages of their network build-out. With its vast, sparsely populated expanses, and challenging terrain, low-frequency spectrum is even more important to new network builders in Canada.

[19] See Telecom Decision CRTC 2017-56, 1 March 2017.
[20] Telecom Notice of Consultation CRTC 2017-259, 20 July 2017.

23. However, in Canada, spectrum ownership is highly concentrated in the hands of Canada's three wireless incumbents. When ownership is concentrated, firms may be able to exercise market power downstream in the provision of services that use wireless spectrum.[21] In other words, spectrum concentration leads to market power. This is clearly evident in the incumbents' spectrum holdings, on the one hand, and their market share, whether measured in subscriber terms (90%) or revenue terms (92%),[22] on the other hand. Excessive concentration of this essential input undermines competition for wireless services, harming consumers.[23]

24. As described in further detail below, the problem of spectrum concentration is particularly acute for low-frequency spectrum, with cascading effects for network design and planning, timely and efficient deployment, capital and operational efficiency and downstream retail competition.

**A. In Canada, Spectrum Is Excessively Concentrated in the Hands of Incumbents**

25. New wireless competitors' acute lack of low-frequency spectrum is an absolute barrier to competition, one that the Government is exclusively positioned to alleviate. Notwithstanding targeted pro-competitive measures by ISED in recent years, the incumbents continue to enjoy a considerable spectrum advantage.

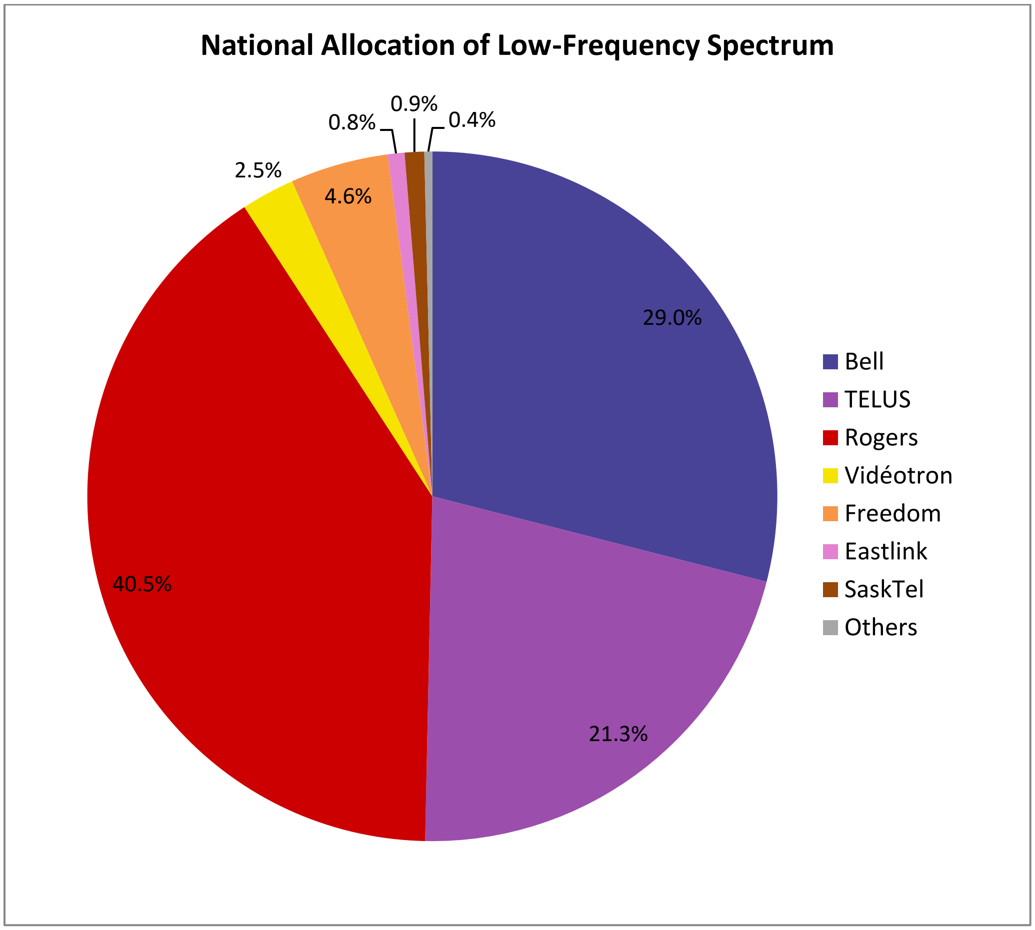
26. In most regions of Canada, the Department has issued radio spectrum licences for a total 118 MHz of low band spectrum in the cellular and 700 MHz bands. Yet, new wireless competitors hold at most only 10 MHz of 700 MHz spectrum in any Tier 2 licence area, with the remaining 108 MHz held by an incumbent wireless carrier. On a national, weighted MHz per population basis, Bell, Rogers and Telus hold 90.8% of all low band spectrum across the country, with all others, including the new wireless competitors, currently holding only 9.2%:

21 See Jonathan B. Baker (Washington College of Law), "Spectrum Auction Rules That Foster Mobile Wireless Competition", paper submitted by T-Mobile in Federal Communications Commission, WT Docket No. 12-268, *In the Matter of Policies Regarding Mobile Spectrum Holdings*, 12 March 2013, pages 3 and 15, hereinafter, "Baker (2013)". Professor Baker states that, "when spectrum ownership is concentrated, firms may be able to exercise market power downstream in the provision of services that use wireless spectrum as an input. Large incumbent firms that recognize this prospect may have an incentive and ability to obtain or maintain downstream market power by keeping spectrum away from their rivals." Accordingly, Professor Baker advised the FCC that it should consider whether excessive concentration of low-frequency spectrum by large incumbents would constrain the ability of rivals with limited access to low-frequency spectrum to compete aggressively in wireless service markets, thereby allowing the large incumbents to obtain or maintain market power.

22 CMR 2016, Figures 5.5.5 and 5.5.6.

23 Peter Cramton (University of Maryland and University of Cologne), "The Critical Importance of the Set-aside in the Canadian 600 MHz Auction", report prepared for Shaw Communications Inc. in the proceeding initiated by *Consultation on a Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band*, Notice No. SLPB-005-17, page 2, hereinafter "Cramton (2017)".

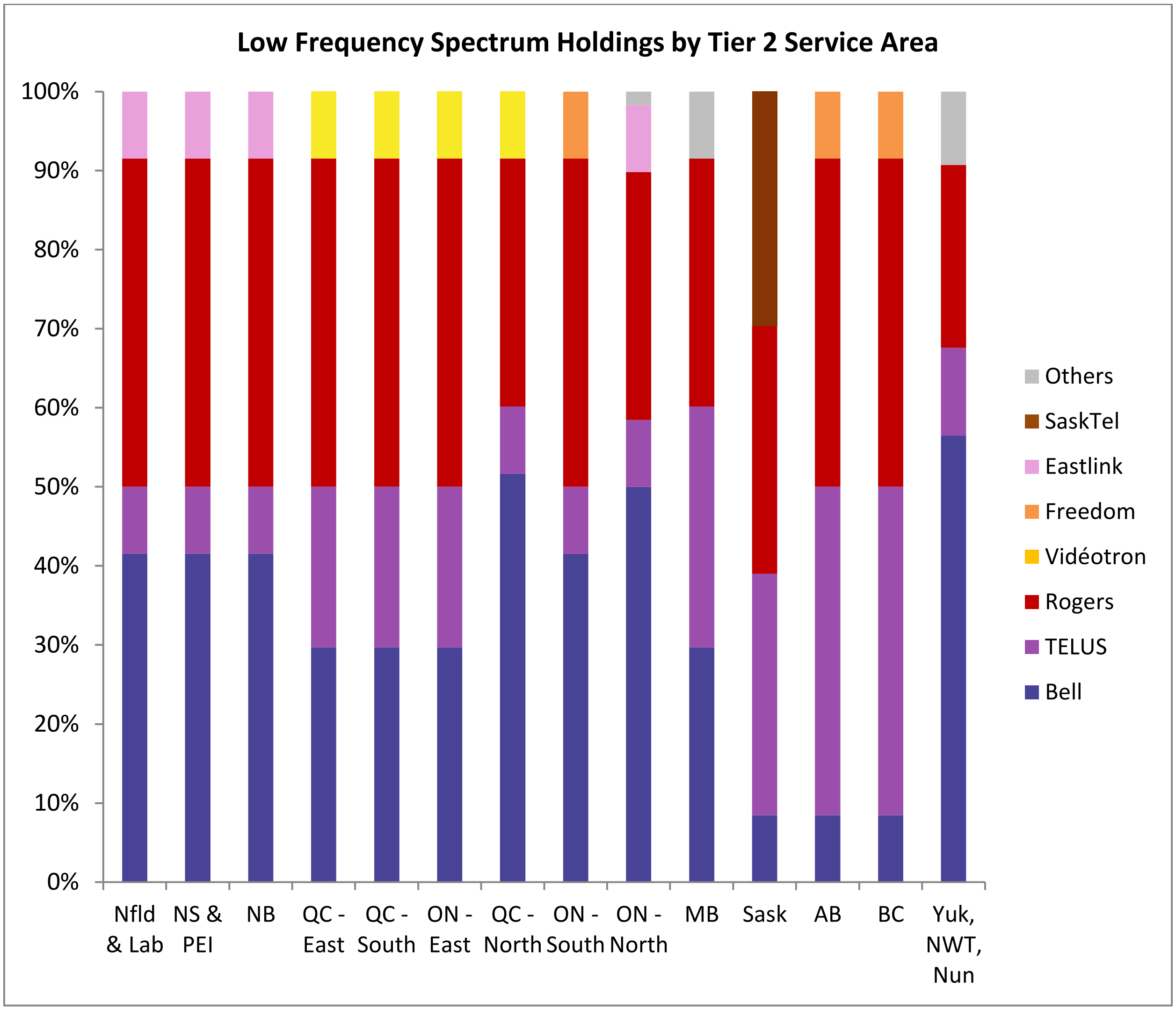
**Figure 1 – National Allocation of Low-Frequency (Cellular and 700 MHz) Spectrum[24]**




27. On a Tier 2 service area basis, the breakdown of low-frequency holdings is depicted in Figure 2 below. Apart from a few exceptions, Bell/Telus generally hold 50% or more of the licensed low-frequency spectrum through their extensive spectrum sharing arrangements, while Rogers generally holds 40%. In short, two networks effectively control more than 90% of the licensed low-frequency spectrum:

24 Weighted MHz/Pop estimate, based on licence data contained in ISED's Spectrum Management System, available online at: http://sms-sgs.ic.gc.ca/eic/site/sms-sgs-prod.nsf/eng/home

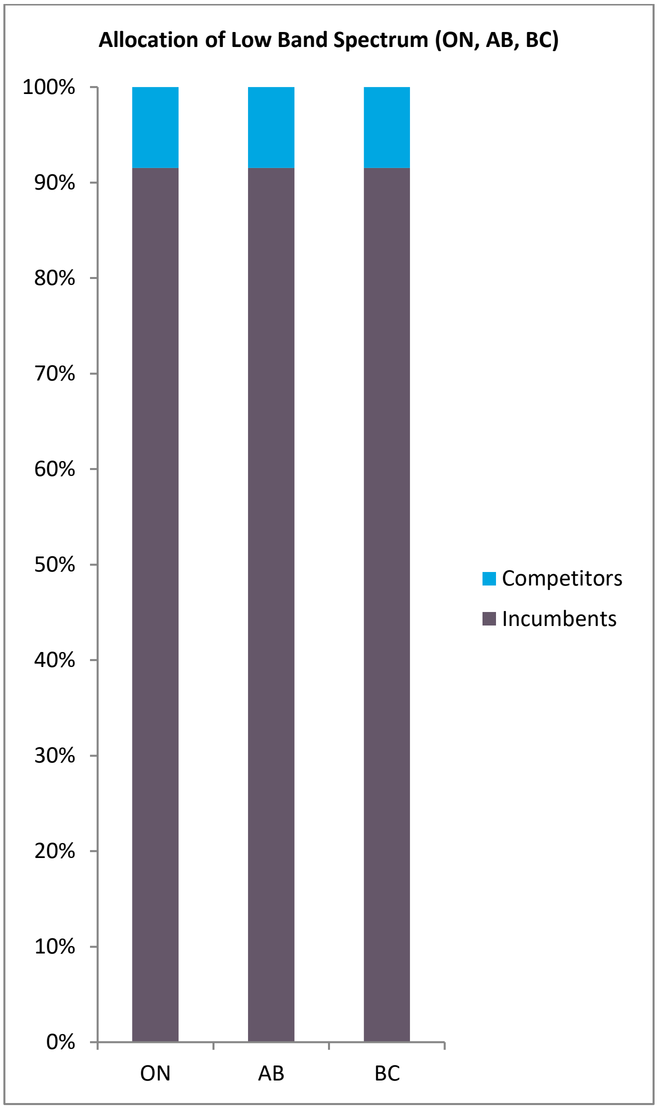
**Figure 2 – Distribution of Low-Frequency (Cellular and 700 MHz) Spectrum by Tier 2 Service Area[25]**




28. In the provinces where Shaw has deployed mobile services to date, namely Ontario, British Columbia and Alberta, the incumbent wireless carriers hold 91.5% of all low band spectrum:

25 Weighted MHz/Pop estimate, based on licence data contained in ISED's Spectrum Management System, available online at: http://sms-sgs.ic.gc.ca/eic/site/sms-sgs-prod.nsf/eng/home

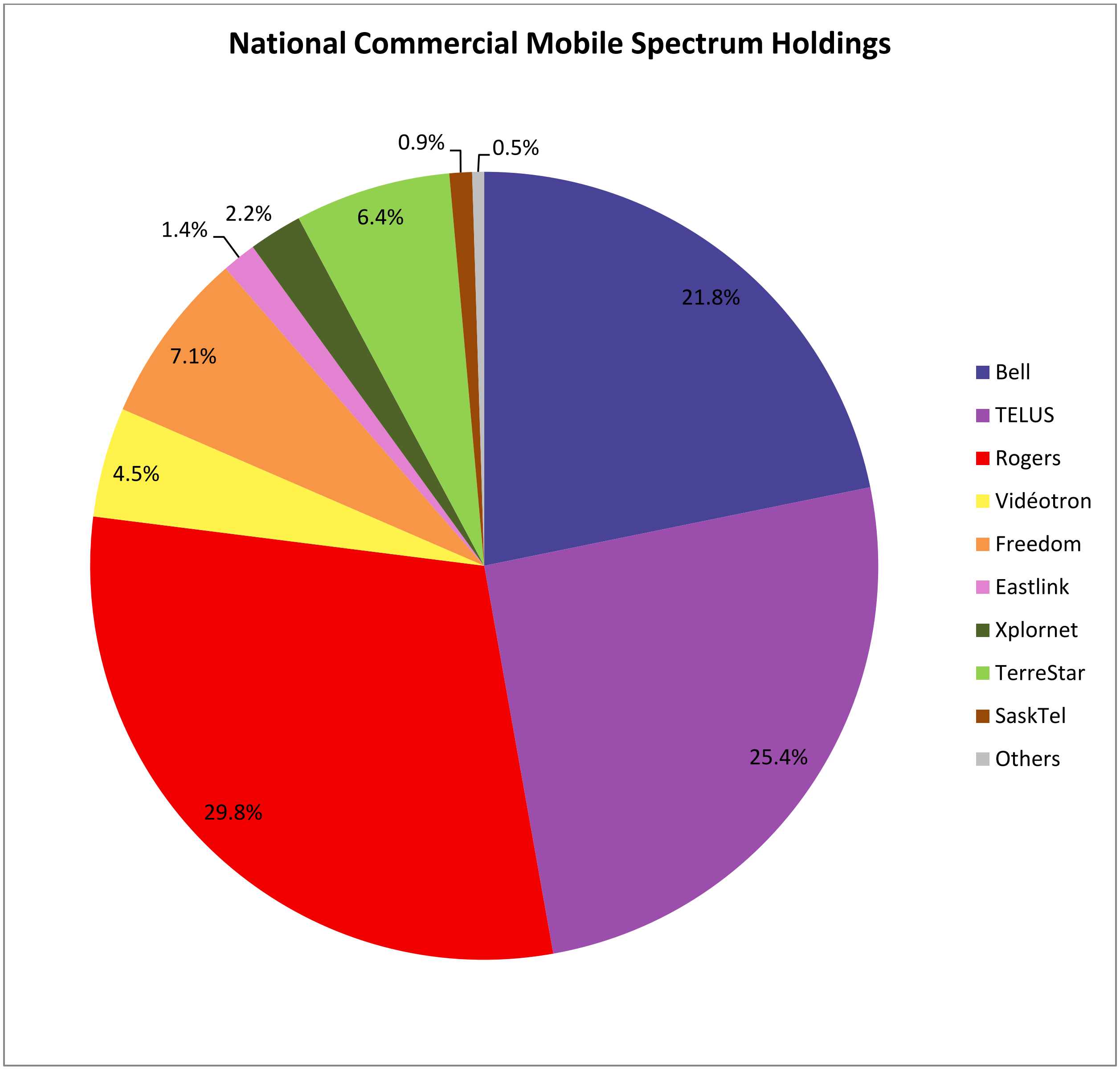
**Figure 3 – Allocation of Low Band Spectrum (ON, AB, BC)[26]**




29. The incumbents also enjoy a considerable advantage with respect to spectrum holdings generally, across all bands. They control more than three quarters (approximately 77%) of all licensed commercial mobile spectrum in Canada.

[26] Estimate based on licence data contained in ISED's Spectrum Management System, available online: http://sms-sgs.ic.gc.ca/eic/site/sms-sgs-prod.nsf/eng/home.

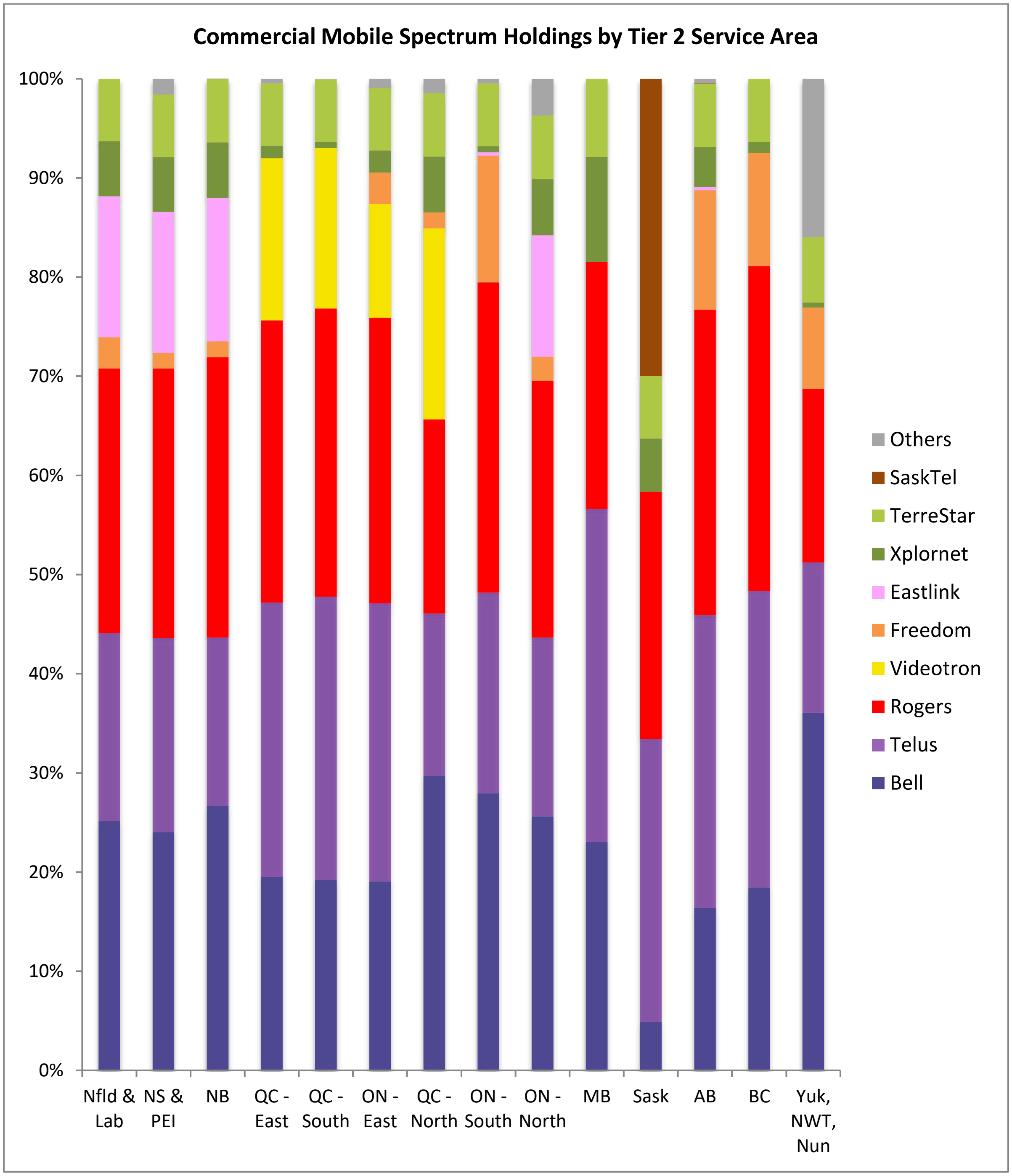
**Figure 4 – National Commercial Mobile Spectrum Holdings**[27]




30. In Shaw's western footprint, the national incumbents control close to or above 80% of the spectrum. The following graphic illustrates the overall spectrum holdings in Canada, on a Tier 2 service area basis:

[27] Weighted MHz/Pop estimate, based on ISED's *National Holdings of Commercial Mobile Spectrum*, July 14, 2016 < online: http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11210.html > updated to reflect licence transfers approved by ISED after this date.

**Figure 5 – Commercial Mobile Spectrum Holdings by Tier 2 Service Area[28]**




31. Even with several pro-competitive measures implemented in spectrum auctions over the last decade, the trend in spectrum holdings concentration has not changed meaningfully. The situation

28 *Ibid.*

is particularly dire in regards to low-frequency spectrum, given that cellular spectrum was handed to Rogers, Bell, Telus, and other regional incumbents for free over 35 years ago. In the 700 MHz band, only 10 MHz was protected from incumbent bidding (via caps), such that a full 40 MHz of 700 MHz spectrum was available for open bidding by the incumbents. The result was that the national incumbents obtained 6 of the 7 blocks available in virtually all areas of the country. As described in more detail below in our response to question 1B, we are still not on a trending pattern of reducing spectrum concentration in Canada. More needs to be done.

**B. Why Is Low-Frequency Spectrum So Valuable to New Competitors?**

32. As demonstrated above, Canada's incumbents have a profound advantage over new competitors in their spectrum holdings, particularly in low-band spectrum. Network operators need and use a mix of lower and higher spectrum frequencies to leverage the various, respective technical attributes of each band.[29] In the absence of this mix, new wireless competitors simply cannot compete against incumbents.[30] In this mix, why is low-frequency spectrum so valuable?

33. Low-frequency signals have less attenuation, resulting in better in-building penetration, reducing dead spots and allowing for more cost-effective deployment and better service in urban areas. In addition, low frequency signals propagate farther in the environment, requiring fewer cell sites to cover an area. Given its physical characteristics, low-frequency spectrum is essential for establishing and expanding wireless network coverage, particularly in the early stages of building out a network, as is the case today for new wireless competitors. A base station in a low frequency band will have greater geographic coverage and superior in-building penetration than a similar station offering service in a higher band. While higher frequency spectrum can augment network capacity and throughput, which is valuable as demand grows, it cannot serve as a substitute for the coverage function uniquely served by low-frequency spectrum.

34. With its unique physical attributes, low-frequency spectrum is less costly and operationally more efficient to deploy in any area. When an operator has sufficient capacity of low-frequency spectrum, it can enhance peak data rates, network capacity, network quality, and end-user experiences, while reducing capital and operational costs by minimising the number of antenna sites required. This is especially, though not only, true for deployment in difficult terrain and less densely populated

[29] Baker (2013), pages 14-15.

[30] The U.S. Federal Communications Commission ("FCC") recognizes that "competition in the mobile wireless marketplace will be better promoted by multiple service providers having the opportunity to access both low-band spectrum that can provide coverage and in-building penetration, as well as higher band spectrum that can provide the increased throughput for mobile broadband applications": see FCC, *Annual Report and Analysis of Competitive Market Conditions with respect to Mobile Wireless, Including Commercial Mobile Services -- 19th Report*, 23 September 2016, paragraph 51 < online: https://www.fcc.gov/document/19th-mobile-wireless-competition-report >, hereinafter, "FCC 2016 Annual Report".

settings. In contrast, the physical properties of higher frequency spectrum make it costlier and less practical for providers to use in establishing and expanding coverage. These technical and operational ramifications of the differences between low- and high- frequency spectrum affect the timing within which network builders can address a market. Those carriers with sufficient low-frequency spectrum can compete more quickly and efficiently. Those without it are unable to compete on an equal footing.

35. In many respects, in a mobile wireless market with entrenched incumbents, access to any newly available low-frequency spectrum is much more important to new competitors.

(a) New competitors, like Shaw, are still in the early stages of building their networks – achieving coverage, and all of its attendant costs and administrative burdens, is our foremost concern. As emphasized by Professor Cramton, "…low-band spectrum provides the foundation of coverage on which capacity can be built. This is true, regardless of the wireless standard – 3G, 4G, and 5G – in question because all are best built on a foundation of low-band spectrum."[31]

(b) Relative to the new wireless competitors, who desperately need low-frequency spectrum in order to achieve coverage and quality in an efficient manner, the marginal utility of additional low frequency spectrum is low for the national wireless incumbents. This is reinforced by the recent U.S. 600 MHz spectrum auction, which did not see vibrant participation from the incumbents.

(c) At the same time, the cost impact for providing service without a mix of spectrum types is not symmetric: it is higher for providers, like Shaw, that to date have mainly only had the use of higher frequency spectrum. As discussed further below, in such circumstances, an incumbent holder of low-frequency spectrum will therefore be incented to disadvantage rivals (raising their capital and operational costs) by denying them access to any newly available low-frequency spectrum.[32]

(d) Having sufficient low-frequency spectrum would enable new competitors to leverage their existing and future higher frequency spectrum holdings in an efficient and effective manner to fully realize the potential of those bands as well. Without low frequency spectrum, network deployments using high frequency bands alone become cost prohibitive, particularly in low-to-medium-density service areas. This, in turn, limits the potential deployment of higher frequency bands. In some areas of the country, where population

31 Cramton (2017), page 4.
32 See Baker (2013), page 15.

density is particularly sparse, low-frequency spectrum is, practically speaking, the only feasible deployment option.

36. As explained above, the low-frequency disadvantage faced by new competitors, such as Shaw, has a significant effect on relative deployment costs, deployment timelines, and our ability to take advantage of different frequency bands to optimize network speed, quality, capacity, coverage and ultimately, the customer's experience. Despite our significant and continuing investments in our network, these disadvantages are reflected in network performance results, as shown in a recent report by PCMag, which identified coverage and other issues with Freedom Mobile's network in a number of geographic areas.[33] These results are unacceptable to Shaw. However, no matter how much money we invest, or how innovative we are technologically or operationally, the only way we can overcome these challenges is through equitable access to low-frequency spectrum. Timing also matters, highlighting the urgency of getting more low-frequency spectrum into the hands of new competitors. 600 MHz and other low-frequency spectrum provides the opportunity to build the foundation of any mobile network, yet, Shaw and other facilities-based competitors have had to start their network builds without sufficient low-frequency spectrum.

37. The Department recognises that spectrum is a critical input for wireless carriers and that for new wireless competitors in particular, additional 600 MHz would enable them to "effectively compete with the services offered by the more established wireless service providers"[34] (emphasis added). Recognizing the problem is the initial step – the paragraphs above all reinforce the extent of the problem and the urgent need for intervention. What we now need to consider is the appropriate remedy. Consistent with the requirements of telecommunications policy that regulation be proportionate,[35] a decisive, impactful measure must be adopted to reverse the wide disparity in the spectrum holdings of new competitors compared to incumbents. This Consultation provides a unique opportunity that will not be repeated to adopt a measure that begins the slow and challenging process of overcoming the mobile incumbents' market power.[36]

38. This takes us to Shaw's responses to the questions included in the Consultation Document.

[33] Sascha Segan, "Fastest Mobile Networks Canada 2017", *PC Magazine*, 11 September 2017 < online: https://www.pcmag.com/article/348825/fastest-mobile-networks-canada-2017 >.
[34] Consultation Document, paragraph 18.
[35] *Order Issuing Direction to the CRTC on implementing the Canadian Telecommunications Policy Objectives,* SOR/2006-355.
[36] Baker (2013), page 15.

## IV. RESPONSES TO SPECIFIC QUESTIONS POSED IN THE CONSULTATION DOCUMENT

### A. Q1 – Pro-Competitive Measures

#### *1. Q1A – Proposal to use a set-aside*

**Q1A—ISED is seeking comments on its proposal to implement a set-aside as a pro-competitive measure in the auction process for the 600 MHz band.**

39. In Part II above, we describe the enduring dominance of the incumbents in Canada's wireless market and the persistent barriers to competition faced by new wireless competitors. In Part III above, we detail the correlation between the incumbents' dominance of the market and the ongoing concentration of spectrum in their hands. Although new competitors face a variety of barriers to competition, the extreme concentration of low-frequency spectrum in the hands of the incumbents effectively guarantees that the incumbents will be able to preserve their market power until the spectrum imbalance is corrected. Remedying this imbalance is not the only measure needed to enhance competition in Canada's mobile wireless marketplace, but it is essential to doing so.

40. The Framework for Spectrum Auctions in Canada identifies market conditions in which a spectrum set-aside should be considered. As recognised by the Consultation Document,[37] each of these conditions applies in the current context:

(a) the wireless incumbents possess market power in the provision of mobile services in Canada;

(b) new competitors, such as Shaw, will use the licences to be issued as a result of the 600 MHz spectrum auction to provide services in competition with the incumbents; and

(c) the anti-competitive effects of the incumbents acquiring the licences are not outweighed by potential economies of scope arising from the integration of the spectrum in the incumbents' networks – the incumbents already have considerable low-frequency spectrum, such that the marginal utility of additional low-frequency spectrum by the incumbents is low, especially relative to that of the incumbents.

41. Implementing an appropriate set-aside is an essential step toward reducing the extreme variance in low-frequency spectrum holdings between the incumbents and new competitors.

[37] Consultation Document, paragraphs 18 and 22 to 24.

### *(a) In the absence of a set-aside, the risk of incumbent foreclosure is too high*

42. As stated in the Consultation Document, "there is a risk that competition in the post auction marketplace could suffer without measures to facilitate regional carriers' access to spectrum."[38] The dominance of the incumbents is not in question: they control 90% of subscribers and 92% of revenues in the market. The excessive concentration of low-frequency spectrum in the hands of the incumbents is also not in question: they control over 90% of the licensed low-frequency mobile spectrum in Canada. At the same time, as explained above, new competitors need low-frequency spectrum much more than the incumbents do.

43. In circumstances where firms, such as Canada's wireless incumbents, are able to exercise market power downstream in the provision of services that use wireless spectrum, they also understand and are able to act on their strategic incentive to obtain or maintain downstream market power by paying a premium beyond the value of the spectrum to them in order to keep smaller rivals from acquiring the spectrum[39] – this is what the economic literature refers to as the "foreclosure risk" in spectrum auctions. Even though there is greater societal value to be derived from the award of spectrum to new competitors, an incumbent will be motivated to bid an inflated amount for the chance to block the competitor from acquiring spectrum and thereby reduce competition in the wireless market.[40]

44. Professor Peter Cramton's paper, included as Appendix A with this submission, substantiates the incumbents' strong incentives to foreclose new competitors. As recounted by Professor Cramton, AT&T and Verizon effectively did "not show up at the auction," obtaining no spectrum, or very little spectrum, in the U.S. 600 MHz auction and thereby demonstrating that additional low-frequency spectrum was of low marginal utility to both of the two largest and most established wireless carriers in the United States. After all, prior to the U.S. 600 MHz auction, Verizon already held 46 MHz of low frequency spectrum and AT&T considerably more than this amount, on a national weighted average basis.[41] Notwithstanding their near-zero economic demand for 600 MHz spectrum, the dominant U.S. wireless carriers "feigned great interest in the 600 MHz spectrum", and lobbied "strenuously against a set-aside."

[38] Consultation Document, paragraph 22.
[39] Baker (2013), page 3.
[40] Cramton (2017), page 3.
[41] Mike Dano, "In 2017, how much low-, mid- and high-band spectrum do Verizon, AT&T, T-Mobile, Sprint and Dish own, and where?" *Fierce Wireless,* May 30, 2017 <online: [http://www.fiercewireless.com/wireless/2017-how-much-low-mid-and-high-band-spectrum-do-verizon-at-t-t-mobile-sprint-and-dish-own](http://www.fiercewireless.com/wireless/2017-how-much-low-mid-and-high-band-spectrum-do-verizon-at-t-t-mobile-sprint-and-dish-own) >. At the present time, across different major urban markets in the United States, AT&T holds anywhere between approximately 65 to 125 MHz of low-frequency spectrum and Verizon, anywhere between approximately 20 MHz to 45+ MHz of low-frequency spectrum.

45. In Professor Cramton's view, the dominant U.S. wireless carriers were clearly driven to foreclose competition by T-Mobile, amongst other potential rivals.[42] He believes the same dynamic is likely to play out in Canada noting that "[t]he economic setting of the Canadian 600 MHz auction is similar, with the exception that the competition problem is more severe in Canada, since the dominant incumbents command an even more dominant position in Canada both in terms of market share and low-band spectrum holdings."[43]

46. There are other empirical examples of the foreclosure risk. In the 2008 AWS-1 auction in Canada, despite actively bidding to acquire open (non-set-aside licences), the new entrants won only seven (7) very insignificant such licences in the AWS-1 band. Not only did this demonstrate foreclosure risk, it also showed how incumbents will engage in foreclosure tactics on a coordinated basis. In that auction, the incumbents managed, in effect, to not compete against one another in any given licence area, and effectively competed only against new entrants.

47. The Canadian 700 MHz spectrum auction, which included a spectrum cap mechanism rather than a set-aside, provides another illustration of the power of the national incumbents in a spectrum auction. In this auction, the national wireless incumbents won 85% of the spectrum by MHz/pop, including 100% of the most sought after lower paired blocks (A, B, and C). The four regional operators at the time – Videotron, Eastlink, MTS and Sasktel were relegated to the much less desirable upper C1 block that was a distant third choice for each of the incumbents.

48. In light of the foreclosure risk, and in view of the current structure of the Canadian wireless market, Professor Cramton has recommended that ISED implement a spectrum set-aside. In his view, "[a]bsent a significant set-aside, foreclosure of competition would be likely—causing tremendous long-term harm to consumers."[44]

***(b) Spectrum set-aside will enhance competition and therefore allow market forces to thrive***

49. The benefits of a pro-competitive set-aside have already been seen in the Canadian marketplace. In Canada, the Department injected much-needed competition into the mobile wireless market by implementing a set-aside of 40 MHz of AWS spectrum exclusively for new entrants in the 2008 AWS-1 auction. Although the incumbents and their experts warned of dire consequences to auction revenues and competitiveness from the AWS-1 set aside, none of these consequences

42 Cramton (2017), pages 4 and 5.
43 *Ibid.*
44 Cramton (2017), page 5.

materialized. The result was a highly competitive auction that generated $4.25 billion in revenue, nearly three times initial revenue expectations.[45]

50. Moreover, the competitive dynamic that was unleashed by this process has been impressive. As of the spring of 2014, it was estimated that new facilities-based wireless carriers had invested over $3 billion since the 2008 AWS auction in mobile wireless assets.[46] Since then, Shaw alone has spent well over $2 billion, first in acquiring Freedom, then in network upgrades and improvements that led to the recent launch of our LTE-Advanced network in Calgary, Edmonton, Vancouver, Toronto and Ottawa, and more recently in spectrum acquisitions that will allow us to more efficiently and effectively serve our footprint in Western Canada and Ontario.

51. Critically, as explained in Part II above, the pricing and service benefits to Canadians of enabling a strong facilities-based competitive alternative in the marketplace have been undeniable. These benefits are already being felt even though new competitors are working at a disadvantage with their limited spectrum portfolios. This only serves to demonstrate how much more they *could* bring to the market if only they were equipped with comparable quantities of low-frequency spectrum. In Shaw's view, this would change the game, finally creating the potential for a truly dynamic wireless environment to emerge from today's stagnant conditions. As Shaw has argued in the CRTC's Wi-Fi First proceeding, with support from Dr. Eric Emch, pro-competitive spectrum policies will also enable further service-based innovation and competition by facilitating a more robust wholesale wireless market in Canada.[47]

### *2. Q1B – Amount of set-aside spectrum*

**Q1B—ISED is seeking comments on its proposal to set aside 30 MHz of spectrum in the 600 MHz band for eligible entities and to have open bidding (no pro-competitive measures) on the remaining 40 MHz in the band.**

52. As discussed above, low-frequency spectrum is at once a unique and scarce public resource that, at present, is disproportionately allocated to the incumbent wireless carriers. These considerations,

[45] Peter Cramton, "The Rationale for Spectrum Limits and Their Impact on Auction Outcomes, paper prepared for T-Mobile , September 2013, page 7 < online: http://apps.fcc.gov/ecfs/document/view?id=7520942733 >, hereinafter "Cramton (2013)," citing Kyle Hyndmany and Christopher F. Parmeter, "Efficiency or Competition? A Structural Econometric Analysis of Canada's AWS Auction and the Set-Aside Provision 4" (2013).

[46] Margaret Sanderson (Charles River Associates), "Wireless Retail and Wholesale Services in Canada. Assessing the State of Competition", May 2014, report prepared for Bell Mobility in the proceeding initiated by Telecom Notice of Consultation CRTC 2014-76, pages 22 and 23.

[47] Emch (2017), Section II, paragraph 9; and Shaw Intervention dated 8 September 2017, paragraphs 9 and 70 regarding Telecom Notice of Consultation CRTC 2017-259.

as applied to the Canadian wireless market, corroborate the correctness of ISED's proposal to use a set-aside measure in the 600 MHz spectrum auction.

53. The scarcity, unique characteristics and lopsided holdings of low-frequency spectrum lead to the conclusion that a 30 MHz set-aside will not sufficiently redress the current low-frequency spectrum concentration problem in Canada. Shaw therefore supports a set-aside of 40 MHz of spectrum in two 10+10 MHz paired blocks. This is supported by Professor Cramton's recommendations.[48]

***(a) 40 MHz set-aside will yield better outcomes for consumers and competition***

54. Shaw has already canvassed above the evidence of the low marginal utility to incumbents of additional low-frequency spectrum, relative to the foundational, significant needs that new wireless competitors have for low-frequency spectrum.

55. It is important to note that even a 40 MHz set-aside will not bring the new wireless competitors to near-parity with the wireless incumbents, given what the incumbents already hold in the cellular and 700 MHz spectrum bands. With a 40 MHz set-aside, post-auction, the incumbents could hold more low-frequency spectrum across the country on a population-weighted basis than any one of the new wireless competitors could realistically obtain, especially given the extensive spectrum sharing arrangement between Bell and Telus. With 30 MHz of 600 MHz spectrum available for open bidding by the incumbents, they will be able to compete and obtain the spectrum they need to supplement their current low-frequency holdings.

56. From a different perspective, if ISED were to adopt a 30 MHz set aside, and we look at the impact of that, together with the other pro-competitive measures for low-frequency spectrum that ISED has undertaken (*i.e.,* the 700 MHz spectrum auction), the ratio between the spectrum that will have been open for all bidders, including incumbents, versus the spectrum that has been subject to caps and set asides would be 66% to 33%. In other words, under this scenario, by the time of the close of the 600 MHz spectrum auction, ISED would have protected an aggregate of 40 MHz of paired spectrum for new competitor bidding while making 80 MHz available on an open basis. Given the extraordinary imbalance in low-frequency spectrum that the incumbents enjoy, this ratio doesn't do enough to establish a more equitable balance.

48 Cramton (2017), page 5.

57. As suggested by Professor Cramton, increasing the size of the set-aside to 40 MHz would not undermine the potential competitiveness of the auction – in fact, the auction would likely be more competitive, with more competition from both new competitors and incumbents:[49]

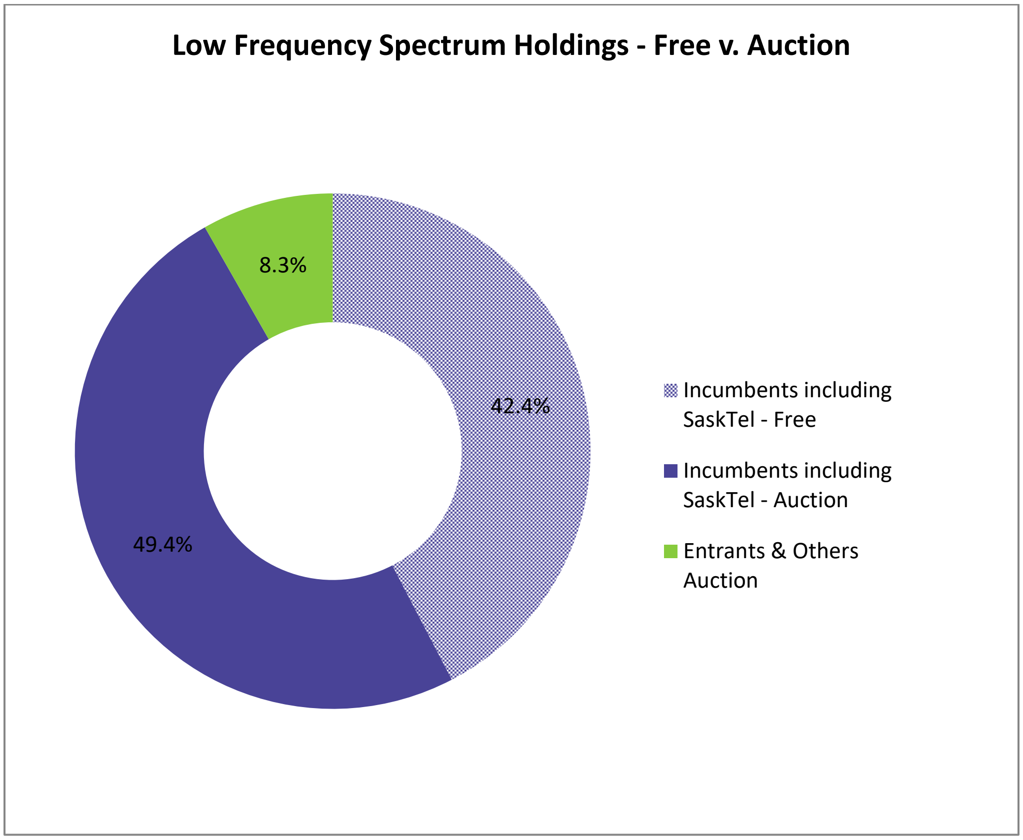
> A key advantage of the 40 MHz, rather than 30 MHz, set-aside is that it prevents the dominant incumbents from splitting the non-set-aside blocks, (2-2 between Rogers on the one hand and Bell/Telus, who have an extensive spectrum sharing arrangement, on the other hand), at low prices, as we have observed in other auctions (Ausubel et al.; Grimm et al. 2003). With only 30 MHz available for the dominant incumbents, if they choose to compete for more low-band spectrum, they must fight to determine who gets more, since the only possibilities for the dominant incumbents is 2-1, 2-0, 1-1, 1-0, 0-0, and the reverse.[50]

58. The gift of low-frequency spectrum without any up-front payment was the seminal moment for the incumbents' dominance. It was not a product of efficiency or competition. In the first 15 years of mobile wireless services, the incumbents were handed on average approximately 25 MHz of low-frequency cellular spectrum and anywhere from 10 to 40 MHz of mid-frequency PCS spectrum through comparative selection and review processes, rather than competitive auctions. With these spectrum assets, acquired for free, the wireless incumbents were able to build their networks. There is no question that the incumbents invested many billions of dollars to build out their networks, but they did so without the challenge of also having to pay for the low-frequency spectrum licences that were ideally suited to establishing network coverage – a critical need in the early days of building out a mobile network.

59. It is no coincidence in Shaw's view that the incumbents' market share, whether measured in subscriber (90%) or revenue share (92%) terms, remains essentially unchanged from over a decade ago and roughly corresponds to the proportion of low-frequency spectrum that the incumbents control. It also isn't surprising that the incumbents would seek to preserve their spectrum advantage as much as possible. The incumbents' free low-frequency spectrum holdings are illustrated below:

49 Cramton (2017), pages 2 and 3.
50 *Ibid.*, pages 5-6.

**Figure 6 – Low-Frequency Spectrum Holdings – Free v. Auction[51]**




60. In contrast, each of the largest operating new wireless competitors that entered the market after the 2008 AWS-1 auction faced the substantial financial burdens and risks associated with acquiring spectrum through a highly competitive auction process that generated record-breaking revenues for the Government. However, the new wireless competitors had no established mobile revenue stream to finance these acquisitions or the launch of their services. In addition, the new competitors only held AWS-1 spectrum, which meant that the relative cost of any build-out would automatically be higher than for the incumbents, given that the new competitors had no low-frequency spectrum for underlay network coverage.

51 Weighted MHz/Pop estimate, based on licence data contained in ISED's Spectrum Management System, < online: http://sms-sgs.ic.gc.ca/eic/site/sms-sgs-prod.nsf/eng/home >.

### *(b) This is the last chance for near-parity of low-frequency spectrum*

61. The upcoming 600 MHz auction is the last foreseeable opportunity for the Department to address the current imbalance in low-frequency spectrum held by new facilities-based competitors. New competitors require a measure that brings them closer to parity in low-frequency spectrum holdings.

62. In Shaw's view, a 40 MHz set-aside would also be more effective at leveling the playing field from an LTE configuration perspective. In particular, a set aside of 40 MHz, with (2 blocks of 10+10, as elaborated upon below in our response to Question 1E) would: (i) maximize network capacity achievable in a single LTE channel; (ii) maximize peak data rates achievable in a single LTE channel; (iii) maximize end-user experience; (iv) maximize capital expenditure efficiency; (v) maximize coverage for the benefit of consumers; (vi) reduce the number of cell sites required in a network; and, (vii) improve network quality as a result of wider channelization.

63. Even with several pro-competitive measures implemented in spectrum auctions over the last decade as outlined above, the trend in spectrum holdings concentration has not changed meaningfully. In the AWS-1 and AWS-3 auctions, the Government set aside a total of 70 MHz and the amount available in the open auctions was 70 MHz (combined between the two). Roughly speaking, the end result was that approximately 50% was open and 50% was set-aside.

64. We are at a highly sensitive juncture in the market's evolution to true, sustainable competition. If ISED does not achieve a balance in low-frequency spectrum holdings today, it will effectively relegate new competitors to a second-tier status on a permanent basis for the future. A decisive, impactful intervention is therefore required. Bringing low-frequency spectrum holdings into better balance will go a long way to establishing the conditions that are necessary for a truly dynamic market to take hold, providing valuable, affordable and differentiated offerings to Canadians.

### *3. Q1C – Eligibility to bid on set-aside spectrum*

**Q1C—ISED is seeking comments on its proposal to limit the eligibility criteria to bid on set-aside spectrum to those registered with the CRTC as facilities-based-providers, that are not national incumbent service providers, and that are actively providing commercial telecommunication services to the general public in the licence area of interest, effective as of the date of application to participate in the 600 MHz auction.**

65. We understand that the Government's primary objective in this auction is to ensure that Canadians in all regions of the country have a choice of innovative and competitively-priced mobile connectivity alternatives. The proposed eligibility requirements promote this outcome. However, Shaw believes

that the proposed eligibility requirements could be further clarified and tailored so that strong new players put this spectrum to use within a reasonable timeframe following the auction.

66. As explained in the Consultation Document, the policy objective of the set-aside is to enable existing new facilities-based competitors, *i.e.*, those that have "launched wireless services in recent years [to] benefit from an opportunity to acquire access to additional spectrum to support network improvements to meet the wireless traffic demands of their growing subscribership."[52] As such, Shaw concurs with the view "that the ability to bid on the proposed set-aside spectrum should be limited to a particular sub-set of regional service providers that are best positioned to compete in the commercial mobile services market."[53]

67. Shaw believes that limiting set-aside bidding to a new competitor ensures that this highly valuable low-frequency spectrum is allocated to parties that are able to create a strong, sustainable alternative to the incumbents. To this end, they must have (i) substantial, existing telecommunications facilities in the relevant Tier 2 area to leverage, but they must also have (ii) a substantial presence in the mobile market, somewhere in Canada. This will ensure timely deployment that will maximize the benefit of the spectrum for Canadians, while also setting the stage for effective and sustained competition in the post-auction marketplace.

68. As explained in further detail below, Shaw proposes that the tests proposed by the Department be clarified to require that an applicant that wishes to bid on set-aside spectrum furnish proof that it is actively providing:

(i) Commercial mobile wireless services anywhere in Canada using a radio access network that it owns and operates; and

(ii) Commercial telecommunications services in the Tier 2 area of interest using access facilities, whether wireline, mobile wireless or fixed wireless, that it owns and operates.

69. The foregoing reflects three narrow but essential clarifying modifications to the proposed eligibility criteria to further assure that the Department and industry achieve the stated policy objectives in the 600 MHz spectrum auction.

70. First, Shaw proposes that the eligibility criteria set out at paragraph 29 of the Consultation Document must explicitly provide that the ability to bid on the set-aside spectrum should be limited to existing new mobile wireless competitors that are actively providing commercial wireless services to the public somewhere in Canada using radio access network facilities that are owned and operated by the entity in question. This will ensure that only providers that have demonstrated the

52 Consultation Document, paragraph 27.
53 Consultation Document, paragraph 29.

capability of launching and offering commercial mobile services are able to gain access to this highly valuable spectrum, while preventing spectrum speculators from acquiring frequencies that are badly needed to enhance connectivity and competition in Canada.

71. The assessment of "active provision of commercial wireless services to the general public" for purposes of this first clarification of paragraph 29 would require a potential bidder for the set-aside spectrum to file with ISED, along with its application to participate in the auction, evidence relating to the commercial mobile wireless services that it offers, the retail/distribution network used to offer the services in Canada and the means by which subscribers access services and the number of subscribers.

72. However, the set-aside eligibility rules should not be so overly restrictive as to preclude Shaw or other existing regional service providers that are currently actively engaged in building out their radio access networks from bidding on available 600 MHz spectrum outside of their existing mobile footprints or license areas. For example, in the current context, there is no sound basis to limit bidding on Tier 2 licence areas to only those regional service providers that are already licenced in the Tier 2 area in question, as was the case in the AWS-3 licensing framework.[54] This would undermine the competitiveness of the auction and the expansion of competitive networks. It would be particularly prejudicial to new competitors that are still in the early stages of their deployment efforts.

73. Rather, any licensed mobile provider that has otherwise established that it is actively engaged in offering and providing commercial mobile wireless services to the public somewhere in Canada and that can demonstrate that it is offering any "commercial telecommunications services," whether wireless or wireline, to the public in a given Tier 2 area, should be eligible to bid on the set-aside licences in the Tier 2 area in question.

74. Shaw notes that the current wording of paragraph 31, when read together with paragraph 29, is consistent with Shaw's view that it was not the Department's intention to limit regional service providers to only bidding in Tier 2 licence areas where they are already actively offering or providing *commercial mobile wireless* telecommunications services. Instead, paragraph 31 refers to proof

[54] Industry Canada, *Technical, Policy and Licensing Framework for Advanced Wireless Services in the Bands 1755-1780 MHz and 2155-2180 MHz (AWS-3),* 18 December 2014, paragraphs 64 and 65. In the AWS-3 auction, eligibility to bid on the set-aside spectrum was limited as follows:

- limit the eligibility to bid on set-aside spectrum to operating new entrants, since new entrants that are already offering wireless services benefit from an existing network and subscribers, and will be able to add set-aside spectrum to improve their mobile networks.
- he Department also proposed that the active provision of commercial wireless services, including a minimum coverage within each Tier 2 licence area, would be assessed when determining an applicant's eligibility to bid on the set-aside spectrum.

that the applicant is actively providing *a commercial telecommunications service* (i.e., wireless *or* wireline) in the Tier 2 licence area.

75. Finally, the requirement for demonstration of active provision of commercial telecommunications services in a Tier 2 licence area of interest should be further narrowed to require demonstration that the service is being provided using *access facilities that are owned and operated* by the applicant. This would provide the necessary assurance to the Department that licence winners in each Tier 2 area are immediately able to leverage existing facilities for rapid deployment. In the absence of these modifications, *de minimis* or inactive facilities could allow for eligibility, which would be inappropriate.

76. These small but essential amendments will ensure that bidding on the set-aside is limited to those that are "best positioned to compete in the commercial mobile services market"[55] and are ultimately able to provide a strong, compelling alternative to the dominant incumbents. These amendments would also ensure deployment of the spectrum in the short-term and prohibit speculative participation in the auction and the holding or trading of spectrum, which would not be in the public interest.

77. To summarise, Shaw proposes that eligibility to bid on the set-aside spectrum in any Tier 2 licence area be limited to persons or entities that are, as of the deadline for the submission of applications to the Department to bid in the 600 MHz auction:

(a) Licensees of commercial mobile terrestrial spectrum that are actively providing commercial wireless services to the public somewhere in Canada using radio access network facilities that are owned and operated by the entity in question;

(b) Not a national wireless incumbent (i.e., any entity with more than 10% of national wireless subscriber market share);

(c) Registered with the CRTC as a facilities-based carrier; and

(d) Actively providing commercial telecommunication services to the public in the relevant Tier 2 licence area using access facilities that the person or entity owns and operates.

[55] Consultation Document, paragraph 29.

### *4. Q1D – Limit on transferability of set-aside spectrum*

**Q1D—ISED is seeking comments on its proposal to limit the transferability of the set-aside spectrum for the first five years of the licence term.**

78. Shaw agrees with the limits on transferability of set aside spectrum for the first five years. This preserves the integrity of the set-aside over a reasonable period of time.

### *5. Q1E – Block sizes for set-aside spectrum*

**Q1E—ISED is seeking comments on its proposal to auction the set-aside spectrum as three separate paired blocks of 5+5 MHz.**

79. As discussed above, Shaw believes that 40 MHz of spectrum should be set aside for bidding by eligible bidders and that under this configuration, the set-aside spectrum should be auctioned in two paired 10+10 MHz blocks.

80. However, should ISED proceed with a 30 MHz set-aside, the available amount should be auctioned in three equal 5+5 MHz blocks.

81. In Shaw's view, these configurations balance the need to acquire optimally sized blocks for LTE deployment with the need to create opportunities for bidding by different players on the set-aside spectrum.

## B. Q2 – Licence Areas

**Q2—ISED is seeking comments on its proposal to use Tier 2 service areas across the country, except in the three Territories (Yukon, Northwest Territories and Nunavut) where Tier 4 service areas would apply.**

82. Shaw agrees that the use of Tier 2 service areas across the country, except in the three northern Territories would be appropriate. This geographic division reflects the physical propagation characteristics of 600 MHz spectrum and is large enough that the number of price clock rounds in the auction would not become overly burdensome, while at the same time being small enough to accommodate bidders with specific geographic interests. In the post-auction market, Tier 2 service areas would also facilitate and streamline coordination among licensees.

### C. Q3 – Auction Format and Rules

**Q3—ISED is seeking comments on:**

- **a. the proposal to use generic licences and;**
- **b. the proposal to categorize all blocks won by set-aside-eligible bidders as set-aside blocks.**

83. Shaw supports ISED's proposal to implement an auction of generic blocks in an initial allocation phase, with a separate assignment stage to determine specific contiguous frequency assignments.

84. The proposal to categorize all blocks won by set-aside-eligible bidders as set-aside blocks is appropriate. Were it not to take this step, ISED could introduce elements into the auction that could be exploited. The auctioneer would not want to encourage set-aside bidders to bid more aggressively to win blocks simply for the opportunity to flip them quickly post-auction, nor would the auctioneer want to encourage the large incumbents to bid less aggressively because they may have a secondary avenue for acquiring the 600 MHz spectrum.

### D. Q4 – Information Disclosure

**Q4—ISED is seeking comments on:**

- **a. the use anonymous bidding during the auction; and**
- **b. the information that will be disclosed to bidders during the clock rounds, as described in annex A (which would also apply to the CCA with a modified activity rule set out in annex B) and annex C.**

#### *1. Q4a – Use of anonymous bidding*

85. Shaw supports anonymous bidding. It has become a common practice in high-stakes auctions, such as the proposed 600 MHz auction.

#### *2. Q4b – Information disclosed during clock rounds*

86. During the clock rounds of the two CCA designs that ISED proposes (WARP CCA and GARP CCA), ISED generally proposes to publish aggregate demand information by service area. This is consistent with the information disclosure rules that occurred in the 700 MHz and 2500 MHz spectrum auctions (both WARP CCAs) and in other CCAs worldwide.

87. In the final clock round, however, ISED proposes to withhold aggregate demand information. This is consistent with auctions implemented in the 700 MHz and 2500 MHz spectrum auctions, but it is inconsistent with the ECCA that ISED has also proposed here.

88. Shaw suggests that in the event ISED implements a CCA, it should disclose aggregate demand in the final clock round in the 600 MHz auction as well. In the 700 MHz auction, the rationale for withholding aggregate demand information in the final clock round was closely related to the fact that in the 700 MHz auction, there was no set-aside. This resulted in a valid concern on the part of the smaller bidders that disclosure of aggregate demand would lead to aggressive bidding (and foreclosure) by the incumbent wireless carriers. In the 600 MHz auction, this concern is not as pronounced, given the proposed use of a set-side.

89. ISED should establish consistent rules regarding the disclosure of aggregate demand information in all three proposed auction designs. That is, aggregate demand information should be provided in the final clock round of a WARP CCA or in the final clock round of a GARP CCA (in addition to all preceding rounds).

## E. Q5 – Enhanced Combinatorial Clock Auction (ECCA) Format

**Q5—ISED is seeking comments on:**

- **a. The advantages and disadvantages of the three auction formats being considered for the 600 MHz auction:**
  - **i. Combinatorial clock auction, using the WARP-based activity rule (annex A);**
  - **ii. Combinatorial clock auction, using the GARP-based activity rule (annex B);**
  - **iii. Enhanced combinatorial clock auction (annex C).**
- **b. Where there is a preference for one of the options, respondents are asked to provide a rationale and explanation.**

### *1. CCA using WARP-based activity rule*

90. The CCA with the WARP-based activity rule has been used in the 700 MHz auction and the 2500 MHz auction in Canada. Thus, Canadian participants are familiar with the rules and how they affect bidding.

### *2. CCA using GARP-based activity rule*

91. The CCA with a GARP-based activity rule is similar to the CCA with a WARP-based activity rule. A GARP-based activity rule is somewhat more restrictive on bid flexibility. However, Shaw believes that bidders that understand a WARP-based activity rule would also understand and would be able to compete effectively in a CCA with a GARP-based activity rule. Moreover, from ISED's perspective, the difference in outcomes between a WARP versus a GARP CCA would be expected to be reasonably similar.

### *3. ECCA*

92. The ECCA would represent a more significant change in auction format from a WARP or GARP-based CCA. In particular, the pricing rule is different and there is more emphasis on maintaining the final clock round outcome in the ECCA than there is in the CCA.

93. The ECCA has potential benefits over the CCA design. Most of all, it provides greater certainty about auction outcomes by skipping the supplementary round when there is no excess supply and by providing bidders with protection prices when there is a supplementary round.

94. It should be noted, however, that pricing in an ECCA involves the auctioneer assuming that clock round bids will be increased to their maximum amounts under the GARP-based rule. In general, this is a strong assumption that could increase auction prices. However, Shaw believes that the impact of this assumption can be mitigated while preserving the desirable features of the ECCA as long as ISED uses restraint in setting bid increments.

95. If ISED were to use large increments during the clock rounds, the ECCA pricing assumptions could result in the auctioneer inferring a package bid for a participant that is significantly larger than what that bidder would submit on its own. Therefore, should it favor an ECCA, ISED could allay this concern by using sensible bid increments at auction.

## F. Q6 – Structure of Assignment Stage

**Q6—ISED is seeking comments on:**

a. **The proposal that winners of more than one block in a single service area be assigned contiguous blocks; and**

b. **The proposed structure of the assignment stage, including the order of the assignment rounds and the combination of service areas into a single assignment round.**

### *1. Q6a – Assignment of contiguous blocks to winning bidders*

96. Shaw supports the proposal that winners of more than one block in a single service area be assigned as a single contiguous block. The guaranteed assignment of contiguous spectrum in an assignment stage is a crucial element of the overall auction design.

### *2. Q6b – Structure of assignment stage*

97. Shaw supports the proposed structure of the assignment stage, including the order of the assignment rounds and the grouping of multiple service areas in the event that the winning allocations and winning bidders in those rounds are identical.

## G. Q7 – Increasing Prices in the Clock Rounds

**Q7—ISED is seeking comments on the proposed methodology for incrementing prices during the clock rounds, as described in annex A.**

98. Shaw supports the proposed methodology for incrementing prices during the clock rounds as discussed in Appendix A of the Consultation Document.

## H. Q8 – Bidder Participation – Affiliated and Associated Entities

**Q8—ISED is seeking comments on the proposed Affiliated and Associated Entities rules that would apply to bidders in the 600 MHz auction.**

99. Shaw has no comment on this question at this time.

## I. Q9 – Other Communication Rules

**Q9—ISED is seeking comments on the proposed rules prohibiting collusion and other communication rules, which would apply to bidders in the upcoming 600 MHz auction.**

100. Shaw supports the proposed anti-collusion and other communications rules that would apply to bidders in the upcoming 600 MHz auction.

## J. Conditions of 600 MHz Licences

### *1. Q10 – Licence term*

**Q10—ISED is seeking comments on its proposal to issue spectrum licences in the 600 MHz band with a 20-year licence term and the proposed wording of the condition of licence above.**

101. Shaw supports the proposed 20-year licence term for licences issued pursuant to the 600 MHz auction. 20-year licence terms are consistent with the timeframes associated with investment in the development and deployment of network infrastructure, technologies, and innovation in the mobile wireless industry today. As such, they are realistic and foster incentives to invest for all licensees.

### *2. Q11 – Licence transferability and divisibility*

**Q11—ISED is seeking comments on the proposals on the condition of licence related to transferability and divisibility, and the proposed wording above.**

102. Shaw supports the proposed condition of licence regarding licence transferability and divisibility.

### *3. Q12 – Deployment requirements*

**Q12—ISED is seeking comments on the proposed deployment condition of licence as stated above.**

103. Shaw does not have any material concerns with the deployment requirements as set out in Annex F of the Consultation Document. The proposed deployment requirements are reasonable and appropriate for ensuring that this valuable spectrum is utilized for the benefit of Canadians.

### *4. Q13 – Other conditions of licence*

**Q13—ISED is seeking comments on proposed conditions of licence outlined in annex G that would apply to licences issued through the proposed auction process for spectrum in the 600 MHz band.**

104. Shaw opposes proposed Condition 10 as set out in Annex G of the Consultation Document, relating to the minimum 2% of gross revenues to be invested by entities with revenues of over $1 billion from wireless services towards eligible research and development ("R&D") initiatives, for reasons that Shaw has previously submitted in response to other recent consultations issued by the Department.[56]

## K. Auction Process

### *1. Q14 – Opening bids*

**Q14—ISED is seeking comments on the proposed opening bids as presented in table 1.**

105. Shaw has no comments at this stage in the proceeding on the proposed opening bid amounts set out in table 1 of the Consultation Document.

106. However, in relation to spectrum valuations generally, and the tremendous financial and other risks involved in building new wireless networks, it is important for the Department to be mindful of the significant uncertainties in Canada's policy environment today. After several years of policy reviews and regulatory and legislative intervention, new competitors still do not have the planning certainty that we need from a CRTC decision on final regulated roaming rates. Yet, as explained above, the Wi-Fi First Review has introduced a significant, additional layer of uncertainty. A regulatory regime that positions resale-based models at an advantage over facilities-based new competitors will

56 See Shaw Comments dated July 25, 2017,paragraph 61 regarding *Consultation on Licence Renewal Process for Advanced Wireless Services and other Spectrum,* June 2017, SLPB-002-17.

undermine the economics of facilities-based investment generally and the prospects for sustainable competition in Canada.

### *2. Q15 – Pre-auction deposits*

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|---|
| **Q15—ISED is seeking comments on the proposed eligibility points for spectrum licences in the 600 MHz as outlined in table 2, and pre-auction deposits as outlined above.** |

107. Shaw has no comments at this time on the proposed eligibility points for spectrum licences in the 600 MHz frequency band as outlined in table 2 of the Consultation Document, and the pre-auction deposits payable as a function thereof.

108. However, Shaw is proposing a change to the schedule for the payment of auction proceeds for all bidders given that the 600 MHz spectrum will likely be unusable for some time after the auction will be held. In this regard, the Department has proposed its usual schedule of the payment of 20% of the final payment within 10 business days following the publication of provisional licence winners, with the remaining portion of 80% due within 30 business days following the announcement of provisional licence winners. These payments will be non-refundable.

109. It is not yet certain when ISED will hold the auction of 600 MHz spectrum, but it could be delayed for approximately 2 years,[57] or sometime in the fall of 2019 or the winter of 2020. Shaw is concerned with this timing and would encourage the Department to hold the auction as soon as possible. Given the fundamental importance of securing sufficient low-frequency spectrum for purposes of building a network foundation to compete, as explained throughout our submission, it is essential for new competitors to know, sooner rather than later, that they will have access to sufficient 600 MHz spectrum. Even if new competitors are unable to use the spectrum for a period of time after the auction, network investments take time to plan, and the certainty of access to 600 MHz spectrum would significantly enhance the efficiency of the planning process, thereby accelerating the potential timing for new competitors to bring true choice and competition to the marketplace.

110. Shaw notes that, based on the current scheduled end dates for the transition of over-the-air television stations that currently occupy the 600 MHz band, the spectrum that is being made available for mobile terrestrial use will not be usable until late 2021 or early 2022, depending on the region in question:

[57] Emily Jackson, "Why Canada is 'dragging its feet' on the next spectrum auction while demand keeps growing," *Financial Post,* 28 April 2017, available online at:: http://business.financialpost.com/technology/why-canada-is-dragging-its-feet-on-the-next-spectrum-auction-while-demand-keeps-growing.

**Table 2 – Estimated Television Station Transition Phase End Dates, by Province[58]**

| Province | Phase End Date |
|---|---|
| Alberta | 8/27/2021 |
| BC | 8/27/2021 |
| Manitoba | 8/27/2021 |
| New Brunswick | 1/14/2022 |
| Nova Scotia | 1/14/2022 |
| NT | 1/14/2022 |
| Nunavut | 1/14/2022 |
| Ontario | 1/14/2022 |
| PEI | 1/14/2022 |
| Quebec | 1/14/2022 |
| Saskatchewan | 8/27/2021 |
| Yukon | 1/14/2022 |

111. Accordingly, licence winners in the upcoming 600 MHz auction will not be able to put the spectrum licences that they have won into use for up to 2.5 years from the time when they will have to make their final payments of the auction proceeds to the Department.

112. While it is reasonable for licence winners to pay an initial 50% instalment of their final payments within 10 days of the announcement of provisional licence winners, Shaw would propose that licence winners should not have to pay the remaining 50% until such time as the spectrum in the applicable Tier 2 region is fully available to be put into use for revenue-generating commercial mobile services. In order to provide the necessary assurances to ISED that payment will ultimately be received, a key component of Shaw's alternative proposal is that provisional licence winners

58 ISED, *Digital Television (DTV) Transition Schedule,* April 2017, Annex A < online: https://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/DTV-transition-schedule2017.pdf/$FILE/DTV-transition-schedule2017.pdf >.

would need to secure any outstanding balance by providing ISED with an irrevocable letter of credit that covers the amount of the outstanding balance.

113. It is not appropriate in this instance to follow the Department's usual practices with respect to the payment of the auction proceeds given the fact that the spectrum being auctioned is heavily encumbered and unusable for commercial mobile services until well after the auction. This unique set of circumstances requires a modified approach to the payment of auction proceeds and spectrum licence fees, as suggested above by Shaw.

### L. Q16 – Licence Renewal Process

| |
|---|
| **Q16—ISED is seeking comments on the proposed renewal process for spectrum licences in the 600 MHz band.** |

114. Shaw has no comments on the proposed renewal process at this time.

## V. CONCLUSION

115. We are at a critical juncture in the evolution of the mobile wireless market in Canada. Shaw and other new competitors are investing and innovating to catch up to the national incumbents in every aspect of the roll-out of their networks. However, sustainable competition will only be attainable if we can balance access to low-frequency spectrum that is essential for network coverage.

116. As has already been noted by the Competition Bureau, the CRTC and ISED, and as supported by empirical evidence, the benefits to consumers in terms of innovation, consumer choice and competitive prices are starting to emerge in Canada's mobile market. The fact that new facilities-based competitors have achieved this almost exclusively with higher-frequency spectrum speaks to their potential.

117. Of the many barriers to realizing the full potential of sustainable competition in the market, one of the most critical is the severe deficiency in low-frequency spectrum available to new competitors. This low-frequency spectrum is essential to efficient and cost-effective deployment by any mobile wireless carrier, particularly in a sparsely populated country like Canada, but it is especially important to new network builders, such as Shaw. Spectrum is a finite resource managed by ISED in the public interest, which demands that new competitors gain access to sufficient amounts of this valuable low-frequency spectrum to compete.

118. Enabling new competitors like Shaw to access sufficient low-frequency spectrum, through a 40 MHz set-aside with appropriate eligibility criteria, will help us reach our goal of bringing world-leading mobile connectivity to Canadians through a competitive marketplace. This auction

represents a rare opportunity to help drive a sustainable competitive dynamic that will deliver the benefits of innovation and choice at affordable prices to all Canadians for the long-term, while providing the infrastructure foundation for Canada's growth, competitiveness and the innovation economy.

*** End of document ***

# The Critical Importance of the Set-aside in the Canadian 600 MHz Auction

Peter Cramton[1]

2 October 2017

## Summary

I have been asked by Shaw Communications Inc., and its affiliate Freedom Mobile Inc., to comment on the use of set-asides in the upcoming 600 MHz spectrum auction to be undertaken in Canada by the Ministry of Innovation, Science and Economic Development (ISED). I focus on the rationale for set-asides, the suitability of set-asides in Canada's 600 MHz auction, and the overall experience with set-asides and other pro-competitive measures from other spectrum auctions. My comments are based on my review of Notice SLPB-005-17 in which ISED outlines the proposed auction policy framework and design. My comments are also based on twenty-five years of experience designing and implementing spectrum auctions for governments around the world, as well as my experience advising bidders in over forty major spectrum auctions. This is a topic I have studied extensively in many countries including Canada, the United Kingdom, and the United States. Indeed, this paper is based in part on a similar analysis that I did in advance of the U.S. 700 MHz auction (Cramton 2013b).

Well-crafted set-asides can increase competition both in the market for mobile broadband services and in the spectrum auctions in which they are applied. The increased competition leads to consumer benefits such as increased innovation, accelerated deployment of advanced mobile services, and expanded consumer choice. It also can lead to improved auction efficiency and higher auction revenues (Cramton 2000).

Regulators commonly use set-asides to encourage competition (Cramton et al. 2011). There are many instances where the set-asides have been effective at increasing competition in the market for mobile services and in the auction (Ayres and Cramton 1996; Arthur D. Little 2009; Cave and Web 2013). The U.S. PCS auctions of 1994-96 are a vivid example. Set-asides in these auctions led to robust competition, innovative services, and rapid price declines (FCC 1999). In recent auctions, for example in the 4G spectrum auctions in Europe, regulators have especially focused on set-asides with respect to low-band—below 1 GHz—spectrum (Cave and Webb 2013). There is little evidence that these set-asides have harmed auction revenue (Binmore and Klemperer 2001; Grimm et al. 2001).

The market structure for mobile services in Canada, with Rogers, Bell, and Telus commanding a 90% market share of subscribers and a 92% market share of revenues (CRTC 2016), is such that, in the 600 MHz auction, ISED should include a significant set-aside for eligible carriers that are not dominant incumbents. The set-aside should exclude the major nationwide incumbents (Bell, Telus, and Rogers). As has been

[1] Professor of Economics, University of Maryland and University of Cologne, www.cramton.umd.edu. Since 1983, Peter Cramton has conducted research on market design; he has applied that research to design auction-based markets of radio spectrum, electricity, financial securities, and other products. I have written many widely-cited practical papers on spectrum auctions and competition policy available at https://goo.gl/hFbkMx. I thank Freedom Mobile for funding this research.

demonstrated repeatedly in spectrum auctions in many countries, including Canada, the United States and the United Kingdom, a set-aside is a powerful and effective instrument to encourage competition and innovation in a concentrated wireless market.

To be most effective, the set-aside should be substantial in size—ideally four of the seven 600 MHz blocks—and restricted to facilities-based bidders, excluding the major nationwide incumbents. Such a set-aside will motivate participation from smaller regional providers. This will have two important impacts: 1) it will make the auction much more competitive, thereby improving the efficiency of the auction outcome (as well as revenues), and 2) it will make the downstream market for mobile broadband more competitive. The set-aside will expand the coverage and increase the capacity of facilities-based network providers beyond those of Rogers, Bell and Telus.

A large set-aside is prudent in Canada's 600 MHz auction because:

- Mobile broadband is highly concentrated with many regions having access from only one or two networks. This absence of network competition leads to high prices and low innovation. A set-aside directly addresses the limited competition.
- The low-band spectrum is highly concentrated. Rogers, Bell and Telus hold more than 90 percent of the low-band spectrum. Low-band spectrum is critical for coverage, both within buildings and in less densely populated areas. Consumers value coverage. Thus, absent a set-aside the major incumbents may attempt to foreclose competition in the mobile broadband market by limiting the blocks won by smaller providers.
- The proposed auction design with package bidding favors those bidding for large packages of licences, making it easier for the major incumbents to foreclose competition absent a set-aside. A significant set-aside eliminates the possibility of foreclosure, and thereby improves both auction efficiency and competition in the downstream market for mobile broadband services.

Such a set-aside is consistent with ISED's design objectives. ISED's goals for the auction are: 1) to foster innovation and investment; 2) to support sustained competition, so that consumers and businesses benefit from greater choice; and 3) to facilitate deployment and timely availability of services across the country, including rural areas (ISED 2017). A 40-MHz set-aside will encourage new competitors to invest, promoting both competition and innovation for the benefit of all Canadians.

## Rationale for set-asides

Spectrum is an essential input in the provision of wireless services (US DOJ 2013). Excessive concentration of this essential input undermines competition for wireless services, harming consumers. Set-asides can prevent excessive concentration of spectrum. This is the primary motivation for set-asides.

Critics of set-asides argue that the set-asides harm both auction efficiency and revenues, and ultimately are unsuccessful in promoting competition (Earle and Sosa 2013). Set-asides, if unsuited to the setting, may have these undesirable effects, but regulators can and often do design the set-asides to enhance competition and improve auction efficiency and revenues (Cramton 2002; Cramton et al. 2011).

At first glance, it may seem that a set-aside necessarily reduces auction revenues. Excluding the dominant incumbents from bidding on the set-aside block means that demand from the dominant incumbents may be reduced from what it would be absent the set-aside. Doesn't this reduced demand imply lower auction revenues? The answer would be yes, but for a countervailing force that often is decisive: the set-aside can motivate participation in the auction and thereby increase auction revenues. Auction revenues are quite sensitive to the level of competition. Adding one or more bidders can have a pronounced impact in increasing revenues.

For purposes of illustrating this dynamic, suppose there are two incumbents in a symmetric duopoly.[2] A spectrum auction creates the possibility that entry will occur and disrupt the duopoly. But the duopolists have a strong incentive to bid aggressively in the auction and acquire the entire award. Doing so prevents entry and preserves the higher duopoly profits. Potential entrants who anticipate this outcome will choose not to participate in the auction and avoid significant participation costs. As a result, only the two incumbents compete and they can coordinate to split the spectrum equally. The auction ends near the reserve price—well below the competitive price. This outcome is seen in practice, for example the 1999 German spectrum auction with two incumbents (Grimm, et al. 2003) and the 2012 Thailand 3G auction with three incumbents. In Thailand, the three incumbents each won one license and paid 2.8% above the reserve price, illustrating that the same low-price outcome may occur with three major incumbents.

Now suppose the regulator imposed a set-aside that prevented the duopolists from winning the entire award. This fundamentally alters the participation decision. New entrants know that at least one new entrant must be successful. This certainty motivates participation. The strongest entrants decide to participate, and the auction becomes more competitive with an expanded set of bidders.

The set-aside can also enhance auction efficiency. More societal value may come from awarding a newer entrant, rather than a dominant incumbent, a spectrum lot. Yet in an auction without set-asides, the incumbent may nevertheless win. The reason is that the incumbent's value is inflated by the benefits it enjoys from reduced competition in the wireless market in the event the entrant fails to acquire spectrum. The set-aside lets the incumbent win some spectrum, but not so much that competition for wireless services is harmed.

These arguments certainly do not imply that set-asides necessarily improve auction outcomes. Excessive set-asides without other eligibility constraints may allocate spectrum to less efficient providers who are unable to build out their spectrum, provide services, or increase competitive pressures (Cramton et al. 2011). The conclusion instead is that the regulator must carefully design set-asides to best achieve the auction objectives. Set-asides may be undesirable in settings with robust competition and little spectrum concentration; however, set-asides are desirable in settings with concentrated markets and concentrated spectrum holdings. The circumstances in which the Canadian 600 MHz spectrum auction will be held is certainly one where both market share and low-band spectrum holdings are highly concentrated.

[2] This example would also apply in other market structures exhibiting high concentration.

## Set-asides in the Canadian 600 MHz auction

The Canadian mobile market consists of three national carriers (Rogers, Bell and Telus) with regional carriers serving a small segment of the market. The market is highly concentrated. Rogers, Bell and Telus have a 90% subscriber market share and a 92% revenue market share (CRTC 2016). Several regional carriers serve the remaining 10% of subscribers, who are further challenged from a lack of low-band spectrum—the dominant incumbents hold more than 90% of the low-band spectrum.

Low-band spectrum is essential for providing coverage in an economically efficient way. This is especially important in Canada, where coverage is an important challenge, given its vast geographic area. Consumers value both coverage and capacity. Coverage is what enables communications. A smart phone is an expensive paperweight in areas without coverage. Capacity is a key measure of the quality of service in areas with coverage—this is measured with data rates (megabits per second). A second measure of quality is latency (milliseconds)—how long it takes to initiate communications. In areas without coverage, latency is infinite.

Low-band (sub-1GHz) spectrum is best for coverage because of its propagation characteristics that enable signals to travel further, penetrate buildings and bend around obstructions. As a result, low-band spectrum provides the foundation of coverage on which capacity can be built. This is true regardless of wireless generation—3G, 4G, and 5G are all best-served with a foundation of low-band spectrum.

Importantly, the demand for low-band spectrum does not scale with market share. Once you have sufficient low-band spectrum to provide coverage and some minimum level of capacity, higher levels of capacity are best obtained with mid-band and high-band spectrum. This is especially true in more densely populated regions where most wireless revenues are generated. In these areas, the carrier can economically build a denser network that makes best use of mid- and high-band spectrum.

This basic result of physics and economics is why in the U.S. 600 MHz auction demand from the dominant incumbents (AT&T and Verizon) was nearly zero. Verizon never placed a bid in the auction. AT&T won little and bid in a way that suggested they did not want what they won even though prices were much lower than the prices in the earlier AWS-3 auction. Most recently, AT&T is in negotiations with Dish to transfer all its 600 MHz winnings to Dish (Piecyk 2017). This would leave both AT&T and Verizon with zero MHz from the U.S. 600 MHz auction. AT&T and Verizon's exit from the U.S. 600 MHz auction stems from the underlying economics and physics of mobile broadband and the fact that both carriers entered the auction with the substantial low-band spectrum.

Given this near-zero economic demand for the U.S. 600 MHz spectrum, why then did the dominant carriers lobby so strenuously against a set-aside for non-dominant incumbents? Because absent a set-aside AT&T and Verizon could have foreclosed competition. T-Mobile was desperate for low-band spectrum to overcome the large coverage advantage enjoyed by AT&T and Verizon. AT&T and Verizon were desperate to avoid competition from the disruptive T-Mobile, who already was making large inroads in acquiring subscribers at the expense of the Big Two. Thus, although the use-value of the 600 MHz spectrum was low for the Big Two, the foreclosure-value of the spectrum was high. This is why AT&T and Verizon feigned great interest in the 600 MHz spectrum only to effectively not show up at the auction. The FCC's wise decision to include a set-aside for non-dominant bidders prevented the foreclosure of competition by pushing T-Mobile aside in the auction. Because of the set-aside, T-Mobile and many others came to the auction loaded for bear and indeed won over 95% (price-weighted) of the spectrum. The set-aside played an essential role in preventing foreclosure by the dominant incumbents and thereby motivated much stronger participation from T-Mobile and others.

The economic setting of the Canadian 600 MHz auction is similar, with the exception that the competition problem is more severe in Canada, since the dominant incumbents command an even more dominant position in Canada both in terms of market share and low-band spectrum holdings. Absent a significant set-aside, foreclosure of competition would be likely—causing tremendous long-term harm to consumers.

The 600 MHz auction is a critical opportunity to strengthen competition, especially the relative disparity in newer entrants' low-band holdings. To avoid excessive concentration of low-band spectrum and motivate participation in the auction from the newer rivals, a significant set-aside is essential.

Well-crafted set-asides can enhance competition for wireless services and increase competition in the auction. The U.S. experience demonstrates these benefits. The PCS auction was a success in bringing fresh competition and innovation to the mobile marketplace. In its 1997 Report to Congress (FCC 1997) on the results of the PCS auctions, the FCC observed that fifty-three percent of the licenses awarded went to new entrants, which had the result of "improving wireless service at lower prices." The FCC also noted that because of the auctions, capital investment in wireless networks increased to $26.7 billion in 1996, up from just $12.8 billion in 1993, while the average cellular subscriber bill decreased 27 percent during the same period. By 1999, the date of the Commission's Fourth Report on Commercial Services (FCC 1999), PCS deployment had resulted in the expansion of the mobile market to include at least five mobile telephone providers in each of the thirty-five largest regions of the U.S., and at least three mobile providers in 97 of the 100 largest regions. Even a casual student of today's mobile marketplace can observe that the wireless providers born of the PCS auction, such as Sprint, Leap, MetroPCS, and T-Mobile remain active competitors today.

Well-crafted set-asides can enhance competition for wireless services and increase competition in the auction while generating little risk that the set-asides would adversely impact the auction outcome. In the Canadian setting, the potential regulatory risk comes from too small a set-aside that does not adequately motivate participation.

A set-aside of 40 MHz (four of the seven blocks) would be ideal in the Canadian 600 MHz auction. A 40-MHz set-aside maximizes participation and competition among non-dominant facilities-based carriers. It guarantees that at least one facilities-based carrier in each service area can obtain the spectrum needed to compete against the dominant incumbents. Such disruptive competition would create enormous social value.

A key advantage of the 40-MHz, rather than 30-MHz, set-aside is that it prevents the dominant incumbents from splitting the non-set-aside blocks, (2-2 between Rogers on the one hand and Bell/Telus, who have an extensive spectrum sharing agreement, on the other hand), at low prices, as we have observed in other auctions (Ausubel et al.; Grimm et al. 2003). With only 30-MHz available for the dominant incumbents, if they choose to compete for more low-band spectrum, they must fight to determine who gets more, since the only possibilities for the dominant incumbents is 2-1, 2-0, 1-1, 1-0, 0-0, and the reverse.

## Experience with set-asides

The regulator faces difficult tradeoffs in designing set-asides. Fortunately, the regulator can draw on experience with set-asides over the last twenty years in spectrum auctions worldwide.

One of the important early uses of set-asides was in the U.S. PCS auctions from 1994 to 1996 (Arthur D. Little (2009). At the time of the first PCS spectrum auction, the market structure was quite close to the duopoly example above—in every region of the country there were two cellular carriers, each with one-half of the available spectrum (Cramton 1997). Were the PCS auctions conducted without set-asides, the outcome likely would have been much less competitive. The set-aside implied that there would be at least five spectrum holders in each market. The set-aside motivated robust competition both in the auctions and in the market for wireless services (Cramton et al. 2011). The market experienced rapid innovation and U.S. consumers enjoyed better services and lower prices. This progress is well-documented in the FCC's annual reports on wireless competition from 1995 to 2003. However, since the elimination of spectrum caps in 2003—which ended effective set-asides—market concentration has increased (Cramton et al. 2007).

The PCS auctions also revealed that some policies distinct from the set-asides were mistakes. The largest mistake was providing small businesses with excessively attractive installment payment terms (Cramton 2000). This policy led to rampant speculative bidding. Most of the winners defaulted on payments and many of the spectrum licenses got tied up in bankruptcy court. The FCC learned from this mistake. Installment payments to encourage small players to participate in auctions were dropped from consideration in future auctions. Some critics point to this experience as a reason to avoid set-asides (Earle and Sosa 2013), but the mistake with installment payments has nothing to do with the successful policy of set-asides.

Nearly all the European spectrum auctions had set-asides or spectrum caps (Cave and Web 2013). My overall assessment is that the set-asides often were effective in promoting competition both in the auction and in the market for wireless services. I discuss below some relevant examples.

The United Kingdom 3G auction of 2000 illustrates well how the auction framework can enhance competition (Börgers and Dustmann 2002). The regulator packaged the 3G spectrum into five licenses, two large licenses and three smaller licenses. No bidder could win more than one license (Cramton et al. 2011). The incentive for entry was further strengthened by designating one of the two large licenses for a new entrant (Binmore and Klemperer 2001). This structure provided strong motivation for new entrants to participate. In fact, thirteen bidders including nine potential entrants competed in the auction.

Strictly in terms of revenues produced, the U.K. 3G auction experience contradicts claims that pro-competitive instruments reduce auction revenues. On the contrary, the U.K. case illustrates the role that these instruments can play in enhancing revenues by motivating participation and thereby encouraging auction competition. Had the regulator instead designed the auction without such instruments, then I would expect the outcome to be dramatically different, including a significant possibility of no participation by newer players and the auction quickly concluding at low prices with the two large carriers each winning a large license and the two smaller carriers each winning a smaller license, much like in the duopoly example. In this low-revenue outcome, the ability of the large incumbents to bid for multiple licenses is what can keep the smaller incumbents from bidding on the large licenses, since the smaller incumbents are then vulnerable to retaliation should they bid for the large licenses.

In addition to the record-setting auction revenues, the U.K. 3G auction gave rise to the operator "3," which has had a disruptive influence on pricing, service, and innovation in the market (Cave and Webb 2013). 3UK was the first operator to roll out 3G in the U.K. and it pioneered video telephony and video download. It was also the first operator to offer unlimited data and the first to offer MiFi capability.

The German 3G auction came shortly after the U.K. 3G auction. The regulator chose the same 2x15 MHz in-auction-spectrum-cap, but the available spectrum was split into twelve 2x5 MHz lots. A bidder could win either two or three lots, which meant that there would be between four and six winners. Two outcomes appeared especially likely: (1) five winners with the two larger incumbents each winning three lots and (2) six winners with each winning two lots, including two new entrants (Grimm et al. 2001). In the case of this German auction, the pro-competitive instrument likely motivated the participation of three strong new entrants and that participation made for a highly competitive auction. The prices paid in the auction, and the ultimate failure of the new entrants that won licenses in this this auction, have been used to criticize pro-competitive measures in auction design (Earle and Sosa 2013). However, this criticism is flawed. The ultimate failure of the new entrants from Germany's 3G auction rested on the entrants assigning too high a value to be a new entrant in a six-carrier German market, in part because of continued fallout from the dot com bubble, not from the fact that a pro-competitive measure was used.[3]

In the Canadian AWS-1 auction of 2008, Industry Canada set aside 40 MHz of AWS-1 spectrum exclusively for new entrants. Critically, the Canadian AWS-1 auction has resulted in reinvigorated challengers, Freedom Mobile—formerly Wind Mobile—Eastlink and Videotron, to the three Canadian incumbents. Together, these competitors have over two million subscribers, serving a small but significant share of Canadians and starting to provide disruptive competition. (Disclosure: Freedom Mobile funded this research.)

Furthermore, the set-asides motivated several new entrants to participate in the auction. The result was a highly competitive auction that generated $4.25 billion in revenue, nearly three times initial revenue expectations. Canada represents another clear case where the set-aside for new entrants can increase auction revenues (Hyndman and Parmeter 2015).

[3] Given the experience of the German 3G auction and the subsequent bursting of the dot com bubble, it is not surprising that the Austrian 3G auction had a much different outcome despite having essentially the same market and auction structure (12 lots with a 3-lot limit). The government set a low reserve price that was one-eighth of the reserve set in the German auction, and the auction ended quickly with each of the six bidders winning two lots (Klemperer 2002). With only six bidders, this low-price equilibrium was focal. The two strongest incumbents knew that they could end the auction quickly by reducing demand from three lots to two lots early in the auction, while trying for a third lot would require much higher bidding to drive out another bidder. The incumbents therefore did not bid at their limits and so this low-price outcome with six winners had nothing to do with the set-asides.

The most recent wave of spectrum auctions was the 4G auctions in Europe and elsewhere beginning in Germany in 2010. These typically were multiband auctions involving both low-band (below 1 GHz) and high-band (above 1 GHz) spectrum (GSMA 2012).

To provide service in a market, carriers require a portfolio of spectrum together with network infrastructure (cell sites, backhaul, etc.) that provides both coverage and capacity. Low-band spectrum has propagation characteristics that make it ideally suited to provide coverage in less populated areas as well as within buildings. High-band spectrum is better suited to provide capacity in more densely populated areas.

Low-band spectrum is especially scarce and as such regulators are concerned that excessive concentration of the low-band spectrum may adversely impact competition for wireless services (Cave and Web 2013). For this reason, regulators typically have in-auction-spectrum-caps or set-asides for low-band spectrum in the recent auctions. Low-band auction prices were high in several countries despite these pro-competition instruments, for example in Germany and Italy. In many countries, a combinatorial clock auction was used, which does not give prices for individual lots. The U.K. 4G auction included both low-band in-auction-spectrum-caps and a spectrum floor that guaranteed that at least four companies would win a sufficient portfolio of spectrum for effective operation in the U.K. wireless market (Myers 2013).

Earle and Sosa (2013) argue that set-asides ultimately have been ineffective in increasing the number of competitors in a market and therefore set-asides are both ineffective and costly. I disagree. Set-asides have played an essential role in creating competition and fostering innovation in wireless communication. Moreover, the evidence suggests that the impact on auction revenues has generally been positive, not negative. While it is true that there has been some consolidation in recent years as the wireless industry has matured, this is a natural tendency in most industries. The process of competition inevitably involves entry of some companies who succeed and grow and other companies who fail and exit or merge with successful rivals. As the industry matures, entry and exit become less common. The competition shifts to fights over market share. In these more mature markets, set-asides still have a role in avoiding excessive concentration.

## Conclusion

Recognizing market concentration in the mobile wireless marketplace, ISED has recommended a set-aside for eligible carriers that are not dominant incumbents. Such a set-aside is essential to the success of the auction, especially one that utilizes package bidding. A package auction without a set-aside would let the dominant incumbents foreclose competition; indeed, I would be shocked if such an outcome did not occur. By contrast, a package auction with a significant set aside prevents the foreclosure of competition, and thereby improves auction efficiency and promotes long-run facilities-based competition, consistent with ISED objectives.

A set-aside of 40 MHz (four of the seven blocks) would be ideal in the setting of the Canadian 600 MHz auction. A 40-MHz set-aside maximizes participation and competition among non-dominant facilities-based carriers. It guarantees that at least one new facilities-based carrier in each service area can obtain the spectrum necessary to compete against the dominant incumbents. A key advantage of the 40-MHz set-aside is that it prevents the dominant incumbents from splitting the non-set-aside blocks, 2-2 (Rogers-Bell/Telus), at low prices.

Experience from around the world shows that set-asides, when properly applied, are an effective tool for promoting competition and social welfare. In the Canadian 600 MHz auction, a significant set-aside is essential. Encouraging participation with a significant set-aside, ideally 40 MHz—four of the seven blocks—is by far the most important design feature of the 600 MHz auction in achieving ISED goals for the benefit of Canadians.

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This is **Exhibit "94"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

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May 15, 2019

**Filed Via GCKey**
CRTC File No: 1011-NOC2019-0057

Mr. Claude Doucet
Secretary General
Canadian Radio-television and
Telecommunications Commission
1 Promenade du Portage
Ottawa, ON K1A 0N2

Dear Mr. Doucet:

**RE: Telecom Notice of Consultation CRTC 2019-57 - Review of mobile wireless services: Comments**

1. Pursuant to Paragraph 54 in the above noted Proceeding, Rogers Communications Canada Inc. ("Rogers") hereby files its intervention.
2. In addition to the intervention, please also find attached two pieces of supporting evidence:
    a. The report of Mr. Jeff Hunter of IMOBIX on mobile virtual network operators in the United States (Appendix 1); and
    b. The report of Mr. Richard Feasey on mobile virtual network operators in Europe (Appendix 2).
3. With reference to paragraph 55 of the Telecom Notice of Consultation CRTC 2019-57, *Review of mobile wireless services*, and in accordance with Section 26 of the Rules of Practice and Procedure, Rogers advises that it wishes to appear at the public hearing starting on January 13, 2020.
4. If you have any questions, feel free to contact the undersigned.

Yours very truly,

David Watt

David Watt
Senior Vice President – Regulatory

Attachs.

# Telecom Notice of Consultation CRTC 2019-57

Review of Mobile Wireless Services

**Rogers Communications Canada Inc. (“Rogers”)**

**Intervention**

**May 15, 2019**

## Executive Summary

ES-1. The Commission has initiated this proceeding to review the state of competition in the Canadian mobile wireless services market, to consider whether to mandate wholesale MVNO access, and to identify barriers to the deployment of infrastructure that will enable the next generation of mobile wireless services.

ES-2. With the onset of fifth generation wireless networks (or "5G"), which will transform the wireless industry, the Commission should not reverse its longstanding policy of facilities-based competition and mandate access for mobile virtual network operators ("MVNOs"). Such a dramatic change would undermine the incentive to invest at the exact moment wireless carriers are planning to invest an unprecedented amount of capital. A mandated MVNO regime would jeopardize Canada's technological leadership just as the rest of the world is taking every measure possible to facilitate the launch of 5G service in their countries.

ES-3. Taking such a drastic regulatory measure is both unnecessary and unwarranted. The Canadian mobile wireless market is now more competitive than it was in 2015, when the Commission last considered and decided not to mandate wholesale MVNO access.

ES-4. Following sustained and deliberate policy efforts to increase facilities-based competition, there are now four strong and stable mobile wireless competitors in every province, providing Canadians with greater choice, better services, more value, and affordable prices. Four facilities-based competitors is identical to the United States and many other peer countries, and better than several other developed markets.

ES-5. The high level of competitive intensity and rivalry between Canada's mobile wireless carriers has led to falling prices, significant ongoing investment, world leading mobile broadband speeds, and ever-expanding mobile wireless coverage. These benefits are the result of a regulatory framework that has promoted facilities-based competition and ongoing investments in network infrastructure.

ES-6. The market shares of mobile wireless carriers vary significantly over time and from market to market and no single carrier has sufficient share to exercise market power in Canadian wireless markets. Promotional activity has also surged in recent years, increasing by a factor of four nationally since 2015. Competitors are constantly devising new initiatives to win customers from each other and to maintain the loyalty of their existing customers.

ES-7. Each year, based on statistics for the national service providers only, 3.3 million Canadians switch wireless providers. Regional carriers are now adding more than 25% of national net subscriber additions, ratcheting up the level of competitive intensity and confirming their strong and growing presence in highly dynamic markets. The regional carriers have now clearly staked out their position in the marketplace.

ES-8. Affordable pricing is available for all mobile wireless services and levels of consumer usage, in both postpaid and prepaid formats. New low-cost data-only price plans offering tremendous value have also recently been introduced that will enable more Canadians to participate and thrive in a digital economy.

ES-9. Rogers' wireless prices have declined by 60% since 2013 on a per gigabyte basis. Canada's wireless prices are lower than, or similar to, prices in the United States for five of six service baskets, despite the fact that Canadian service providers must purchase their network equipment and handsets in US dollars. Canadian carriers are continuously offering better plans at lower prices.

ES-10. Canada's mobile broadband download speeds and quality exceed those of all other G7 countries and Australia, providing Canadians with LTE download speeds that are two times faster than speeds in the United States. Ongoing carrier investments have resulted in the deployment of LTE mobile broadband services that are available to 99% of the Canadian population. Canada's facilities-based wireless carriers invested nearly $70 billion in communications infrastructure between 1987 and April 2019, and invested more capital on a per subscriber basis in 2018 than their counterparts in the United States.

ES-11. The evidence demonstrates that the Canadian wireless market is vigorously competitive. The level of concentration in Canada's wireless markets is comparable to the United States and considerably lower than most other countries. Wireless consumers actively switch between service providers and carriers continuously invest to offer innovative new technologies and services to enhance their competitive position. There is no joint dominance, abuse of dominance, or refusal to deal that would justify regulatory intervention in the wholesale wireless market and mandated wholesale MVNO access. The federal government's fourth carrier policy has successfully increased the level of competitive intensity in the mobile wireless market, while simultaneously diminishing the opportunity for MVNOs in Canada.

ES-12. Despite Canada's impressive deployment of LTE mobile broadband services, massive generational investments are now required to successfully deploy advanced new 5$^{th}$ generation (5G) technology. 5G will drive innovation and efficiency, transform industries across all sectors, enable exciting new consumer applications, and enhance Canada's productivity and international competitiveness. As mentioned above, governments and regulators around the world are striving to lead in the development of 5G in order to seize its considerable advantages and benefits. To deliver on the promise of 5G, Canada's wireless carriers will need to make additional investments of approximately $26 billion between 2020 and 2026. This will only happen if they have a regulatory framework providing the correct incentives to encourage these investments.

ES-13. Wholesale MVNO access should not be mandated since it is unnecessary, its benefits are questionable, and it will undoubtedly undermine incentives to invest, jeopardizing the successful deployment of necessary 5G technology and its transformative benefits. It will harm the Canadian digital economy and Canada will fall behind.

ES-14. There is no evidence that MVNOs will reduce prices for consumers or that they will have a positive impact on investment or innovation in the market. The evidence of Mr. Richard Feasey explains that MVNOs operating in other jurisdictions have tended to focus their efforts on the more profitable segments of the market, such as business users, and have been shown to have no statistically significant impact on lowering prices. At the same time, it is generally recognized that mandated wholesale access has had a negative impact on investment levels in some European countries, both for facilities-based carriers and those that resell their networks. Because of this, European regulators have shifted their focus away from resale and MVNO competition and are seeking to promote facilities-based competition and investment in network infrastructure to encourage the development of 5G. Mr. Jeff Hunter points out in his evidence that investments made by MVNOs are "exponentially lower" than investments made by mobile wireless carriers.

ES-15. Mandated MVNO access will also harm the regional carriers and will undermine the federal government's fourth carrier policy. MVNOs will target the same market segments currently served by the regional carriers, reducing their ability to earn the returns necessary to offset the substantial investments they have made in acquiring spectrum and deploying their own networks. At the same time, mandated MVNO access will undermine the incentives for the regional carriers to continue to invest in the expansion of their networks. Rather than take the risk by expanding their coverage, the regional carriers will instead rely on mandated MVNO access to compete in the market.

ES-16. Very few countries have mandated wholesale MVNO access and no country has regulated the rates for this service. Typically MVNOs have only been mandated as a remedy for market consolidation in some European countries. The evidence of Mr. Hunter points to the fact that MVNO access and rates have never been mandated in the United States and that MVNOs and wireless carriers there negotiate mutually beneficial commercial arrangements. The evidence of Mr. Hunter indicates that there have been many MVNO failures in the United States and Mr. Feasey's evidence explains that the opportunities for MVNOs in other parts of the world appear to be flat or declining.

ES-17. The interests of Canadian wireless consumers are well protected by the Wireless Code and the mandatory participation of carriers in the Commission for Complaints for Telecom-television Services. Canada's mobile wireless carriers have invested in important enhancements that enable consumers to monitor their usage and avoid unexpected overage charges, and that provide convenient access and discounted pricing for Canadians with disabilities. Canada's telecommunications policy objectives are being met on the basis of the current regulatory framework which promotes investment and encourages facilities-based competition. Within this climate, Canada's mobile wireless carriers continuously invest to expand their networks and offer Canadians the most advanced new technologies and services at affordable prices. Narrowly focused intervention can address any demonstrated failure in the Canadian wireless market so that investment incentives can be sustained and lasting harm to Canada's mobile wireless leadership will be avoided. The existing and proposed Policy Directions also do not support regulation that would mandate MVNO access.

ES-18. Mandated wholesale roaming positively supports the level of competition in the market today and the policy framework should remain unchanged. Mandated roaming allows mobile wireless carriers to offer national coverage to their customers while they continue to expand their own network coverage in an orderly manner.

ES-19. If Canada is to become an innovation leader, the Commission and ISED must take a holistic approach to 5G. Access to spectrum is essential, but equally important is access to infrastructure. All mobile wireless carriers must have equal access to rights-of-way and passive infrastructure in order to successfully deploy 5G small cells, antennas, fibre and wires so that they can compete effectively in the provision of 5G services. Canadians will derive the most enduring benefits from the deployment of multiple competing 5G networks.

ES-20. Access to rights-of-way and passive infrastructure must be provided on the basis of reasonable and economical rates. The successful deployment of 5G networks is too strategic to be held hostage by utilities and other public infrastructure owners who seek to extract exorbitant fees in the interest of their particular constituents.

ES-21. Federal, provincial, and municipal impediments to the deployment of 5G infrastructure must be eliminated and policies and processes must be created to foster rather than hinder 5G infrastructure deployment. Mobile wireless carriers must be provided with timely access to underlying infrastructure so that 5G networks can be deployed as expeditiously as possible.

ES-22. The Commission should therefore take this opportunity to facilitate the deployment of 5G rather than stifle it. Mandating MVNO access will unquestionably damage and delay the roll-out of 5G in Canada. Improving access to infrastructure however will enable wireless carriers to rapidly deliver the next generation of wireless services and maintain Canadian competitiveness.

# Table of Contents

## Introduction

1. Rogers Communications Canada Inc. ("Rogers") is pleased to provide the Canadian Radio-television and Telecommunications Commission ("the Commission") with our comments on the important issues raised in Telecom Notice of Consultation CRTC 2019-57 (TNC 2019-57 or the "Notice"), followed by our answers to the specific questions posed by the Commission in the Notice.

2. This review comes at a pivotal juncture in the Canadian wireless industry. Carriers are poised to make a generational investment in the next level of wireless technology – 5G. 5G will genuinely transform how Canadians work, study, and play. It will support data communications at blazing speeds and exceedingly low latency to millions of devices in a blink of an eye. Unlike current wireless technology, 5G is flexible, permitting customized services for varying uses ranging from e-medicine to monitoring moisture levels on farms to playing virtual reality games. Simply put, 5G will unlock new opportunities in every sector of the Canadian economy. That is why every country in the world is rushing to become a leader in this exciting digital frontier. Canada cannot afford to be left behind. The digital economy in Canada and the ability to compete both at home and abroad depends on deployment of advanced, competing 5G infrastructure.

3. It is therefore crucial that the Canadian government and the Commission ensure the proper regulatory environment exists to foster Canadian leadership in 5G. It is a testament to Canada's current telecommunications policy, founded on promoting facilities-based competition, that Canadians enjoy among the most advanced wireless networks in the world. Despite our challenging geography and climate, approximately 99% of Canadians have access to Long-Term Evolution (LTE), and 92% have access to LTE-Advanced (LTE-A), the current leading wireless technology. Carriers recognize the need and benefit to continuously invest in their networks, providing their customers, both consumers and businesses, with the latest devices, services and features.

4. Dramatically changing Canada's telecom policy by mandating access by mobile virtual network operators ("MVNOs") to the physical networks of the country's national wireless service providers will jeopardize these capital investments at the most inopportune time. MVNOs do not make material investments or lead innovation. On the contrary, they undermine the incentive for carriers who do invest to continue to do so. Why build when you can rent? Why take a risk when there will be no reward? Mandated MVNOs will fundamentally change the economics of investment and cause every facilities-based carrier to rethink their 5G plans.

5. That is why so few countries in the world have mandated MVNOs and no country has regulated MVNO rates. The impact on investment can be profound. At the same time, the impact of MVNOs on pricing is questionable. In fact, there is no evidence that MVNOs have had any significant impact on retail prices in other countries. Many MVNOs in fact target the most lucrative segments of the market. Those MVNOs who do focus on lower prices generally do not survive. Thus, while Rogers supports the Government's policy objective of affordability, mandating MVNOs will not accomplish this goal.

Mandating MVNOs will throttle the wireless market rather than enable it at the very time that it is imperative to facilitate and maintain the incentives for Canada's national and regional carriers to deploy 5G networks.

6. Moreover, none of the prerequisites to regulatory intervention, in the form of mandated wholesale MVNO access, are satisfied. Retail wireless markets are intensely competitive, and this intensity has only increased with the entrenchment of strong regional wireless competitors in all parts of Canada. The absence of mandated MNVO services cannot, in these circumstances, be found to result in a substantial lessening of competition. Several MVNO arrangements have also been negotiated on commercial terms. An MVNO could replicate a national network by entering into resale arrangements with multiple regional carriers. Customers of MVNOs that enter into arrangements with a regional carrier are entitled to roam nationally. For these reasons alone, no individual carrier has market power and national carriers have no ability to exercise collective dominance in the provision of wholesale MVNO services, another pre-condition to regulatory intervention.

7. The Commission should therefore maintain its longstanding policy of facilities-based competition and not mandate MVNOs. It should not mandate access to the networks built by those prepared to invest to those who invest nothing.

8. This paper will explain how the Canadian wireless market is robustly competitive, delivering tremendous value to its customers. It will further illustrate how well Canada compares, in technology, quality and affordability, against the rest of the world. The international experience with MVNOs will also be explored, particularly how regulators in the United States (U.S.) and Europe have generally refrained from regulating MVNOs in large part because of their negative impact on investment. The magnitude and importance of 5G deployments to Canada, and the negative impact of mandated MVNOs on this investment will also be detailed. Finally, we will explain how rather than inhibiting investment in 5G, the Commission should be facilitating it by easing access to infrastructure. This kind of progressive regulatory environment is essential if Canadian wireless service providers are to continue delivering the highest quality advanced wireless services in the world and to maintain and grow Canada's competitiveness in the 5G digital economy.

## The Current Status and the Future of Wireless in Canada

9. This proceeding is being convened at a critical time in the evolution of the Canadian telecommunications industry and Canada's digital economy. The wireless industry is about to embark on 5G, the single biggest network development since the industry began in the early 1980s.

10. 5G will be transformative. It will enable new applications for business in every sector of our economy and make faster and more innovative services available to consumers. Beyond enhanced speeds, it will open up a new frontier in machine-to-machine (M2M)

and 'Internet of things' (IoT) applications. Through a combination of ultra-low latency and high bandwidth connectivity, 5G networks will enable applications such as autonomous driving, remote industrial drone piloting, autonomous robotics and artificial intelligence.

11. 5G and the Canadian digital economy hinge on massive investments being made by wireless carriers over the next several years. It is estimated that between 2020 and 2026 approximately $26 billion in incremental investment by wireless carriers will be required to deliver on the promise of 5G.[1]

12. The anticipated benefits of this investment are enormous with $40 billion per annum in additional gross domestic product (GDP) projected by 2026 and 250,000 new jobs in the digital sector of the economy. Statistics Canada recently reported that Canada's digital economy is growing much faster than the rest of the economy and is already bigger than staple industries such as mining, forestry and oil and gas. Statistics Canada calculates that as of 2017, the digital economy was worth nearly $110 billion or 5.5% of the entire Canadian economy that year.[2]

13. With growth between 2010 and 2017 that outpaced the rest of the economy, Canada's digital economy, powered by 5G, can be expected to continue to fuel the Canadian economy as a whole in an ever-increasing way.

14. All of the world's developed economies recognize 5G's promise and are racing to be the first to build 5G networks and launch 5G services. They believe that this will guarantee their international competitiveness. Canadian wireless carriers know that they are at the centre of this crucial development, but they also know that they will have to shoulder much of the investment burden of getting to the finish line. This will only happen if they have the correct incentives to make the massive investments necessary.

15. It is at this juncture that the Commission has launched this Notice. This proceeding, which is examining whether the Commission should mandate MVNO resale of wireless services, has the potential to seriously undermine the incentive of wireless carriers to make the very large investments necessary for Canada's digital economy to reap the economic and social benefits possible through 5G.

16. In the Notice, the Commission indicated that it has changed its view expressed in a number of prior proceedings that MVNO competition would negatively impact investment in new facilities. It now holds the preliminary view that it would be appropriate to mandate that the national wireless carriers provide wholesale MVNO access as an outcome of this proceeding. In support of this preliminary view the Commission has reasoned that:

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[1] Accenture, *Fuel for Innovation – Canada's Path in the Race to 5G, June 2018*. Available: https://www.5gcc.ca/wp-content/uploads/2018/06/CWTA-Accenture-Whitepaper-5G-Economic-Impact_Updates_WEB_06-19-2018.pdf

[2] Statistics Canada, *Measuring digital economic activities in Canada: initial estimates*. Available: https://www150.statcan.gc.ca/n1/pub/13-605-x/2019001/article/00002-eng.htm

> *…The Commission considers that, on balance, it is likely that the benefits that a well-developed MVNO market would deliver to Canadians are now more likely to outweigh any negative impacts that a policy of mandated wholesale MVNO access might have on wireless carriers' network investments, particularly given the extensive investments that have been made in recent years. Further, properly structured rates, terms, and conditions should further mitigate potential negative impacts on future investments.*[3]

17. Rogers does not know how the Commission can make this statement in the face of the investment that the wireless carriers are facing to roll-out 5G networks and services over the next few years. As indicated above, this is the single biggest investment ever faced by carriers. The investments referred to by the Commission in the paragraph above were large - but they pale in comparison to what 5G will entail. They were also made in an environment in which the Commission's regulatory policy encouraged investment. The fact that LTE networks were built out to 99% of Canadians and LTE-A technology is available to 92% of Canadians is evidence that the Commission's prior decision not to mandate MVNO resale was the correct one. But the job is by no means finished. If those incentives are now removed at this critical juncture, it will undermine the investment climate for wireless carriers at precisely the time when the requirement for new investment in 5G is the greatest.

18. Beyond a new 5G deployment, service providers must continually invest in their existing LTE deployments in order to cope with the exponential growth of mobile wireless data. Without frequent capacity upgrades, networks will quickly become strained and congested, resulting in slower mobile broadband speeds. The Commission did not seem to consider this when entering into its preliminary decision.

19. The Commission should therefore take extreme care not to unintentionally undermine the current investment climate. It should avoid any regulatory measures that will jeopardize Canada's digital economy that will ride on 5G networks. As discussed below, the benefits from mandating MVNO resale are both small and uncertain, while the consequences of undermining the investment climate for 5G will have enormous implications for the Canadian digital economy and the Canadian economy in general.

20. As also discussed below, the Commission's "preliminary view" is inconsistent with regulatory practice elsewhere in the world among Canada's major trading partners. The U.S. has never mandated MVNO resale and the European countries that previously favoured MVNO competition have backed away from it. Deployment of advanced European networks lagged behind North American networks when spectrum regulators mandated MVNOs. Now European regulators are seeking to encourage facilities-based investment by carriers and are taking steps to facilitate investment in 5G by breaking down regulatory barriers, rather than by mandating MVNO resale. In Australia as well, the Australian Competition and Consumer Commission (ACCC) has completed a review

[3] TNC 2019-57, para. 39

of wireless wholesale markets and concluded that intervening in wireless wholesale markets risks undermining the incentive of carriers to invest.

21. The Commission's preliminary view is therefore out of step with other regulators in the U.S., Europe, and Australia. It is ill-conceived and will do more harm than good at a critical time when significantly more investment in facilities is required. What is clearly needed is a focus on facilities-based investment and on the steps that the Commission can take to facilitate the rollout of 5G.

## Canada's world-class wireless networks

22. The Canadian mobile wireless market is characterized by extensive geographic coverage and high-quality service.

23. While most Canadians live in large urban centres near our southern border, millions of Canadians live in rural and remote communities spread throughout the country, often with rugged terrain and separated by long distances. This makes deploying mobile wireless networks extremely challenging and expensive. It is a challenging environment for an industry that is heavily reliant on infrastructure spending. Yet Canada has some of the best wireless networks in the world thanks to continuous heavy investment.

24. This is a testament to Canadian wireless carriers. Despite the challenges faced by the industry, Canada's facilities-based wireless service providers have invested to provide 99% of Canadians with robust and reliable access to mobile wireless services at LTE speeds and more than 99% of Canadians with access at 3G speeds.[4] Thanks to sustained investment by carriers, LTE-A coverage has increased significantly from 83% of the population in 2016 to 92% in 2017.[5] This is a significant feat in a country as difficult to serve as Canada.

25. All of Canada's urban areas are well served. Mobile wireless carriers continue to expand their broadband networks to rural and remote areas of Canada. For example, in March 2019, Rogers announced a $100 million investment to bring mobile wireless service to over 1,000 km of unserved highways across Canada.[6] Other wireless carriers have announced similar initiatives in an effort to extend mobile wireless services deeper into rural and more remote areas. Additional expansion will be made possible with the assistance of the various federal, provincial, and municipal funding programs for the deployment of broadband services in rural and remote areas, as well as by the Commission's new Broadband Fund.

[4] CRTC CMR 2018, infographic 6.1.
[5] Ibid.
[6] Rogers news release, *Bringing new wireless coverage to over 1,000 kilometres of rural and remote corridors*, March 21, 2019. Available: https://about.rogers.com/2019/03/21/bringing-new-wireless-coverage-1000-kilometres-rural-remote-corridors/

26. Along with the incredible breadth of Canadian networks, the quality of the services delivered by the Canadian mobile wireless networks also rank among the highest in the world. Canadian consumers enjoy the fastest networks in the world. In fact, Canada leads its peer countries (G7 countries and Australia) in download speeds. Ookla, a mobile and broadband testing applications firm, has ranked Canada's overall mobile download speed to be the fastest for six consecutive months among this group, with a speed nearly twice that of the United States (U.S.).[7]

27. Recent crowd-sourced data on network performance and quality is also available from OpenSignal. It publishes country reports based on data gathered from actual users conducting real performance measurements across the major carriers in each country included. Each of these reports is based on measurements provided by thousands of devices of different types and vintages covering hundreds of thousands of measurements. The key findings include:

- LTE download speed consistency: Canada achieved the fastest LTE download speed during the typical slowest time of day compared to peer countries. Canada's speed is more than twice that of the U.S.[8]
- Download experience: Beyond consistently fast networks, recent reports show Canadian mobile wireless service providers achieve better results than those in the U.S. when it comes to download speed experience (LTE & 3G speeds combined), latency experience (LTE & 3G latency combined), and video experience (quality of mobile video streamed to devices, including video loading time, stalling during playback and the level of resolution supported).[9]
- The average download speed recorded by users in Canada was approximately 49 megabits per second (Mbps),[10] 31% faster than the average speed across the 10 countries that came in at 37 Mbps. The country with the second fastest download speed was Singapore at 47 Mbps, a densely populated country with a small geography, while the U.S. came in at 21 Mbps, less than half of the average speed in Canada, and Australia's average was 39 Mbps.[11]

[7] Ookla Speedtest Global Index.
[8] OpenSignal, *The 5G Opportunity*, Feb 2019.
[9] OpenSignal, *Mobile Network Experience Report Canada* Feb 2019, and *Mobile Network Experience Report U.S.* Jan 2019.
[10] OpenSignal, *Mobile Network Experience Report Canada* Feb 2019.
[11] Average speed per country calculated by taking a subscriber weighted average of the 4G speeds of each carrier, taken from country specific reports by Open Signal. Australia: Nov 2018, Canada: Feb 2019, Japan: April 2019, UK: April 2019, USA: Jan 2019, Singapore: Nov 2018, Belgium: March 2019, Germany: Oct 2018, Netherlands: March 2019, Spain: Feb 2019.

## The existing Canadian wireless industry drives investment, jobs, and innovation

28. Extensive geographic coverage and world leading network performance in a nation with the geography of Canada do not happen without significant on-going investment in network facilities. This level of capital intensity is necessary in the face of the rapid technological change that characterizes the wireless industry. While one new technology is being deployed, another is being developed. Continuous investment is the only way to deliver the latest generation of technology to Canadians.

29. The constant change in technology has resulted in related changes in consumer behaviour. As network and device technology has evolved, so did the way customers use them. Specifically, with the advent of smartphones, data consumption has exploded.

30. The CRTC Communications Monitoring Report for 2018 shows in figure 6.15 that average monthly data usage for subscribers with data plans increased by 47.3% from 2015 to 2017.[12] On a global basis, the latest Ericsson *Mobility Report* shows mobile data growing by close to 88% between Q4 2017 and Q4 2018.[13]

31. This phenomenon results in a constant need to expand network capacity, split cells, and build new tower sites and backhaul facilities. These requirements drive large capital budgets. Unless these investments continue to be made, networks will not be able to satisfy growing demand. There is virtually no spare capacity in the system. The process of network expansion is a continuous one.

32. These investments have made Canada one of the most intensive investors in telecommunications in the world. Including spectrum auctions and capital expenditures, Rogers alone invested approximately $30 billion between 1984 and 2019 to build its world-class wireless network. All together, Canada's facilities-based wireless carriers invested nearly $70 billion in communications infrastructure between 1987 and April 2019 (over $50 billion in capital expenditure with the remainder in spectrum auction costs).[14] When it comes to investment, Canada's facility-based carriers punch well above their weight, spending $95.77[15] per subscriber in capital expenditures in 2018, about $10 more per subscriber than wireless providers in the U.S. - our closest comparator. Canadian incumbent carriers have paid significantly higher spectrum costs at auction and annual spectrum fees than their international peers, in particular, American carriers.

33. These investments have made Canadian wireless mobile carriers major contributors to the Canadian economy. A recent report commissioned by the Canadian Wireless Telecommunications Association (CWTA) shows the significant positive economic

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[12] CRTC 2018 CMR, figure 6.15.
[13] Ericsson, *Mobility Report Q4 2018 update.* Available: https://www.ericsson.com/en/mobility-report/reports/q4-update-2018
[14] The CWTA, *Facts & Figures*. Available: https://www.cwta.ca/facts-figures/
[15] Analysis done with Bank of America Merrill Lynch Global Wireless Matrix April 30 2019 and Shaw 2018 Annual Financial Statement.

impact the industry makes when it comes to GDP, jobs and capital investment. The report also shows this impact has grown significantly on a year-over-year basis. Key findings in the report are:

- In 2017, Canada's wireless industry contributed $27.5 billion to the Canadian GDP, an increase of 9.1% from $25.21 billion in 2016.
- The wireless sector generated 151,550 full-time equivalent (FTE) jobs in 2017, including direct, indirect and induced effects – an increase of 13,500 FTEs or 9.8% from 2016.
- Canadian facilities-based network operators made capital investments in Canada's wireless infrastructure totaling $2.92 billion in 2017 – an increase of $0.34 billion or 13.2% from 2016.[16]

34. Rogers alone contributed $14 billion in economic value to the Canadian economy in 2018.[17] The company's activities generated a $20.4 billion total economic output footprint in the same year. Finally, Rogers either generated or supported almost 68,000 jobs in Canada in 2018.[18]

35. The impact of wireless investment on the Canadian economy is why it is so essential to maintain an effective regulatory regime. In addition to the direct benefits described above, the wireless sector plays a fundamental role in enabling just about every other sector in the economy. The Commission recognized the importance of preserving wireless investment when it declined to mandate MVNOs in its 2015 review of the wireless wholesale market.[19] It later upheld this principle when denying Ice Wireless' Sugar Mobile brand unfettered access to Rogers' network.[20]

## Key changes since the Commission's 2015 review are driving increasing competition

36. In Telecom Notice of Consultation CRTC 2014-76, *Review of Wholesale Mobile Wireless Services*, the Commission initiated a proceeding to determine whether the wholesale mobile wireless services market is sufficiently competitive and, if not, what regulatory measures are required. In its decision, Telecom Regulatory Policy CRTC 2015-177, *Regulatory Framework for Wholesale Mobile Wireless Services* (TRP 2015-177) the Commission found that wholesale roaming rates were not competitive and subsequently established tariffs for these services. However, while expressing some concern over the

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[16] The CWTA, *The Benefits of the Wireless Telecommunications Industry to the Canadian Economy in 2017.* Available: https://www.cwta.ca/wp-content/uploads/2019/03/2017-Report-on-Economic-Benefits-of-Canadian-Wireless-Industry-Final-....pdf
[17] Rogers news release*, Rogers contributed $14 billion to the Canadian economy in 2018*. Available: https://about.rogers.com/2019/01/24/rogers-contributed-14-billion-canadian-economy-2018/
[18] Rogers corporate social responsibility report. Available: https://about.rogers.com/responsibility/economy-society/
[19] TRP 2015-177, para. 122.
[20] TD 2017-57.

market for MVNOs, the Commission determined that any regulatory intervention would negatively impact investment.

37. Since that decision, a number of significant changes have occurred in the mobile wireless market that have stimulated more competition in the Canadian wireless industry and improved affordability for consumers. These include new entry into the market, the auctioning of new spectrum, the introduction of mandated wholesale rates for national roaming for regional service providers, and the introduction of lower-cost data-only services.

38. The last four years have seen several of key additions to the mobile landscape. The entry of Shaw Communications Inc.'s (Shaw) Freedom Mobile service into the wireless market cannot be underestimated. Shaw's acquisition of Wind Mobile in 2016 provided secure funding to continue the operations of the wireless service provider, which had been struggling. Re-launched as Freedom Mobile, the new carrier entered the market as a credible alternative to the three incumbent carriers in Alberta, British Columbia, and Ontario. Shaw's shares of net adds has trended upwards significantly since 2017, ending 2018 with 19% of national net adds in the last quarter of the year - corresponding to a significantly higher share of net adds in the geographic areas it serves. As a vertically integrated supplier of cable television, satellite TV, home phone, and mobile wireless services, Shaw may be viewed as a maverick supplier in the markets it serves.

39. Xplornet Communications Inc.'s (Xplornet) 2018 entry into the mobile market in Manitoba under the name of Xplore Mobile was also essential. After the acquisition of MTS by Bell, Xplornet purchased from Bell 30 megahertz (MHz) of spectrum and access to other valuable resources including certain wireless infrastructure, a number of retail locations and roaming access on Bell Mobility's network. Xplornet's entry ensured Manitoba continued to be served by four wireless carries, maintaining that province's intense state of competition.

40. During this same period, Innovation, Science and Economic Development (ISED) made more spectrum available, particularly for the smaller regional carriers. In March and April 2019, ISED conducted the 600 MHz auction. This much anticipated auction made available spectrum required for the provision of new 5G services. Wireless carriers spent $3.47 billion dollars to acquire these frequencies. Significantly, former new entrants and other regional competitors, Freedom Mobile, Quebecor Media Inc. (Videotron), Bragg Communications Inc. (Eastlink), Xplore Mobile, Iristel Technologies Inc. (Ice Wireless), Tbaytel and Saskatchewan Telecommunications Holding Corp. (SaskTel) all acquired spectrum, in addition to Rogers and TELUS. Rogers invested more than $1.7 billion to acquire national licences in this coveted band. This auction demonstrated, in particular, the commitment of the regional service providers to invest in their markets to provide competition to the incumbent wireless carriers.

41. Another key development since the 2015 review is the implementation of the wholesale roaming rates for regional carriers. As mentioned above, this development was spawned by the Commission's decision in its 2015 review of the wireless market. This measure,

which furnished cost-based rates for national roaming to regional carriers, was intended to provide them with a better means to compete with the national carriers. It will be important for the Commission to assess the success of this measure in the context of its current review.

42. Finally, in 2018 the Commission directed the national mobile wireless carriers to design and market lower-cost data-only plans as an alternative to other service packages. These will be particularly appealing to Canadians with low incomes, or others who do not require more expansive wireless service packages.[21]

43. Rogers' lower-cost data-only plans offer subscribers tremendous value. Rogers' largest lower-cost data-only plan offers 1 gigabyte (GB) of mobile wireless data. This is a large amount of data that would meet the needs of many Canadians. One gigabyte of data allows for 3,000 minutes (50 hours) of voice calling, 400 minutes (6.5 hours) of FaceTime video calling, 10,000 emails, 5,000 webpages, or some combination thereof.[22]

44. Subscribers to Rogers' 250 megabyte (MB) or 500 MB plans would have proportionately less data use. For $15 per month, subscribers to Rogers' lowest-cost data-only plan will have access to 250 MB of LTE mobile wireless data on Rogers' nation-wide wireless network. This plan's data allowance provides for a significant amount of communications capability while enabling even more Canadians to enter the mobile wireless market at a very low price point. This amount of data allows for approximately 750 minutes of voice calling, 100 minutes of FaceTime calling, 2,500 emails, 1,250 webpages, or some combination thereof.

45. Rogers launched its lower-cost data-only plans in March 2019. Early indications are that the plans will be popular, but it will take time to observe their full impact in the market.

46. Taken together, the wireless market has experienced several competitive measures in a relatively short period of time since the Commission's last review. Some of these developments are so recent that their true impact remains to be seen. It is pre-mature for any change to the wireless wholesale policy. If the Commission determined that the risk to investment outweighed any perceived benefit to competition in 2015, how can it change its mind when the market since then has become even more competitive, with several initiatives just launched, and the potential impact on investment has never been so severe? Jeopardizing investment on the cusp of 5G would be both unjustified by the current circumstances and poor policy going forward.

## Competition in Retail Wireless Markets

47. The starting point for the current proceeding is an assessment of competition in Canadian retail wireless markets. It is a well-established principle that regulatory intervention in wholesale markets is only appropriate if retail markets are not

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[21] TD 2018-97 and TD 2018-98.
[22] Using the conversion factors from Sugar Mobile. Available: https://www.sugarmobile.ca/

competitive.[23] A fact-based impartial assessment of Canadian retail markets, in accordance with the framework established by the Commission for assessing the competitiveness of telecommunications markets, clearly demonstrates intense competition in all retail markets in Canada, with the result that a pre-condition of wholesale regulation is not met.

48. The remainder of this section addresses Canadian retail markets and key indicators of competition in those markets.

## Analytical framework for assessing competition in retail markets

49. The Commission addressed the analytical framework for assessing competition in telecommunications markets in Telecom Decision CRTC 94-19, *Review of regulatory framework* (TD 94-19). The framework first requires a definition of the relevant product and geographic markets. It then requires an assessment of competition in those markets based on competitiveness indicators such as market shares and concentration levels, demand conditions, the ability of existing suppliers to expand output in response to a price increase, barriers to entry, evidence of rivalrous behaviour, and the nature of innovation and technological changes. Such an evaluation is consistent with the assessment of market power in competition law, as set out in the Competition Bureau's (the Bureau) guidance documents and Canadian competition jurisprudence. The Commission should continue to apply this approach to assess competition in wireless markets.

50. Application of this analytical framework to retail wireless service markets in Canada is discussed below. The analysis establishes that retail wireless markets in Canada are competitive, that Rogers does not have market power in any of these markets, and that the national carriers, Bell, TELUS, and Rogers, do not have the ability to exercise coordinated or joint market power in Canadian wireless markets.

## Relevant product and geographic markets

51. The relevant product markets for retail wireless services are: the consumer market for wireless services; and, the enterprise (or corporate) market for wireless services.

52. The distinction between consumer and enterprise markets is consistent with the Bureau's delineation of retail wireless markets for purposes of its review of Bell's acquisition of MTS. In that case, the Bureau concluded that "[c]orporate customers constitute a separate product market as they purchase services through alternate channels and have different requirements."[24] The Bureau also stated that consumers are unlikely to consider postpaid and prepaid wireless plans to be close substitutes. In

[23] See, for example, TRP 2015-177, para. 23 and the Feasey Report, para. 29j.
[24] Competition Bureau statement regarding Bell's acquisition of MTS. Available: https://www.competitionbureau.gc.ca/eic/site/cb-bc.nsf/eng/04200.html.

Rogers' experience, customers can and do switch between prepaid and postpaid service. In any event, Rogers does not believe that the assessment of competition in Canadian wireless markets is materially altered by considering postpaid and prepaid wireless services as one or separate relevant markets, as wireless service providers compete equally fiercely in both segments in their coverage areas.

53. As competitors' posted price plans and product offerings differ across provinces, the relevant geographic market is provincial, again consistent with the Bureau's analysis of the Bell/MTS merger.[25]

### Competitiveness indicators

54. Key competitiveness indicators include: the ability of existing suppliers (including regional carriers) to expand supply in response to a price increase, market shares and concentration, demand conditions (including the ability of customers to switch suppliers), the nature of innovation and change, and evidence of rivalrous behaviour.

#### The regional carriers continue to gain ground and expand

55. In TD 94-19, the Commission recognized the importance of obtaining "information on the supply expansion responses of firms to price increases or other developments affecting the relevant market. The easier it is for rivals to expand output in response to a non-transitory price increase, the lower is the dominant firm's market power."[26]

56. There has been considerable new entry and expansion in Canadian wireless markets since the Commission's last review of these markets in 2015. All provinces in Canada are now served by four carriers, and Northern wireless markets (Yukon, Northwest Territories, and Nunavut) are contested by three carriers. There are very few countries, and none with the land mass and population density of Canada, that have more than three competing facilities-based wireless carriers. At four facilities-based carriers, Canada is also on par with its closest peer country – the U.S. Notably, however, two of the national American carriers – Sprint and T-Mobile – have entered into an agreement to merge, subject to regulatory approval. A key rationale for the merger is that it will allow Sprint and T-Mobile to build a world class nationwide 5G network and to extend rural and remote coverage.

[25] Ibid.
[26] TD 94-19, section III.

| Market | | Operating Mobile Network Operators |
|---|---|---|
| **BC** | | Rogers, Bell, Shaw, TELUS |
| **AB** | | Rogers, Bell, Shaw, TELUS |
| **SK** | | Rogers, Bell, SaskTel, TELUS |
| **MB** | | Rogers, Bell, TELUS, Xplornet |
| **ON** | Southern | Rogers, Bell, Shaw, TELUS |
| | Eastern | Rogers, Bell, Shaw, TELUS, Videotron |
| | Northern | Rogers, Bell, Eastlink, Shaw, Tbaytel, TELUS |
| **QC** | | Rogers, Bell, TELUS, Videotron |
| **NB** | | Rogers, Bell, Eastlink, TELUS |
| **NS** | | Rogers, Bell, Eastlink, TELUS |
| **PEI** | | Rogers, Bell, Eastlink, TELUS |
| **NL** | | Rogers ,Bell, Eastlink, TELUS |
| **North** | | Bell, Ice Wireless, SSi Micro |

*Table 1: Mobile network operators by geographic market*

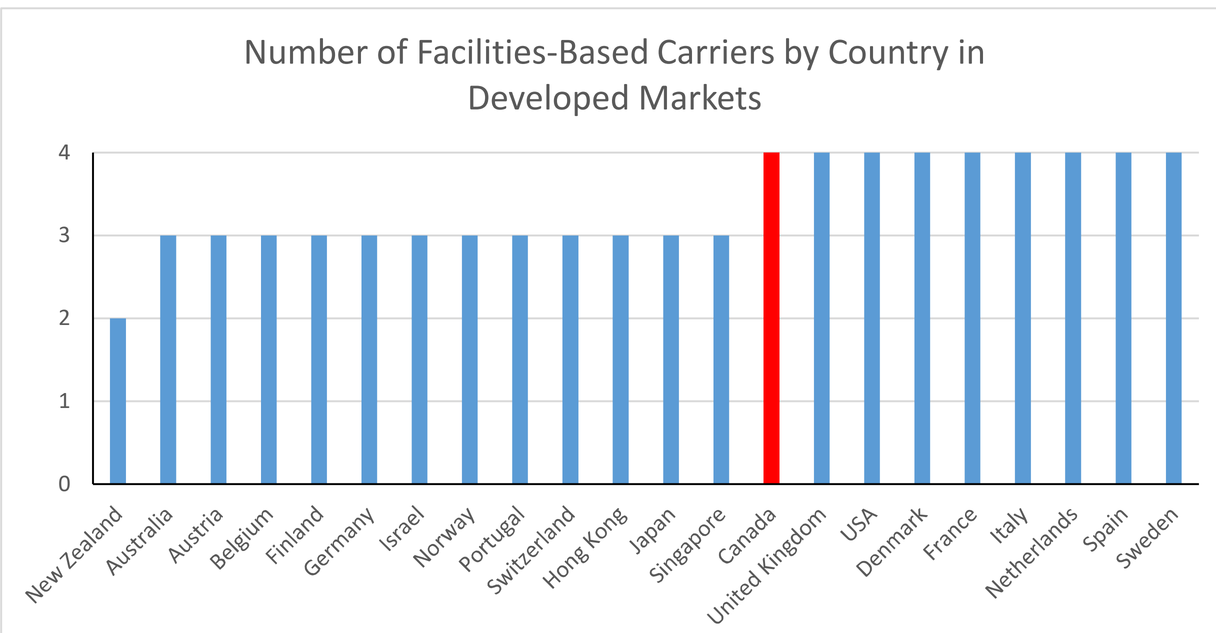


*Figure 1: The number of facilities-based service providers in select countries.27*

[27] Bank of America Merrill Lynch Global Wireless Matrix, April 30 2019.

57. Buoyed by access to spectrum set aside for regional carriers and to tariffed national roaming rates, regional carriers are now well established and funded. They have been aggressively building out wireless networks. They have also recently purchased large quantities of 600 MHz spectrum to expand their network capacity and coverage.

58. Since acquiring Wind in 2016, Shaw has reported capital expenditures of $785 million on wireless network infrastructure in British Columbia, Alberta and Ontario. Shaw is marketing its wireless services in these provinces intensely and is making rapid market share gains, fuelled by its network investments and the launch of the iPhone on its network last year. Shaw acquired eleven 600 MHz licences, covering British Columbia, Alberta, Southern and Eastern Ontario, and the Outaouais region of Quebec in the spectrum auction that concluded last month. This new spectrum will support expansion of Shaw's capacity and coverage.

59. In Saskatchewan, the incumbent regional carrier SaskTel competes with Bell, Rogers and TELUS. It holds a commanding market share of 64%. SaskTel also acquired three 600 MHz licences for network expansion.

60. In Manitoba, Bell, Rogers and TELUS compete with Xplornet, a situation deemed by the Bureau to maintain competition in the province following the acquisition of MTS by Bell. Navdeep Bains, Minister of ISED, expressly confirmed and expanded on this result, stating "Bell's deal to acquire MTS and the expansion of Xplornet into the Manitoba market <u>will result in more competition</u>, which means more choice and competitive prices for all Manitobans."[28] In addition to spectrum acquired as part of the Bell/MTS transaction, Xplornet purchased a 600 MHz licence covering Manitoba last month.

61. As previously mentioned, Shaw has entered the Ontario market, and has obtained 600 MHz licences to expand its network in Southern and Eastern Ontario. In Northern Ontario, where Shaw is not present, Tbaytel is a strong regional competitor that continues to expand its network facilities. Eastlink serves the communities of Sudbury and Timmins in Northern Ontario.

62. Videotron continues to grow its market share in Quebec and Eastern Ontario. Videotron acquired 10 new 600 MHz licences covering Quebec and Eastern Ontario last month. Shaw also purchased a 600 MHz licence covering Eastern Ontario.

63. Eastlink has now deployed competing wireless LTE infrastructure serving New Brunswick, Nova Scotia, Prince Edward Island (PEI), Newfoundland and Labrador (NL), and Northern Ontario. Eastlink acquired 600 MHz licences covering New Brunswick, Nova Scotia, and PEI in ISED's 600 MHz spectrum auction. Xplornet acquired 600 MHz licences covering those three provinces and NL. Ice Wireless also purchased a 600 MHz

[28] Minister Bains' statement *Manitoba consumers get more choice with approval of Bell-MTS deal* with emphasis added. Available: https://www.newswire.ca/news-releases/statement---manitoba-consumers-get-more-choice-with-approval-of-bell-mts-deal-613824323.html

licence covering NL and, once deployed, will be the fifth facilities-based carrier in the province.

64. Finally, Ice Wireless has deployed network facilities in Yukon and the Northwest Territories, and purchased six 600 MHz licences covering the North. SSI Micro currently serves Nunavut.

| Province | Region | Number of 600 MHz licences acquired by Regional Carriers |
|---|---|---|
| **BC** | | Shaw: 3 |
| **AB** | | Shaw: 3 |
| **MB** | | Xplornet: 1 |
| **SK** | | SaskTel: 3 |
| **ON** | Southern | Shaw: 3 |
| | Eastern and Outaouais | Shaw: 2<br>Videotron: 1 |
| | Northern | TBayTel: 1 |
| **Quebec** | Eastern | Videotron: 3 |
| | Southern | Videotron: 3 |
| | Northern | Videotron: 3 |
| **NB** | | Eastlink: 2<br>Xplornet: 1 |
| **NS and PEI** | | Eastlink: 2<br>Xplornet: 1 |
| **NFLD** | | Ice Wireless: 1<br>Xplornet: 1 |
| **Yukon** | | Ice Wireless: 2 |
| **Nunavut** | | Ice Wireless: 2 |
| **NWT** | | Ice Wireless: 2 |

*Table 2: New 600 MHz licences of new entrant and regional carriers.*

65. In addition to these carriers, three national resellers are also currently active in consumer wireless markets in Canada: Ztar Mobile (7-Eleven Speakout Wireless, Petro

Canada Mobility), PC Mobile and CTExcel (China Telecom). While these resellers have not garnered significant market share, they are a competitive alternative for consumers. Indeed, PC Mobile was identified in a recent pricing report as a lowest price alternative for some service baskets in some regions.[29]

### Market shares are consistently shifting and concentration is not problematic

66. Market shares and concentration are indicators of competitiveness. In this regard, the Bureau's *Abuse of Dominance Enforcement Guidelines* state:

> *29. … While there is no definitive numeric threshold, the Bureau is of the view that high market share is usually a necessary, but not sufficient, condition to establish the existence of a substantial degree of market power.*
>
> …
>
> *39. A high market share is not itself sufficient to establish a substantial degree of market power. A firm's attempt to exercise market power may be thwarted by expansion of existing and/or potential competitors on sufficient scale and scope if expansion and/or entry are expected to be profitable.*[30]

67. Table 3, below, shows the shifting market shares (by percent of subscribers) in each province and the North.

| | Bell | | | TELUS | | | Rogers | | | Other | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2016 | 2017 Q3 | 2018 Q4 | 2016 | 2017 Q3 | 2018 Q4 | 2016 | 2017 Q3 | 2018 Q4 | 2016 | 2017 Q3 | 2018 Q4 |
| **BC** | 20 | 19 | 21 | 41 | 40 | 40 | 38 | 37 | 35 | 0 | 4 | 4 |
| **AB** | 25 | 24 | 24 | 52 | 50 | 50 | 23 | 23 | 21 | 0 | 3 | 5 |
| **SK** | 17 | 17 | 20 | 13 | 13 | 13 | 5 | 6 | 5 | 64 | 64 | 62 |
| **MB** | 9 | 49 | 45 | 7 | 13 | 15 | 38 | 38 | 39 | 47 | 0 | 1 |
| **ON** | 30 | 28 | 28 | 21 | 20 | 20 | 47 | 44 | 43 | 2 | 8 | 9 |
| **QC** | 30 | 29 | 29 | 27 | 27 | 26 | 28 | 28 | 27 | 15 | 16 | 18 |
| **NB** | 55 | 55 | 56 | 26 | 26 | 26 | 19 | 19 | 18 | 0 | 0 | 0 |
| **NS** | 53 | 52 | 52 | 34 | 33 | 34 | 13 | 12 | 12 | 0 | 3 | 2 |
| **PEI** | 56 | 54 | 52 | 31 | 26 | 32 | 13 | 19 | 12 | 0 | 1 | 4 |
| **NL** | 69 | 69 | 68 | 28 | 28 | 29 | 2 | 3 | 3 | 1 | 0 | 0 |
| **North** | 86 | 87 | 84 | 10 | 10 | 11 | 0 | 0 | 0 | 3 | 3 | 5 |

*Table 3: Changing market shares by province and territory.*[31]

[29] Wall Communication Inc., *Price Comparisons of Wireline, Wireless and Internet Services in Canada and with Foreign Jurisdictions, 2018 Edition*, pp. 27.
[30] The Bureau, *Abuse of Dominance Enforcement Guidelines*. Available: https://www.competitionbureau.gc.ca/eic/site/cb-bc.nsf/eng/04420.html
[31] 2016 data: Table 6.6. CRTC Communications CMR 2018. 2017 data: TD Securities, Canadian Wireless Map Q3 2017, November 17 2017. 2018 data: TD Securities, Canadian Wireless Map Q4 2018, February 28, 2019.

68. With the possible exception of Bell in the North, no single carrier has sufficient share to exercise market power in Canadian wireless markets. Rogers, in particular, with a 2018 Q4 market share ranging from well below 10% in some regions to a high of 43% in Ontario (and falling in the past few years in Ontario), does not have sufficient share to exercise market power. In all regional markets, Rogers faces vigorous regional and national competitors.

69. Moreover, regional carrier market shares are growing, with Videotron now at 18% share in Quebec. Shaw and Eastlink are competing fiercely to grow their share: in BC, Alberta, and Ontario in the case of Shaw; and in New Brunswick, Nova Scotia, PEI and NL in the case of Eastlink. These regional carriers have existing capacity and have recently acquired spectrum to expand their network capacity.

70. Furthermore, the market shares of national and other carriers vary significantly across different geographic markets and are not static. While Bell, Rogers and TELUS have in the most part lost market share to regional carriers in recent periods,[32] they most recently took market share from one another in the one-year period ending 2018 Q4 in Manitoba, PEI, NL, and in the North. Over longer periods of time, there have been more dramatic movements in market share. Videotron has, for example, grown its share of the Quebec market to 18% since entry in 2007. Meanwhile TELUS, which had no market share in New Brunswick in 2006, had a share of 26% in 2018 Q4; it acquired this share by taking customers from Bell and Rogers.

71. A more indicative measure of current competitive intensity than market shares is carrier shares of net customer additions (net adds). Table 4 shows national growth in customers in 2014-2018, while Figure 2 illustrates the quarterly share of national net adds of wireless service providers that report subscriber information publicly, namely, Bell, Rogers, Shaw, TELUS and Videotron over this period.[33] Consistent with highly dynamic markets, service provider shares of net adds vary substantially between periods. Also notable are the net add shares of wireless service providers Videotron and Shaw. Videotron, which is active only in Quebec and Ottawa, acquired 7% of net adds in 2018 Q4; this corresponds to a very significant share of net adds in its serving areas of Quebec and Eastern Ontario. Shaw's share of net adds has also trended upward significantly since 2017, ending 2018 at 19% of national net adds in the last quarter of the year, again corresponding to a much higher share of net adds in its coverage area of B.C., Alberta and Ontario.

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[32] These share measures mask (or net out) the switching of customers back and forth between service providers. As discussed more fully below, customer switching is frequent and customer retention is the subject to constant targeted promotional activities.
[33] Based on each carrier's publicly reported results.

| | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|
| **Net adds in 000s** | 877 | 866 | 1,041 | 1,396 | 1,705 |

*Table 4: Annual net subscriber additions.*

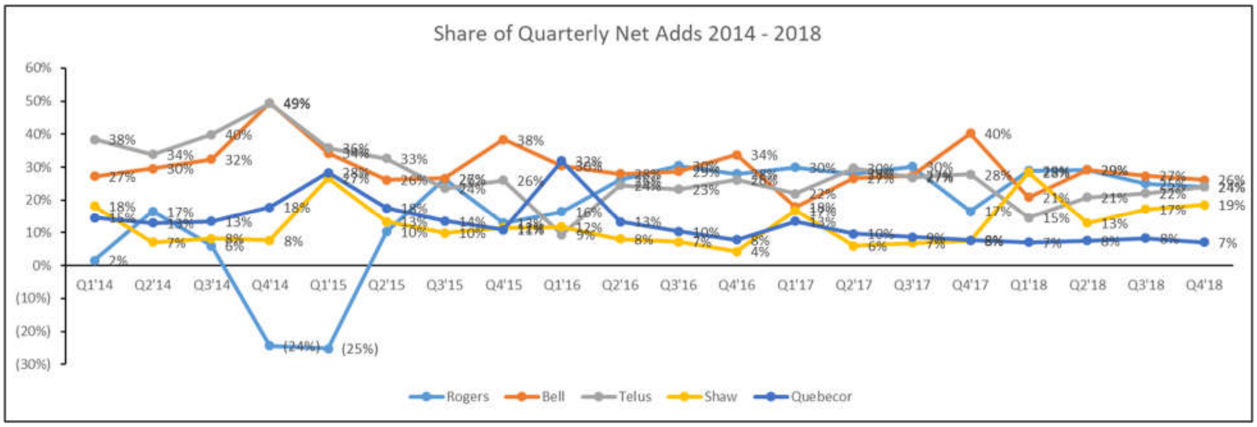


*Figure 2: Share of quarterly net additions, 2014-2018.*

72. Even accounting for the difference in reporting periods,[34] a view across the wireless industry's Q1 2019 results paints a very competitive picture. It shows that both Shaw and Videotron led the industry with 48,000 and 39,800 respective net new subscribers.

73. Another metric that is used to gauge the competitiveness of markets is concentration, measured by the Hirfindahl-Herschmann Index (HHI).[35] Canadian wireless market HHIs are, in most cases, comparable to the U.S. and are considerably lower than most other countries. For example, in its most recent review of U.S. wireless markets, the Federal Communications Commission (FCC) reported a U.S. weighted average HHI of 3106 as of year-end 2017, as well as HHIs ranging from between 2000-7000 for individual economic areas in the U.S.[36] The national HHI for Canada in 2018 was 3058.[37] On a regional market basis, Canadian HHIs vary from 2623 (Quebec) to 7181 (the North), while the HHI for each of Ontario, British Columbia and Alberta is considerably below the HHI of the Saskatchewan and Manitoba markets.[38]

[34] Shaw's quarter ends on February 28.

[35] The HHI is the sum of market shares of competitors in a market, and therefore is a number between 0 and 10,000.

[36] FCC 18-181, para. 30. Available: https://docs.fcc.gov/public/attachments/FCC-18-181A1.pdf

[37] Bank of America Merrill Lynch Global Wireless Matrix Q4 2018, 30 April 2019.

[38] Provincial HHIs were calculated using market shares as gathered and estimated by TD Securities Equity Research note of February 28, 2019. In Ontario, Freedom Mobile is estimated to have 7% market share and Eastlink and Tbaytel to have a combined 2% market share.

| | Bell | TELUS | Rogers | Other | HHI |
|---|---|---|---|---|---|
| **BC** | 21 | 40 | 35 | 4 | 3282 |
| **AB** | 24 | 50 | 21 | 5 | 3542 |
| **SK** | 20 | 13 | 5 | 62 | 4438 |
| **MB** | 45 | 13 | 39 | 1 | 3716 |
| **ON** | 28 | 20 | 43 | 9 | 3086 |
| **QC** | 29 | 27 | 27 | 18 | 2623 |
| **NB** | 56 | 26 | 18 | 0 | 4136 |
| **PEI** | 52 | 33 | 12 | 2 | 3941 |
| **NS** | 52 | 26 | 12 | 4 | 3540 |
| **NL** | 68 | 28 | 3 | 0 | 5417 |
| **North** | 84 | 10 | 0 | 5 | 7181 |

*Table 5: HHI score for each province and the territories, along with market share by operator.*

## Demand conditions

74. Demand conditions are another important indicator of competitiveness. The main focus of the assessment of demand conditions "is on the ability of customers to switch to another supplier or reduce consumption of the good or service in question in response to a price increase."[39]

75. As discussed above, wireless consumers in all regions of the country have access to wireless services provided by at least four carriers as well as by resellers, with the exception of the North where there are currently three competing carriers. Consumer switching between competing service providers has been facilitated by the requirement, since December 2017, that all new phones must be sold unlocked, by number portability, and by the ability to terminate term service contracts on payment of any remaining device subsidy amount. The maximum term of a subsidized device contract is two years, meaning that all these contracts expire after two years and, in any event, can be terminated by a customer at any time.

76. One measure of customer switching is churn. Churn is the number of customers that switch between service providers in a given period. Rogers' average 2018 postpaid customer monthly churn was 1.08%. This churn equates to 13% customer turnover in the year.[40] Rogers' churn fell in 2018 and dropped again to a record low in the first quarter of 2019.[41] This reduction in churn is attributable to increased promotional

[39] TD 94-19, section III. The Commission went on to state: "Important market demand conditions identified by parties included: (1) the availability of economically feasible and practical substitutes; and (2) the cost to customers of switching suppliers …"
[40] Prepaid churn is higher than postpaid churn. Therefore, the postpaid churn understates customer turnover.
[41] Rogers, *Rogers Communications reports first quarter 2019 results*. Available: https://about.rogers.com/wp-content/uploads/2019/04/Rogers-Q1-2019-Press-Release.pdf

activities and focus on customer service and quality by Rogers in order to retain customers in the face of competition from Bell, TELUS and regional competitors. Rogers' reduced churn signals the satisfaction of its customers. Customers that were not satisfied could, and did, switch service providers. More broadly, based on statistics for the national service providers only, some 3.3 million customers switched wireless providers in 2018.

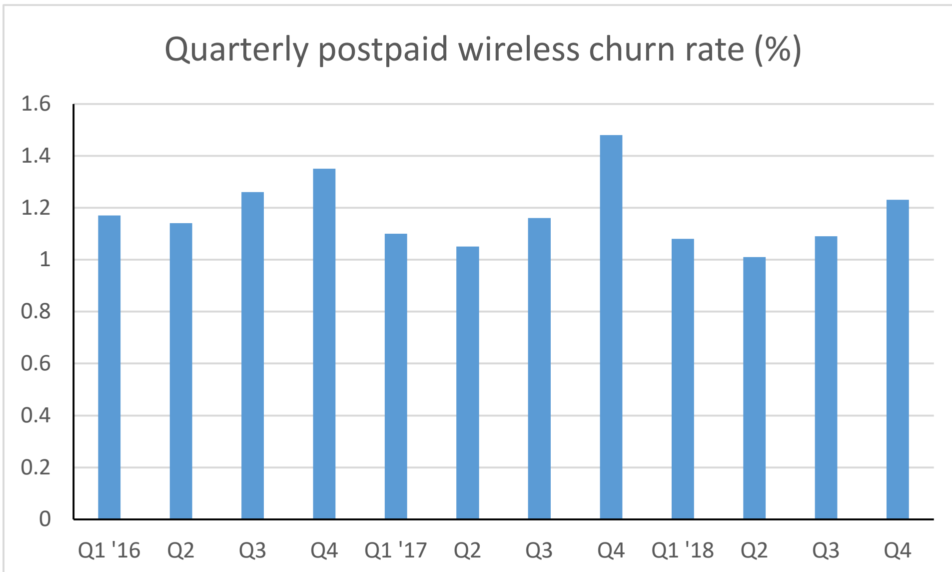


*Figure 3: Postpaid wireless churn rate, 2016-2018.*

## Wireless service providers deliver world-class speeds and world-first innovations

77. As discussed above, Canadian wireless carriers have consistently punched above their weight in investing and extending state-of-the-art wireless infrastructure that covers most of the Canadian population – in the face of dramatic shifts in demand and a challenging climate, geography, and low population density. These activities are a critical feature of the intense competitive dynamic in Canadian wireless markets, and are essential to maintaining the competitiveness of the Canadian economy.

78. The investments driven by this competition have resulted in decades of wireless innovation in Canada. For its part, Rogers has achieved many firsts since its inception including:

- First carrier in Canada to offer fully automatic roaming (1987)
- First carrier in North America to commercially deploy a public access digital wireless packet switching network (1989)
- First carrier in North America to implement commercial digital wireless cellular service (1992)

- First carrier in Canada to add digital transmission technology to its wireless network from coast to coast (1992)
- First carrier in Canada to bring commercial PCS services to the Canadian market place (1996)
- First carrier in Canada to offer Digital PCS services nationwide (1997)
- First carrier in Canada to introduce prepaid cellular and paging services with the launch of Rogers Wireless Pay As You Go (1998)
- First carrier in Canada to provide a national seamless network, with analog coverage reaching well over 90% of the population and digital coverage reaching over 81% (1999)
- First carrier in Canada to launch the first generation BlackBerry devices with the launch of Rogers Wireless Interactive Messaging (1999)
- First carrier in Canada to launch BlackBerry email service (2000)
- First carrier in the world to install both voice and packet data service simultaneously on GSM/GPRS technology (2001)
- First carrier in Canada to offer a wireless phone with a built-in camera (2002)
- First carrier in Canada to trial third generation EDGE capabilities (2003)
- First carrier in Canada to implement Wireless Priority Service, a feature which provides government-authorized wireless phone-users with priority service on the Rogers network during times of emergency (2004)
- First wireless service provider in North America to offer downloadable music to a handset (2005)
- First service provider in Canada to provide real-time access to live television programming in partnership with MobiTV (2005)
- First Canadian service provider to launch a HSPA network (2006)
- First wireless service provider in North America to offer video calling on HSPA handsets (2007)
- First Canadian service provider to launch HSPA+ service, offering speeds up to 21 Mbps (2009)
- First Canadian service provider to launch LTE (2011)
- Rogers Wireless enabled the first SIM-based mobile transaction on NFC-enabled smartphones (2012)
- First Canadian carrier to offer daily pay-per-use data roaming rate for international travel (2014)

- First Canadian service provider to launch voice over LTE (VoLTE) (2015)
- First Canadian service provider to use Facebook Messenger for customer care (2015)
- Commencement of three-year, multi-million dollar research partnership with the University of British Columbia (UBC) to study 5G applications (2018)
- Agreement to deploy of 5G-ready network equipment and infrastructure to create a smart campus at UBC (2019)

79. Rogers continues to deliver innovative broadband services through trials and deployment of new wireless technologies, including carrier aggregation licensed spectrum bands, 256-QAM transmission, and Licence-Assisted Access LTE (LTE-AA). These technologies are vital to the deployment of 5G. As well, Rogers is currently working with our network infrastructure vendor, Ericsson, on 5G trials in Toronto, Ottawa, and other cities.

80. Through a combination of direct and indirect investments, Rogers spends hundreds of millions of dollars every year on research and development activities. Rogers has been in the top 10 Canadian corporate research and development spenders since 2012. In the 2017 fiscal year alone, Rogers spent almost $460 million on research and development activities.

81. The investment and innovation by Canadian wireless carriers, and the quality of Canadian networks, both reflect and are the result of strong competition in Canadian wireless markets. For its part, Rogers has invested heavily in spectrum and new technologies to lead Canadian wireless markets – not to stay on par with Bell and TELUS or its regional competitors. Rogers' recent expenditure of over $1.7 billion on 600 MHz spectrum underscores this dynamic and the intensity of competition in Canadian wireless markets amongst all competing service providers.

## Wireless prices are declining and rivalry is vigorous

82. Competitive rivalry in Canadian wireless markets is fierce, as evidenced by falling prices and relentless promotional activity. As shown in Figure 4, below, the price per megabyte of data in Rogers' wireless data prices has declined dramatically over the last six years, dropping more than 60% over this period.

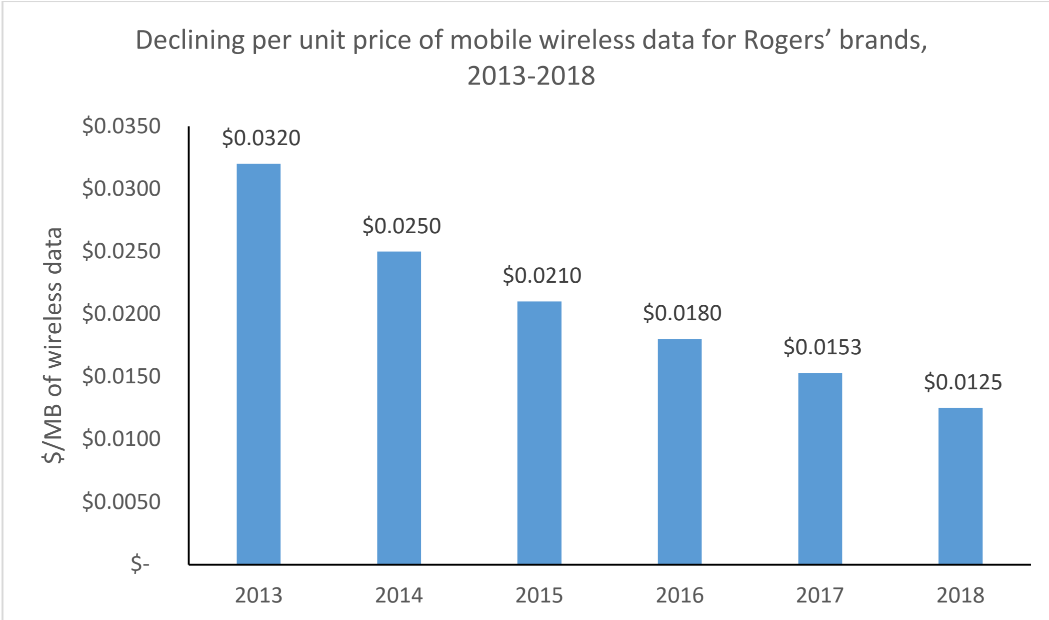


*Figure 4: The declining per unit price of mobile wireless data, 2013-2018.*

83. As an example, Fido offered a bring your own device (BYOD) data plan including 750 MB of data at a monthly price of $45 in November 2015. In May 2019, Fido is offering a BYOD data plan including 4 GB of data at a monthly price of $50. Between these two plans, there is a nearly 80% drop in the cost of data per MB. These large declines are market driven. In contrast, the largest price *increase* in wireless markets occurred due to the mandated withdrawal of three-year subsidized device contracts with the implementation of the Wireless Code.[42]

84. Since 2015, quarterly promotional activity has also increased by a factor of four nationally. During this time period, special promotional activity[43] was in market 70% of the time in 2016, 75% of the time in 2017, and 88% of the time in 2018. Carriers are constantly bringing to market new initiatives to win customers from each other.

[42] TRP 2013-271, para 234. This mistaken policy illustrates the harm that can be caused by unintended consequences from regulatory intervention.
[43] Based on internal estimates. Does not account for resellers.

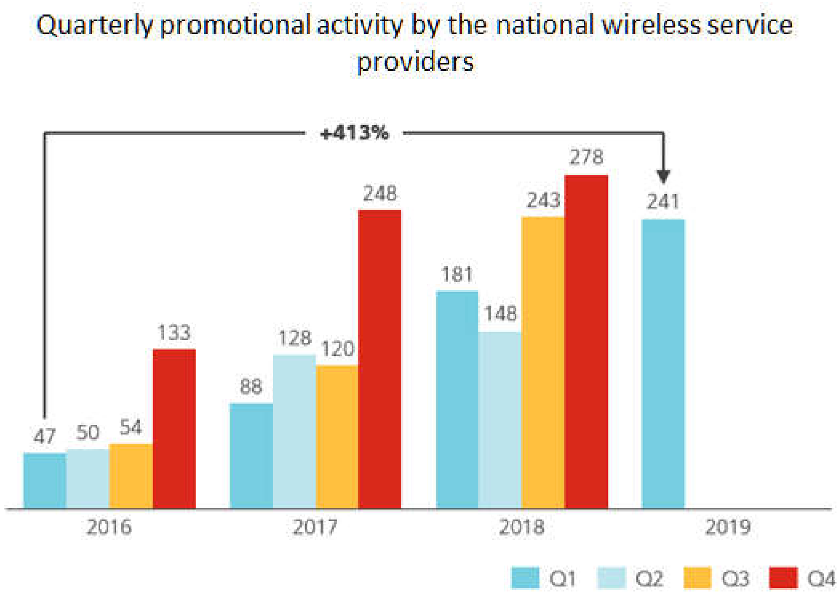


*Figure 5: Quarterly consumer promotional changes, postpaid incumbent brands, 2016-2019.*

85. National and regional carriers, their flanker brands, and resellers are also relentlessly issuing and changing promotional offers directed at attracting new customers and retaining their existing customers. Each promotional activity is typically short term in duration. While the below is not an exhaustive list, promotional activity may take the following forms:

- Larger data buckets to customers with no or a minimal change in price
- Recurring discounts, for example, $10 off a new line added to a family share plan for one year
- $0 or low upfront device acquisition fees
- Forgiving activation fees
- Targeted promotions in particular sales channels

86. The intensity of wireless marketing activities is further illustrated by the very large number of pricing changes by service providers. For example, in the 2018 Q4 period the national carriers made 38 and 47 competitive changes to their carrier-branded and flanker plans respectively, for a total of 85 pricing changes. In 2019 Q1, this number increased to 136 price changes. These numbers are a reflection of highly dynamic markets.

87. Canadian wireless markets are therefore characterized by constant, vigorous, and rivalrous behaviour.

### International comparisons

88. Price comparisons are not identified in either TD 94-19 or the Bureau's guidance documents as a measure of competitiveness of markets. This is for good reason: cross-market pricing comparisons are complex and inconclusive. It is very difficult or impossible to make true apples to apples comparisons between different markets. Even if comparable prices are available, they are a function of numerous market-specific factors including differences in demand, quality, costs and marketing activities. International price comparisons are further complicated by exchange rates and purchasing power parity, both of which often fluctuate significantly over time, dramatically altering the results of price comparisons. Even in Canada, the structure of pricing plans, demand, network coverage, quality and cost vary between regional markets. Moreover, measures of posted and average prices mask critical competitive information including promotional activity and lowest available pricing. As discussed above, much of the competition in Canadian wireless markets occurs through promotional activities. Failure to capture these activities ignores the most telling competitive pricing data.

89. In contrast to price comparisons, the relative competitiveness of markets is often assessed based on comparing HHIs. As discussed above, the HHIs of Canadian wireless markets generally compare favourably to wireless markets in other countries including the U.S.

90. International comparisons of network performance and coverage are also common. These studies consistently rank quality and coverage of Canadian wireless networks very highly.

91. Cross-market price comparisons, as indicated above, suffer from serious flaws. Given this, if any weight is to be placed on price comparisons – and it is not apparent that any weight is appropriate - then the comparison should be limited to countries that are most likely to have similar demand, cost and service plan structures so as to approximate as much as much as possible an apples to apples comparison. In the case of Canadian wireless markets, that market is the U.S. Recent international pricing comparisons have consistently concluded that Canadian wireless prices compare very favourably to American wireless prices. For example, the 2018 Wall Pricing Study found that Canadian wireless prices are similar to those in the U.S.[44]

92. The Economist's Intelligence Unit's *2019 Inclusive Internet Index* also considered wireless pricing. Affordability was assessed by looking at two factors, (1) the cost of access relative to income and (2) the level of competition in the Internet marketplace. Some of the key findings were:

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[44] Wall Communications Inc., *Price Comparisons of Wireline, Wireless and Internet Services in Canada and with Foreign Jurisdictions* (2018 Edition)

- Canada ranked just 1.5 points behind the U.S. for smartphone handset costs expressed as a percent of monthly gross net income per capita, with a score of 98.1/100, where 100 is the most affordable score possible.
- Canada and the U.S. tied for the monthly cost of a 500 MB postpaid mobile broadband data plan, expressed as a percent of monthly gross net income per capita, at 1.42%.
- Prices for prepaid service were nearly the same in Canada and the U.S. A 500 MB prepaid plan cost 0.49% of monthly income in Canada but cost 0.45% of monthly income in the U.S.

93. The fact that Canadian carriers must purchase wireless network equipment and handsets in US dollars while generating revenues in Canadian dollars makes these results more striking. Despite implicitly higher network and device costs, Canadian prices are similar, and often better, than American prices.

94. Furthermore, studies that compensate for differences in markets, such as the NERA study, *An Accurate Price Comparison of Communications Services in Canada and Select Foreign Jurisdiction*s (October 2018) have found that Canadian wireless prices are below the comparable international benchmark price.[45]

95. Figure 6, below, illustrates the results of a *Mobile Data Cost Index* calculated for 10 select countries.[46] The higher the Index, the lower the benefit to end-users. This figure of merit is calculated as the average monthly cost to users divided by the average LTE download speed, multiplied by the average LTE percentage availability across each of the countries.[47] All else being equal, a country with a lower LTE availability will have a higher Mobile Data Cost Index than one with a higher LTE availability. The average value of the Mobile Data Cost Index across the 10 countries is 1.55 while Canada's score is 1.37, 12% lower, i.e. better than the average. This Index includes the average monthly cost (ARPU) as well as the download speed and availability of LTE services across the 10 countries and is thus a good reflection of what is being offered to end users. As shown, Canada ranks better than the U.S., the United Kingdom, Japan, Germany and Australia. Only countries with much smaller geographies and higher population density yield better results than Canada.

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[45] NERA Economics Consulting (2018), *An Accurate Price Comparison of Communications Services in Canada and Select Foreign Jurisdictions*

[46] The Mobile Data Cost Index was created by Lemay-Yates and Associates Inc.

[47] LYA has used ARPU as a proxy for the monthly cost. The monthly cost for each country is the subscriber weighted average ARPU for postpaid services, expressed in Canadian dollars, converted at nominal rates, either as reported directly by each carrier in each country or as calculated based on carrier reporting.

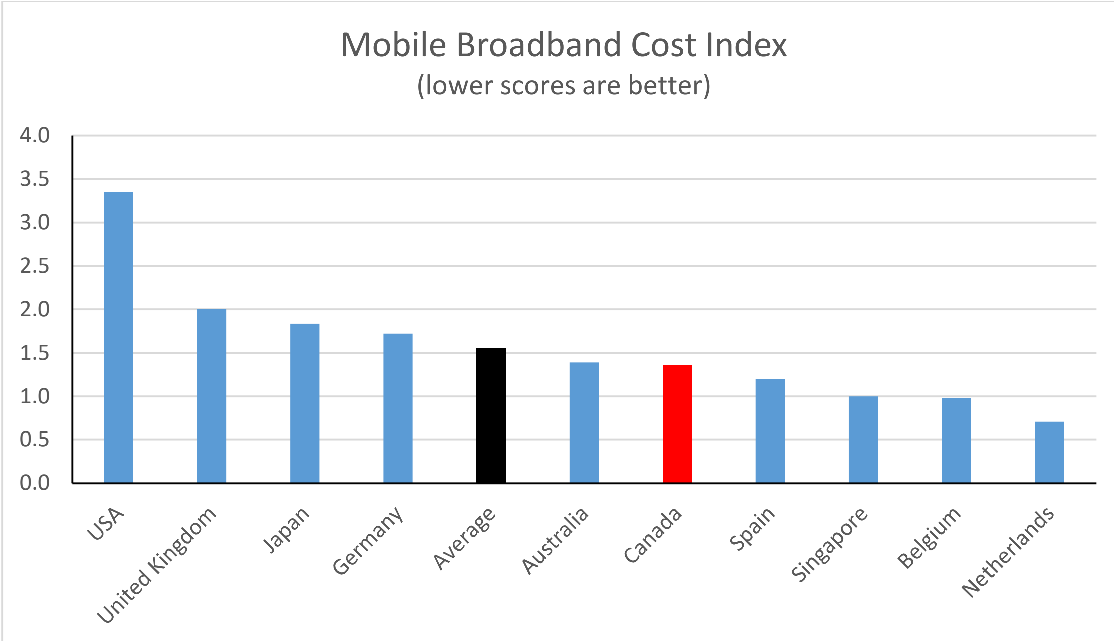


*Figure 6: Benchmarking the Mobile Data Cost Index across select countries.*

## There is no basis for a joint dominance finding

96. The competitiveness indicators do not support a finding of joint dominance. High combined market share is not determinative of joint dominance; if it were, joint dominance could be established in any market, simply by choosing a group of service providers with a high combined market share.[48] Rather, a finding of joint dominance must be supported by evidence that the alleged members of the group (in this case, the national carriers) do not compete vigorously with one another – which is clearly not the case in Canadian retail wireless markets – and that they do not face effective competition from other operators – which is equally untrue.

97. Notably, in its statement on the Bell/MTS merger, the Bureau alleged coordinated behaviour among the national carriers in regions where they do not face a strong regional competitor, like MTS. To remedy this potential impact on competition in Manitoba, the Bureau required Bell to divest spectrum and customers and to provide transitional services to Xplornet. All other regions of Canada are now served by a strong,

[48] As Mr. Feasey states, the fact that the three national carriers continue to serve over 90% of wireless customers in Canada may be true "but it is generally recognised by regulators and competition authorities around the world that market shares or concentration levels represent a poor indicator of market performance, and that much more and different evidence would be required before the CRTC could come to a view as to its competitiveness. I also note that if this measure is relied upon, then Canada is not unusual and performs better than many other markets in which regulators have decided not to intervene in the wholesale market for MVNOs." (The Feasey Report, para. 60(a))

well-financed regional carrier that is no less effective than Xplornet (or MTS) is in the Manitoba market.

98. Thus, there is no credible basis for a finding of collective dominance by national wireless carriers in any market, including Canadian retail wireless markets.

### Conclusion on the competitiveness of retail wireless markets

99. In summary, competitiveness indicators consistently point to competitive retail wireless markets in Canada. Indeed, both the Commission and the Bureau have previously concluded that Canadian retail wireless markets are competitive – at times when there was materially less competition in these markets than there is today. There is now a strong and well-financed regional carrier competing in every Canadian wireless market. These regional carriers have not only deployed their own wireless network infrastructure over the past several years, but they have all recently acquired new spectrum licences to expand their capacity and coverage. No service provider has a dominant share of any market (with the possible exception of Bell in the North). There are four competing carriers as well as resellers in all markets except the North, where there are three competing carriers. Customers are willing and able to switch suppliers, Canadian wireless markets are characterized by constant innovation and technological change, and there is vigorous competitive rivalry between all service providers, including between the three national carriers, in every geographic market.

## Wholesale Mobile Wireless Service Framework

### Test for mandated wholesale services

100. In TRP 2015-177, the Commission determined the appropriate approach to assessing the circumstances in which an intervention in the wholesale wireless market might be appropriate. It determined that a decision to examine the wholesale market should take place only if an assessment of the retail market reveals concerns with the sustainability of its competition:

> *22. The Commission considers that the objective of any regulatory intervention in the wholesale market should be to ensure sustainable competition in the retail market that provides benefits to Canadians, such as reasonable prices and innovative services. Therefore, the Commission considers that a decision to conduct an examination of the wholesale market should take place only if an assessment of the retail market reveals concerns with the sustainability of competition in that market. Accordingly, in this decision, the Commission reviews the key elements of the retail market to determine if an examination of the wholesale market is warranted.*
>
> *23. The proposed approach set out in Telecom Notice of Consultation 2014-76 to examine the wholesale market contained key elements of the essential services test*

*set out in Telecom Decision 2008-17, including consideration of market power and its impact on the downstream retail market. Therefore, the Commission determines that the essential services test is the appropriate test to apply if an assessment of the retail market demonstrates that an examination of the wholesale market is warranted. The essential services test, along with policy considerations, informs the Commission's decision whether to mandate a particular wholesale mobile wireless service.*[49]

101. As discussed above, Rogers believes that the evidence before the Commission establishes that the retail wireless market is in fact sustainably competitive. For this reason, no examination of the wholesale market is necessary.

102. Notwithstanding that this is the case, Rogers has nonetheless conducted an analysis of the wholesale market for the sake of completeness. As discussed in greater detail below, such an analysis reveals that there is no basis for the Commission to make a finding of a denial of access to MVNOs, or a finding that a denial of access would result in a substantial lessening or prevention of competition in the downstream market.

103. In Telecom Decision 2008-17, the Commission determined that to be essential, a facility, function, or service must satisfy all of the following conditions:

- *it is required as an input by competitors to provide telecommunications services in a relevant downstream market;*
- *it is controlled by a firm that possesses upstream market power such that withdrawing mandated access, or denying access to the facility, would likely result in a substantial lessening or prevention of competition in the downstream retail market; and*
- *it is not practical or feasible to duplicate the functionality of the facility.*[50]

104. The Bureau's *Abuse of Dominance Enforcement Guidelines* are very similar to the Commission's test:

*Refusals to Supply*

*71. As a general matter, there is no obligation on any business to supply to, or buy a product from, another business. However, in some exceptional circumstances, refusals to supply may engage the abuse of dominance provisions.*

*72. In some cases, a firm may explicitly refuse to supply a product. However, concerns may also arise in relation to "constructive" refusals, where a firm agrees to*

[49] TRP 2015-177, paras. 22 and 23.
[50] TRP 2015-177, at para. 199.

> *supply on terms that are sufficiently onerous as to have the same effect as an explicit denial (e.g., charging a prohibitively high price).*
>
> *73. For the Bureau to conclude that a refusal to supply is an anti-competitive act, it must be the case that the product or service being denied is both competitively significant and cannot otherwise be feasibly obtained (for example, from other suppliers or through self-supply). Where this is the case, the Bureau may conclude that it was reasonably foreseeable that the purpose of a refusal was to exclude a competitor, in the absence of a legitimate business justification.*
>
> *74. When exercising its enforcement discretion in relation to refusals to supply, the Bureau is aware that competitively significant inputs are often the result of significant and costly investment and innovation, and forcing firms to supply may undermine incentives for firms to develop new and beneficial products and services.*[51]

105. The Competition Act test under the abuse of dominance provision also requires a showing of substantial lessening or prevention of competition in a relevant market.

106. In the case of MVNOs, these players are by definition resellers of mobile wireless services. There is no question that they require access to a carrier's wireless network, or its radio access network (RAN), in order to compete in the market as a reseller. But has there been a refusal to supply by the wireless carriers? Is the provision of the RAN by wireless carriers the result of significant and costly investment and innovation and would forcing firms to supply undermine incentives for them to develop new and beneficial products and services? Would a refusal to supply result in a substantial lessening or prevention of competition in a relevant market? All of these questions must be answered before wireless carriers can be mandated to provide access to MVNOs.

## Application of the test to MVNO services in Canada

107. There has been no refusal by wireless carriers to deal with MVNOs. As recognized by the Commission in its public notice, resale activity has dramatically increased in the M2M and IoT markets.[52] Rogers alone has over 200 such agreements. Consumer MVNOs remain in the market as well with Rogers' MVNO partner, Ztar Mobile, powering the 7-Eleven and Petro-Canada labels and China Telecom's recent arrival in Canada.[53]

108. The MVNO market was considerably larger before ISED enacted its fourth carrier strategy. Rogers had five consumer MVNOs at that time. However, a by-product of the fourth carrier strategy is that most of these MVNOs either went bankrupt or were forced to sell themselves. They were simply unable to withstand the pressure placed on the market by the government-supported new entrants, who targeted many of the same

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[51] The Bureau's *Abuse of Dominance Enforcement Guidelines*, paras. 71 – 74.
[52] TNC 2019-57, at para. 37.
[53] China Telecom's CTExcel. See: https://www.ctexcel.ca/

market segments with far more resources and had other advantages. The prospects for MVNOs dried up.

109. As explained in the IMOBIX Report, wireless carriers will enter into arrangements with MVNOs when there is a mutual interest being served. For example, the MVNO may serve a niche market that the wireless carrier does not adequately serve, or the MVNO may have a better distribution network or have a more recognized brand name in the market segment being addressed.[54] Additionally, excess capacity may be the motivating factor for a wireless carrier to enter into an agreement with one or more MVNOs.[55]

110. The US market has more MVNOs than the Canadian market. There are good reasons why this is the case. First, the population of the U.S. is 10 times larger than the Canadian population with correspondingly larger market niches to be served. Second, in the U.S., both T-Mobile and Sprint host numerous MVNOs because they have significant excess capacity in their networks. They built or acquired big networks that they could not fill with their own customers' traffic. There was a mutual interest to work with MVNOs to help fill their networks with additional traffic.

111. The Commission appears to believe that there should be "excess capacity" in the network, because significant capital investments have been made in the past. And further that this capacity can be freed up for MVNOs. In particular the Commission states:

- That "facilities-based competition should naturally result in more opportunities for MVNO competition (for example, <u>through the sale of excess network capacity</u>)."[56]

- And that "…it is likely that the benefits that a well-developed MVNO market would deliver to Canadians are now more likely to outweigh any negative impacts that a policy of mandated wholesale MVNO access might have on wireless carriers' network investments, <u>particularly given the extensive investments that have been made in recent years</u>".[57]

112. The Commission's view, however, overlooks two key points.

113. First, while "extensive investments" have been made throughout the LTE era – $12 billion by Rogers alone, including building out to cover 97% of the Canadian population with LTE – investment continues to be needed to support customer growth, particularly in LTE data usage. The investments were made so that customers can use the network. It is not a network-in-waiting. At the same time, the industry is faced with significant new investment to support the development of 5G. One investment cycle may be over, but another is just beginning.

[54] IMOBIX Report, paras. 27 and 47.
[55] Ibid, para. 54.
[56] TNC 2019-57, para. 34 with emphasis added.
[57] Ibid, para. 39 with emphasis added.

114. Second, past network build-out was done to ensure that customers would have the necessary coverage and capacity to support growth in usage of LTE mobile services. Networks do not have inherent built-in "excess" capacity.

115. Operators continually add radio capacity to sites and build new sites. This is an indicator that there is no excess capacity, not the contrary. If there were excess capacity in the network, operators would not have to make ongoing investments in radio equipment and sites.

116. Rogers does not have any excess capacity. It is constantly investing in new capacity to keep up with growing demand. Rogers closely monitors its available capacity at all points of its network. Rogers only undertakes the necessary upgrades to increase capacity when a particular element in its network is approaching its limitations. This has two implications. First, Rogers is not actively seeking arrangements with MVNOs to fill spare capacity, and secondly, Rogers cannot serve MVNOs without investing incrementally more capital to expand network capacity. This makes the cost of serving MVNOs much higher than it would otherwise be if there was excess capacity.

117. MVNO access is not mandated in Canada, but operators are not prohibited from supporting MVNOs. There is nothing stopping operators from supporting MVNOs where the commercial arrangement makes sense, consistent with the Commission's observation that "MVNO activity has increased in the machine-to-machine (M2M)/IoT markets."[58] Of course, it should also be kept in mind that M2M/IoT applications require relatively little bandwidth and are thus easier to accommodate than consumer-focused MVNOs offering voice and data services.

118. In its public notice the Commission cited two examples in the past five years where it had to intervene in the mobile wireless service market to address disputes between a carrier and a potential MVNO when the prospective MVNO was unable to successfully negotiate an agreement with a wireless carrier, and instead sought to inappropriately use wholesale roaming as a means to enter the market.[59] One of the two examples cited was the case involving Rogers and Sugar Mobile. In its case, Sugar Mobile never sought an MVNO agreement from Rogers. It merely started reselling Rogers roaming service through its affiliate, Ice Wireless. There was no attempt made by Sugar Mobile to negotiate an MVNO agreement with Rogers. There was no refusal to deal by Rogers.

119. Another reason why MVNO activity has not thrived in Canada is that every market segment is well served. As mentioned above, the regional service providers initially entered the market targeting underserved markets. The national carriers over time have introduced several value brands targeting similar segments. With at least four carriers and even more flanker brands serving every provincial market, there is a lot less room for MVNOs to operate.

[58] Ibid, para. 37.
[59] Ibid, para. 38.

120. The difficulties MVNOs face in Canada is demonstrated by the number of potential MVNOs that have approached Rogers but never ultimately launched. The overwhelming majority of resellers who approached Rogers to commence an MVNO never bothered to complete the standard initial information package. As the amount of work and capital necessary became apparent, most potential MVNOs declined to continue in light of their limited market prospects.

121. As evidenced above, there has been no general refusal to supply potential MVNOs.

122. Nor is it clear to Rogers that MVNOs cannot obtain access to the networks of other carriers, including new entrant carriers. The test of an essential service requires that it is not practical or feasible to duplicate the functionality of the facility. There are regional carriers in every province in Canada. Customers of MVNOs that enter into arrangements with any of these regional carriers are entitled to roam outside the regional carriers' home territory provided that the customer resides within that home territory. An MVNO could replicate a national network by entering into MVNO arrangements with all of the regional carriers in Canada. This means that there is no relevant national wholesale MVNO market, and national carriers have no ability to collectively dominate any wholesale MVNO market.[60]

123. Potential MVNOs could also enter the mobile wireless market as a new entrant, if they chose to invest the capital required to do so. All of the spectrum auctions in the past 10 years have included set-asides for new entrants. This spectrum sells at a much lower price than other spectrum because the largest three carriers are precluded from bidding on it. In the 600 MHz auction 43% of the spectrum was set aside for regional carriers.[61] Smaller companies, such as Xplore Mobile, Ice Wireless, and Tbaytel all purchased spectrum in this auction. Several blocks were even unsold. If foreign wireless carriers such a Verizon or Orange, or technology behemoths like Google or Facebook, wished to provide wireless service in Canada, with their resources they would have no difficulty obtaining the necessary spectrum to launch service.

124. Notwithstanding the lack of a refusal to supply, it is uncertain whether such a refusal would result in a substantial lessening of competition in the market. In fact, as discussed below, Rogers denies that this would be the case.

[60] The Feasey Report on this point is also instructive. See, in particular, para. 29(l), 78-81 and 116-118. At para. 81, in particular, Mr. Feasey states: "The critical question to which the regulator needs to turn its mind is whether they [in this case, the national carriers] have the collective *capacity* not to do so [refuse MVNO access on commercial terms], given the unilateral incentives which each will face. This is a central issue in any analysis of collective market power. The CRTC says [in its 2015 decision] that there is little evidence that the national carriers compete on the wholesale market, but that does not explain how those carriers have been able to co-ordinate their conduct, what they are coordinating on, how they monitor and would punish any deviation from such an agreement or whether there is any evidence of such deviation or punishment. No European regulator would be allowed to proceed without first addressing these points in detail, and with evidence."
[61] ISED, *Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band*, para. 30.

125. If one compares pricing in the U.S. with pricing in Canada, one can discern that the greater number of MVNOs in the U.S. has not translated into lower prices in that country.

126. ISED's *2018 Price Comparison Study of Telecommunications Services in Canada and Select Foreign Jurisdictions* compared six baskets of talk, text and data and three baskets restricted to mobile broadband in Canada, the G7 and Australia. It found among other things that:

- In level 1, 2, and 5 baskets, Canada was cheaper than the U.S.
- In level 3 and 4 baskets, Canada and the U.S. have similar pricing.

127. Cable.co.uk recently released a report titled *World-Wide Mobile Data Pricing: The Cost of 1 GB of Mobile Data.*[62] According to data collected in the last quarter of 2018, Canada's average price per GB is $15.58 while the U.S.'s is $16.03.[63] The calculation of the average cost is determined as a simple mean average for each country. The price comparison does not take into consideration coverage, quality of networks (including speeds and latency which Canada mostly leads the U.S.), or purchasing power parity, to say nothing of population densities.

128. These price studies cast serious doubt on whether MVNO activity results in reduced prices for consumers, or a higher level of competitive activity in the market. Rogers believes that MVNO activity would have little if any impact on prices or competition in the Canadian marketplace. This has certainly been the case in other countries. Rogers has filed the evidence of Mr. Richard Feasey as part of its intervention in this proceeding (the Feasey Report). The Feasey Report discusses developments in Europe since 2014 and the impact of MVNO activity on prices and investment. The Feasey Report notes that "What research we have today suggests, consistently, that MVNOs have had no statistically significant impact on retail prices."[64]

129. In addition, there is no evidence that MVNOs have a material positive impact on investment or innovation in the marketplace. In fact, they are widely acknowledged to do the opposite. As is explained in the Feasey Report, it is commonly accepted by European regulators that wholesale access regulation has a negative impact on investment.[65] The Feasey Report explains this issue in the following terms:

> *One aspect of the European debate over the past few years has concerned the relationship between competition and investment. European policymakers have been concerned since at least 2007 that Europe had been performing comparatively poorly in terms of investment in new network facilities. Investment in 4G has lagged behind the United States and other regions, whilst investment in new fibre to the home*

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[62] Cable.co.uk, *World-Wide Mobile Data Pricing: The Cost of 1 GB of Mobile Data.* Available: https://www.cable.co.uk/mobiles/worldwide-data-pricing/
[63] Prices in CAD.
[64] The Feasey Report, para. 12.
[65] The Feasey Report, para. 12 and 111. See also the Feasey Report (2014), para. 40.

> *technologies has varied enormously between countries, with larger markets such as the UK, Germany and Italy performing particularly poorly. Although there remains some dispute as to the causes of Europe's underperformance, it was generally accepted that a reorientation of the regulatory framework was required in order to promote investment in Europe and that this should involve placing greater emphasis upon inter-platform competition between facilities-based based carriers and less emphasis on intra-platform competition between carriers and resellers in downstream markets.*
>
> *This conclusion was underpinned by research for the Commission which had suggested a positive correlation between competition between facilities-based wireline carriers (generally HFC and copper-based networks) and the rate of investment in new technologies and upgrading of networks.*[66]

130. Because they are resellers of wireless services, MVNOs would produce few, if any, innovations. This is because service innovations generally occur in the network which the carriers control, and MVNOs are left to tinker with bills and pricing plans - not network services. This is confirmed in the evidence of Mr. Hunter in the IMOBIX Report.

131. For example, the IMOBIX Report notes that "A simple Branded Reseller MVNO focuses on just sales and marketing," and that "an MVNO or reseller that is simply rebranding its host MNO's services is unlikely to have an impact on the market, as it will likely have difficulty finding investors willing to back its proposed business and creating a unique service offering desired by customers."[67]

132. Experience in the Canadian wireline resale market confirms this American experience. Resellers of wireline access generally do not innovate in terms of services. They basically deliver only what the underlying carrier provides to them.

133. MVNOs also make negligible investments in comparison with wireless carriers. It is the facilities-based carriers that spend the capital to extend the reach of networks, add capacity, and deploy new technologies such as LTE and now 5G. Many MVNOs can be expected to be white label providers who merely change the name of the service provider from that of the carrier, and rebill the underlying carrier's services. They employ very few employees and contribute in no way to the extension of service to more remote or rural areas. The bulk of the cost of providing mobile wireless services resides in the RAN, which is financed and provided by the wireless carrier. This is explained in the IMOBIX Report:

> *the majority of investment and financial risk is borne by MNOs and related to the cost of acquiring spectrum, building, and operating and continually upgrading the radio access network.*[68]

[66] The Feasey Report, paras. 110 and 111.
[67] The IMOBIX Report, paras. 14 and 11.
[68] Ibid, para. 16.

> …
>
> *Over 70% of the CAPEX for MNOs is related to the radio access network, civil works, and transmission. Not only is the initial buildout expense very large for new MNOs, but MNOs must continually invest in the radio access network to upgrade it with the most recent technology and to support the spectrum that has been acquired.*[69]

134. What mandated MVNO resale competition can be expected to do is deter facilities-based carriers from continuing to make the type of investments they have made in the past, to stay current or ahead of new wireless technologies as they are developed, and to develop new services. If Canadian carriers are required to share the benefits of their investments with competing MVNOs who are not required to make similar investments, they will feel less inclined to make the investments required.

135. In addition, if MVNO activity is mandated, there is nothing to stop regional entrants from forgoing investment in their own networks and simply reselling an incumbent carrier's network. Why take the risk of expending the capital required to expand network coverage, particularly in the face of MVNO resale which will negatively impact their ability to recoup that investment, when they can simply pay for another carrier's service?

136. It was primarily for this reason that the Commission declined to rule in favour of mandating MVNO access to wireless networks in its last review of the wholesale wireless market, its decision on wireless roaming rates, and in the Commission's reconsideration decision on referral back from the Governor in Council. In the latter decision, released just a little over a year ago, the Commission emphasized the negative impact that mandated MVNO activity would have on the incentive of new regional entrant carriers to invest in network expansion - particularly in rural areas:

> *71. …While the national wireless carriers' longer-term plans are unlikely to be affected to any noticeable extent by the introduction of mandated resale competition at this time, the risk to investment and expansion is greater for the other wireless carriers.*
>
> *72. The business case for these other wireless carriers to expand their networks into new markets, particularly in less densely populated areas outside major metropolitan centres, is challenging. For an investment to make sense, the company's projected revenue in the expansion area must exceed the projected costs of expansion over a given time frame, and must also compare favourably relative to other potential investment opportunities (in larger cities).*
>
> *73. If mandated resale competition were to occur in these areas it would likely splinter the market and reduce the number of customers that the other wireless carriers are relying on to generate revenue. Because of a challenging business case, the loss of customers to Wi-Fi-first service providers could reduce projected revenue*

[69] Ibid, para. 18.

> *enough to make the business case for a targeted expansion area unprofitable and prevent the facilities-based carrier from going ahead with the investment.*
>
> *74. In conclusion, while the introduction of resale competition could result in some improvement to affordability, the Commission considers that the potential negative impact on investment outweighs that benefit.*
>
> *75. …Given the circumstances, the Commission considers that the record is persuasive insofar as it establishes that there is a risk to the investment by certain wireless carriers, especially with respect to expansion in rural areas, if the Commission were to expand access to wholesale wireless roaming.*[70]

137. It is important to note that despite reaching this conclusion in its decision, the Commission addressed the gap it found in the market in data-only plans. The same day that the Commission released its decision, it announced a new proceeding related to lower-cost data-only services. As discussed above, it required the largest wireless carriers to file proposals for lower-cost data-only services and convened a public process to review the filings. In Telecom Decision CRTC 2018-475, the Commission required these carriers to (i) submit information concerning their lower-cost data-only plans implemented as a result of this proceeding every six months, and (ii) confirm, within 90 days of the date of this decision, whether the plans had been introduced in the market as expected. The Commission also encouraged the national wireless carriers to continue to improve their offerings to respond to consumers' needs and expectations. Given that this decision was released a scant five months ago, the Commission has yet to receive its first report.

138. It is therefore difficult to discern what has happened in the intervening period since the Commission's decision not to mandate MVNO resale and the Notice in which the Commission expresses the "preliminary view" that MVNO resale should be mandated.

139. Why was investment by regional carriers of concern then, but not now - particularly when the industry is facing the challenge of making massive new investments in 5G technology? If anything, regional carriers will have an even greater incentive to engage in resale, rather than finance their own network expansion.

140. The Commission was very careful in its last review of the wholesale market to ensure that any regulatory interventions that it made would not affect the economic incentive for wireless carriers to invest. This concern about preserving incentives to invest accounted for the Commission's different treatment of wholesale roaming by regional carriers and mandated resale by MVNOs.

141. Importantly, the current roaming framework promotes competition by preserving incentives for service providers to invest in networks. Under ISED's and the Commission's rules, roaming is an incidental service that allows the customers of one

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[70] TD 2018-97, paras. 71 – 75.

carrier to use the network of another carrier when out of range of their home carrier's network. ISED's Conditions of Licence attached to every commercial mobile wireless spectrum licence state that:

> *Roaming must enable a subscriber (a Roamer) already served by the Requesting Operator's network (Home Network) to originate or terminate communications on the Licensee's network when out of range of the Home Network, whenever technically feasible.*[71]

142. The Commission has provided a very similar definition:

> *…wholesale roaming services provide incidental access to a host network by the end-customers of a wireless carrier when these end-customers are outside their home network's footprint.*[72]

143. Roaming coverage supplements the home carrier's network; it does not replace it and it cannot be used for resale. This important policy determination is based on the fact that allowing broader access would significantly undermine the investments of other wireless carriers, particularly the regional carriers, and especially in rural areas. Some small and regional wireless service providers may even cancel their future network deployment plans and instead resell another carrier's network. After all, this would be a significantly less costly way to expand their operating territory without taking on any risk whatsoever.

144. To ensure this doesn't happen, the Commission has structured its roaming framework such that smaller service providers are still incentivized to invest in expanding their networks:

> *The Commission's determinations with respect to the regulation of rates, terms, and conditions for wholesale roaming, as set out later in this section, will allow smaller wireless carriers such as the new entrants to expand their wireless networks …. The Commission also considers that these determinations will not act as a disincentive for wireless carriers to continue to invest in their network facilities because, among other things, wholesale roaming is incidental access to the network.*[73]

145. Mobile wireless service providers can only sell their service within their operating footprint. Providers who expand their networks can therefore sell their service to additional Canadians, and thus increase their revenues while decreasing their wholesale roaming costs. For example, Freedom Mobile could invest in expanding its network into Sarnia, where it holds licences for 90 MHz of mobile wireless spectrum. This would allow Freedom Mobile to retail its service in Sarnia, which it currently cannot do under the Commission's roaming rules. It would also allow Freedom Mobile to stop paying a

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[71] ISED, *CPC-2-0-17 Conditions of Licence for Mandatory Roaming and Antenna Tower and Site Sharing and to Prohibit Exclusive Site Arrangements*, Part B, section 2 with emphasis added.
[72] CRTC TD 2016-60, para. 14 with emphasis added.
[73] TRP 2015-177, para. 123.

wholesale roaming provider for roaming service in that city. Consumers living in Sarnia would benefit from the additional choice of a new service provider in their community.

146. On the other hand, if Freedom Mobile were allowed to sell service in Sarnia without expanding its network there, then it would not, in fact, be selling its own service there at all: it would be reselling its wholesale roaming provider's network. The carrier would gain the artificial advantage of being able to sell services in an area where it has not made a single dollar of investment. It's hard to see why any carrier would want to take on the massive cost and risk associated with building a mobile wireless network, particularly where the business opportunity is modest, if it could simply avoid the cost and risk by reselling another company's services. Consumers living in Sarnia would not benefit very much either, as the new carrier would add no new infrastructure in their community. Requiring mandated resale by MVNOs could therefore result in less facilities-based competition in areas that regional carriers might otherwise build out.

147. This is why the Commission decided to permit incidental roaming - but denied mandated resale activity by MVNOs. It is also why the Commission subsequently sought to take an alternative approach to improving the affordability of wireless services for lower income Canadians through its lower-cost data-only service initiative.[74]

148. The reasons that led the Commission to distinguish between incidental roaming and mandated MVNO resale are as applicable today as they were one year ago. If anything, the challenge of deploying 5G services is now upon us and this exacerbates the need to preserve the carriers' incentives to invest. Now is clearly not the time for the Commission to change course. For the very negligible and unproven benefits that mandated MVNO resale might produce, it is clearly not the time to undermine the incentive of wireless carriers to make the critical investments required.

### Application of test to mandated wholesale MVNO access by other regulators - results and pitfalls

149. The Feasey Report describes that there have been no attempts in Europe to extend regulation to wholesale services for MVNOs since 2014 and that the new European regulatory framework (the European Electronic Communications Code (EECC)) further limits opportunities for national regulators to do so. The report states that the Spanish regulator has withdrawn obligations previously in place. It also states that the only regulator in the region that continues to regulate wholesale services for MVNOs is the Norwegian regulator, which is dealing with a market in which there are only two facilities-based carriers, and one is considered to possess significant market power. That market is therefore very different from the Canadian market. In that case, the report also states that the Norwegian regulator has had to intervene ever more extensively in the wholesale market over the years in an effort to sustain the margins earned by MVNOs.[75]

[74] TD 2018-97, paras. 71 - 75.
[75] The Feasey Report, para. 10.

This does not support the Commission's assumption that a limited time intervention is possible.

150. While European regulators have not intervened to assist MVNOs, the Feasey Report states that the Competition Directorate of the European Commission has relied upon wholesale MVNO remedies to restore competition otherwise lost as a result of the merger of facilities-based carriers in a number of European markets, including Austria, Germany and Ireland. The European Commission has since abandoned MVNO remedies and instead relied upon the entry of a new facilities-based carrier to restore competition in the most recent merger in Italy.[76]

151. With respect to the impact of MVNOs on retail prices, the Feasey Report states:

> *What research we have today suggests, consistently, that MVNOs have had no statistically significant impact on retail prices, particularly low cost tariffs, despite the many claims of potential MVNOs to the contrary. There is little or no research as to the impact of MVNOs or MVNO regulation on investment in wireless network facilities. There is, in contrast, a substantial and now well-developed literature on the impact of wholesale regulation on investment in the wireline market, where the impact is generally found to be both statistically significant and negative.*[77]

152. With respect to the impact on lower income groups, the report states:

> *The CRTC should not assume that mandating wholesale access for MVNOs will meet the needs of low income groups. The evidence from Spain, Norway and other markets I have researched is that the majority of MVNOs focus their attention on profitable customer groups such as business users and frequent international callers. Only a relatively small proportion of MVNOs in the rest of the world are 'low cost' providers of the kind which the CRTC seems to want to promote.*[78]

153. Rather than rely on MVNO activity to stimulate competition, the EECC, which was adopted in December 2018, shifts the focus to encouraging investment by facilities-based carriers.

> *The EECC shifts the focus of European policy in an effort to increase and accelerate investment in new network technologies, including both fibre to the home and 5G. It seeks to do this by limiting any interventions to upstream markets, generally for 'passive' civil engineering assets, such as towers and masts in the mobile wireless sector and ducts and poles in the wireline sector. Interventions in markets that are downstream, such as the market for services for MVNOs, can only be considered as a last resort once all other options have been exhausted.*[79]

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[76] Ibid, para. 11.
[77] Ibid, para. 12.
[78] Ibid, para. 9.
[79] Ibid, para. 13.

154. In Australia, the Feasey Report describes that the ACCC has completed a review of the wholesale wireless market. The ACCC expressed the view that intervening in wireless wholesale markets risked undermining the incentive of carriers to invest and differentiate and so declined to do so.[80]

155. The Feasey Report states that there is some evidence to suggest that the traditional MVNO model is "past its peak." MVNOs who originally entered the market to exploit growth opportunities in particular customer segments that might have been neglected by the facilities-based carriers have often now exhausted that growth. Carriers, seeking new sources of growth for themselves, have focused on segments of the market that they had previously ignored. In many countries, this has led to the exit of independent MVNOs through consolidation or sales to carriers, and to the entry of new 'flanker brands' owned by carriers themselves. Commercial opportunities for new independent MVNOs appear more limited than they were in the past and their future prospects more uncertain.[81]

156. This observation is equally applicable to Canada where we have witnessed the exit of a number of MVNOs from the market and the emergence of a number of flanker brands.

157. The Feasey Report summarizes the evidence on MVNO experience in other countries as follows:

> *Overall, the evidence from elsewhere in the world reveals that regulators have generally decided not to intervene in mobile wireless wholesale markets and to focus instead on expanding competition between facilities-based carriers. Where they do intervene, regulators elsewhere in the world leave carriers and MVNOs to negotiate terms between themselves rather than impose their own view of what prices should be. There is no evidence that, even when the detailed terms of wholesale supply have been prescribed in detail by the regulator, the entry of MVNOs leads to lower retail prices for consumers in general, or for low income groups in particular. The impact of MVNOs on wireless network investment is still not well understood but is likely to be similar to the negative relationship between investment and wholesale access regulation which has been observed in wireline markets around the world. As mobile wireless markets have matured, opportunities for new MVNOs appear more limited than in the past, and experience shows that many over-promise during regulatory proceedings but fail to enter or otherwise make an impact on the market.*[82]

158. The Feasey Report also warns of the dangers inherent in mandating MVNO resale at this point in time:

> *… If the CRTC were instead to mandate wholesale services for MVNOs following this Review, it is not clear to me that much entry or expansion by MVNOs would occur or*

[80] Ibid, para. 16.
[81] Ibid, para. 18.
[82] Ibid, para. 19.

> *that, if it did, it would be low income consumers who would benefit. In my view there would be a significant risk that the CRTC would find itself under pressure to intervene further, that despite the CRTC's best intentions regulated wholesale services for MVNOs would become a permanent feature of the Canadian market and that this would mean less investment in network facilities and less innovation in wireless services in Canada over the long run.*[83]

159. The report's evidence is very pertinent to Canada at this particular juncture. Why would the Commission take the risk of dissuading investment by wireless carriers, and regional carriers in particular, at a time when they are about to embark on the most capital intensive transition to date: the introduction of 5G services. Why would it risk this opportunity and the benefits that it is expected to produce for the economy, consumers and businesses in favour of mandated MVNO access, a regulatory remedy that has passed its prime and is no longer being used by Canada's trading partners, a remedy that is unlikely to result in any significant investment, is unlikely to result in service innovation, and is unlikely to produce lower prices for consumers.

160. This trade-off has everything going against it. The Commission's recent targeted measures to introduce lower-cost data-only services are much more focused on Canadians with lower incomes and Canadians who might not require larger packages of services. These measures do not come with the pitfalls of mandated MVNO access. Prior Commission decisions were careful to preserve the incentive for regional carriers to invest. This same goal is now driving European and Australian regulators. As the Feasey Report states:

> *The 2015 policy to regulate wholesale roaming but not to regulate wholesale MVNO access was at least in part consistent with the approach taken by many regulators elsewhere in the world (whatever the actual merits of the decision itself). By this I mean that the CRTC's primary objective appears to have been to promote 'inter-platform' competition between facilities-based carriers rather than to rely upon 'intra-platform' competition between carriers and MVNOs in order to safeguard the interests of Canadian wireless consumers. Most regulators around the world would share the view that facilities-based competition is the 'gold standard'. The United States has relied upon it exclusively for more than 15 years, and I explain in Section B how Europe also now regards intra-platform competition as very much second best.*[84]

161. Forgoing investment in favour of mandated MVNO access is clearly a bad deal for Canada - particularly at this juncture when the wireless industry is facing the need for huge capital expenditures over a multi-year period to deploy 5G. It was not in the public interest to mandate MVNO resale in 2015, it was not in the public interest to do so in 2018, and it is not in the public interest now in 2019. With so little upside anticipated

[83] Ibid, para. 21.
[84] The Feasey Report, para. 45 with footnotes removed.

from mandated MVNO access, and potentially such a big downside, it is simply not worth the risk.

### Re-consideration of mandated roaming regime is not required

162. In Rogers' view, there is no need for the Commission to re-consider its mandated roaming regime in this proceeding. Final tariffs for mandated roaming were only approved a little over a year ago in March 2018 in Telecom Order CRTC 2018-99.[85] Final terms and conditions were established the previous year. This process was a long and arduous one. There is no need to repeat it at such an early date.

## Regulatory Intervention to Facilitate 5G Network Deployment

### Access to rights-of-way and passive infrastructure is critical for 5G deployment

163. The small cells that will support 5G speeds will need to be deployed widely, especially in dense urban and high traffic areas. Millimetre wave frequencies, in particular, will support high bandwidth requirements but have limited coverage. This means that thousands of cells, located close to street level in dense urban and other high traffic areas, will be required to support extensive 5G networks. Each small cell will need to be affixed to supporting infrastructure and be connected to electricity and to the core radio network, generally through fibre optic backhaul facilities.

164. Successful deployment of 5G cell smalls depends on timely and efficient access to rights-of-way and supporting structures. The latter include traditional support structures like poles, strand and duct owned by telecommunications carriers, electrical utilities and public entities, as well as the sides of public buildings and all manner of street furniture such as streetlights, bus shelters and street signs.

165. Successful deployment of competing 5G networks is also contingent on ensuring that carriers have non-discriminatory access to rights-of-way and supporting infrastructure. It is essential that every type of carrier has the same ability to deploy small cell antennas. Historic advantages must be eliminated. It is both inefficient and unfair to local communities to duplicate pole lines alongside or across the street from an existing line of poles. Carriers seeking access to existing poles must be able to obtain it at fair prices and within reasonable timelines. These terms of access must be extended to hydro utilities as well.

166. Non-discriminatory access to rights-of-way and supporting structures is therefore essential to the efficient, competitive deployment of 5G. In recognition of this, other jurisdictions such as the U.S. and the European Union (EU) have taken steps to facilitate

[85] Telecom Order 2018-99.

access to rights-of-way and supporting structures required for 5G infrastructure. Canada must do the same.

167. The FCC has, for example, conducted several proceedings over the last few years in order to streamline carrier access to rights-of-way and supporting structures at the local, state and federal levels, and to ensure that fees for such access are reasonable. In the course of these proceedings, the FCC determined that state and local government fees for small wireless facilities must be non-discriminatory and based on a reasonable approximation causal costs. This principle applies to all state and local government fees payable by a carrier for use of rights-of-way to deploy small wireless facilities, as well as for the attachment of these facilities to property within the rights-of-way owned or controlled by the government (e.g., streetlights, traffic lights, utility poles, etc.) and any associated application or permit fees.

168. In light of these principles and the record before it, the FCC determined that the following fees would be reasonable:

- $500 for a single up-front application that includes up to five Small Wireless Facilities, with an additional $100 for each Small Wireless Facility beyond five; and
- $270 per Small Wireless Facility per year for all recurring fees, including any possible right-of-way access fee or fee for attachment to municipally owned structures in the right-of-way.

169. These indicative fees provide importance guidance to service providers and local authorities.

170. In addition to addressing fees, the FCC recognized the significance of timely access to rights-of-way and passive infrastructure for 5G deployment. To address this issue, the FCC established two "shot clocks" to govern small wireless facility consultation with local governments. Under these rules, local governments must respond to requests to co-locate a small cell on existing infrastructure within 60 days and within 90 days to requests for new builds. The FCC also formalized the existing 90-day(for co-location) and 150-day (new sites) day shot clocks for non-small wireless facility deployments. If local governments do not satisfy these timelines, wireless service providers can seek relief through the courts.

171. The EU has also been active in removing barriers to 5G infrastructure deployment. The European Commission has updated the EECC to promote small cell deployment. Article 56 of the EECC requires local municipalities to permit deployment, connection, and operation of small-area wireless access points and directs these entities not to restrict such deployments through the permitting process. The EECC also provides that small-area wireless access points should be subject only to administration fees.

172. As in the U.S. and the EU, the Commission should take proactive steps to facilitate access to rights-of-way and supporting infrastructure for the deployment of 5G infrastructure.

173. To date, the Commission has focused on addressing access issues on a case-by-case basis for the purposes of constructing, maintaining and operating wireline transmission facilities pursuant to section 43 of the Telecommunications Act (the Act), as well as establishing tariffed terms and conditions of access to poles, ducts and strand of the incumbent local exchange carriers (ILECs) pursuant to section 25 of the Act.

174. Sections 43 and 44 of the Act establish a framework for access by telecommunications carriers to highways and other public places for the purposes of constructing, maintaining and operating a "transmission line." Carriers are granted a right of entry to highways or other public places for these purposes provided they do not interfere unduly with public use and enjoyment of that highway or other public place and provided the public authority having proper jurisdiction has consented to construction of the transmission line. If a carrier and public authority cannot agree on acceptable terms, the carrier or public authority may ask the Commission to set the terms of access. In addition, a carrier that is unable to obtain access to a supporting structure of a transmission line on a highway or other public place may ask the Commission to set the terms of access to the supporting structure.

175. While these provisions were drafted at a time when wireless technology was nascent and the focus was on wireline telecommunications infrastructure, there is no longer a public policy basis to limit sections 43 and 44 of the Act to wireline infrastructure. Nor is there any public policy basis for excluding utility poles from the scope of these provisions, as required by the Supreme Court of Canada decision in the *Barrie Public Utilities* case.[86]

176. The Commission has recently advocated that the Act be amended to provide clear jurisdiction to the Commission to address wireline and wireless access and support structure issues, regardless of ownership.[87] Rogers wholeheartedly supports and applauds these actions. However, consideration should also be given to initiating a policy proceeding to consider:

- The adoption of a broad definition of "transmission line" which includes a wireless transmission line, such as wireless transmission lines established using 5G small cells. The definition of "transmission facility" clearly covers both wireless and wireline facilities, and there is no more reason in this context to distinguish between access rights for wireless and wireline facilities supporting transmission lines or paths, than there is to distinguish between different types of wireline facilities.

[86] Barrie Public Utilities v. Canadian Cable Television Assn., 2003 SCC 28.
[87] CRTC, *CRTC written public submission to the Legislative Review Panel*. Available: https://crtc.gc.ca/eng/publications/reports/rp190110.htm

- The adoption of an expansive definition of the term "supporting structure" for the purposes of section 43, to include all passive public infrastructure capable of supporting wireless small cells and located on highways or other public places.
- Confirmation of the general principle that any fees charged by a public authority for access to a public place or public infrastructure for purposes of deploying wireless facilities, including small cells, should be based solely on causal costs, and identification of presumptively reasonable application and access fees.
- The identification of reasonable timelines for access to public places and infrastructure for purposes of installing 5G infrastructure.
- The establishment of an expedited dispute resolution process for disputes relating to access to public rights-of-way and places and public infrastructure for the construction, maintenance and operation of wireless facilities.

177. In addition, the Commission needs to ensure that owners of support structures can not delay or block access to them. While the ILECs are required to provide access to support structures in their incumbent serving areas in accordance with their approved tariffs, they are required to do so only when there is "spare capacity" on the structure. Spare capacity, for these purposes, is defined as total capacity, less capacity in use, less capacity required by the ILEC to meet its anticipated future service requirements. Unlike ISED's guidelines on tower sharing, the ILEC's tariffs impose no requirement that reserved unused capacity is required for imminent future use, i.e., use within the next 18 months. Nor do competing carriers have an effective means of challenging the ILEC's claims regarding future service requirements, or to enforcing the application processing timelines identified in the tariffs. To address these issues, Rogers recommends that the Commission:

- Initiate a proceeding to consider revisions to the relevant support structure tariffs, with a view to limiting reservation of capacity on support structures for future service requirements to capacity required for imminent future use (i.e., within the next 18 months);
- Establish an expedited process for considering disputes regarding access to ILEC support structures, including spare capacity assessments; and
- Establish a schedule of monetary penalties for failure to comply with processing timelines in the tariffs.

178. Finally, consideration should be given to extending the expedited dispute resolution process to disputes relating to non-tariffed carrier support structures, and to establishing guidelines in this context on reservation of spare capacity.

179. Taken together, these measures will help ensure that competing service providers are able to deploy their 5G networks in a timely and efficient manner.

## Conclusion

180. Competition in the Canadian mobile wireless market is stronger than ever. As a result of fierce and growing competition between service providers, including a fourth carrier in every province, prices are affordable and continue to fall. Service providers continue to invest in their networks, extending the reach of their advanced LTE and LTE-A networks into rural and remote parts of the country.

181. Canada's 5G revolution is around the corner and will require massive investments. 5G will transform many industries and enable new and exciting enterprise and consumer applications. It will be critical to Canada's international competitiveness. However, service providers must have regulatory certainty and a clear path to a reasonable return on their investments if they are to undertake risky 5G deployments. They must also have timely and cost-effective access to poles and municipal infrastructure so they can deploy the small cells that will enable 5G's most transformative applications.

182. Mandating MVNO access would harm the Canadian wireless market and undermine the incentives for ongoing investment. While additional competition from mandated MVNO access might appear to be beneficial consumers, it would be unsustainable and ineffective in the long term, and would come at a significant cost. First, there is no compelling evidence MVNOs result in material long term price reductions in other countries. Second, by introducing great regulatory uncertainty, and by fragmenting the market and reducing facilities-based service providers' ability to invest, mandated MVNO access could slow or even stop upcoming 5G deployments.

183. A decision not to mandate MVNO access is well supported by the 2006 Direction and the Proposed Direction as well as the Commission's past decisions. The Commission should not stray from the path that has been so successful in establishing vibrant facilities-based competition in the Canadian mobile wireless market.

# Answers to the Commission's Questions

## Competition in the retail wireless service market

### Question 1 – definition of markets

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|---|
| Provide your views on how the Commission should define markets for the purpose of assessing the state of competition in the retail market. |

- How should the relevant product market be defined for the purpose of assessing retail competition? Can the product market be segmented for this analysis and, if so, how? For example, should the Commission consider the prepaid and postpaid markets separately?
- What is the appropriate geographic market for the assessment retail competition?
- Identify the key market indicators for the assessment of the state of retail competition in the mobile wireless service market(s). In other words, what specific evidence should the Commission gather and how can that information be used to assess competitiveness?

184. The relevant product markets for retail wireless services are: the consumer market for wireless services and the enterprise (or corporate) market for wireless services.

185. The distinction between consumer and enterprise markets is consistent with the Bureau's delineation of retail wireless markets for purposes of its review of Bell's acquisition of MTS. In that case, the Bureau concluded that "[c]orporate customers constitute a separate product market as they purchase services through alternate channels and have different requirements." The Bureau also stated that consumers are unlikely to consider postpaid and prepaid wireless plans to be close substitutes. Rogers does not believe that the assessment of competition in Canadian wireless markets is materially altered by considering postpaid and prepaid wireless services as one or separate relevant markets, as wireless service providers compete equally fiercely in both segments in their coverage areas.

186. As competitors, price plans, and product offerings differ across provinces, the relevant geographic market is likely provincial, again consistent with the Bureau's analysis of the Bell/MTS merger.

187. Key competitiveness indicators include: supply conditions, including the number of competitors in relevant markets, quarterly net customer additions, promotional activity, price movements, customer switching, and innovation and technological change.

## Question 2 – competitiveness of the mobile wireless service market

Comment on the competitiveness of the mobile wireless service market(s). Are the mobile wireless service needs of Canadians currently being met? How have competitive conditions changed over the past five years? If the Commission's mobile wireless service regulatory framework remains unchanged, what do you expect the level of competition to be in the future?

### The Canadian wireless market is robustly competitive

188. The Canadian mobile wireless market is robustly competitive. Since the industry's inception, Canadian carriers have constantly challenged each other for customers. This competitive intensity is demonstrated by pricing and promotional activities as well as network investment. Despite our challenging geography, Canadian consumers enjoy multiple advanced networks as wireless service providers continuously invest in the latest technology in order to attract new customers while retaining their existing ones.

189. Competition has grown fiercer since the Commission's last review of these markets in 2015. There are now at least four facilities-based wireless carriers in each provincial market. Each regional carrier now has stable ownership, significant resources and strong brand recognition. The competitiveness of the regional carriers has increased each year as they have improved their networks and expanded their distribution.

190. The metrics discussed below confirm the intensity of competition between all carriers in Canadian retail wireless markets.

### Canada is served by four facilities-based providers in every province

191. There are now at least four facilities-based wireless carriers in each provincial market.

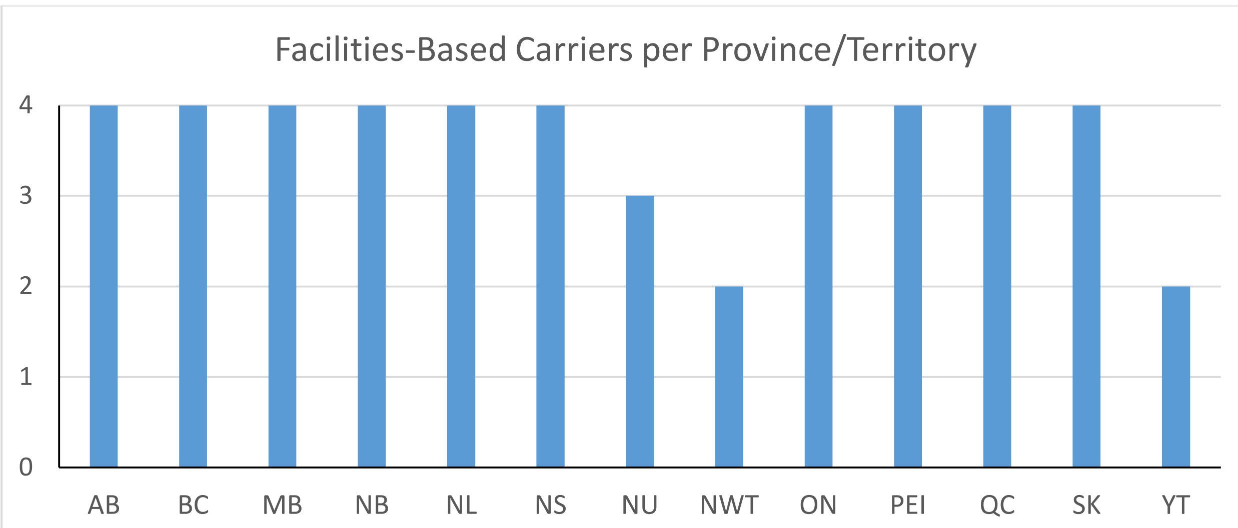


*Figure 7: The number of facilities-based service providers operating in each province and territory.*

192. Four wireless carriers for Canada compares very favourably with other developed countries that typically have either three or four carriers. Virtually no developed country has more than four national carriers. Figure 8 compares the number of facilities-based carriers in the Canadian market with the number of carriers in comparable country markets.[88]

[88] Bank of America Merrill Lynch Q1 2019 Global Wireless Matrix.

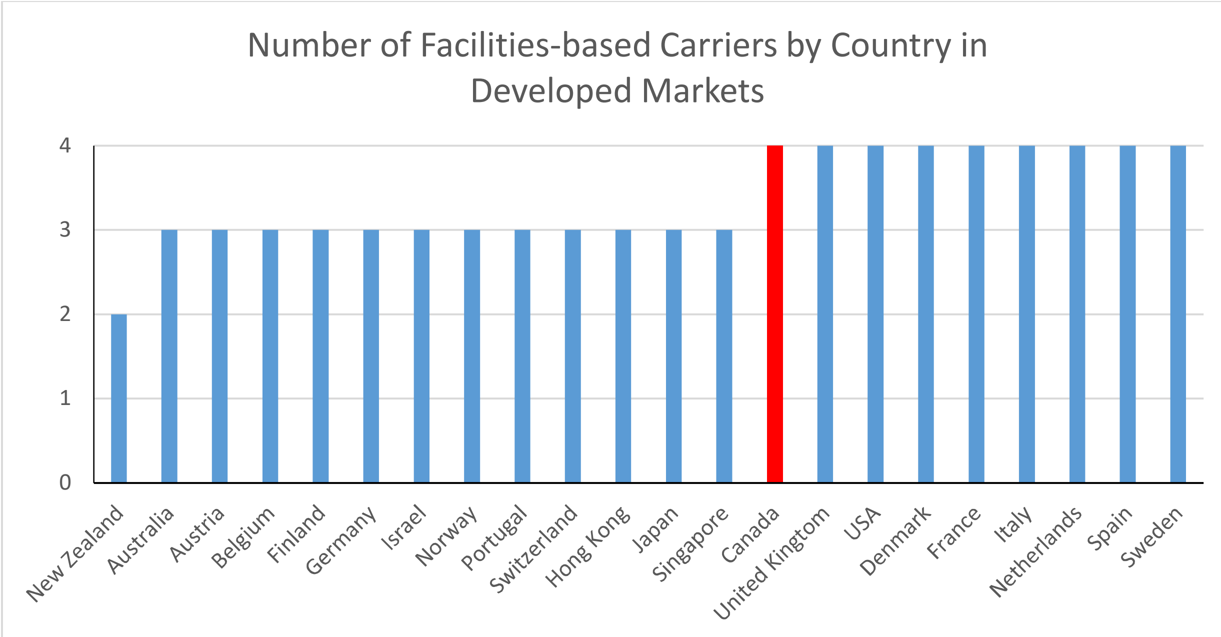


*Figure 8: The number of facilities-based service providers in select countries.*

## Share of postpaid net additions

193. A key measure of the current state of competition in the wireless industry is net additions. Net adds are the number of new subscribers that chose an operator after deducting those that leave it for a different service provider in a quarter. Net additions therefore are a key indicator of consumer sentiment and acts as an important yardstick of competitive intensity

194. A service provider's success in a quarter is measured not only against the competition but also against what it achieved in the previous year for the same period. The trend in share of postpaid net additions over an extended period is indicative of the sustainability of the success of a given competitor.

195. As illustrated in the chart below, service provider shares of net additions have oscillated significantly. A carrier's share in one quarter will not necessarily repeat in the following quarter. These swings are the result of the constant array of new products and services, price changes, promotions, new applications, and other features. A carrier may take the initiative temporarily but its competitors will respond. The ultimate beneficiary is the consumer.

196. What is also clear from the chart is that the new entrant service providers have staked out their place in the marketplace. In Q4 2018, Freedom Mobile and Videotron totaled 26% of national net additions by themselves. Adding in Eastlink, SaskTel, Tbaytel, and the other regional carriers across Canada would drive up this number. Thus, regional carriers have garnered in excess of a quarter of net additions in recent periods, evidencing their strong presence in highly dynamic markets.

197. Freedom Mobile in particular has rapidly gained prominence as the country's fourth national operator. In 2018, Freedom Mobile acquired 19% of postpaid net additions, comparable to TELUS at 21%. This trend continued into the first quarter of 2019 when Freedom Mobile won approximately 65,000 net additions compared to Rogers' 23,000 and Bell's 50,000 over similar periods. Freedom Mobile is now clearly a strong competitive alternative to Rogers, Bell and TELUS in its serving areas.

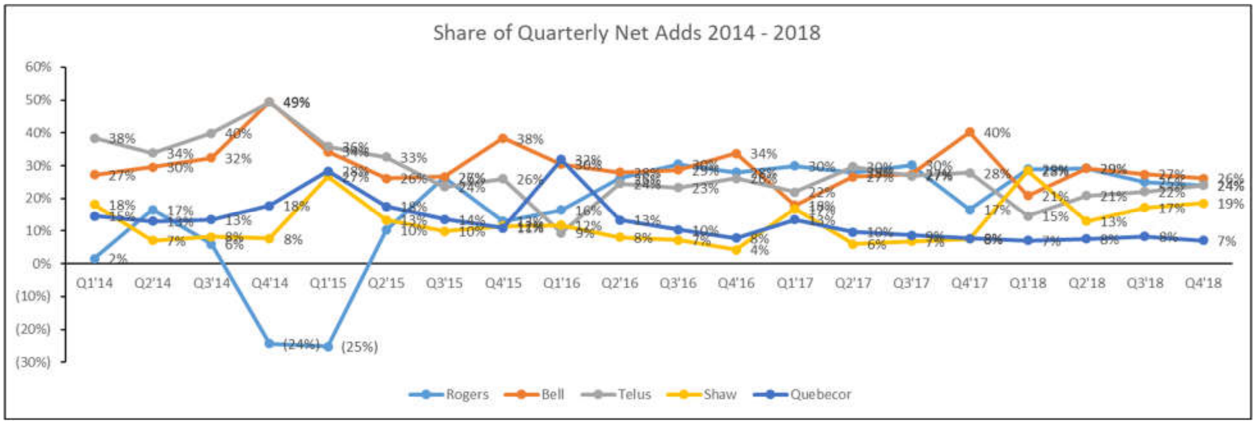


*Figure 9: Change in subscriber market share in provinces over time*

198. While there is a tendency to focus on the aggregate national market share, the more important metric is the change in market share at the regional level. The regional providers continue to expand their network within the provinces where they hold significant market and brand presence. Freedom Mobile leverages its parent Shaw's cable footprint in Alberta and British Columbia (while continuing to grow its presence in Ontario). Videotron, in Quebec, and Eastlink, in the Atlantic, share similar advantages in their respective regions.

199. The three national carriers also have different and changing regional focuses. Their shares significantly vary depending on the province. Having a leading share in one province at one point of time does not mean the lead will remain further down the road. Table 6 sets out 2016, 2017 Q3, 2018 Q4 market shares (by % of subscribers) in each province and the North.

| | Bell | | | TELUS | | | Rogers | | | Other | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2016 | 2017 Q3 | 2018 Q4 | 2016 | 2017 Q3 | 2018 Q4 | 2016 | 2017 Q3 | 2018 Q4 | 2016 | 2017 Q3 | 2018 Q4 |
| **BC** | 20 | 19 | 21 | 41 | 40 | 40 | 38 | 37 | 35 | 0 | 4 | 4 |
| **AB** | 25 | 24 | 24 | 52 | 50 | 50 | 23 | 23 | 21 | 0 | 3 | 5 |
| **SK** | 17 | 17 | 20 | 13 | 13 | 13 | 5 | 6 | 5 | 64 | 64 | 62 |
| **MB** | 9 | 49 | 45 | 7 | 13 | 15 | 38 | 38 | 39 | 47 | 0 | 1 |
| **ON** | 30 | 28 | 28 | 21 | 20 | 20 | 47 | 44 | 43 | 2 | 8 | 9 |
| **QC** | 30 | 29 | 29 | 27 | 27 | 26 | 28 | 28 | 27 | 15 | 16 | 18 |
| **NB** | 55 | 55 | 56 | 26 | 26 | 26 | 19 | 19 | 18 | 0 | 0 | 0 |
| **NS** | 53 | 52 | 52 | 34 | 33 | 34 | 13 | 12 | 12 | 0 | 3 | 2 |
| **PEI** | 56 | 54 | 52 | 31 | 26 | 32 | 13 | 19 | 12 | 0 | 1 | 4 |
| **NL** | 69 | 69 | 68 | 28 | 28 | 29 | 2 | 3 | 3 | 1 | 0 | 0 |
| **North** | 86 | 87 | 84 | 10 | 10 | 11 | 0 | 0 | 0 | 3 | 3 | 5 |

*Table 6: Changing market shares by province and territory.*

200. With the possible exception of Bell in the North, no single carrier has sufficient share to exercise market power in Canadian wireless markets. Moreover, new entrant market shares are growing, with Videotron now at 18% share in Quebec. Shaw and Eastlink are competing fiercely to grow their share in BC, Alberta, and Ontario in the case of Shaw, and in New Brunswick, Nova Scotia, PEI, and Newfoundland and Labrador in the case of Eastlink. These and other regional carriers have existing capacity and have recently acquired spectrum to expand their network capacity.

201. Another metric that is used to gauge the competitiveness of markets is concentration, measured by the Hirfindahl-Herschmann Index (HHI).[89] Canadian wireless market HHIs are, in most cases, comparable to the U.S. and are considerably lower than most other countries. For example, in its most recent review of U.S. wireless markets, the FCC reported a weighted average HHI of 3,106 as of year-end 2017, as well as HHIs ranging from between 2000-7000 for individual economic areas in the U.S..[90] The national HHI for Canada in 2018 was 3058.[91] On a regional market basis, Canadian HHIs vary from 2623 (Quebec) to 7181 (the North), while the HHI for each of Ontario, British Columbia and Alberta is considerably below the HHI of the Saskatchewan and Manitoba markets.[92]

[89] The HHI is the sum of market shares of competitors in a market, and therefore is a number between 0 and 10,000.
[90] FCC 18-181, para. 30. Available: https://docs.fcc.gov/public/attachments/FCC-18-181A1.pdf
[91] Bank of America Merrill Lynch Global Wireless Matrix Q4 2018, 30 April 2019
[92] Provincial HHIs were calculated using market shares as gathered and estimated by TD Securities Equity Research note of February 28, 2019. In Ontario, Freedom Mobile is estimated to have 7% market share and Eastlink and Tbaytel to have a combined 2% market share.

| | Bell | TELUS | Rogers | Other | HHI |
|---|---|---|---|---|---|
| **BC** | 21 | 40 | 35 | 4 | 3282 |
| **AB** | 24 | 50 | 21 | 5 | 3542 |
| **SK** | 20 | 13 | 5 | 62 | 4438 |
| **MB** | 45 | 13 | 39 | 1 | 3716 |
| **ON** | 28 | 20 | 43 | 9 | 3086 |
| **QC** | 29 | 27 | 27 | 18 | 2623 |
| **NB** | 56 | 26 | 18 | 0 | 4136 |
| **PEI** | 52 | 33 | 12 | 2 | 3941 |
| **NS** | 52 | 26 | 12 | 4 | 3540 |
| **NL** | 68 | 28 | 3 | 0 | 5417 |
| **North** | 84 | 10 | 0 | 5 | 7181 |

*Table 7: HHI score for each province and the territories, along with market share by operator.*

## Promotional activity is surging

202. Changes in net addition and market share are being driven by the extensive marketing activities of all the carriers. Competitive marketing efforts by the national incumbent brands, the flanker brands, the regional competitors, and the resellers are materially increasing each quarter. These activities have intensified as the regional carriers have grown.

203. Since 2015, quarterly promotional activity has increased by a factor of four nationally. During this time period, special promotional activity[93] was in market 70% of the time in 2016, 75% of the time in 2017 and 88% of the time in 2018. Carriers are constantly devising new initiatives to win customers from each other. These special offers, which are not reflected in international pricing comparisons, provide Canadian consumers with tremendous value and have become a necessity in the Canadian wireless landscape.

[93] Based on internal estimates. Does not account for resellers.

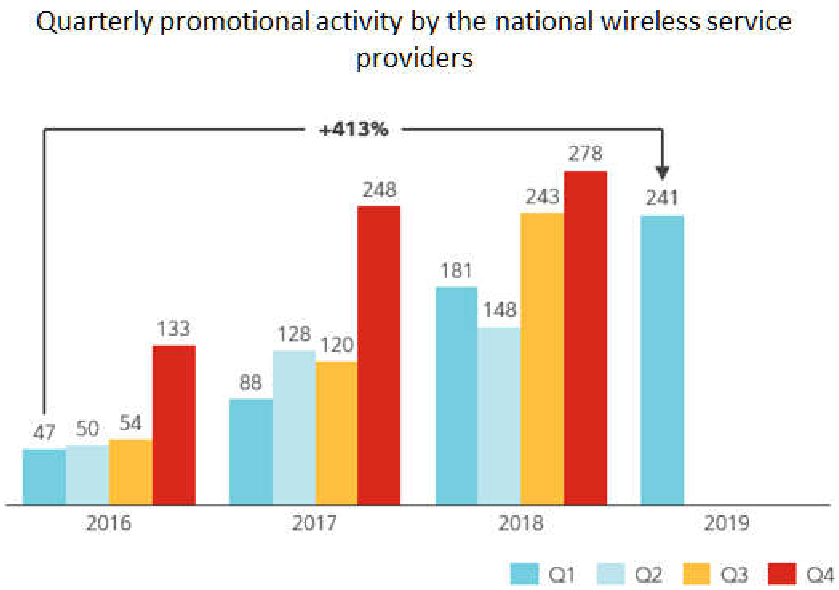


*Figure 10: Quarterly consumer promotional changes, postpaid incumbent brands, 2016-2019*

204. Such offers are most visible in the consumer retail segment. There is relentless and directed promotional activity to attract new customers (acquisition) while maintaining a customer base (retention). Each promotional activity is typically short-term in duration and, while the initiatives described below are not an exhaustive list, could take the following forms:

- Offering larger data buckets to customers for the same price.
- Increasing the size of the buckets with a much smaller increase in price.
- Offering recurring discounts for a time based duration, for example $10 off for 12 months on a new line if one is adding to a family.
- Encouraging the activation of a new hardware device by offering it for $0 or a low cost up front. These subsidies are recouped over the applicable term commitment.
- Other promotional activities such as forgiving an activation fee for customers that have longer-term relationships with an operator.
- Offering promotions that are targeted in particular sales channels.

205. According to Rogers' tracking, in the two most recent fully reported quarters (Q4 2018 and Q1 2019), the following key movements were recorded:

- In the Q4 2018 period, there was nearly one competitive plan and price change per day (84 over a 90 day period).
- There were 38 competitive plan and pricing changes and responses among the premium brands (Bell, Rogers and TELUS).

- There were 46 competitive plan and pricing changes and responses among the value brands (Virgin, Koodo, Freedom Mobile, and Fido).
- In the Q1 2019 period, the competitive offers activity increased to nearly 1.5 competitive plan and pricing changes per day (136 over a 90 day period).
- There were 83 competitive plan and pricing changes and responses among the premium brands (Bell, Rogers and TELUS).
- There were 53 competitive plan and pricing changes and responses among the value brands (Virgin, Koodo, Freedom Mobile, and Fido).

206. Uncompetitive markets simply do not experience this level of promotional activity. Only market participants who actively challenge each other for customers engage in this type of behaviour. Wireless carriers are clearly competing vigorously in the marketplace. Unfortunately, these types of efforts are not generally recognized in pricing studies.

## Customer switching drives promotional activity

207. Churn is a measure of customer switching. Churn is the number of customers that switch between service providers in a given period. Rogers' average 2018 post-paid customer monthly churn was 1.08%. This churn equates to 13% customer turnover in the year.[94] Rogers' churn fell in 2018 and dropped again to a record low in the first quarter of 2019. This reduction in churn is attributable to increased promotional activities and focus on customer service and quality by Rogers in order to retain customers in the face of competition from Bell, TELUS, and regional competitors. In spite of these improvements, based on statistics for the national carriers only, some 3.3 million customers switched wireless providers in 2018.

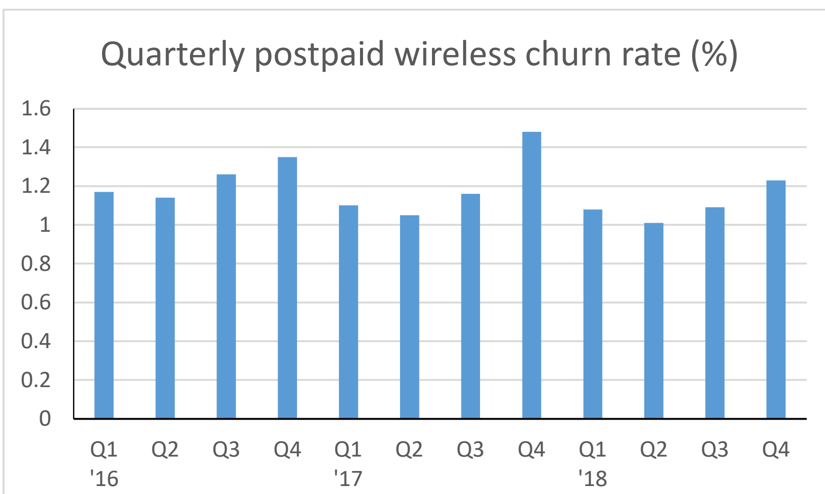


*Figure 11: Postpaid wireless churn rate, 2016-2018.*

[94] Prepaid churn is higher than postpaid churn. Therefore, the postpaid churn understates customer turnover.

208. Canadian wireless customers, therefore, have and are exercising the ability to switch wireless service providers.

## Canadians have access to a wide range of low cost plans

209. There is now a greater variety of low cost plans in the market than ever before. This includes economical talk & text plans, talk, text, and data plans, and, as discussed below, lower-cost data-only plans. These plans are available in both postpaid and prepaid versions. Customers can acquire an advanced smartphone for no additional cost if signing up for a contract, or can buy a smartphone outright at a low cost if signing up for a no-term plan. These price plan and smartphone offers have enhanced affordability.

210. These plans provide excellent value for all consumers, including Canadians with low household incomes. The plans start from as little as $10 per month. Many of Rogers' low cost plans include unlimited calling or texting capability, or both. Rogers' low cost plans are summarized in the following table.

| Plan name | Brand | Cost | Voice minutes | Text msgs. | Data (MB) | Type | Notes |
|---|---|---|---|---|---|---|---|
| **Talk, text, data** | Rogers | $ 25 | 50 | 100 | 100 | Postpaid | Canada-wide minutes |
| **Talk & text** | Rogers | $ 10 | 50 | 50 | 0 | Prepaid | Local minutes, Canada/international SMS |
| **Text** | Fido | $ 15 | 0 | Unlim | 0 | Prepaid | Canada/international SMS |
| **Talk & text** | Fido | $ 25 | Unlim | Unlim | 0 | Prepaid | Unlimited evening and weekend voice, unlim Canada/international SMS |
| **Talk & text** | chatr | $ 15 | 100 | Unlim | 0 | Prepaid | Canada-wide minutes, Canada/international text |
| **Talk** | chatr | $ 20 | Unlim | 0 | 0 | Prepaid | Province-wide minutes |

*Table 8: Select Rogers' low cost mobile wireless plans.*

211. Canada's other national wireless service providers and its regional mobile wireless service providers also offer a wide range of low-cost plans, including plans with unlimited calling and text capabilities, and plans with mobile wireless data. A small sample of such plans include:

| Plan name | Brand | Cost | Voice minutes | Text msgs. | Data (MB) | Type | Notes |
|---|---|---|---|---|---|---|---|
| **Talk, text, data** | Public Mobile | $ 25 | Unlim | Unlim | 1000 | Prepaid | 3G speeds, Canada-wide minutes, Canada/international text, must use preauthorized payment |
| **Data only** | Sasktel | $ 20 | 0 | 0 | 1000 | Postpaid | |
| **Talk, text, data** | Lucky Mobile | $ 25 | Unlim | Unlim | 1000 | Prepaid | Canada-wide minutes, Canada/international text, must use preauthorized payment |
| **Talk, text, data** | Freedom Mobile | $ 25 | Unlim | Unlim | 500 | Postpaid | Canada-wide minutes, Canada/U.S. text, must use preauthorized payment |

*Table 9: A small sample of low cost talk, text, and data plans available from other Canadian service providers.*

212. The plans listed in Table 8 and Table 9 are all priced at or under $30 per month. These plans include up to one gigabyte of mobile wireless data at LTE-A speeds. They are excellent options for consumers who desire the fastest mobile wireless speeds at an economical rate.

213. The range of low cost plans available from multiple service providers shows that there is intense competition at this end of the market. In fact, service providers have aggressively launched new and innovative service offerings targeted at the low cost end of the market. For example, Rogers' chatr brand offers prepaid talk, text, and data plans with monthly data allowances up to 8.5 GB and no data overages. Other service providers have recently launched new brands or service offerings aimed at the low cost market segment.[95]

214. A research report prepared for Bell Canada by Wall Communications in September 2017 examined the affordability of wireless services in Canada.[96] The report found that mobile wireless services are available to Canadians, and to low income Canadians in particular,

[95] These include Quebecor Media's Fizz brand, Bell Canada's Lucky Mobile brand, and Freedom Mobile's new prepaid plans.
[96] Wall Communications Inc., *A research report examining affordability in the Canadian mobile wireless market*. Available: https://services.crtc.gc.ca/pub/ListeInterventionList/Documents.aspx?ID=241087&en=2017-259&dt=i&lang=e&S=C&PA=T&PT=NC&PST=A (see Intervention Appendix 1).

at affordable prices.[97] The report found that the lowest priced voice and text plan that is widely available across Canada constitutes 0.5% or less of the annual low income cut-off level of each population center category. The lowest priced smartphone plan that is widely available across Canada constitutes roughly 1% or less of the low income cut-off. Since this report, carriers have introduced new low-price plans, at lower price points.

### Lower-cost data-only plans

215. While there were already several affordable commercial offers by wireless carriers, the Commission has taken measures to ensure this segment is served. The Commission recently undertook a comprehensive review of the retail mobile wireless market, with a specific focus on low cost plans, in the proceeding initiated by Telecom Notice of Consultation CRTC 2017-259, *Reconsideration of Telecom Decision 2017-56 regarding final terms and conditions for wholesale mobile wireless roaming service*. In its decision in that proceeding, the Commission wrote

> *98. The Commission has observed, however, that while entry-level wireless plans with lower price points are widely available from several wireless service providers, most of these plans contain voice minutes and text messaging but offer only very limited data allotments. Further, there is a noticeable gap in the market in terms of lower-cost data-only plans available to consumers.*[98]

216. While declining to mandate Wi-Fi first MVNOs due to the negative impact they would have on investment in wireless infrastructure,[99] the Commission came to the conclusion that the only real gap in the retail market was in lower-cost data-only plans.

217. The Commission then initiated a follow-up proceeding to examine and close this gap. In Telecom Notice of Consultation CRTC 2018-98, *Lower-cost data-only plans for mobile wireless services*, the Commission asked the national wireless carriers to propose lower-cost data-only plans that met a short list of requirements.[100] The national wireless carriers responded with a range of plans that satisfied the Commission's requirements while offering some additional features to compete against each other. For example, Rogers' lower-cost data-only plans include unlimited text and picture messaging at no extra cost. Rogers' lower-cost data-only plans are as follows:

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[97] This Wall Communications' report used three different measures of affordability: 1) comparing the lowest priced mobile wireless service available to Canadian consumers relative to the income levels of low income Canadians; 2) comparing Canadian lowest price services relative to low income levels with those in the G7 and Australia; and 3) using PIAC statistical and survey data to test the affordability of mobile wireless service relative to other communications services.

[98] TD 2018-97, paras. 62, 63, and 98.

[99] TD 2018-97, para. 74.

[100] TNC 2018-98, para. 12.

| Plan name | Brand | Cost | Voice minutes | Text msgs. | Data (MB) | Type | Notes |
|---|---|---|---|---|---|---|---|
| **LCDO** | Fido | $ 15 | N/A | Unlim | 250 | Postpaid or prepaid | Canada SMS, unlim incoming internal SMS |
| **LCDO** | Fido | $ 25 | N/A | Unlim | 500 | Postpaid or prepaid | Canada SMS, unlim incoming internal SMS |
| **LCDO** | Fido | $ 30 | N/A | Unlim | 1000 | Postpaid or prepaid | Canada SMS, unlim incoming internal SMS |

*Table 10: Rogers' lower-cost data-only plans. Rogers launched the plans on March 12, 2019.*

218. Rogers' lower-cost data-only plans offer Canadians tremendous value. Rogers' largest lower-cost data-only plan offers one gigabyte of mobile wireless data. This is a large amount of data that would meet the needs of many Canadians. One gigabyte of data allows for 3,000 minutes (50 hours) of voice calling, 400 minutes (6.5 hours) of FaceTime video calling, 10,000 emails, 5,000 webpages, or some combination thereof.

219. Subscribers to the 250 MB or 500 MB plans would have proportionately less data use – but this would still amount to a large quantity. For $15 per month, subscribers to Rogers' lowest-cost data-only plan will have access to 250 MB of LTE mobile wireless data on Rogers' nation-wide wireless network. This plan's data allowance provides for a large amount of communications service while enabling even more Canadians to enter the mobile wireless market at a very low price point. This amount of data allows for approximately 750 minutes of voice calling, 100 minutes of FaceTime calling, 2,500 emails, 1,250 webpages, or some combination thereof. This is not a small amount of usage.

220. Rogers' lower-cost data-only plans have only been available since March 2019. Early indications are that these plans will be very popular with Canadians seeking innovative wireless services at a low price. However, the plans need time to settle into the market. It would be premature to discount their effectiveness at improving retail choice until they have been in the market for at least two years. The Commission should refrain from further regulation in the retail market until these plans have had a chance to take root and have their full effect on the market.

## Mobile wireless prices are declining

221. International price comparisons garner media attention, but they do not often provide a proper picture of pricing. Prices, particularly for data, have in fact been falling for many years.

222. Both Rogers' internal data and external pricing studies show that wireless prices in Canada are decreasing. In fact, over the last six years the price per gigabyte of data, across all of Rogers' brands, has dropped by 60%.[101]

[101] Based on internal estimates.

223. As an example, in November 2015, on Fido, a $45 BYOD plan included 750 MB of mobile wireless data. Today a $50 BYOD plan includes 4 GB of data. Comparing the 2015 and 2019 plans, customers get more than five times the data for only $5 more. As described above, Rogers introduced a data-only plan at $30 with 1GB of data in March. This represents a 33% lower price point with 33% more data in comparison to the 2015 Fido plan.

224. Canadian carriers are continuously offering better plans at lower prices.

### Innovation and technological change

225. As discussed above, Canadian wireless carriers have consistently punched above their weight in investing and extending state-of-the-art wireless infrastructure that covers most of the Canadian population – in the face of dramatic shifts in demand and a challenging climate and geography with low population density. These activities are a critical feature of the intense competitive dynamic in Canadian wireless markets, and are essential to maintaining the competitiveness of the Canadian economy.

226. The investment and innovation by Canadian wireless carriers, and the quality of Canadian networks, both reflect and are the result of strong competition in Canadian wireless markets. For its part, Rogers has invested heavily in spectrum and new technologies to lead Canadian wireless markets, not to stay on par with Bell and TELUS or regional carriers. Rogers' recent expenditure of over $1.7 billion on 600 MHz spectrum underscores this dynamic and the intensity of competition in Canadian wireless markets amongst all competing service providers.

### The retail wireless market will be even more competitive in five years

227. If the current regulatory framework remains in place and competing carriers have timely and effective access to supporting infrastructure for small cell deployment, Canadian wireless markets are expected to remain intensely competitive, as the national, flanker and regional brand carriers continue to battle one another for market share. The result of this competition is expected to be reflected in increasing regional carrier shares. Other factors that are expected to affect the marketplace are:

(a) Penetration: Wireless penetration will continue to increase, especially as Canadians 'cut the cord.' According to Rogers' internal estimates, wireless penetration stands at approximately 90% at the end of 2018. With the growth in competitive activity, both in the postpaid and prepaid segments of the business, wireless penetration continues to expand to maturity, despite Canada's relatively high population growth rate. It is important to note that Canada's population growth is the highest among the G7 countries. It is twice the growth of the U.S. and exceeds the growth in the U.K., France, and Germany, while population is decreasing in Italy and Japan.

(b) Technological innovation: embedded SIM (eSIM) functionality (i.e. no physical SIM cards but rather a SIM card as software) is beginning to appear in new models of premium smartphones. Rogers and Fido both now support eSIMs for the iPhone XR, XS, and XS Max marquee devices.[102] As this functionality becomes more mainstream, competitive intensity for customer acquisition and retention will only increase.

(c) 5G inter-carrier competition: assuming that the Commission adheres to its policy of facilities-based competition, Rogers expects that there will be several 5G deployments operational by 2022. Highlighting 5G's unique capabilities, service providers will actively compete against each other for both consumer and enterprise customers on their new 5G networks.

## Question 3 – regulatory measures at the retail level

Are there issues that require regulatory measures at the retail level (i.e. beyond current measures such as the Wireless Code and mandatory participation in the Commission for Complaints for Telecom-television Services Inc. [CCTS])? If so, what are the issues and what measures would be required? Explain why these measures are necessary.

228. There is no need for new retail regulation in order to protect the interests of consumers. As discussed above, Canada has a very competitive wireless retail market resulting in a range of affordable wireless plans on some of the most advanced networks in the world.

229. These benefits are driven by inter-carrier competition which ensures that consumers are well-protected as service providers actively recruit new subscribers from each other while preserving their current customer base. Any customer who perceives that they are not receiving the best possible service from their provider has easy recourse: they can switch. The majority of Canadians can choose from four competing service providers, each with numerous and varied brand offers, meaning that Canadians have a wide range of competing service providers to choose from.

230. Consumers benefit from this rivalry in many different ways, including low prices, on-going promotions, exclusive handsets, value-added services and bonuses, and much more. An array of new price plans and discounts are made available each month. New features like data management tools are constantly becoming available. Efforts are always being made to improve customer service. The competition between wireless carriers has been and will remain the most significant level of retail protection for Canadian consumers.

231. There has been occasion where the Commission felt the need to supplement competition with some incremental retail regulation. Consumer-based regulations can occasionally help ensure that consumers are treated equally and fairly by all service providers. For example, the Wireless Code was implemented to ensure that each

[102] MobileSyrup, *Fido eSIM technology rolls out for iPhone XR, XS and XS Max.* Available: https://mobilesyrup.com/2019/04/24/fido-esim-iphone-xs-max-xr/

customer had an improved retail experience. The Wireless Code helped address some of the inherent complexity with wireless products and services.[103] As widely agreed upon in the Commission's 2016-2017 review, the Wireless Code is achieving its objectives.

232. Similarly, the Commission for Complaints for Telecom-television Services (CCTS) continues to help consumers resolve conflicts with service providers. In its latest report, the CCTS states that it resolved over 90% of the complaints it received.[104] Rogers has supported the CCTS since its inception in 2007.

233. However, in most instances, retail regulation should not be considered. Canadian regulators have rightfully and wisely avoided regulating the retail market for the most part. As the Feasey Report explains, the primary method regulators use to generate desired competitive outcomes is by regulating at the highest point of the value chain to ensure competition in the downstream market.[105] This was the approach taken by both the Commission and ISED when they introduced and supported the fourth carrier in each market. The regulators stimulated more competition at the retail level by regulating access at the wholesale level while preserving investment though facilities-based competition. Regulating retail markets is fraught with danger as such regulations often have unforeseen consequences. There is no need for retail regulations and the Commission should therefore avoid taking such measures.

234. Taken together, Canada's facilities-based service providers, in conjunction with the Wireless Code and the CCTS, continue to protect consumers effectively. No additional measures are necessary at this time.

## Question 4 – Canada compared to other countries

| |
|---|
| Discuss how Canada's retail mobile wireless service market(s) compare(s) internationally, and provide any studies and reports you have in this regard. Which countries offer the best comparisons with Canada and why? Discuss whether international comparisons are meaningful in the context of mobile wireless service regulation. |

### Canada is best compared to the U.S.

235. When comparing wireless services between different countries, it is important to consider a variety of factors. Though Canada is perhaps most often compared to the G7 countries[106] and Australia, the most appropriate and natural comparison would be with the U.S. After all, Canada and the U.S. share a language, a border, aligned spectrum bands, and tend to implement wireless technology upgrades around the same time. This allows for an apples to apples comparison.

[103] As originally laid out in TRP 2013-271, and as revised in TRP 2017-200.
[104] CCTS, *Mid-Year Report August 1, 2018 – January 31, 2019*, executive summary. Available: https://pub.ccts-cprst.ca/2018-2019-mid-year-report/
[105] The Feasey Report, para. 46.
[106] The G7 countries are France, Germany, Italy, Japan, the United Kingdom, the United States, and Canada.

236. When it comes to download speeds, wireless networks in Canada lead those in other countries. Ookla has ranked Canada's overall mobile download speed to be the fastest among peer countries for six consecutive months, with Canada's download speed nearly twice as fast as that of the U.S.[107]

237. Separately, OpenSignal found that Canada has the fastest LTE download speed during the typical slowest time of day compared among peer countries.[108] The study shows that Canada's speed is more than twice as fast as the U.S. The same study also shows that Canada received the highest score among peer countries for the smallest difference in LTE download speeds between the fastest and slowest hour of the day.[109] According to OpenSignal, this means that "Canada does an excellent job delivering the full capabilities of its network from hour to hour. There was very little difference between Canada's most optimized connections and its average speed, putting it not only among the fastest countries in our analysis but also the most consistent."

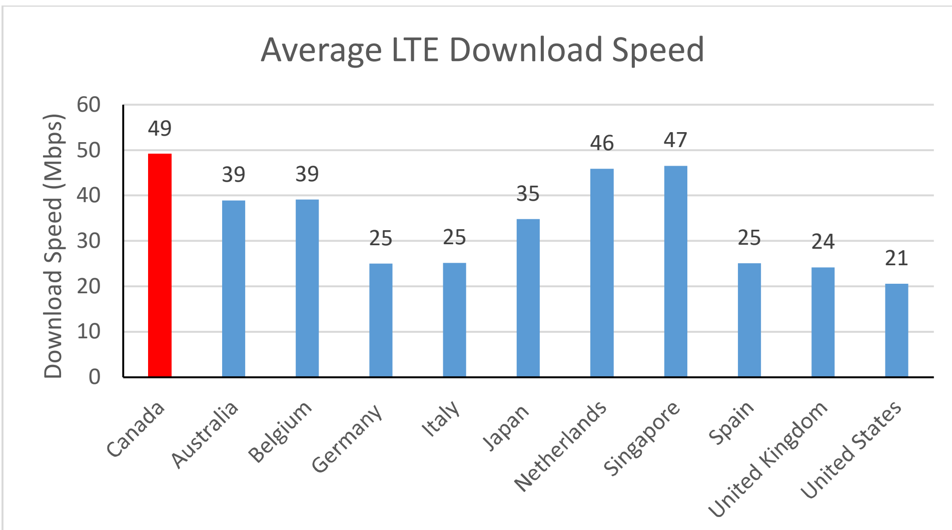


*Figure 12: the average download speed of Canada's LTE networks is second to none.*[110]

238. Beyond network consistency, OpenSignal also reports that Canadian mobile wireless service providers achieve better results than those in the U.S. when it comes to download experience (LTE & 3G speeds combined), latency experience (LTE & 3G latency combined), and video experience (quality of mobile video streamed to devices,

[107] Ookla Speedtest Global Index, October 2018 -March 2019
[108] OpenSignal The 5G Opportunity, Feb 2019
[109] OpenSignal The 5G Opportunity, Feb 2019
[110] Average speed per country calculated by taking a subscriber weighted average of the 4G speeds of each carrier, taken from country specific reports by Open Signal. Australia: Nov 2018, Canada: Feb 2019, Japan: April 2019, UK: April 2019, USA: Jan 2019, Singapore: Nov 2018, Belgium: March 2019, Germany: Oct 2018, Netherlands: March 2019, Spain: Feb 2019.

including video loading time, stalling during playback and the level of resolution supported).[111]

239. Canadians enjoy a consistent quality wireless experience because of high LTE availability. Availability refers the percent of time a subscriber connects to an LTE network over a 3G network. OpenSignal wrote that "all three national operators had excellent 4G availability scores above 86%."[112] On average Canadians connect to fast LTE signals 88.1% of the time, only 3.3 percentage points less than the American average.[113]

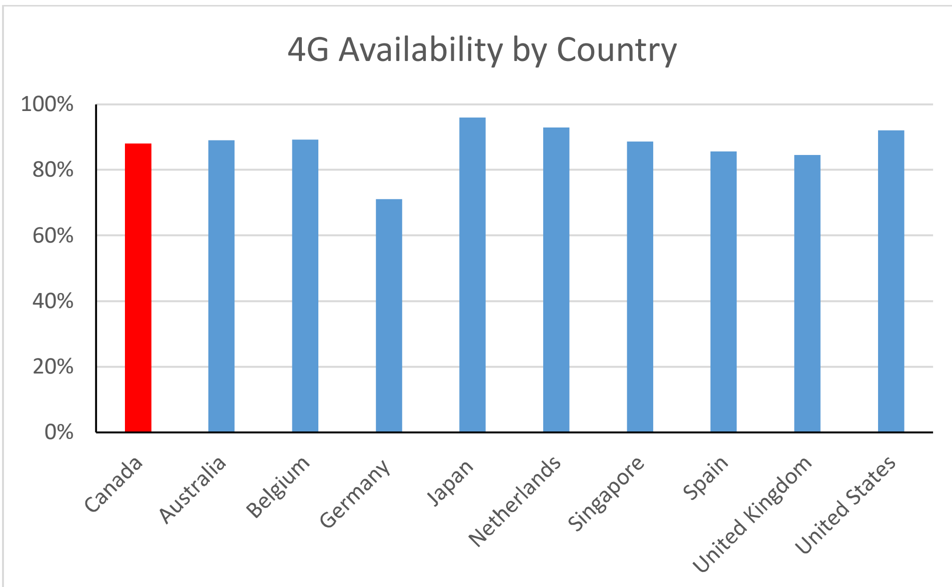


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*Figure 13: Benchmarking average LTE availability.*

240. World leading mobile broadband speeds and availability do not happen by chance. Canadian networks have high LTE download speeds and availability because of the massive network investments made by operators that have been taking place for decades. Between spectrum auctions and capital expenditures, Rogers alone has invested approximately $30 billion between 1984 and 2019[115] to build its world-class wireless network. Canada's facilities-based wireless carriers invested nearly $70 billion in communications infrastructure between 1987 and April 2019 (over $50 billion in capital expenditure with the remainder in spectrum auction costs).[116] The result is that 99% of Canadians now have access to LTE coverage.

[111] OpenSignal Mobile Network Experience Report Canada, Feb 2019, OpenSignal Mobile Network Experience Report U.S. Jan 2019.
[112] OpenSignal Mobile Network Experience Report Canada, Feb 2019.
[113] OpenSignal Mobile Network Experience Report U.S., Jan 2019.
[114] OpenSignal State of LTE, Feb 2018.
[115] Estimate based on auction spend both for auctions and spectrum purchase in the open market and wireless capital investment.
[116] The CWTA, *Facts & Figures.* Available: https://www.cwta.ca/facts-figures/

241. Canada's facilities-based service providers continue to punch well above their weight, spending $95.77[117] per subscriber in capital expenditures in 2018, nearly $10 more per sub than wireless providers in the U.S.

242. Above and beyond investments made in the network and spectrum acquisition fees at auctions, on-going spectrum licence fees continue to be very high in Canada. At $5.69 per subscriber, licence fees in Canada are 21 times higher than licence fees in the U.S. on a per subscriber basis ($0.27).[118] The Government of Canada currently records approximately $766 million per year in revenue from mobile spectrum licence fees and auctions combined.

243. Wireless churn, the measurement that shows how many customers leave an operator for another, suggesting competitive intensity, is very similar in Canada and the U.S. The 2018 CRTC Communications Monitoring Report indicates that churn rates in 2017 were between 1.1% and 1.6% per month for the national service providers, averaging 1.37% per month or 16.4% per year.[119] This means that more than 5 million Canadians switched wireless service providers in 2017. Annual industry-wide churn in the U.S. was almost exactly the same for 2017, averaging 1.3% per month or 15.9% per year.[120] This again indicates that the U.S. and Canada are comparable markets.

## The NERA report improves on ISED's pricing study

244. No single pricing report is able to capture the breadth and depth of competition in the wireless market, let alone effectively compare pricing across multiple countries. The value of international pricing comparisons is generally limited due to differences in costs, network quality, consumer demand, and many other factors. These differences make performing an apples to apples comparison difficult. Pricing reports tend to provide an ill-informed snapshot taken at a specific point in time, providing a simplistic view of the market while leaving out key variables. These variables can include promotional and targeted pricing, regional operator pricing, and connections per square kilometer of wireless network coverage.

245. Below is a collection of studies that all attempt to determine relative price or affordability in the Canadian market. The reports can collectively contribute to a larger discussion around affordability. However, no matter which country Canada is compared to, the

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117 Bank of America Merrill Lynch Global Wireless Matrix, April 30 2019

118 Based on a comparison of Cellular and PCS fees. FCC, *WHAT YOU OWE – COMMERCIAL WIRELESS SERVICES FOR FY 2018*; available from: https://docs.fcc.gov/public/attachments/DOC-353888A1.pdf. OECD, *National Accounts Statistics: PPPs and exchange rates*; available from: https://data.oecd.org/conversion/exchange-rates.htm. CRTC, *Communications Monitoring Report – Retail Mobile Sector Data Set*, T6.4; available from: https://open.canada.ca/data/en/dataset/f4233c69-f639-4cab-a234-80dbdd04eaa0. CTIA, *The State of Wireless 2018*; available from: https://www.ctia.org/news/the-state-of-wireless-2018.

119 CRTC 2018 Communications Monitoring Report, Open Data Table 6.9.

120 CTIA, *Wireless Industry Indices Year-End 2017*, at 35. For prepaid services, CTIA reported an annual industrywide churn rate of 48.3% and a monthly churn rate of 4%. Id. at Appendix C, 12.

wireless industry is complex and no single study should be relied on when informing government and regulatory policy.

246. ISED's own pricing study, *Price Comparisons of Wireline, Wireless and Internet Services in Canada and with Foreign Jurisdictions*, found that at every level, Canadian mobile wireless service basket prices decreased or remained unchanged (in one case) since the 2017 report.[121] Since the first study in 2008, mobile wireless prices in Canada have generally trended downwards with a cumulative annual decrease over the relevant period between roughly -2% and -7% depending on the plan level (with the exception of Level 6 at just under a 1% annual decrease).

247. As discussed above, the U.S. is the most relevant standard against which to benchmark Canadian prices. As domestic prices dropped in 2018, Canadian prices fell closer to rates in the U.S. Canada was cheaper than the U.S. in six of nine wireless levels (mobile wireless and mobile internet) surveyed in the report and had similar pricing in the two of the remaining three baskets. Referring to facilities-based competition, ISED's press release announcing the 2018 pricing study even had the title "Greater competition leads to reduced mobile wireless plan prices for Canadians."[122]

248. However, the ISED pricing report, like many other pricing reports, falls short when it comes to comparing the cost and worth of wireless services across different countries. Significantly, the report does not capture promotional pricing. There are multiple forms of promotional prices, including 'above the line' promotions visible on websites or flyers, and 'below the line' promotions that are targeted and only obtainable after contacting a carrier. Canada's service providers run frequent promotions that can offer a substantial discount on standard pricing. This type of information was not included in the study. Like others that use a basket of services approach, ISED's study does not usually capture the lower cost services available to Canadians. The report also doesn't take into consideration the quality of networks being compared.

249. As a direct response to ISED pricing study's shortcomings, NERA Economic Consulting drafted a report titled *An Accurate Price Comparison of Communications Services in Canada and Select Foreign Jurisdictions* in 2018. NERA's report sought to more comprehensively compare pricing between countries than the ISED pricing report.[123] NERA used a regression model-based price comparison analysis to consider a wider variety of factors when comparing the price of services across countries.

250. Improving over the ISED study, the NERA report considers important factors like network quality, population density, contract length, network speeds, labour costs, and

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[121] Wall Communications Inc., *Price Comparisons of Wireline, Wireless and Internet Services in Canada and with Foreign Jurisdictions (2018 Edition).*

[122] ISED, *Greater Competition Leads to Reduced Mobile Wireless Plan Prices for Canadians*, December 21, 2018. Available: https://www.canada.ca/en/innovation-science-economic-development/news/2018/12/greater-competition-leads-to-reduced-mobile-wireless-plan-prices-for-canadians.html

[123] Nera Economics Consulting, *An Accurate Price Comparison of Communications Services in Canada and Select Foreign Jurisdictions*, 2018.

promotional pricing to more accurately determine the relationship between prices and plans, networks, and other characteristics. NERA used this information to forecast the retail prices the average international provider would charge for the Canadian plans in the study. The analyses reveal strong relationships between retail prices and the variables outlined above. When NERA compared the forecasted international prices to actual prices in Canada, it found that:

- 80% of the time, mobile wireless prices in Canada were lower than the forecasted international benchmark.
- 80% of the time, mobile wireless internet prices in Canada fell below the forecasted international benchmark.
- 79% of the time, fixed broadband prices in Canada were lower than the forecasted international benchmark.

251. The study included two robustness checks on the econometric models used to confirm its results. NERA concluded that because approximately 80% of the Canadian plans studied have prices below international benchmarks, the Canadian market is competitive and hence does not require regulatory intervention. Canadian consumers are paying relatively lower prices given Canada's specific market offerings, networks, and geographic considerations.

252. Other studies that have also taken a more nuanced approach have similarly concluded that mobile wireless services in Canada are affordable. The Economist's Intelligence Unit's 2019 *Inclusive Internet Index* ranked Canada first out of the 100 countries surveyed, for the third year in a row, in the category of Internet affordability.[124] This study considered both fixed-Internet and wireless pricing in its assessment. Affordability was assessed by looking at two factors, (1) the cost of access relative to income and (2) the level of competition in the Internet marketplace. Some of the study's key findings:

- Canada ranked first for a competitive environment, including an unconcentrated wireless market.
- Canada ranked just 1.5 points behind the U.S. for smartphone handset costs expressed as a percent of monthly gross net income per capita, with a score of 98.1/100, where 100 is the most affordable score possible.
- Canada and the U.S. tied for the monthly cost of a 500 MB postpaid mobile broadband data plan, expressed as a percent of monthly gross net income per capita, at 1.42%.
- Prices for prepaid service was nearly the same in Canada and the U.S. A 500 MB prepaid plan cost 0.49 % and 0.45 % of monthly income in Canada and the U.S. respectively.

[124] The Economist's Intelligence Unit, *2019 Inclusive Internet Index.* Available: https://theinclusiveinternet.eiu.com/

253. The *Inclusive Internet Index* also looked at a variety of measures to determine the competitive environment for Internet service provisioning, including wireless operator market share.[125] For market share, the report looked at a measure of market concentration among all wireless operators in a country using the Hirschman-Herfindahl Index.[126] Canada and the U.S. both ranked first overall for this measure, meaning that they both have less concentrated wireless markets and therefore a competitive wireless sector.

### Canadians receive excellent value compared to other countries

254. Figure 14, below, provides a comparison of the *Mobile Data Cost Index* across 10 select countries.[127] The higher the Index, the lower the benefit to end-users. This figure of merit is calculated as the average monthly cost to users divided by the average LTE download speed, multiplied by the average LTE percentage availability across each of the countries.[128] All else being equal, a country with a lower LTE availability will have a higher Mobile Data Cost Index than one with a higher LTE availability. The average value of the Mobile Data Cost Index across the 10 countries is 1.55 while Canada's score is 1.37, 12% lower, i.e. better than the average. This Index includes the average monthly cost (ARPU) as well as the download speed and availability of LTE services across the 10 countries and is thus a good reflection of what is being offered to end users. As shown, Canada ranks better than the U.S., the United Kingdom, Japan, Germany and Australia. Only countries with much smaller geographies and higher population density yield better results than Canada.

[125] Ibid
[126] The Index looks at the network operators' market share and scores them on a 10,000 point scale. HHI < 3,000 "unconcentrated"; HHI 3,000-4,000 "moderately concentrated"; HHI > 4,000 "highly concentrated". Canada scored 2,769 and the U.S. 2,575.
[127] The Mobile Data Cost Index was created by Lemay-Yates and Associates Inc.
[128] LYA has used ARPU as a proxy for the monthly cost. The monthly cost for each country is the subscriber weighted average ARPU for postpaid services, expressed in Canadian dollars, converted at nominal rates, either as reported directly by each carrier in each country or as calculated based on carrier reporting.

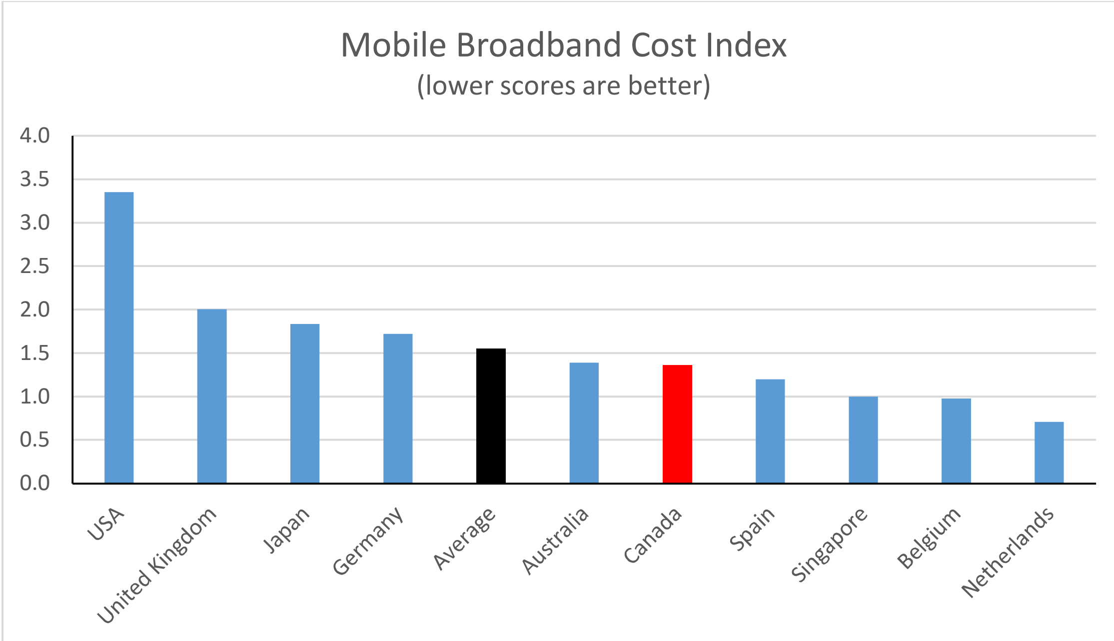


Figure 14: Benchmarking the Mobile Data Cost Index across select countries

## Question 5 – protecting the interest of users

If the retail market, or a portion of it, is found to be insufficiently competitive to protect the interests of users, what regulatory measures (e.g. the application of additional conditions of service or mandating of the provision of lower-cost data-only plans), if any, ought to be applied to ensure that the policy objectives of the Act, as well as the Policy Direction, are met?

255. As demonstrated in Rogers' response to question 2 above, the Canadian mobile wireless market is robustly competitive and Canadians have access to ubiquitous, high quality, and world-class mobile wireless services at affordable prices. Canada's facilities-based wireless service providers offer a wide array of price plans, including low cost plans for Canadians with low household incomes and affordable plans for those with very high usage requirements.

256. In addition, in an effort to increase customer satisfaction and enhance their competitive position in the market, Canada's wireless carriers have also taken significant steps to introduce innovative new services, capabilities, and safeguards all aimed at addressing and eliminating significant customer irritants and protecting the interest of users. For its part, Rogers has made significant investments in important new service enhancements to allow customers to monitor their usage and avoid unexpected and inconvenient overage charges, improve accessibility for Canadians with disabilities, and empower customers to make informed decisions about the services they choose. These important enhancements, along with the significant ongoing investments made in the expansion of mobile wireless networks and the deployment of advanced new technologies, ensure that the policy objectives of the Act, as well as the current and proposed new Policy Directions, are being met.

257. Following is a summary of the important steps that have been take to protect the interest of Canadians that use mobile wireless services and to further the objectives of the Act and the current and proposed Policy Directions.

## Providing bill certainty

258. Rogers offers its customers convenient and easy to use tools to monitor their wireless usage and prevent unexpected and inconvenient overage charges. For example, a subscriber to a postpaid Fido plan will receive a text message notification when they use 90% of their monthly data allowance. Should they continue to use their mobile wireless service, the subscriber will receive an additional notification when they reach 100% of their monthly data allowance. Fido customers can also track their data usage in real-time through Fido's My Account smartphone application. The application provides customers with an easy and convenient way to stay on top of their mobile wireless data usage. Rogers offers similar tools for its customers under its premium Rogers brand.

259. Beyond these convenient data management tools, Rogers offers consumers other worry-free ways to stay on top of their data usage. Subscribers to Rogers' chatr plans do not have to worry about data overages at all. Subscribers to chatr receive notifications when they have reached both 75% and 100% of their monthly data allotment. If a chatr subscriber uses their full data allowance, their mobile wireless data connection speed is reduced until the start of their next billing cycle. This allows customers to avoid annoying overage charges.

260. Regardless of their plan or brand, if a customer exhausts their data allowance for the month, they can turn to free and ubiquitous Wi-Fi to bridge the gap until the end of the month and allow for continuous connectivity without incurring any sort of additional costs.

## Rogers prioritizes Canadians with disabilities

261. Rogers recognizes that Canadians with disabilities face unique challenges accessing telecommunications services. Rogers is committed to giving Canadians with disabilities convenient access to mobile wireless plans and options that meet their needs.

262. Rogers voluntarily offers discounts on mobile wireless service for Canadians with disabilities. Rogers offers a $20 monthly discount on its in-market Share Everything plans that include its Data Manager and Roam Like Home features. Rogers' Fido brand offers its customers with disabilities a $10 monthly discount on any of its in-market postpaid mobile wireless plans.

263. Lastly, Rogers recognizes that Canadians with disabilities might need a different level of care when inquiring about services. Rogers has an Accessibility Service Center that is dedicated to addressing its customers' accessibility needs. Customers and potential

customers can contact the Accessibility Service Centre through multiple channels, including phone calls, social media, and TTY Message Relay Service.

264. Rogers also pays for sign language interpreter services for customers who need help communicating in its stores. The customer's interpreter simply bills Rogers directly for their services. In this way, Rogers is improving customer service for Canadians with disabilities, encouraging their participation in the mobile wireless market so they may enjoy all of the benefits and convenience of wireless services.

### Other consumer protections

265. The Commission has recently undertaken two different initiatives to further ensure that the needs of users are protected. Rogers has made the necessary investments and enhancements to implement these important initiatives.

266. First, the Commission reviewed the Wireless Code in 2016-2017.[129] When developing the Wireless Code, the Commission intended to establish new requirements that would "ensure that consumers are empowered to make informed decisions about wireless services [that would] contribute to a more dynamic marketplace by making it easier for consumers to take advantage of competitive offers."[130] The Wireless Code has certainly lived up to this goal. Plain language requirements and critical information summaries allow users to enter into service agreements with clarity and a full understanding of their new services. Roaming and overage caps help to avoid bill shock. Mandatory device unlocking and contract cancellation rules facilitate consumers switching from one service provide to another to take advantage of lower prices. The many other enhancements and features in the Wireless Code similarly protect the interests of Canadians in other ways.

267. While the Commission has stated that changes to the Wireless Code are beyond the scope of this proceeding, Rogers draws attention to it here because the Wireless Code is a broad and powerful tool to ensure that Canadians are well protected in the retail market. The Wireless Code has proven to be an effective tool in addressing industry-wide issues that may negatively impact the interest of users.

268. Second, as explained above in Rogers' answer to question 2, the Commission recently intervened in the retail market by asking the national wireless carriers to propose and then launch lower-cost data-only plans. The Commission asked the national wireless carriers to create these plans after a thorough review of the mobile wireless market.

269. The Commission made clear in TD 2018-97 that its intention in asking the national wireless carriers to launch lower-cost data-only plans was to increase consumer choice especially with regard to innovation and lower costs:

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[129] See TRP 2017-200.
[130] TRP 2013-271, para. 2.

> *In the Commission's view, if more options for lower-cost data-only plans were available in the market from wireless carriers, consumers would be further empowered to use the voice and messaging applications of their choice when and where they want, using a combination of Wi-Fi access and cellular networks. In other words, consumers would not necessarily have to purchase the voice and text messaging services offered by wireless carriers, and could instead purchase a lower-cost data-only plan and use an application for voice and text messaging if they chose to do so.*[131]

270. In response, the national wireless carriers have launched a range of lower-cost data-only plans that will address this particular gap once they take hold and have their intended positive impact on the market. A sufficient period of time must pass before the Commission can determine how effective the plans have been in terms of addressing the need identified by the Commission. Rogers firmly believes that its lower-cost data-only plans will prove attractive to a large number of Canadians as an innovative service offering at a lower-cost. But the plans must be given enough time in the market to make an impact. Rogers' plans have only been in the market for two months. They will need more time and it would be premature for the Commission to intervene further in the market at this time.

### Canada's telecommunications policy objectives are currently being met

271. The Commission is guided to regulate in a way that promotes the policy objectives of the Act. To date, the Commission has exercised a relatively 'light touch' regulatory approach to the mobile wireless services market and has sought to maintain incentives for facilities-based carriers to continue to invest in mobile wireless networks. In response to the regulatory certainty afforded by this policy framework, Canada's mobile wireless carriers have taken the risk and invested billions of dollars in the expansion of their networks in urban and rural areas, and in the deployment of advanced new technologies providing Canadians with super-fast mobile broadband speeds. The current regulatory framework and market-based developments have worked in concert to ensure that Canada's telecommunications policy objectives are being met.

272. Section 7(a) of the Act sets out the following telecommunication policy objective:

> *7. It is hereby affirmed that telecommunications performs an essential role in the maintenance of Canada's identity and sovereignty and that the Canadian telecommunications policy has as its objectives*

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[131] TD 2018-97, para. 102.

*(a) to facilitate the orderly development throughout Canada of a telecommunications system that serves to safeguard, enrich and strengthen the social and economic fabric of Canada and its regions;*

273. Until now, Canada's policy framework has relied on market forces and promoted facilities-based competition in the mobile wireless market. The regulatory certainty afforded by this framework has provided an incentive for Canada's facilities-based mobile wireless carriers to invest billions in the expansion of their networks throughout Canada. Within this framework, the market has evolved from two facilities-based competitors in each province to four facilities-based competitors. Canada now has a vibrant and fiercely competitive market for mobile wireless services. Canada's mobile wireless service providers have spent decades building multiple, nation-wide and regional networks to serve the country. They have invested over $50 billion over the past 30 years to design, build, maintain, and continually upgrade their networks,[132] providing Canadians with access to the most advanced mobile wireless technologies and services available.

274. Canadians now use mobile wireless services in every aspect of their lives. They use these services to talk to friends and family, access health care and other government services, and to connect to the digital economy. Businesses have benefitted tremendously from the innovations and capabilities enabled by Canada's mobile wireless networks and services. Workers have significantly increased mobility and enjoy improved access to digital tools that help them do their jobs more efficiently. Canada now stands on the cusp of the next technological revolution that will be enabled by significant upcoming generational investments in advanced new 5G mobile wireless technology.

*(b) to render reliable and affordable telecommunications services of high quality accessible to Canadians in both urban and rural areas in all regions of Canada;*

275. Canada is a difficult country to serve with mobile wireless services. While most Canadians live in large urban centres in close proximity to our southern border, millions of Canadians live in rural and remote communities spread throughout the country and separated by long distances. This makes deploying mobile wireless networks extremely challenging and expensive.

276. Despite these challenges, Canada's facilities-based wireless service providers have invested to provide 99%[133] of Canadians with robust and reliable access to mobile wireless services at LTE speeds and more than 99% of Canadians with access at 3G speeds.[134] Thanks to sustained investment by carriers, LTE-A coverage has increased

[132] The CWTA, *Facts & Figures*. Available: https://www.cwta.ca/facts-figures/
[133] CRTC CMR 2018, infographic 6.1.
[134] CRTC CMR 2017, Table 5.3.14.

significantly from 83% of the population in 2016 to 92% in 2017.[135] This is a significant feat in a country as difficult to serve as Canada, and it was accomplished on the basis of a regulatory regime that promotes facilities-based investments.

277. Mobile wireless carriers continue to expand their broadband networks to rural and remote areas of Canada. For example, in March 2019, Rogers announced a $100 million investment to bring mobile wireless service to over 1,000 km of unserved highways across Canada.[136] Other wireless carriers have announced similar initiatives in an effort to extend mobile wireless services deeper into rural and remote areas. Additional expansion will be made possible by the various federal, provincial, and municipal funding programs for the deployment of broadband services in rural and remote areas.

278. Additionally, Canada's facilities-based wireless service providers offer a wide array of price plans, including low cost plans for Canadians with low household incomes and affordable plans for those with high usage requirements.

*(c) to enhance the efficiency and competitiveness, at the national and international levels, of Canadian telecommunications;*

279. Canada's mobile wireless market is extremely competitive. Canada now has four strong facilities-based wireless competitors in each province. As demonstrated above, Canada's wireless service providers are in constant, active rivalry with each other to enhance their competitive position and gain customers. Consumers benefit tremendously from this rivalry. The level of churn shows that millions of Canadians are actively switching carriers each year to take advantage of customer-friendly features like lower prices, unique service offerings, and exclusive devices.

280. In addition, the Commission has mandated that the national wireless service providers offer wholesale roaming service to the regional wireless service providers at low, cost-based rates. This policy has allowed Canada's smaller service providers to compete much more effectively against the national providers. The policy has therefore successfully increased competition in the market.

*(f) to foster increased reliance on market forces for the provision of telecommunications services and to ensure that regulation, where required, is efficient and effective;*

281. Canada's policy framework has relied on market forces and promoted facilities-based competition in the mobile wireless market. Canada's wireless carriers have responded to the regulatory certainty afforded by this framework by investing billions of dollars in their mobile wireless networks. The competitive intensity and rivalry between Canada's

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[135] CRTC CMR 2018, infographic 6.1.

[136] Rogers, *Bringing new wireless coverage to over 1,000 kilometres of rural and remote corridors*, March 21, 2019. Available: https://about.rogers.com/2019/03/21/bringing-new-wireless-coverage-1000-kilometres-rural-remote-corridors/

wireless service providers has led to the expansion of wireless networks and the implementation of advanced new technologies, keeping Canadians at the forefront of technological advancements. This reliance on market forces and the need for competitors to differentiate themselves to enhance their competitive position has also delivered dozens of different price plans for $30 per month or less, including plans with up to a gigabyte of mobile wireless data. It is only on the basis of this framework that Canada's carriers have taken extraordinary risks, spending billions of dollars building networks with no guarantee of a return.

282. An increased reliance on market forces, rather than regulatory intervention, should be the Commission's approach going forward. This will encourage and provide the incentives for the generational investments in 5G technology that will be required to maintain Canada's leadership in future years.

283. Based on the current state of the market, it is clear to Rogers that the Commission's policy of very narrow regulation of the mobile wireless market has been efficient and effective and the Commission's regulation of the market should not be expanded.

*(g) to stimulate research and development in Canada in the field of telecommunications and to encourage innovation in the provision of telecommunications services;*

284. Canada's facilities-based service providers have a long history of innovation going back to the introduction of mobile wireless services in Canada more than 30 years ago. These innovations cover both the technology and services that have benefited Canadian consumers and businesses. The following is a short list of select innovations and research efforts that Rogers has led:

- First carrier in Canada to offer fully automatic roaming (1987)
- First carrier in North America to commercially deploy a public access digital wireless packet switching network (1989)
- First carrier in North America to implement commercial digital wireless cellular service (1992)
- First carrier in Canada to add digital transmission technology to its wireless network from coast to coast (1992)
- First carrier in Canada to bring commercial PCS services to the Canadian market place (1996)
- First carrier in Canada to offer Digital PCS services nationwide (1997)
- First carrier in Canada to introduce prepaid cellular and paging services with the launch of Rogers Wireless Pay As You Go (1998)

- First carrier in Canada to provide a national seamless network, with analog coverage reaching well over 90% of the population and digital coverage reaching over 81% (1999)
- First carrier in Canada to launch the first generation BlackBerry devices with the launch of Rogers Wireless Interactive Messaging (1999)
- First carrier in Canada to launch BlackBerry email service (2000)
- First carrier in the world to install both voice and packet data service simultaneously on GSM/GPRS technology (2001)
- First carrier in Canada to offer a wireless phone with a built-in camera (2002)
- First carrier in Canada to trial third generation EDGE capabilities (2003)
- First carrier in Canada to implement Wireless Priority Service, a feature which provides government-authorized wireless phone-users with priority service on the Rogers network during times of emergency (2004)
- First wireless service provider in North America to offer downloadable music to a handset (2005)
- First service provider in Canada to provide real-time access to live television programming in partnership with MobiTV (2005)
- First Canadian service provider to launch a HSPA network (2006)
- First wireless service provider in North America to offer video calling on HSPA handsets (2007)
- First Canadian service provider to launch HSPA+ service, offering speeds up to 21 Mbps (2009)
- First Canadian service provider to launch LTE (2011)
- First SIM-based mobile transaction on NFC-enabled smartphones (2012)
- First Canadian carrier to offer daily pay-per-use data roaming rate for international travel (2014)
- First Canadian service provider to launch voice over LTE (VoLTE) (2015)
- First Canadian service provider to use Facebook Messenger for customer care (2015)
- Rogers enters into a three-year, multi-million dollar research partnership with the University of British Columbia (UBC) to study 5G applications (2018)
- Rogers will deploy 5G-ready network equipment and infrastructure to create a smart campus at UBC (2019)

285. As noted above, Rogers was the first to deploy LTE service in Canada and continues to deliver innovative mobile broadband services through trials and deployment of new wireless technologies. These technologies include carrier aggregation of licensed spectrum bands, 256-QAM transmission, and Licence-Assisted Access LTE (LTE-LAA). Such innovation is vital on the march to 5G. Rogers is currently working with our network infrastructure vendor, Ericsson, on 5G trials in Toronto, Ottawa, and other cities.

286. Through a combination of direct and indirect investments, Rogers spends hundreds of millions of dollars every year on research and development activities. Rogers has been in the top 10 Canadian corporate research and development spenders since 2012.[137] In the 2017 fiscal year alone, Rogers invested almost $460 million on research and development activities.

*(h) to respond to the economic and social requirements of users of telecommunications services; and*

287. Rogers and other service providers offer a wide range of plans at low price points. Canadians with low household incomes are well-served by a range of plans, including talk, text, and data plans and new lower-cost data-only plans. Rogers sells a variety of plans that do not feature overage charges so that customers can benefit from bill certainty. For example, none of chatr subscribers pay data overages. Their data connection speed is simply temporarily reduced if they exceed their monthly data allowance.

288. As detailed above, Rogers is also a leader in offering enhanced service to Canadians with disabilities. Rogers provides discounts on its wireless services to people with disabilities. Rogers has also created the Rogers Accessibility Service Centre, a dedicated group of employees that help address our customers' accessibility needs.

*(i) to contribute to the protection of the privacy of persons.*

289. Rogers is committed to protecting the personal information of its customers. Rogers has a dedicated privacy team that ensures it meets all regulatory requirements as specified under the Personal Information Protection and Electronic Documents Act (PIPEDA). Rogers is also constantly working to ensure that it does the right thing when it comes to protecting personal information. This often means going beyond what is required by the law. Rogers' approach to privacy follows the 10 principles of PIPEDA,[138] as well as the principles of fair information.

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[137] Research Infosource Inc., *Annual listing of top 100 corporate R&D spenders.* Available: https://researchinfosource.com/top-100-corporate-rd-spenders/2018

[138] PIPEDA fair information principles. Available: https://www.priv.gc.ca/en/privacy-topics/privacy-laws-in-canada/the-personal-information-protection-and-electronic-documents-act-pipeda/p_principle/

## Both the current and the newly proposed Policy Directions are being met by the retail market

290. In 2006, the Governor in Council issued an *Order Issuing a Direction to the CRTC on Implementing the Canadian Telecommunications Policy Objectives*, SOR/2006-355 (the "2006 Direction"). The 2006 Direction directs the Commission to rely on market forces to the maximum extent feasible as a means of achieving Canadian telecommunications policy objectives and, when relying on regulation, to use measures that are efficient and proportionate to their purpose and interfere with the operation of competitive market forces to the minimum extent necessary.

291. The 2006 Direction has been a success as it has guided the Commission's 'light touch' regulation that has led to a vibrant, world-class market for mobile wireless services. For example, when declining to mandate MVNO access in TRP 2015-177, the Commission explained that its decision was in line with the 2006 Direction:

> *Consistent with subparagraph 1(a)(i) of the Policy Direction, the Commission has, with respect to wholesale MVNO access, and tower and site sharing, relied to the maximum extent feasible on market forces by continuing to forbear from the regulation of rates for these services.*[139]

292. In its recent decision not to mandate Wi-Fi based MVNO access, the Commission explained in greater specificity that its determinations were fully consistent with the 2006 Direction:

> *In this decision, the Commission relies on market forces to the maximum extent feasible insofar as it does not consider it appropriate, at this time, to expand the types of providers that qualify for mandated wholesale access. The Commission considers that such an expansion would result in regulation that is unlikely to be efficient and proportionate to its purpose of supporting the availability of high-quality, innovative mobile wireless services at affordable prices.*[140]

The Commission subsequently initiated a narrowly focused proceeding to have the national wireless service providers propose lower-cost data-only plans. This proceeding was efficient and proportionate to the Commission's findings. The national wireless service providers designed their respective lower-cost data-only plans and quickly launched them in the retail market.

293. The 2006 Direction has certainly been an effective tool. It allows the Commission to act when necessary but stresses reliance on market forces as much as possible to achieve the policy objectives. However, given that the Canadian mobile wireless market has produced almost universal LTE coverage at low prices by multiple competing service providers since the 2006 Direction has been in force, the 2006 Direction does not support the use of any further regulatory measures at this time.

[139] TRP 2015-177, para. 198.
[140] TD 2018-97, para. 126.

294. In February 2019, the Government of Canada proposed a new Policy Direction. The *Order Issuing a Direction to the CRTC on Implementing the Canadian Telecommunications Policy Objectives to Promote Competition, Affordability, Consumer Interests and Innovation* (the "Proposed Direction") complements the 2006 Direction by adding the requirement that the Commission make its decisions with specific reference to a consumer-first policy lens that addresses not just affordability but also the quality and coverage of Canadian telecommunications services.[141]

295. The Proposed Direction instructs the Commission to consider how it can promote competition, affordability, consumer interests, and innovation when relying on regulation. Rogers has provided extensive evidence, above, that the mobile wireless market is already extremely competitive and affordable for Canadians with low household incomes. Rogers has also provided evidence that consumers are well protected by service providers and existing regulations. Finally, facilities-based service providers, like Rogers, are Canada's true telecommunications innovators, investing continually in advanced new technologies, services and applications to keep Canadian consumers and businesses at the forefront of technological advancements. The aims of the Proposed Direction are therefore already being fulfilled.

## Wholesale mobile wireless service regulatory framework (roaming and MVNO access)

### Question 6 – the current wholesale regulatory framework

Discuss whether the current wholesale mobile wireless service regulatory framework effectively supports competition in the retail market.

296. Competition in Canada's retail mobile wireless market is extremely strong. As shown in the answer to question 2, above, Rogers and other service providers are vigorously competing against each other; the sheer volume of promotional activity has also steadily increased over the past several years. Each year, and considering only the national wireless service providers, more than 3.3 million customers switch providers as competitors offer them better value.

297. The current wholesale regulatory framework is working well to support this competition. While Canada previously had a strong competitive environment, the current framework, adopted in 2008 and amended over the years, has enabled Canada's new entrant and regional wireless service providers to compete at the same level as the national wireless service providers. Consumers have more choice while carriers continue to build networks.

298. This framework is aligned with the approach taken by regulators around the world. The expectation is that by providing access to some network components (those where

[141] Although it has not yet been registered and its draft wording is subject to change, for the purposes of this intervention Rogers will assume the Proposed Direction will be left fundamentally unchanged.

reproduction would be inefficient or impractical) on regulated terms will support competition in the downstream markets. The European Commission explained, "the market to be analysed first is the one that is most upstream from the retail market in question in the vertical supply chain. [National Regulatory Agencies] NRAs should undertake a gradual analysis of the markets that are downstream from a regulated upstream input, until it reaches the stage of the retail market(s)".[142] The growing market share of the regional carriers, particularly of late, demonstrates the growing impact this strategy is having on the retail market.

### The current roaming framework is working well to support competition

299. Under the current wholesale wireless framework, Canada's regional wireless service providers can access portions of the three national carriers' networks to supplement their own networks. Specifically, the regional carriers can access wholesale roaming service as well as tower and site sharing from the national service providers.

300. Smaller providers are able to assure their subscribers and potential subscribers that they will stay connected across Canada, even outside of their home carrier's coverage. Without access to any roaming service, for example, a Freedom Mobile subscriber based in Toronto would not have service when visiting a relative in Sarnia, where Freedom Mobile has no network. Naturally enough, the subscriber might question signing up with Freedom Mobile in the first place if their phone would not work everywhere they travel within Canada. With nation-wide roaming service, Freedom Mobile's customers have full coverage in Sarnia and everywhere else outside of Freedom Mobile's network coverage. This allows Freedom Mobile to better compete with the national wireless service providers given that it has access to their vast network footprints.

301. The Commission itself has noted that the wholesale roaming framework enables competition, writing that "Wholesale roaming facilitates wireless carriers' entry into and competition in the market."[143]

302. Importantly, the current roaming framework promotes competition while preserving incentives for service providers to invest in networks. Under ISED's and the Commission's rules, roaming is an incidental service that allows the customers of one carrier to use the network of another carrier when out of range of their home carrier's network. ISED's Conditions of Licence attached to every commercial mobile wireless spectrum licence state that

> *Roaming must enable a subscriber (a Roamer) already served by the Requesting Operator's network (Home Network) to originate or terminate communications on*

[142] The Feasey Report, para.46.
[143] TD 2018-97, para. 58.

> *the Licensee's network when out of range of the Home Network, whenever technically feasible.*[144]

303. The Commission has provided a very similar definition in one of its roaming decisions:

> *wholesale roaming services provide incidental access to a host network by the end-customers of a wireless carrier when these end-customers are outside their home network's footprint.*[145]

304. Roaming coverage supplements the home carrier's network; it does not replace it and it can not be used for resale. This important policy determination is based on the fact that allowing broader access would significantly undermine the investments of other wireless carriers, particularly the regional carriers, and especially in rural areas. Some small and regional wireless service providers may even cancel their future network deployment plans and instead resell another carrier's network. After all, this would be a significantly less costly way to expand their operating territory without taking on any risk whatsoever.

305. To ensure this doesn't happen, the Commission has structured its roaming framework such that smaller service providers are incentivized to invest in expanding their networks:

> *The Commission's determinations with respect to the regulation of rates, terms, and conditions for wholesale roaming, as set out later in this section, will allow smaller wireless carriers such as the new entrants to expand their wireless networks … . The Commission also considers that these determinations will not act as a disincentive for wireless carriers to continue to invest in their network facilities because, among other things, wholesale roaming is incidental access to the network.*[146]

306. For example, mobile wireless service providers can only sell their service within their operating footprint where they provide wireless coverage. Providers who expand their networks can therefore sell their service to additional Canadians, and thus increase their revenues while decreasing their wholesale roaming costs.

307. To return to the above example, Freedom Mobile could invest in expanding its network into Sarnia, where it holds licences for 90 MHz of mobile wireless spectrum. This would allow Freedom Mobile to retail its service in Sarnia, which it currently can not do under the Commission's roaming rules. It would also allow Freedom Mobile to stop paying a wholesale roaming provider for roaming service in that city. Consumers living in Sarnia would benefit from the additional choice of a new service provider in their community.

308. On the other hand, if Freedom Mobile were allowed to sell service in Sarnia without expanding its network there, then it would not, in fact, be selling its own service there at

[144] ISED, *CPC-2-0-17 Conditions of Licence for Mandatory Roaming and Antenna Tower and Site Sharing and to Prohibit Exclusive Site Arrangements*, Part B, section 2 with emphasis added.
[145] TD 2016-60, para. 14 with emphasis added.
[146] TRP 2015-177, para. 123.

all: it would be *reselling* its wholesale roaming provider's network. The carrier would gain the artificial advantage of being able to sell services in an area where it has not made a single dollar of investment. It's hard to see why any carrier would want to take on the massive cost and risk associated with building a mobile wireless network, particularly where the business opportunity is modest, if it could simply avoid the cost and risk by reselling another company's services. Consumers living in Sarnia would not benefit very much either, as the new carrier would add no new infrastructure in their community.

309. In the extreme, an unscrupulous carrier could construct a small mobile wireless network in a remote region of Canada where mobile wireless spectrum is available at relatively low cost. It could then rely on mandated roaming to provide it with nation-wide permanent coverage even though it only has a small network footprint. While this might seem far fetched, it has in fact happened twice in the past few years. Both Ice Wireless and TNW Wireless sought to leverage Canada's mandated roaming rules to launch nation-wide service, even though both of these companies only have small networks in remote parts of the country and roaming must not be used for resale.[147]

310. The Commission's roaming framework has proven itself successful. Since the Commission introduced roaming at cost-based rates in 2015, Canada's national and regional service providers have all continued to make investments in network infrastructure. This includes investments in rural and remote communities and along unserved highways. The current wholesale roaming regulations have benefitted consumers and do not need to be changed.

## Question 7 – developments that would affect current roaming policy

Discuss whether there have been any developments, technological or otherwise, that would require the current wholesale roaming policy to be modified. For any proposals to modify that policy, provide rationale for why the change is necessary and how it would benefit retail competition.

311. The current wholesale roaming policy does not need to be modified to account for any recent developments. For example, the current framework can accommodate VoLTE roaming and eSIM cards without modification.

312. However, the pace of innovation in the mobile wireless market is very fast. Technological changes that would impact the Commission's wholesale roaming policy could arise with little notice. As such, the Commission should maintain a flexible framework that can cope with the rapid pace of technological advancement. The same approach would help the industry manage any non-technological developments that are incompatible with the roaming framework.

313. Lastly, as pointed out in the Feasey Report, the Commission should be aware that "other, unexpected developments, such as new entry or technological changes which lower entry barriers or otherwise disrupt markets, may also create conditions which

[147] See TD 2017-56 and TD 2019-56, respectively.

enable withdrawal [of existing regulations]."[148] If the Commission undertakes any sort of retail or wholesale intervention as a result of this proceeding, it should be aware that future developments might require it to revisit the necessity of its regulations.

## Question 8 – mandating MVNOs

Comment on whether the Commission's preliminary view that the national wireless carriers should be required to provide wholesale MVNO access on a mandated basis is appropriate. Should this requirement apply to other wireless carriers as well and, if yes, why?

314. The Commission should not mandate wholesale MVNO access to the national wireless carriers' networks. The Commission has historically successfully balanced Canada's wholesale policies to maintain incentives to invest and to boost retail competition. However, if the Commission were to mandate MVNO access, this delicate balance would be upset. To be clear, MVNOs are not a panacea; they would undoubtedly do more harm than good.

### MVNOs do not represent innovation

315. The foundation for all innovation in telecommunications is the network itself. Facilities-based service providers have delivered countless new technologies, products, services, and programs that all rely on connectivity either directly or indirectly. However, MVNOs lack this foundational element. Instead of innovating themselves, MVNOs will ride on the coattails of facilities-based providers. They will have instant access to world-class networks painstakingly built with significant risk over the past 30 years.

316. The Proposed Direction instructs the Commission to regulate in a manner that will "enable innovation in telecommunications services, including new technologies and differentiated service offerings."[149] However, MVNOs will not be in any position to launch new technologies nor differentiate their service offerings in any substantive way. MVNOs will also likely not have the mandate or desire to spend time and effort on risky endeavours that have no guaranteed return, such as ultimately building network infrastructure. After all, MVNOs are not innovators. By their nature they avoid risky endeavours.

317. Moreover, an MVNO's service offerings are strongly linked to its host carrier. An MVNO would not be able to offer a service or product that their host could not offer to its direct customers. For example, an MVNO would be unable to offer its customers a new handset or device that is incompatible with its host carrier's network.

318. On the other hand, MVNOs will endanger the level of investment and innovation already serving Canadians. Mandated MVNOs access would financially impair facilities-based service providers who would otherwise be in a strong position to continue their history of innovation by investing in advanced new infrastructure. Ironically, this could mean that mandating MVNOs would lead to less innovation in the wireless industry than if they

[148] The Feasey Report, para. 56.
[149] Proposed Direction, part 1 a. vi.

were not mandated. Canada's world-class wireless networks fuel the country's innovation agenda. These networks are the backbone that other companies and industries rely on to innovate.

### MVNOs will jeopardize Canada's 5G future

319. 5G will, without exaggeration, change how Canadians work, study and play. It will transform the home, the factory and the farm. By connecting millions of devices almost instantly at unprecedented speeds, 5G will enable products and services that could not be imagined before today. As a result, every nation in the world is rushing to be a 5G leader and secure their place in the digital economy. It is essential that Canada be at the forefront.

320. It will take unprecedented investment to make 5G a reality. According to Accenture, Canada's wireless carriers are expected to invest $26 billion from 2020 to 2026 to deploy 5G.[150] The technology's dependence on small cells and fibre backhaul will require a massive influx of capital and an appetite for risk. A mandated MVNO regime will put both these necessities at risk. As the Commission concluded before, resale undermines the investment environment.

321. After thoroughly weighing the detailed record of its last year-long wholesale wireless proceeding, the Commission decided not to mandate MVNO access in TRP 2015-177 and, when challenged to reconsider, it confirmed this decision categorically in TD 2016-60.[151] The Commission's primary reason for not mandating MVNO access was to maintain the incentive to invest in wireless network infrastructure. The Commission wrote in TRP 2015-177:

> *121. Investment in wireless network infrastructure by wireless carriers is important to ensure that Canadians have access to mobile wireless networks and services of high quality in all regions of Canada. The new entrants have made and are planning to make significant investments in spectrum and their wireless networks. The Commission considers that mandating wholesale MVNO access at this time would significantly undermine these investments, particularly urban core areas.*
>
> *122. Accordingly, if the Commission were to mandate GSM-based wholesale MVNO access provided by the national wireless carriers, this permanent network access would likely discourage continued investment by wireless carriers, because they could*

[150] Accenture, *Fuel for Innovation – Canada's Path in the Race to 5G, June 2018*. Available: https://www.5gcc.ca/wp-content/uploads/2018/06/CWTA-Accenture-Whitepaper-5G-Economic-Impact_Updates_WEB_06-19-2018.pdf

[151] In full, Telecom Decision CRTC 2016-60, *The Canadian Network Operators Consortium Inc. – Application to review and vary Telecom Regulatory Policy 2015-177*. Available: https://crtc.gc.ca/eng/archive/2016/2016-60.htm

*rely on this access rather than investing in their own mobile wireless network infrastructure.*[152]

322. More recently, the Commission re-affirmed its finding that mandated resale would have an adverse impact on network investments when declining to mandate access for Wi-Fi MVNOs.[153]

323. However, the Commission is now considering abruptly changing its course. In the Notice, the Commission writes that its preliminary view to mandate MVNO access is supported by its belief that the benefits that MVNOs would deliver would outweigh any potential negative impact on network investment.[154] The Commission further writes that the impact to network investment would be muted given that service providers have already made extensive investments in LTE and LTE-A in the past few years.

324. The Commission's reasoning is incorrect. Simply put, MVNOs will lead to a dramatic reduction in investment that will have a significant and long-lasting impact on Canada. Faced with diminishing returns, service providers will have no choice but to reduce their capital spending. This will impact both existing networks and Canada's upcoming 5G deployment.

325. With regard to existing networks, while LTE and LTE-A technologies are now available to almost all Canadians, service providers continue to upgrade their existing networks in order to cope with the explosive growth in mobile wireless data usage.[155] Halting or even reducing these investments in the face of this exponential growth would lead to gradually deteriorating network quality and slower mobile broadband speeds that would impact consumers and businesses alike. The impact would be noticeable and unpleasant for Canadians who have come to expect world-class mobile wireless services.

326. Canadian wireless carriers are already among the largest, if not the largest, network investors in the world. Between Canada's size, demographics and climate, building out cutting edge networks is an expensive proposition. Yet Canadian carriers have continuously offered among the most advanced networks available in the world. Mandated MVNOs, however, would risk this investment. Why build when you can rent? As importantly, why build when someone else will avoid building and rent on you? Canada's current network investment will undoubtedly suffer.

327. However, the much bigger impact would be to Canada's fledgling 5G networks. As explained above, the Canadian wireless industry is just beginning to make generational investments in advanced new 5G technology that will require billions of dollars more

[152] TRP 2015-177, paras. 121 and 122.
[153] TD 2018-97, paras. 72 and 73.
[154] TNC 2019-57, para. 39.
[155] Cisco forecasts that mobile data traffic will grow at a compound annual growth rate of 36% from 2017-2022. Source: Cisco, *Visual Networking Index: Forecast and Trends, 2017–2022*, Appendix H. Available: https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white-paper-c11-741490.html#_Toc532256809

than the industry's current significant ongoing investments. 5G networks are expected to use primarily high frequency electromagnetic spectrum where there is a relatively large amount of bandwidth available. However, these high frequency bands have relatively poor propagation characteristics. As a consequence, 5G deployments are expected to be very dense with many small, low-power base stations installed closely together to provide sufficient coverage. Deploying these networks will require substantial investments by Canada's mobile wireless service providers. Mandating access for MVNOs will undermine the incentives and funds for these substantial investments.

328. The Commission must consider Canada's future as a leader in the digital economy because the negative impact will extend beyond a loss in revenue for mobile wireless service providers. Specifically, 5G will enable transformative applications for businesses in every sector. 5G networks will come in multiple flavours that enable both broad-based connectivity and specific, advanced capabilities.

329. Broad-based connectivity on 5G networks is the next generation of today's LTE-A networks. Consumers and businesses alike will benefit from faster mobile wireless download and upload speeds. By delivering up to 20 gigabits per second (Gbps) peak data rates, 5G will unlock new ways for Canadians to interact with their devices, businesses, and the world around them.[156] Faster speeds will enable new technologies like 8K resolution streaming. Workers will increase their productivity through enhanced connectivity that allows for superior video conferencing from the field, speedy large file transfers, and much more.

330. Beyond enhanced speeds, 5G networks will enable specific capabilities through low latency and ultra low latency connections. End-to-end latency will decrease by a factor of 10 to less than one millisecond. Consumers will benefit from low latency virtual reality and augmented reality capabilities that will enable innovative applications in telemedicine, online education, social media, and entertainment to name a few.

331. Perhaps the most distinguishing opportunity enabled by 5G, compared to existing LTE networks, is that 5G will open up a completely new frontier in M2M and IoT technologies for enterprises. Through combined ultra low latency and high bandwidth connectivity, 5G networks will enable applications like autonomous driving, remote industrial drone piloting, autonomous robotics, and more. These precision applications simply aren't possible over LTE networks.

332. Canada is a global leader in the field of artificial intelligence (AI). The Toronto, Kitchener-Waterloo, and Montreal regions are widely recognized hotspots for AI start-ups. AI software requires large amounts of data to function. Depending on the application, this data may be gathered by thousands or even millions of remote sensors that could be spread across very large distances. Continuing Canada's momentum in AI will require 5G networks that will form the foundation for advanced IoT sensor deployments.

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[156] Accenture, *Fuel for Innovation: Canada's Path in the Race for 5G*. Available: https://www.5gcc.ca/wp-content/uploads/2018/06/CWTA-Accenture-Whitepaper-5G-Economic-Impact_Updates_WEB_06-19-2018.pdf

333. The anticipated benefits that 5G could bring to the Canadian economy are enormous. Accenture expects that 5G will deliver approximately $40 billion per annum in incremental GDP by 2026. It also estimates that adopting 5G technology in Canada will create 250,000 jobs

334. While both consumers and businesses will greatly benefit from 5G's advances, the enterprise uses will enable Canada's businesses to compete and then outperform at the global level – but only if the necessary 5G networks are available. Without widely deployed 5G networks, Canada will fall behind other countries in efficiency, productivity, and competitiveness. Every country in the world is racing to become a leader in 5G, ensuring they are among the first economies to adopt this crucial advancement in order to guarantee their international competitiveness. Canadian companies should be leaders, not watching from the sidelines as foreign competitors who rely on next generation networks that have been deployed without regulatory hindrance pass them by. Canada can not afford to be left behind.

335. Even if the Commission's mandated MVNO policies are only in place for a set period of time, Canada's digital economy would be set back by years. The next few years are the most critical. Companies that don't begin to harness the power of 5G networks will lose first-mover advantages in their various industries and may have a difficult time catching up.

336. In TNC 2019-57, the Commission states that carefully set rates, terms, and conditions should help to mitigate the negative impact on investment.[157] This is not true. By definition, MVNOs will completely depend on facilities-based providers for their existence. There can be no access rates that will adequately maintain the incentive for facilities-based service providers to continue to invest in their networks in the presence of MVNOs.

337. Depending on its outcome, the current proceeding could seriously impact the incentives for Canadian carriers to invest the capital needed to produce these benefits for the Canadian economy. A decision that undermines these incentives to invest would have serious ramifications for all Canadians.

### MVNOs will disrupt network expansion and development in rural areas

338. When declining to mandate resale for Wi-Fi MVNOs, the Commission made an important distinction between urban and rural areas. In the context of the new entrant wireless service providers, the Commission wrote:

> *72. The business case for [the new entrant] wireless carriers to expand their networks into new markets, particularly in less densely populated areas outside major metropolitan centres, is challenging. For an investment to make sense, the company's projected revenue in the expansion area must exceed the projected costs of*

[157] TNC 2019-57, para. 39.

> *expansion over a given time frame, and must also compare favourably relative to other potential investment opportunities (in larger cities).*
>
> *73. If mandated resale competition were to occur in these areas it would likely splinter the market and reduce the number of customers that the other wireless carriers are relying on to generate revenue. Because of a challenging business case, the loss of customers to Wi-Fi-first service providers could reduce projected revenue enough to make the business case for a targeted expansion area unprofitable and prevent the facilities-based carrier from going ahead with the investment.*[158]

339. The facts have not changed since the Commission recognized this basic principle in TD 2018-97. The low population density and vast geography of Canada already make rural and remote areas costly to serve and challenging for earning a return. It is the economies of scale attained in major cities that enables service providers to invest in rural and remote regions of the country. Artificially eroding market share in major cities would put the marginal business cases for other areas at risk. Allowing MVNOs to capture market share through mandated resale will further reduce the base of customers over which facilities-based providers can recoup their investments. This will transform marginal business cases into unprofitable ventures and will result in less expansion of networks into rural areas.

340. Service providers have been expanding their LTE and LTE-A networks into increasingly remote parts of Canada. These efforts have been very successful as these networks now reach the vast majority of the population. LTE-A coverage increased significantly from 83% of the population in 2016 to 92% in 2017 as a result of network upgrades outside of core urban areas. These investments were made under the assumption that these rural networks would not be open to mandated resale. If that assumption no longer holds, then service providers will question making these low-returning investments in rural infrastructure going forward. The expansion of LTE-A networks to the last few unserved Canadians could be slowed or even stopped outright.

341. The impact on rural connectivity would be most acute for Canada's upcoming 5G deployment. Rural areas could make heavy use of 5G networks; 5G will enable transformative wireless applications in agriculture, forestry, mining and many other industries based in rural and remote areas. However, 5G networks will also be more expensive to deploy in rural areas than in urban areas on a per customer basis. Not only are there naturally fewer customers, but rural areas require dense small cell installations to provide low-range millimeter wave coverage. Backhaul from each of these small cells will entail much longer fibre runs or multiple microwave links compared to urban areas, adding significant cost.

342. Mandated MVNO access will severely impair the business case for installing 5G networks in rural and remote areas. Facilities-based carriers will face a decline in the

[158] TD 2018-97, paras. 72 and 73.

revenue that they need to fund these expensive builds along with the necessary returns to justify the initial investment. Rural Canadian consumers and businesses cannot be deprived of the benefits of 5G connectivity or Canada will fall behind.

343. MVNOs themselves would not prioritize serving rural areas. Instead, MVNOs would focus their marketing efforts on urban areas where they would naturally have higher revenues. On the other hand, facilities-based providers have a long history of providing excellent service in rural areas.

### MVNOs will undermine the Government's fourth carrier strategy

344. Mandating MVNOs will severely undermine the Commission's and ISED's fourth carrier strategy. The regional carriers would have to compete with MVNOs that would have instant national coverage despite not investing a single dollar in mobile wireless networks. MVNOs will then attempt to undercut the new entrant service providers on price, which is typically the prime advantage that regional carriers offer consumers over the national wireless service providers because of their inferior networks.

345. It is not clear if Canada's regional service providers would be able to weather the storm of mandated resale. Certainly they would have to curtail their investments in expanding their networks. The Commission recently agreed with this, writing again in the context of Wi-Fi based MVNOs that "the risk to investment and expansion is greater for the other wireless carriers."[159]

346. Some small and regional wireless service providers may even cancel their future network deployment plans and instead resell another carrier's network. This would be, after all, a significantly less costly way to expand their territory without taking on any risk whatsoever. The Commission acknowledged this as a very real risk in 2016, writing that

> *A determination to mandate MVNO access services, or at a minimum full MVNO access services, could result in regional carriers or new entrants relying on mandated leased facilities instead of implementing their significant network investments themselves.*[160]

347. The Commission has reaffirmed this risk much more recently when it decided not to mandate Wi-Fi MVNO access:

> *One consequence of [mandating Wi-Fi MVNOs] would be to disincent existing wireless competitors from investing in their networks, since they could more broadly rely on the national wireless carriers' networks to offer service outside their traditional network footprints.*[161]

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[159] TD 2018-97, para. 71.
[160] TD 2016-60, para. 35.
[161] TD CRTC 2018-97, para. 69.

348. There is no credible evidence that this view is no longer valid only one year later. The risk remains and is significant.

349. Changing course at this moment could not be less opportune. Canada's regional carriers are just now developing a strong footing. Wind Mobile was purchased by Shaw Communications and subsequently rebranded as Freedom Mobile. Quebecor Media's Videotron has just launched the Fizz brand offering a range of low cost mobile wireless plans. Xplornet Communications Inc. has just launched Xplore Mobile in Manitoba. Collectively, Canada's regional carriers have invested billions of dollars in mobile wireless networks over the past 10 years.

350. The Commission recognized these facts recently when it decided not to mandate access to Wi-Fi based MVNOs:

> *the record shows that several competing wireless carriers, such as Eastlink, Freedom Mobile, SaskTel, and Videotron, and, more recently, Xplornet, have invested heavily in network expansion, and plan to continue to expand their networks. All told, the wireless carriers have spent billions of dollars in network investments over the past few years, supported, in part, by the existing regulatory conditions.*[162]

351. The Government of Canada and the Commission are now poised to jeopardize the fourth carriers. After effectively providing them billions of dollars in spectrum subsidies and convincing them to invest billions of dollars more in network deployments, the regional carriers may now face a host of new government assisted competitors without the financial burdens they endured in building out LTE networks over the last 10 years. As discussed below, government-supported regional carriers greatly diminished commercial MVNO activity in Canada. Now regulated MVNOs could do the same to the regional carriers.

## MVNOs will make negligible investments in Canada

352. While undermining investments from facilities-based carriers, MVNOs make relatively few investments themselves. The RAN is far and away the costliest and riskiest investment in the wireless industry. By definition, no MVNO would ever have a RAN. Rogers does not expect any MVNO would ever climb the 'ladder of investment' and become a full facilities-based service provider as long as access is mandated at artificially low rates indefinitely.

353. As Bell noted in the proceeding that led to TD 2016-60, MVNOs avoid up to 85% of the investments that mobile wireless service providers must make.[163]

354. Many of the network elements that MVNOs require to operate are now available as virtual network elements. Instead of investing in advanced hardware and software in a

[162] TNC 2018-97, para. 68.
[163] TD 2016-60, para 29.

Canadian co-location facility, virtual network elements are immaterial instances hosted on a third-party's cloud computing platform. They can be spun up or turned off at a moment's notice. To be clear, Rogers has no issue with virtualization itself. However, the majority of the companies providing these services are non-Canadian companies with their servers based outside of Canada. Not only are there clear security concerns with such arrangements, but MVNOs would avoid hiring skilled Canadian technicians and network engineers to design, maintain, and operate their networks. This will harm Canadians.

355. Beyond network infrastructure, MVNOs will also avoid making other kinds of investments. For example, a variety of international vendors sell white-label voice over Internet Protocol ("VoIP") and messaging software for MVNOs. These applications are already developed and require only minor tailoring before launch. For example, one European software development company that offers messaging and VoIP smartphone software for MVNOs boasts that its customers simply "Add your company colors, branding and your logo to your white label messenger and publish …" and "We'll make it look like the app was built by you, for you." and "Just contact us and have your app up and running on the marketplace in days time."[164]

356. A seemingly Canadian company could therefore launch a complete MVNO service by hiring a small number of Canadian employees and then buying a virtual core and billing and support systems from overseas developers. These MVNOs would avoid hiring skilled Canadians, instead relying on off-shore developers and perhaps even overseas call centres to provide customer care. Such companies are likely not what the Commission was envisioning when it expressed the preliminary view that it would mandate MVNO access, but they are certainly what will result if MVNO access is mandated.

357. Evidence from Canada's wireline resale regime shows that wireline resellers make negligible investments in infrastructure compared to facilities-based providers (both ILECs and cable companies). The following table shows the annual investment made in plant and equipment by the various types of wireline service providers:

| Sector | 2012 | 2013 | 2014 | 2015 | 2016 | CAGR (%) 2012-2016 |
|---|---|---|---|---|---|---|
| **Incumbent service providers** | 4.7 | 4.9 | 4.8 | 5.2 | 5.5 | 4.1 |
| **Other facilities-based providers (incl. cable companies)** | 2.3 | 1.9 | 2.3 | 3.1 | 3.7 | 12.1 |

[164] Zangi, *Become a Virtual Telecom Operator*. Available: https://zangi.com/telecom

| | | | | | | |
|---|---|---|---|---|---|---|
| **Resellers** | 0.04 | 0.04 | 0.03 | 0.02 | 0.03 | -8.5 |

*Table 11: Telecommunications investments made in plant and equipment in billions of dollars. Source: CRTC 2017 CMR, table 5.0.5.*

Wireless resellers would similarly make a small fraction of the investment in equipment that wireline resellers make.

358. Contrast this with Canadian telecommunications service providers who have made massive investments that have generated significant economic benefits for Canada. In 2016, Canada's mobile wireless industry contributed $25.21 billion to the country's GDP.[165] The industry was directly responsible for approximately 31,000 full-time jobs, and was indirectly responsible for an additional 50,800 full-time jobs.[166] In addition, the Canadian wireless ecosystem generated 56,300 full-time jobs, for a grand total of 138,000 full-time equivalent jobs.[167] All of these direct and indirect benefits have been generated as a result of facilities-based competition in the mobile wireless market and regulatory policies that encourage facilities-based investment. It is no exaggeration that some of these jobs and other economic benefits would be put at risk by MVNOs who will have no requirement or incentive to invest in their own wireless infrastructure and who therefore will create few, if any, jobs or other related economic benefits themselves.

359. As noted above, the majority of the cost and risk of enabling mobile wireless services is borne by the facilities-based carriers that acquire the necessary spectrum and build and maintain the RAN.[168] The IMOBIX Report explains that investments made by MVNOs are a fraction of those made by mobile carriers and that the main expense for MVNOs relates to their day-to-day operations and not investment in network infrastructure:

> *While capital expenditures (CAPEX) are an important part of the overall budget for both MNOs and MVNOs, the relationship and size of the required CAPEX budget for MNOs is exponentially larger than for MVNOs. (As mentioned in this report, the main expense for MVNOs is not CAPEX, but rather OPEX related to customer acquisition and retention and the variable usage that they pay to their host MNOs.)*[169]
>
> *For MNOs, the cumulative CAPEX per subscriber can be over $400 per subscriber. For Light and Full MVNOs, it is less than $100 per subscriber. For Second Brand and Branded Reseller MVNOs, the CAPEX per subscriber would be even lower than Light*

[165] Nordicity, *The Benefits of the Wireless Telecommunications Industry to the Canadian Economy in 2016*, July 2017. Available: https://www.cwta.ca/wp-content/uploads/2017/07/2017-Report-on-Wireless-Industry-Final-July-27.pdf.
[166] Ibid.
[167] Ibid.
[168] IMOBIX Report, para. 16.
[169] Ibid, para. 18.

> *and Full MVNOs, given that they are not required to invest in a core or infrastructure for services and applications.*[170]

## MVNOs will not lead to lower prices

360. Canada's facilities-based mobile wireless service providers offer a wide range of low cost plans, including talk and text plans with data and data-only plans. The national wireless service providers recently launched their lower-cost data-only plans. The regional and new entrant service providers have launched competing plans. Providers make every effort to serve every corner of the market. For example, Rogers' chatr brand offers significant value for customers who are seeking talk, text, and data plans at low price points. The low cost sector of the market is well served.

361. Rogers has shown above in its answers to question 2 that prices are declining in Canada while value is increasing. Organizations that are seeking mandated access will without a doubt state that MVNOs would further lower prices. However, as explained in the Feasey Report, the evidence from other countries shows that MVNOs do not generally lead to lower prices.[171] The report indicates that MVNOs in other countries tend to focus on serving the most profitable parts of the market.[172] There is no reason to believe that MVNOs would not do the same in Canada.

362. At most, mandated MVNOs might produce what the Feasey Report calls a "hit and run" effect: an unsustainable short term affect on prices followed by an exit from the market. The consequences will be reduced investment levels, stunted 5G deployment, and Canada lagging behind other economies. This type of disruptive competition would not benefit Canadians.

## Consumer MVNOs have not fared well in the Canadian market

363. MVNO arrangements have already been commercially negotiated in Canada on a voluntary basis. In 2007, when ISED first embarked on its four carrier strategy, Rogers alone had five commercial MVNOs operating on its network. However, there are far fewer MVNOs operating in Canada today. Over the past decade, MVNOs have suffered due to ISED's and the Commission's policies to assist the non-national service providers. In fact, in several cases, Rogers ultimately agreed to buy its MVNO partners as they could no longer compete independently due to the new entrants targeting the same market segments. The introduction of the new carriers, who benefitted from the AWS-1 spectrum set-aside and mandatory roaming in 2007, simply shrunk the growth opportunities for traditional MVNOs by targeting the same market segment. Such measures for facilities-based providers continue to today. In ISED's April 2019 auction of

[170] Ibid, para. 20.
[171] The Feasey Report, para. 12.
[172] The Feasey Report, paras. 9 and 105.

the 600 MHz band, a massive 43% of all available spectrum was set aside for the non-national wireless service providers.[173] Amazingly, Canada could be entering an era in which the government is continuously asked by the fourth carriers and the newly mandated MVNOs to provide them both with increasing assistance in order to compete with one another. Such an outcome, ultimately paid for by taxpayers and the national carriers, will hurt consumers (who pay the taxes) and investment (made overwhelmingly by the national carriers).

364. Even with government assistance, there is no assurance mandated MVNOs in Canada will succeed. In fact the evidence suggests otherwise. While MVNOs in other countries may find limited success by focusing on niche markets, Canada's facilities-based service providers, including the regional carriers, market very broadly. Through their premium brands and flanker brands, service providers are able to meet the needs of Canadians.

365. There is therefore no reason to believe that MVNOs would be successful in Canada now. In fact, the regional carriers providers are much stronger competitors now than ever before. New MVNOs might not be able to successfully compete against the combined presence of established national wireless service providers and the regional carriers. If this is the case, and MVNOs do not fare well, then mandating MVNOs would ultimately cause harmful disruption and confusion for customers as fledgling MVNOs are forced to cease operations. Mandating MVNO access at artificially low rates will also significantly harm ongoing investments by facilities-based wireless service providers, undermining Canada's position in the race to 5G long after the MVNOs have failed and exited the market.

366. MVNOs have had limited success in capturing an appreciable share of the market in other countries. The Feasey Report provides the following evidence:

> *Hong Kong has four facilities-based carriers and a large number of MVNOs who have acquired an aggregate 14% of the retail market.*
>
> *[In the U.S.,] MVNOs, of which there are over 100, have acquired an aggregate market share of a little over 10%.*
>
> *In no European country other than the Netherlands do MVNOs have an aggregate retail market share of more than 10%, despite MVNOs having been present in most European markets for well over 10 years.*
>
> *MVNO market share in most European markets is either flat or declining. … it seems likely that the total number of MVNOs in Europe has been declining, not rising, in recent years.*[174]

[173] ISED, *Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band*, para. 30.
[174] The Feasey Report, paras. 127, 130, 134.b and 134.c.

## MVNOs would not further Canada's telecommunications policy objectives.

367. The regulators' commitment to facilities-based investment is based upon Canada's telecommunications policy objectives as listed in Section 7 of the Act. As conclusively demonstrated earlier, these objectives are currently being met through natural market forces.

368. Mandating MVNO access will not further Canada's policy objectives in a meaningful or enduring way. In fact, mandated MVNO access would be a step in the wrong direction from the perspective of the policy objectives.

369. First, not only do MVNOs avoid making as many investments in telecommunications systems as possible, but they will also lead to a reduction in investments in new networks by facilities-based providers. MVNOs would therefore not further the "orderly development" of telecommunications systems – they would do the opposite.

370. By disrupting the nation's 5G deployment, MVNOs would also cause Canadian businesses in virtually every sector of the economy to lose out on the innovative applications that are enabled by 5G's ultra fast speeds and ultra low latency. Thus MVNOs would not enrich Canada's economic prosperity and would undermine Canada's competitiveness internationally.

371. The policy objectives call for *enhanced* competitiveness in Canadian telecommunications. Note that this is not necessarily the same as *increased* competitiveness. While mandating MVNOs might increase competition in the short term, this would not be sustainable or efficient competition. The level of competition in Canada is already very high with multiple service providers targeting every corner of the market. MVNOs might have a difficult time finding success, in which case they could have a disruptive effect on the market when some of them are forced to cease operations. Additionally, because they will be responsible for reduced network investment across the country, MVNOs will harm future inter-carrier 5G competition. Finally, MVNOs would focus their competitive efforts in urban areas; rural Canadians would not see the same unsustainable boost in competition as their urban counterparts. MVNOs will therefore not enhance competition at all – they will harm it.

372. The policy objectives also call for the promotion of Canadian telecommunications systems over systems based outside of the country. Without strict restrictions, foreign companies could use a mandated resale regime to try to enter the Canadian market. Foreign-based MVNOs would not prioritize the use of Canadian transmission facilities. Rather, they would leverage the national wireless carriers' RANs to the maximum extent possible before shuttling customer traffic outside of Canada for routing, even if the traffic has a Canadian destination. It is hard to say what they might do with the traffic when it is outside of Canada. However, there can be no compromise on the security of Canadians' communications.

373. Additionally, the policy objectives include an important goal focussing on innovation and research and development in the field of telecommunications. However, MVNOs are not natural innovators since they do not invest in their own network infrastructure and merely resell the networks and services of facilities-based carriers. They will seek to reduce their costs as much as possible to gain a foothold in the market. They will devote few resources, if any, to the development of new and innovative products and services that might help Canadians or further the state of the art in telecommunications networks.

374. At the same time, MVNOs will drain the necessary revenues from facilities-based providers who make significant investments and have a long history of innovating. Innovation often relies on taking large risks over long timelines. Facilities-based providers will have their ability to do this reduced if they no longer have the required financial resources to make the necessary investments. The incentives for facilities-based providers to continue to innovate in order to differentiate themselves will also naturally be undermined if they will be required to share their innovations with MVNOs.

375. It is also not clear to Rogers if MVNOs will be able to protect their customers' privacy and security as well as facilities-based providers. As service providers experience a growing wave of complex cyber security and fraud incidents, the role of an expert in house privacy team is becoming increasingly important. Having years of experience managing customer privacy, Rogers and other facilities-based service providers are in a better position to manage their customers' security than MVNOs.

376. And perhaps most importantly, the policy objectives call for a reliance on market forces. It is the Commission's long-standing approach to using a light touch in regulating the wireless market and this has allowed competition between facilities-based service providers to fulfill Canada's policy objectives. Mandating MVNO access would represent a significant departure from an increased reliance on market forces. It would constitute a significant, artificial interference in the market that will only erode the efficiencies that typically arise from the free operation of market forces. At the same time, mandating MVNO access will undermine important ongoing investments by facilities-based carriers while providing no meaningful and lasting impact on affordability in the market.

### The 2006 Policy Direction and the Proposed Direction do not favour mandating MVNOs.

377. Beyond the Act, neither the 2006 Direction nor the Proposed Direction support any move by the Commission to mandate MVNO access.

378. The 2006 Direction is clear: the Commission should "rely on market forces to the maximum extent feasible as the means of achieving the telecommunications policy objectives."[175] Not only are the policy objectives already being achieved primarily through market forces with only a 'light touch' of regulation, but if it were to mandate

[175] The 2006 Direction, section 1 (a) (i).

MVNOs, then the Commission would not be relying on market forces at all. Thus the 2006 Direction does not support mandating MVNOs.

379. Further, if it must rely on regulation, the 2006 Direction instructs the Commission to use "measures that are efficient and proportionate to their purpose and that interfere with the operation of competitive market forces to the minimum extent necessary."[176] First, Rogers does not consider any further regulation necessary in the mobile wireless market. Second, if the Commission were to find that additional regulation was needed to meet the telecommunications policy objectives, then there are more efficient and proportionate measures than mandating MVNOs. Mandating MVNOs would be using a sledgehammer to crack a nut.

380. For example, the Commission asked the national wireless service providers to offer lower-cost data-only plans. These plans have only recently been launched. They have not had enough time to make a significant impact in the market. After an appropriate length of time, should the Commission determine that additional measures are needed, it could again ask the national wireless service providers to make available another type of plan. Such a move would be a much more efficient and proportionate method to fill any gap in the market that the Commission detects.

381. The Proposed Direction, as of the time of writing, directs the Commission to consider competition, affordability, consumer interests and innovation when relying on regulation. The Proposed Direction specifies this in several different ways. First, the Proposed Direction asks the Commission to "encourage all forms of competition" when regulating. MVNOs would represent additional competition in the market, but not the type of sustainable or efficient competition that would be useful or meaningful to Canadians.

382. In addition, the Proposed Direction would require the Commission to consider measures that would "foster affordability and lower prices" when regulating. However, the mobile wireless market is already affordable, even for Canadians with low household incomes. The retail price of data has been continually declining. Plans with up to one gigabyte of mobile wireless data on very fast LTE-A networks can cost less than $30 per month. There are a number of plans in the market that offer unlimited voice calling and texting capabilities for less than $30 as well.

383. Rogers does not expect that MVNOs will lead to lower prices for the reasons provided above. As described in the Feasey Report, there is no evidence that MVNOs have led to lower prices in other countries.[177] Rather than targeting the low cost segment of the market, MVNOs seem to prefer serving the higher end of the market where there are larger profits to be made.

384. Because they would endanger Canada's upcoming 5G deployments and will reduce the ability of service providers to expand and maintain their current 4G LTE networks,

[176] The 2006 Direction, section 1 (a) (ii).
[177] The Feasey Report, para. 104.

MVNOs would compromise Canadians' ability to access high quality services – another important consideration in the Proposed Direction.

385. Since they would divert funds away from existing networks, MVNOs would lead to the gradual deterioration of the high quality networks that Canadians depend on every day. As MVNOs simply resell other service providers' networks, this deterioration would affect their customers too. In short, everyone would lose.

386. It is also not clear to Rogers whether MVNOs will take the privacy of Canadians as seriously as facilities-based providers. Rogers is concerned that some MVNOs might fail to safeguard their customers' privacy by storing sensitive information on servers outside of Canada. This would be the cheaper and faster approach; some MVNOs will take any short cut available in order to get into the market and undercut facilities-based providers.

387. Lastly, the Proposed Direction asks the Commission to consider enabling innovation and stimulating research and development with a focus on "new technologies and differentiated service offerings."[178] As Rogers has described above in the context of Canada's telecommunications policy objectives, MVNOs will not be innovators nor will they invest in research and development at any appreciable scale. Rather, they will leverage the innovations of facilities-based carriers to the maximum extent possible.

### The Commission should not mandate MVNO access

388. Rogers understands that it is the Commission's preliminary view that it would be appropriate to mandate MVNO access. However, mandating MVNO access would not offer any benefits that are not already achieved through existing facilities-based competition. Consumers already have access to low cost plans from multiple service providers.

389. In fact, MVNOs would prove to be harmful to the Canadian economy. International experience shows that they are unlikely to have a meaningful or enduring impact on the level of prices. They will certainly cause facilities-based service providers to re-evaluate their plans to invest billions of dollars in important new 5G networks.

390. For the reasons outlined above, the Commission should not mandate MVNO access. This is not an easy choice to make but it is the right decision, based on the principle of evidence-based decision making, and it is fully supported by both the 2006 Direction and the Proposed Direction.

[178] The Proposed Direction, section 1. a. vi.

## Question 9 – structuring wholesale MVNO service

Comment on how a wholesale MVNO service should be structured and implemented. In particular, discuss the following:

- whether there should be a requirement for an MVNO to own a minimum amount of facilities in order to be eligible for a wholesale MVNO service. If so, what should that amount be and how should evidence of facilities ownership be demonstrated by a potential MVNO seeking access?
- whether there should be other restrictions or eligibility criteria. If so, why?
- whether it would be appropriate and/or feasible to establish different regulatory requirements for wholesale MVNO service on the basis of geographic divisions. For example, should the service be mandated provincially or on another basis, as opposed to nationally?

## Question 10 – terms and conditions for wholesale MVNO access

What terms or conditions should apply to regulated wholesale MVNO access?

391. In light of Rogers' answer to question 8, the Commission should not mandate MVNO access. There is no model for mandated wholesale MVNO access that will adequately preserve the incentive and ability for facilities-based providers to invest in their existing LTE-A and future 5G networks. There are no restrictions or eligibility criteria that will ensure that Canadians living in rural communities continue to have access to the same high-quality networks as those living in urban centres. Mandating MVNO access would not benefit Canadians in any way that would outweigh the damage it will do.

## Question 11 – setting a wholesale rate for MVNOs

Discuss whether the Commission should set a wholesale rate for MVNO access.

- If a rate is to be set, would it be appropriate to establish an interim rate as part of this proceeding and, if so, what principle(s) should be used to set that rate?
- Alternatively, should the national wireless carriers be required to make available a certain amount of capacity on their networks for MVNOs to use at commercially negotiated rates? If so, how should the amount of reserve capacity be determined? In this scenario, would it be appropriate to have a default tariffed rate to act as a backstop if negotiations fail?
- What are the advantages and disadvantages of each approach?

392. There is no reasonable wholesale rate for mandated MVNO access that would preserve the ability for facilities-based service providers to invest in their networks, including commercially negotiated rates.

393. Canadian facilities-based served providers can and do enter into commercial negotiations with MVNOs when it makes good business sense. Service providers negotiate unique terms and conditions with each MVNO as each requires different approaches to meet their needs.

### Question 12 – phase-out process for mandated MVNO access

Discuss what would be an appropriate phase-out process for a mandated wholesale MVNO access service. For example, should the service be phased out on a specific, pre-determined date, be subject to a trigger that initiates a phase-out period, or be subject to another process?

394. A mandated MNVO regime that is in place for even a short period of time would cause harm to the Canadian economy. The next few years are the most critical for 5G deployments. A reduction in available investment funds due to mandated MVNOs could cause Canadian businesses in every industry to lose out on the innovative services and applications enabled by 5G connectivity. Meanwhile, competing organizations in other countries would capture market shares and gain first-mover advantage.

## Future of mobile wireless services in Canada

### Question 13 – the future of retail and wholesale mobile wireless services in Canada

Provide your views on the future of retail and wholesale mobile wireless services in Canada. How do you foresee the rollout of small cells and 5G technology taking place? Over what time period do you expect this rollout to occur?

395. The work to rollout 5G has just begun in Canada and Rogers is at the forefront of this revolutionary and transformative technology. In April 2018, Rogers announced its partnership with Ericsson to build and deploy 5G technology and announced plans to test 5G networks in several cities.[179] In September 2018, Rogers announced a three year multi-million dollar partnership with the University of British Columbia to deploy 5G-ready network equipment and infrastructure. The partnership will research 5G applications such as automobile and traffic monitoring to develop smarter and safer cities.[180]

396. As part of its 5G deployment plan, Rogers is currently upgrading antenna systems with new hardware and software to allow for a seamless transition from LTE to 5G technologies. To support this 5G rollout, investment is needed in three key areas: deep fibre networks, spectrum, and network densification.

397. With regards to fibre requirements, the increased performance characteristics of 5G will require more fibre to support increased backhaul needs on the cellular network. Unlocking the full potential of 5G rests on the key assumption that fibre deployment will run deep into city centres and adjacent communities and that service providers will be able to gain cost-effective access to this fibre.

398. As for spectrum requirements, 5G technology will rely on three types of frequency bands to support 5G performance characteristics; these are low-band, mid-band, and high-

[179] Rogers, *Rogers and Ericsson Partner to bring 5G to Canadians*, April 16, 2018. Available: https://about.rogers.com/2018/04/16/rogers-ericsson-partner-bring-5g-canadians/
[180] Rogers, *Rogers and UBC ink multi-year agreement to build 5G hub in Vancouver,* September 20, 2018. Available: https://about.rogers.com/2018/09/20/rogers-ubc-ink-multi-year-agreement-build-5g-hub-vancouver/

band spectrum. Low-band 600 MHz spectrum is valued for its wide-area coverage and for deep indoor penetration. The mid-3.5 GHz band provides a compromise between coverage and capacity. Higher frequency millimeter wave bands (28 and 38 GHz) only propagate over very short distances but provide massive amounts of capacity through very wide channels.

399. Access to mobile wireless spectrum is notoriously expensive in Canada. Through ISED's recent auction of the 600 MHz band, Rogers has just paid more than $1.7 billion for licences in every single province and territory. However, spectrum represents just one of the many substantial costs that service providers will pay in order to deploy their 5G networks.

400. With regard to network densification, 5G technology will operate on new antenna technologies such as massive multiple-input and multiple-output (MIMO) and will use short distance millimetre wave bands that will in turn require significant network densification as small cells provide useful coverage over relatively small areas. Macro sites will still be important as they use higher power radios and cover larger areas. As service providers deploy 5G networks, small cells will play an increasingly large role in delivering capacity for high bandwidth applications and provide highly targeted capacity in small coverage areas (e.g., sporting venues) or in areas where macro sites are discouraged.

401. To be cost effective, 5G will need to incorporate both macro sites and small cells. Wireless infrastructure today includes many elements – macro base stations, metro cells, outdoor and indoor distributed antenna systems (DAS), small cells and more – all working together in a heterogeneous network. Mobile device users are moving from low bandwidth services (such as pictures, email, web browsing) to applications that require significantly more bandwidth (such as gaming and high definition video streaming). This will require networks with fast handovers from site to site. Small cell densification provides an efficient and less expensive solution to attaining these faster handovers. As a result, small cells form the foundation for building a 5G future.

402. Small cells are typically used in densely populated urban areas, such as shopping centers, sports venues, airports, train stations, and along busy streets – basically anywhere a large amount of customers are using mobile wireless data. Dense small cell deployments will provide increased network capacity through tighter spectrum reuse and the enhanced ability to use millimeter wave bands, lower latency, and longer handset battery life as devices do not need to transmit at high power to reach a faraway macro site.

403. It is difficult to accurately predict timelines. However, Rogers expects that 5G will initially be used for broad-based connectivity for mobile wireless service, fixed wireless service, and, to a lesser extent, low-bandwidth IoT service. These services will primarily use 600 MHz low-band and 3.5 GHz mid-band spectrum. Rogers expects that this type of 5G connectivity will become broadly available over the 2019-2023 timeframe.

404. Advanced 5G services and capabilities will follow 5G broad-based connectivity. These capabilities include, for example, the ultra low latency, high bandwidth connectivity that enables the next generation of autonomous driving. These capabilities will not become available until 2022 and beyond.

405. The promise of small cells and 5G technology is very high. However, 5G networks are inherently more complex and costly than LTE or legacy networks. They will only be enabled through the massive investments that facilities-based service providers will make over the next few years. Rogers is actively investing in partnerships with industry and academia, acquiring the necessary spectrum, and readying new and existing sites to support 5G deployments.

### Question 14 – challenges facing carriers as they deploy their networks

| |
|---|
| What are the challenges facing carriers as they continue to deploy their networks, particularly with respect to small cells? |

406. Small cells are an integral part of the evolution to 5G. The deployment of small cells will only accelerate over time due to the introduction of new 5G services and the expected increase in demand for data. 5G small cells will provide increased data capacity, lower latency, and longer battery life. However, the Canadian wireless industry will face some key challenges in the near future to make the evolution to 5G via small cells a reality.

407. On the network side, this investment will require many additional macro sites and thousands of new small cells in areas where Canadians live, work, and play. Carriers will require timely and cost-effective access to supporting structures owned by municipalities. If telephone or utility poles are not accessible, other municipal-owned structures such as streetlights, bus shelters, and public buildings must be available to attach telecommunications facilities.

408. Service providers require several vital elements for a successful small cell deployment. There is a need for a willing host. This can be a municipality or electrical utility, with poles or streetlights or other street furniture, as well as an accessible right-of-way. Service providers also require electrical power at the location and a means of signal transport (whether fibre or microwave) to backhaul traffic to the network. Given all of these considerations, it has been Rogers' experience that small cells work best when installed on hydro poles because these poles provide ready space for the antenna and connecting fibre, and have access to electrical power.

409. Rogers and other wireless carriers have always faced challenges regarding network implementation and, in particular, choosing locations for towers, rooftop sites, and other antenna required to expand and densify wireless networks. Delays are one of the most significant challenges currently in the deployment of small cells. Coming to terms and signing agreements with municipalities and electrical utilities to access their infrastructure takes time. In some cases, service providers need the approval of both entities to gain access to a power pole that is located on a municipal right-of-way. Concerns from local residents, tied to cumbersome municipal consultation processes

(known as "protocols"), also make small cell deployment a more onerous and expensive proposition than it needs to be.

410. As it has exclusive federal jurisdiction over telecommunications and tower siting, ISED has introduced a process to address public and municipal concerns, known as CPC 2-0-03: *Radiocommunication and Broadcasting Antenna Systems* (the "CPC"). The CPC sets out the public consultation process that must be followed by carriers seeking to install towers and other antenna systems.

411. While municipal protocols are not supposed to be more burdensome than the CPC,[181] some municipalities have implemented more stringent requirements in order to gain greater control over the number and location of proposed antenna and tower sites. For instance, some municipal protocols ban sites in or within a certain radius of residential areas entirely. Other protocols require public consultation for all proposed sites, including those that have been specifically exempted from consultation under the CPC. Some municipalities also view proposed sites as a revenue opportunity and charge a myriad of fees for applications, permits, zoning applications, public consultations, and environmental assessments. These fees and protocol requirements make it difficult and expensive to build sites where customers need them.

412. Unfortunately, parts of the CPC are vague and leave a lot of discretion to municipalities. For example, the CPC exempts certain types of antenna systems from both municipal and public consultation (e.g., modifying or replacing an existing site, adding antennas to existing structures (buildings, water towers, lamp posts) or putting up a temporary structure). Because small cells are attached to existing structures, they fall under this exemption. However, the CPC unhelpfully notes that individual circumstances vary and it may be prudent for a carrier to consult even if a site is exempt.[182] Because of this wording, ISED may not support or enforce an exemption when municipalities ask for full consultation on unobtrusive small cells. To encourage 5G deployments, small cells cannot be subject to the same consultation requirements and fees as much larger and more obtrusive towers.[183]

413. Other countries have faced similar obstacles and have responded with new rules to limit municipal red tape for small cell deployments. Over the last few years, the FCC has launched several initiatives to accelerate wireless/Internet deployment to clear the path for 5G infrastructure deployments. For example, in April 2017, the FCC launched proceedings designed to remove barriers to wireless and wireline infrastructure investment. The FCC's intention was to streamline rules and processes at the local, state, and federal levels, speeding up approval process and examine the application fees charged by municipalities and utilities. Over a series of decisions, the FCC has

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[181] ISED, *Guide to Assist Land-Use Authorities in Developing Antenna System Siting Protocols*, Section 2.1.
[182] ISED, *CPC-2-0-03: Radiocommunication and Broadcasting Antenna Systems*, Section 6: Exclusions.
183 Some municipalities and hydro utilities require carriers to complete public consultations to nearby residents when simply installing a small cell on existing infrastructure and this has resulted in delays as the public consultation process takes a minimum of 120 days to complete under the ISED mandated process.

moved to eliminate regulatory barriers to 5G deployment by capping local fees and requiring faster application reviews.

414. The FCC also determined that state and local government fees for small wireless facilities should be non-discriminatory and based on a reasonable approximation of costs. The fees covered by this decision include all state and local government fees paid by a carrier for use of a right-of-way to deploy small wireless facilities, including fees for access, and fees to use property within rights-of-way owned or controlled by the government (e.g., streetlights, traffic lights, utility poles, etc.), and other related fees such as application fees or building and electrical permits.

415. Based on the record of the proceeding, the FCC found that reasonable fees would be:

- $500 for a single up-front application that includes up to five Small Wireless Facilities, with an additional $100 for each Small Wireless Facility beyond five, and
- $270 per Small Wireless Facility per year for all recurring fees, including any possible right-of-way access fee or fee for attachment to municipally owned structures in the right-of-way.[184]

416. In the U.S., state and local governments have greater authority to regulate the location and construction of wireless communications facilities than equivalent Canadian governments. This means that there have traditionally been more hoops for American carriers to jump through than Canadian service providers operating solely under federal jurisdiction.

417. The FCC recognized the delays caused by local processes and established two 'shot clocks' to govern small wireless facility consultation with local governments. Now, local governments must respond to requests within 60 days (when co-locating a small cell on existing infrastructure) and within 90 days for new builds. The FCC also formalized the existing 90-day (for co-location) and 150-day (new sites) day shot clocks for non-small wireless facility deployments. Carriers can go to court if local governments do not meet the timelines.[185]

418. In Canada, ISED uses mandated timelines for non-exempt sites. However, as small cells are attached to existing infrastructure, they fall under ISED's exemption from public consultation. This exemption must be maintained under the Canadian regime as consultation with municipalities can take many months. These delays will only be exacerbated as small cell deployment accelerates.

419. The EU has also been active in removing barriers to 5G infrastructure deployment. The European Commission has updated its *European Electronic Communications Code* (the

184 FCC 18-133: Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment and Accelerating Wireline Broadband Deployment by Removing Barriers to Infrastructure Investment. FCC Press Release, September 26, 2018.
185 Ibid.

"Code") to promote small cell deployment. Article 56 of the Code requires that local municipalities allow deployment, connection and operation of small-area wireless access points and not restrict such deployment through the permitting process. These small-area wireless access points are not subject to any fees beyond an administration fee.[186]

420. Rogers supports the American and EU initiatives to minimize fees and decrease delays when deploying small cells. The FCC's determination that municipal fees must be non-discriminatory and based on costs is of particular importance here in Canada as local governments consider their own small cell fees. Providing Canadian wireless carriers with better and timelier access to public and private infrastructure at economical rates is critical to 5G deployments and the Commission and ISED should pursue similar policies in order to support competition and the provision of high quality and innovative wireless services to Canadians.

421. As outlined in Rogers' submission to the government panel undertaking the *Review of Canada's Communications Legislative Framework*, one of Rogers' principle messages is related to access to infrastructure. Rogers' submission recommends that:

> *The Commission should be granted exclusive authority under the Telecommunications Act to establish the terms under which carriers can gain access to municipal and utility infrastructure (including rights of way and support structures, such as poles, ducts and municipal buildings and street furniture) for wireline broadband, wireless 5G and future technologies deployment. Efficient and timely broadband and 5G deployment are fundamental to the ongoing development of Canada's leading edge digital economy and are highly dependent on timely and affordable access to supporting infrastructure owned by third parties.*[187]

422. It is crucial that the Commission establish the necessary regulatory framework to ensure Canada remains a wireless leader. In order to do so, the Commission must ensure that wireless carriers have access to passive infrastructure, including rights-of-way currently managed by municipalities and the poles owned by electrical utilities. In addition, the Commission must ensure that any access to facilities and rights-of-way advantages that the ILECs possess are made available to all other competitors in order to increase competition for the benefit of all Canadian businesses and customers. This will be discussed in more depth in response to Question 16.

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[186] Directive of the European Parliament and of the Council Directive establishing the European Electronic Communications Code, Chapter 3: Article 56, September 14, 2016.

[187] Rogers Submission to the Broadcasting and Telecommunications Legislative Review Panel, dated January 11, 2019, pp. 5. Available: https://about.rogers.com/2019/04/08/view-modernizing-canadas-communications-framework/

## Question 15 – regulatory implications of new technologies

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| Identify any expected changes or new technologies that are likely to be deployed in Canadian wireless networks that will have regulatory implications in the near term. How can the Commission ensure that its regulatory frameworks account for market and technological changes? |

423. Telecommunications technologies have always evolved at breakneck speed. This makes it difficult for regulations to keep pace. The Commission has a difficult task in ensuring a balanced approach so that regulations do not become outdated and inadvertently impede the introduction and future evolution of Canada's 5G networks. In order to ensure that its regulatory frameworks account for market and technological changes, the Commission must ensure that 5G technologies can operate as effectively as possible.

424. As described previously in Rogers' intervention, 5G networks enable novel low and ultra-low latency applications. Some of these applications will operate on higher frequency millimetre waves that will cover only small areas and will not penetrate buildings. This will necessitate the use of indoor and outdoor small cells. Small cells will require wireless carriers to have timely and cost effective access to rights-of-way, municipal infrastructure, hydro poles, ILEC telephone poles, fibre and ducts. As described more fully in Rogers' response to questions 14 and 16, access to hydro utility and municipal infrastructure is critical. The Commission's regulations must allow all carriers to access this infrastructure based on a causal costs fee structure.

425. The Commission's regulations must be flexible to facilitate new 5G technologies. The biggest difference between 5G and legacy design requirements is the diversity of use-cases that 5G networks will support compared to today's networks, which were designed primarily to deliver high-speed mobile broadband. 5G will be about people and things that can be broadly split into three use-case categories:

- enhanced mobile broadband will provide peak data rates of greater than 20 Gbps with 100 Mbps as average throughput, resulting in 10,000 times more traffic carried on networks compared to today;
- massive machine type communications with10-100 times more devices connected to the network, with some IoT devices having 10-year battery lives; and
- ultra-reliable low latency communications that enable new precision applications, that require latency below one millisecond.

426. Each of these use cases requires different levels of network performance characteristics (such as latency, throughput or priority). Network slicing is a technology used to ensure these different levels of network performance characteristics are maintained and customized to the customer or business need. This will be especially important as machine-to-machine connections increase. Network slicing allows wireless network operators to virtually separate network resources for a wide variety of services with

different requirements on a single physical network. For example, an operator may deliver a low latency connection to an autonomous vehicle application for one customer while providing a wireless broadband connection to another customer on a different network slice.

427. Providing different speeds and latency for different applications is not discriminatory as 5G networks must be able to efficiently allocate capacity and performance as required. In addition, the user, and not the service provider, chooses the level of service. Without network slicing, 5G will not be able to deliver all of the expected benefits that are necessary to drive innovation across the Canadian economy. As a result, the network neutrality framework in Canada must allow for the customization demanded by end users and provisioned through the use of network slicing capabilities.

428. Rogers would like to reiterate here that Canada's network neutrality regime is working well for today's networks and applications. However, the framework might need to evolve to allow 5G technologies to reach their full potential.

## Question 16 – obtaining access to infrastructure

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| What are the issues associated with wireless carriers obtaining access to infrastructure, including towers, sites, structures, and fibre transport? Discuss whether the Commission's existing rules are sufficient to address these issues and what changes, if any, could be made to improve these rules under the Commission's current statutory framework. |

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| • If there is a need for the Commission to mandate additional wholesale services to support network deployment, identify those services and demonstrate their essentiality in accordance with the Essentiality Test set out in Telecom Decision 2015-326. |
| • If a wholesale service that ought to be mandated is currently forborne from regulation, explain how that service no longer satisfies the conditions for forbearance under section 34 of the Act. |

429. Because of the important role that 5G will play in driving innovation, efficiency, and productivity throughout the Canadian economy, wireless service providers require fair and reasonable access to public infrastructure in order to deploy this new technology in a timely and efficient manner.

430. 5G will incorporate high band radio frequencies that cover relatively small areas. This means that thousands of new small cell antennas will be required to deploy extensive networks. These small cells will be located closer to street level, and will be generally connected to the core network with new fibre optic facilities. The successful deployment of 5G will only be possible if new small cells can be attached to the sides of buildings, streetlights, transit shelters, and street furniture; and fibre optic facilities can be attached to all types of support structures (e.g., poles and underground duct), whether owned by carriers, utilities or municipalities.

431. Improved access to passive physical facilities is vital for wireline broadband deployment and wireless 5G deployment. The need for regulated access to passive physical assets must extend beyond traditional supporting structures of telecommunications carriers (poles, strand and duct). It must include all public property that is capable of supporting both wireline and wireless telecommunications facilities including streetlights, traffic lights, signs, and public buildings. It must also include the supporting structures (poles and ducts) owned by provincially-regulated electrical utility companies. The short spacing between antennas used for 5G services will necessitate many more attachments than are currently in use. It is vital that the scope of access to possible municipal property and support structures be significantly broadened to capture wireless facilities.

## Access to municipal property

432. Municipal access rights need to be clarified in order to capture wireless networks. Under the Act, all facilities-based carriers have a statutory right to access "highways and other public places" for the purpose of installing, maintaining, and operating their "transmission lines."[188] Historically, "transmission lines" (an undefined term) has been treated as applying only to wireline networks. Accordingly, over the last several years, the Commission has provided guidance on, and established clear principles governing, the construction and operation of wireline facilities on streets and other municipal property. The goal is to strike a balance between the need for carriers to deploy their networks in a cost-effective and orderly manner, and the need for municipalities to manage construction and other activities within their rights-of-way.

433. For example, as one of the guiding principles, the Commission has determined that carriers are not required to pay any occupancy fees to access and use municipal streets, and are only required to pay any causal costs incurred by a municipality. Also, municipalities are required to contribute towards a carrier's costs of relocating its facilities when they are required to move due to municipal road work.

434. However, wireless facilities have been, and continue to be, treated differently. In the absence of clear guidance on the right, statutory or otherwise, for carriers to use streets and other municipal property to install their wireless networks, they do not enjoy the same benefits as wireline facilities. Rather, carriers must enter into negotiations in which municipalities consider access a privilege rather than a right, and view small cell and other wireless deployment as an opportunity to extract considerable rent for the use of public property.

435. In today's telecom technology and environment, this distinction and different treatment between wireline and wireless facilities is artificial and untenable. A narrow definition of

[188] The Act, section 43(2).

the word "line" in "transmission line" would exclude wireless services, resulting in a clearly outdated and inappropriate interpretation of the Act.

436. Since the initial passage of the Act in 1993, wireless communications have exploded, and wireless infrastructure now makes up an integral part of Canada's telecommunications networks. For many Canadians, mobile wireless service is their primary means of communication and access to the Internet. Texting and instant access to email have become essential communications tools and rely on ubiquitous wireless access.

437. Therefore, it only makes sense that the statutory right of access under the Act includes wireless facilities. The term "transmission line" must be interpreted broadly so as to include wireless facilities. Without this reasonable and sensible interpretation, wireless facilities will continue to be treated as "second class citizens" and face unreasonable barriers.

438. Rogers believes the Commission has the power to exercise this discretion to interpret the Act. However, in Rogers' submission to the Broadcasting and Telecommunications Legislative Review, Rogers advocated amendments to the Act that would replace the term "transmission lines" with the broader and technology-neutral term, "telecommunications facilities," which would take into account wireless facilities.

### Municipal access rights need to clarified in order to capture other municipal property

439. Not only do wireless carriers require reasonable access to municipal rights-of-way, but they also require effective access to municipally-owned passive infrastructure such as streetlights, traffic signals, transit shelters or even municipal buildings – all ideal locations for attaching wireless equipment such as small cell antennas.

440. Carriers have a right of access to "highways,"[189] but it is not clear if this right includes the ability to access and use street furniture and other passive infrastructure located on these highways or rights-of-way.

441. Carriers also have the right to access "other public places." In fact, the Commission has established a three-part test to determine what kinds of property would constitute an "other public place" (which would include parks, schoolyards, public squares, transit tunnels), but it is not clear if that test can be applied to qualify particular objects, like streetlights or the side of a municipal building.

442. Understandably, municipalities are quite protective of their properties as they attempt to manage and limit street 'clutter.' There is also a focus on maximizing revenues for the taxpayers by charging what they view as commercial rates, which can be as high as several hundred dollars per year per site.

[189] The term "highways" can include streets, rights-of-way, sidewalks, bridges, and overpasses.

443. The Commission should adopt a broad interpretation of "highways and other public places" in order to grant carriers similar terms of access they enjoy for their wireline facilities. These more favourable terms are critical to the efficient deployment of the next generation of wireless networks.

### These interpretation issues should be reviewed outside of the Commission's established dispute application process

444. If Rogers or another carrier wished to test or challenge the historical interpretations "transmission line" or "highway or other public place", it would have to follow the process set out in the Act under which a carrier would first have to refuse the terms of access for municipal wireless facilities, and then, unable to get consent to construct "transmission lines", bring an application before the Commission under subsection 43(4). In doing so, the carrier would run the risk of damaging its relationship with the municipality and putting its build plans on hold. The process could take many months to conclude, particularly if there are numerous intervenors, which would be expected.

445. Rather than waiting for a carrier to initiate the statutory dispute-driven process, Rogers encourages the Commission to explore how it can address these issues in a more policy-driven fashion that avoids the lengthy and sometimes unwieldy subsection 43(4) proceeding.

### The current dispute resolution process between carriers and municipalities should be streamlined

446. Municipalities have become increasingly frustrated with the statutory right of carriers to build on municipal property and, over the last couple of years, have sought to assert their own control over the construction, operation, and maintenance of telecommunications networks. This has been accomplished by the introduction of comprehensive street use by-laws, unreasonable terms for obtaining permits, or onerous construction standards. While there are only a handful of municipalities who have engaged in this type of behaviour, in the last few years, carriers have been forced to go to the Commission or the courts to challenge them.

447. Faced with a very complex balancing exercise, the Commission has encouraged the parties to resolve as many issues as possible without its involvement. While this strategy has been beneficial in some instances, in other instances it has needlessly delayed the dispute to several months or even years. The Commission should take a more active role in these disputes and streamline the process to allow for a more expedient resolution.

### Access to support structures

448. An integral part of a wireless network is the series of structures that support a carrier's fibres, wires, cables and associated equipment. The most common support structures are poles and underground duct, which are typically owned by the ILECs and the electrical utilities.

449. Historically, the ILECs have collaborated with the electrical utilities to build comprehensive joint networks of poles that they use and share for their respective facilities. These pole networks were built using the regulated rates of the ILECs and the electrical utilities in their capacity of monopoly providers of their utility services.

450. Rogers and other competitive carriers do not build their own pole networks. Instead, they rely on the poles of the ILECs and the electrical utilities. This is because it does not make sense, economically or operationally, to build a duplicate set of poles alongside or across the street from an existing line of ILEC-owned poles. Furthermore, the owners of the streets and rights-of-way strongly encourage the sharing of facilities and discourage unnecessary duplication.

451. It is essential that all carriers have the same level of access to the existing population of poles. Competitive networks underpin the Canadian wireless industry and every service provider should have the same ease of access to infrastructure to build their networks.

452. The Commission has designated poles as a "public good" service. That designation should extend to wireless attachments.

### ILEC support structures – regulated but often unattainable

453. The Commission regulates access to the poles of the ILECs under the Support Structure Service Tariff[190] and a mandated Support Structure Agreement. The ILECs have a regulatory obligation to allow competitors to attach to their support structures, being poles, strand, and duct. However, they are required do to so only where there is "spare capacity" on those support structures, i.e., where the space is not required for their own future use. In Rogers' experience, this loophole has resulted in cases of exaggerated assertions of "future use." These assertions are extremely difficult to challenge as an ILEC's plans to utilize its support structures to build out or add to its network will typically be claimed to be deemed as confidential for competitive reasons.

454. Even if competitive carriers were to take the matter to the Commission, the ILEC would likely be able to defend its claim with, once again, network build plans provided in confidence to the Commission. It is relatively easy to make claims of planned future use knowing that there are no consequences if, later on, it turns out that that ear-marked capacity was never utilized.

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[190] National Services Tariff, Section 9 - Miscellaneous Services, Item 901 - Support Structure Service.

455. Meanwhile, Rogers and other carriers would have spent several months tied up in a Commission application, with no real ability to challenge, and are no further ahead following the Commission's determination.

456. This is a very unfortunate "shell game" that is played repeatedly across the industry. Rogers believes that the current dispute resolution process is inadequate to properly address the matter and needs to be strengthened to ensure the regulatory chicanery is kept in check.

457. Further, as the owner of what the Commission has deemed to be "public good" services, the ILECs control the permit application process, which is frequently misused notwithstanding the guidelines set out in the Support Structure Service Tariff.

458. Given these problem accessing with ILEC structures, Rogers' network planners frequently avoid building fibre routes that use ILEC structures. A stronger dispute resolution mechanism by which competitors can challenge the ILECs is necessary.

### Poles are also required for wireless equipment

459. Joint use telecom and power poles are also ideal for small cell antennas. However, while the regulatory regime for wireline attachments is relatively well-defined (with tariffs and Commission-approved agreements), it is not as clear for wireless attachments.

460. Therefore, the Commission should confirm that the existing wireline regulatory regime is broad enough to encompass wireless attachments. If the Commission determines that this is not the case, it should takes the necessary steps to extend its oversight to include wireless attachments.

### Hydro support structures – beyond the reach of the Commission

461. Given the difficulties associated with ILEC poles, Rogers and other carriers are heavily dependent on power poles to build their networks. The natural appeal of power poles is that they serve the same customers and occupy the same rights-of-way required for telecom networks. It makes perfect sense to align a telecom network with a power network.

462. Unfortunately, the Commission lacks the statutory authority to regulate access to support structures owned by electricity utilities.[191] This has left access to supporting structures owned by electrical utilities either unregulated, or regulated by provincial energy regulators who have no interest in ensuring that such access advances Canada's telecommunications policy objectives.

463. Under this regime, the rates for access to supporting structures of electrical utilities have soared, particularly in Ontario, making the provision of telecom services that utilize these

[191] This is a result of the Supreme Court of Canada's decision in the case of Barrie Public Utilities v. Canadian Cable Television Assn., 2003 SCC 28.

structures much more expensive. This is a direct result of the electricity utilities and their regulators seeking to maximize revenues derived from these facilities to offset electricity rates. For example, the rates set by the Ontario Energy Board for attachments to power poles are several times the rate set by the Commission for access to identical poles owned by the ILECs.

464. This is a particular problem in rural areas where the cost of service is already higher than in urban areas due to the fact that more poles are required to reach customers in rural areas and the only means of deploying telecommunications facilities is attaching to power poles. Prohibitive rates to attach to these poles will threaten the extension of 5G services to these areas.

465. The disparity is even worse for underground duct, which is not regulated. In many cases, Rogers has been faced with rates of well over $10 per meter of duct per year. Contrast this with the Commission's rate for access to ILEC-owned duct, which is just under a dollar per meter per year.

466. Further, competitive carriers have very little power when it comes to negotiating pole attachment agreements with the electrical utilities. These agreements, which are, for the most part, standard across the industry, are presented with a "take it or leave it' proposition, leaving the carriers with no choice if they want to use the poles. They are very one-sided and have onerous provisions.

467. Given the vital interest of the federal government in improving access to supporting structures in order to enable the deployment of 5G services, in its submission to the Telecom Review Panel, Rogers proposed that electricity utility undertakings be made subject to Commission jurisdiction under the Act. The Commission has much more experience in setting pole and duct rates as it understands the costs and mechanics of these structures, and has developed a balanced rate-setting methodology that allows the structure owner to recover a reasonable portion of its costs.

## Other matters

### Question 17 – other matters, issues, or proposals

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| Are there any other matters, issues, or proposals related to mobile wireless services, beyond those listed above, that the Commission should be aware of and potentially make determinations on as part of this proceeding? Identify and explain why those issues are relevant and include proposed regulatory solutions |

468. Rogers has no other issues or proposals to raise with the Commission at this time.

*** END OF DOCUMENT ***

This is **Exhibit "95"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

This is **Exhibit "96"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

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Industry Canada Industrie Canada

CPC-2-0-17
Issue 2
March 2013

Spectrum Management and Telecommunications

Client Procedures Circular

# Conditions of Licence for Mandatory Roaming and Antenna Tower and Site Sharing and to Prohibit Exclusive Site Arrangements

Aussi disponible en français – CPC-2-0-17

Comments and suggestions may be directed to the following address:

Industry Canada
Spectrum Management Operations Branch
300 Slater Street
Ottawa, Ontario
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Attention: Spectrum Management Operations

E-mail: spectrum_pubs@ic.gc.ca

All Spectrum Management and Telecommunications publications are available on the following website: http://ic.gc.ca/spectrum.

## Contents

## General

1. Issue 2 of this Client Procedures Circular (CPC) contains revisions announced in Gazette Notice DGSO-001-13, *Revised Frameworks for Mandatory Roaming and Antenna Tower and Site Sharing*.[1]

2. Part A provides background information on the development of the conditions of licence and additional guidance for Licensees, while Part B contains the conditions of licence.

3. This revision has incorporated pertinent information from the *Guidelines for Compliance with the Conditions of Licence Relating to Antenna Tower and Site Sharing and to Prohibit Exclusive Site Arrangements* (GL-06) and *Responses to Questions for Clarification on the AWS Policy and Licensing Frameworks*. GL-06 has been rescinded with the publication of this revised CPC.

4. It should be noted that anyone proposing to install an antenna system continues to be required to follow CPC-2-0-03, *Radiocommunication and Broadcasting Antenna Systems*.[2] Licensees are also required to follow the amended conditions of licence in this CPC.

5. Should Licensees require additional clarification or information on these conditions of licence, they should contact Industry Canada at rts-ipp@ic.gc.ca.

## Legislative Authority

6. The Minister of Industry, through the *Department of Industry Act*, the *Radiocommunication Act* and the *Radiocommunication Regulations*, with due regard to the objectives of the *Telecommunications Act*, is responsible for spectrum management in Canada. As such, the Minister is responsible for developing policies and processes for the spectrum resource and ensuring effective management of the radio frequency spectrum resource. Subsection 5(1) of the *Radiocommunication Act* gives the Minister of Industry the power to fix and amend the terms and conditions of spectrum licences. The Minister may suspend or revoke a radio authorization if the Licensees have contravened the *Radiocommunication Act*, the *Radiocommunication Regulations* or the terms or conditions of the radio authorizations.

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[1] This decision was taken following the public consultation announced in Gazette Notice DGSO-001-12, *Proposed Revisions to the Frameworks for Mandatory Roaming and Antenna Tower and Site Sharing* (http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10251.html).

[2] See CPC-2-0-03, *Radiocommunication and Broadcasting Antenna Systems* (http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf08777.html).

# Part A – Background and Guidance

## 1. Background

7. In DGRB-010-07,[3] published on November 28, 2007, Industry Canada initiated a public consultation on proposed conditions of licence for mandatory roaming and antenna tower and site sharing. In November 2008, Industry Canada released CPC-2-0-17,[4] which adopted the licence conditions as set out in DGRB-002-08,[5] *Conditions of Licence for Mandatory Roaming and Antenna Tower and Site Sharing and to Prohibit Exclusive Site Arrangements.*

8. In February 2009, comments were sought[6] on issues that arose during the initial tower and site sharing negotiations. In April 2009, Industry Canada issued GL-06,[7] *Guidelines for Compliance with the Conditions of Licence Relating to Antenna Tower and Site Sharing and to Prohibit Exclusive Site Arrangements*, which clarified some of the phrases used in the conditions of licence.

9. In November 2010, the Minister of Industry announced that a review of the roaming and tower and site sharing policy would be undertaken.[8] Following the preliminary analysis, a public consultation was launched in March 2012 to provide stakeholders with an opportunity to comment on the proposed changes.[9]

10. Revisions to the framework were subsequently announced in March 2013 (DGSO-001-13). Those revisions, along with the incorporation of text from GL-06 and from the *Responses to Questions for Clarification on the AWS Policy and Licensing Frameworks*, are reflected in Issue 2 of this CPC. CPC-2-0-18, *Industry Canada's Arbitration Rules and Procedures*, was also revised (Issue 2). GL-06 has been rescinded with the publication of Issue 2 of this CPC.

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3 See DGRB-010-07, *Consultation on Proposed Conditions of Licence to Mandate Roaming and Antenna Tower and Site Sharing and to Prohibit Exclusive Site Arrangements* (http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf08834.html).

4 See CPC-2-0-17, *Conditions of Licence for Mandatory Roaming and Antenna Tower and Site Sharing and to Prohibit Exclusive Site Arrangements* (http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf09081.html).

5 See DGRB-002-08, *Conditions of Licence for Mandatory Roaming and Antenna Tower and Site Sharing and to Prohibit Exclusive Site Arrangements* (http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf08890.html).

6 See *Consultation Letter – Issues Related to the Preliminary Phase of the Antenna Tower and Site-Sharing Process* (http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf09271.html).

7 Refer to *Guidelines for Compliance with the Conditions of Licence Relating to Antenna Tower and Site Sharing and to Prohibit Exclusive Site Arrangements* (GL-06) (http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf09390.html).

8 See press release (November 2010): "Minister Clement Updates Canadians on Canada's Digital Economy Strategy" (http://www.ic.gc.ca/eic/site/064.nsf/eng/06096.html).

9 Refer to *Proposed Revisions to the Frameworks for Mandatory Roaming and Antenna Tower and Site Sharing* (http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10250.html).

# 2. Mandatory Tower Sharing

## 2.1 Application of the Condition

11. The mandatory tower and site sharing conditions of licence apply to all Licensees in all bands who are telecommunications common carriers as defined in the *Telecommunications Act*.

## 2.2 Process Overview

12. The antenna tower and site sharing process will have the characteristics outlined below.

**Preliminary Information and Analysis:**

13. After having identified a potential site for sharing, the Party that wishes to share (Requesting Operator) may contact the site owner/operator who is subject to the conditions of licence (Responding Licensee) in order to obtain a preliminary information package (PIP) for a technical analysis of the site. Each request for a PIP must be assigned a unique identification number by the Requesting Operator which must be used by both parties as a common sharing request identifier.

14. When asked, the Responding Licensee must provide the PIP (which includes available technical data on the site) within two weeks of receiving a complete PIP request. The conditions of licence in Part B, Section 1.3 of this CPC outline the minimum information required both in the PIP request and in the subsequent response.

15. Both parties should work together to exchange information expeditiously. The Requesting Operator should consider prioritizing sites when submitting a large number of requests.

16. The Responding Licensee is responsible for coordinating and granting access to the site on request, as set out in the conditions of licence. Generally speaking, this access should be granted within one week of the request. Extenuating circumstances, such as access to a remote location or adverse weather conditions, could justify a short delay. Should the site be leased, the Responding Licensee must provide the Requesting Operator with the landlord's contact information as part of the PIP. Where an exclusivity clause is in place, the Licensee must provide immediate notification to the landlord demonstrating that it is prepared to waive the exclusivity clause in its agreement.

17. The Requesting Operator is responsible for carrying out its own technical analysis.

**Proposal to Share and Offer to Share:**

18. After reviewing and analyzing the PIP, the Requesting Operator may then submit a Proposal to Share to the Responding Licensee, including identification of any technical requirements and/or modifications that the Requesting Operator anticipates may be required to permit sharing. The time frames for this step of the process commence on the date that the Responding Licensee receives the Proposal to Share.

19. The Responding Licensee is responsible for conducting its own technical analysis, if required, and shall respond within 30 days with a draft Offer to Share (Offer) in each case where sharing is technically feasible. Note that Industry Canada expects that sharing will be technically feasible in the vast majority of cases.

20. If after 60 days from the date that the Responding Licensee receives the Proposal to Share, the Responding Licensee and the Requesting Operator have not entered into a Site-Sharing Agreement or have not agreed to any interim arrangement, the Licensee must then submit or agree to submit the matter to arbitration in accordance with CPC-2-0-18, *Industry Canada's Arbitration Rules and Procedures*, as amended from time to time.

**Outstanding Offers to Share:**

21. If within 60 days, the Responding Licensee has not received a response from the Requesting Operator to an Offer to Share, the Licensee may treat the Offer to Share as withdrawn with no further obligations. A response may simply be an acknowledgement by the Requesting Operator that additional time is required to consider the Offer.

**Access to Ancillary Equipment and Services:**

22. The operation of a Requesting Operator's radiocommunication system relies on more than just mechanical access to an antenna-supporting structure. In order to be considered to be negotiating in good faith, Responding Licensees must offer access to ancillary equipment and services at commercial rates that are reasonably comparable to rates currently charged to others for similar access. Such access and services shall therefore be part of the preliminary information exchange, the negotiations and the eventual arbitration, if required.

**Site Exclusivity:**

23. Where the Licensee is party to an agreement that includes a provision excluding other operators from the use of a Site, then, in order to facilitate the sharing of Sites, the Licensee must consent to waiving that portion of the agreement to facilitate a Request to Share. As applicable, the Licensee must consent to or, in a commercially reasonable manner, seek the consent of third parties to the assignment, sublease or other rights of access to Sites, pursuant to any agreement or arrangement to which the Licensee is a party. In addition, the Licensee must not enter into or renew agreements that exclude other operators from using a Site. Licence conditions do not apply to independent landlords. However, exclusivity provisions may be waived by either party to a lease, including either or both the Licensee and an independent landlord.

**Reservations for Licensees' Future Requirements:**

24. Mandatory tower sharing does not displace the Responding Licensee's needs in favour of the Requesting Operator's, but requires that both parties be open to negotiating fair commercial terms for access; neither does the licence condition force the Responding Licensee to replace or rebuild a tower at its own expense.

25. Industry Canada expects both near-term and longer term future use requirements to be the subject of good faith negotiations. Unless a space on an antenna tower is properly identified as reserved for “imminent future use” or “reserved for a third party” in accordance with this CPC, that space must be deemed to be available for negotiation of a tower sharing agreement.

26. *Imminent Future Use*: Equipment installations specifically identified in the Responding Licensee’s plans and to be installed within the 18 months immediately following the submission of a PIP request may be identified as "imminent future use" on the tower profile portion of the PIP. Plans for use of this space are not expected to be disrupted for the purposes of this condition of licence unless both parties agree to negotiate access to the space. As imminent use forms a portion of near-term future needs, plans for imminent future use must be reasonable and well-documented.

27. Where an assessment of non-compliance is being made with respect to this requirement, the Licensee may be required to provide evidence (such as installation agreements, appropriate authorizations or other relevant documentation) to Industry Canada demonstrating that the space will be put into service within 18 months.

28. For every PIP that is sent to a Requesting Operator that includes a reservation for imminent future use, the Responding Licensee must also provide a copy of the PIP to Industry Canada at the following email: rts-ipp@ic.gc.ca. This requirement also applies to any subsequent modifications made during the negotiation.

29. *Reservations Beyond 18 Months*: Where the tower owner is reserving space because there is a plan to install equipment on the tower beyond the next 18 months, that space may be identified as "future use" in the PIP and dealt with during the negotiation process. Reasonable and well-documented near-term needs beyond 18 months are legitimate considerations in the negotiation process. Longer term future needs alone will not be considered a reason not to share.

30. *Reservations for a Third Party*: Any space reserved on a tower identified for future use by a third party (where a contract is in place for a specific location on a tower) should be identified as part of the PIP. In this situation, as is the case with the Licensee’s future plans, a third party’s imminent installation is not expected to be disrupted, unless all the parties reach an agreement. All other third party future plans (near-term and longer term) should be open to three-way negotiations.

**Reporting to Industry Canada:**

31. Licensees must submit regular reports to Industry Canada, upon request, on the status of antenna tower and site sharing negotiations and on the number of sites and degree of sharing in their network. These regular reports will initially be required on a semi-annual basis detailing the preceding six-month period. Licensees must submit these reports to Industry Canada using a standardized template, which can be obtained from Industry Canada’s Spectrum Management and Telecommunications website.[10] Reports will not be required if there has been no change to the requested data since the previous reporting period. Industry Canada will notify licensees through

[10] Refer to the Framework for Mandatory Roaming and Antenna Tower and Site Sharing webpage (http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/h_sf10290.html).

its website in advance of any changes to these reporting requirements. The reports must be sent via email to rts-ipp@ic.gc.ca.

### 2.3 Confidentiality and Non-Disclosure Agreements (NDAs)

32. Since most of the information included in the response to a PIP request is in the public domain and since only basic technical information is being shared (including information regarding imminent future use), Industry Canada does not believe that a non-disclosure agreement (NDA) is required prior to the release of the PIP and would therefore not be a valid reason to delay providing the PIP.

33. If parties agree to sign an NDA during their negotiations, it should be appropriate and generic in nature, should not include provisions that are unique to a single operator or group and should not prohibit negotiation with other parties nor prohibit communication with Industry Canada.

## 3. Mandatory Roaming

### 3.1 Application of the Condition

34. The conditions of licence apply to all Licensees in the Cellular, Personal Communications Services (PCS), Advanced Wireless Services (AWS), Mobile Broadband Service (MBS) and Broadband Radio Service (BRS) bands.

35. Roaming enables a subscriber (a Roamer) already served by one carrier's network (the Home Network) to originate or terminate voice or data traffic on another carrier's network (the Host Network). Accordingly, a subscriber cannot roam unless he or she is already served on another radio access network. A carrier must therefore be offering service on its own network before its subscribers may benefit from roaming on another network, thus it does not include resale.

36. Roaming must be offered where technically feasible. Given the wide range of Roaming Agreements currently in place, both domestically and internationally, across networks operating with a range of technologies, Industry Canada does not anticipate that technical feasibility will be an impediment to roaming. The basic technical requirement for roaming is that the subscriber has a device technically capable of accessing the Host Network.

37. As a general principle, roaming should provide a Roamer with the ability to access voice and data services offered by the Roamer's Home Network at a level of quality comparable to that offered for similar services by the Host Network carrier to its own subscribers. For further clarity, the policy does not require a Host Network carrier to provide a Roamer with a service that the Host Network operator does not itself provide to its own subscribers, nor to provide a Roamer with a service which the Roamer's Home Network operator does not itself provide.

38. Seamless communications hand-off between Home and Host Networks (i.e. which ensures no interruption of communications in progress) is not mandated; however, this service may be the subject of negotiations.

39. Roaming should provide for the origination and termination of calls on the Host Network automatically, without the need for any special facilitating action by the Roamer.

40. Nothing in the policy, however, is intended to limit the ability of carriers to conclude commercial agreements that are not mandated by this policy.

## 3.2 Process Overview

41. Requests for mandatory roaming on Cellular, PCS, AWS, MBS and BRS Licensees' networks will follow the process outlined below.

**Preliminary Information and Analysis:**

42. The Party that wishes to roam (Requesting Operator) may contact the Cellular, PCS, AWS, MBS or BRS Licensee who is subject to conditions of licence for mandatory roaming (Responding Licensee) to obtain a preliminary information package (PIP) in order to prepare a proposal to enter into a Roaming Agreement (Roaming Proposal). Upon request, the Responding Licensee must provide available technical information, such as technical data, engineering information, network requirements and other information relevant to formulating a Roaming Proposal within two weeks of receiving the request.

**Roaming Proposal and Offer**

43. After reviewing and analyzing the PIP, the Requesting Operator may then submit a Roaming Proposal to the Responding Licensee.

44. The Responding Licensee must respond to a Roaming Proposal from a Requesting Operator within 30 days with a response in writing and an offer to enter into a Roaming Agreement. In the event that the Licensee believes that the Roaming Proposal is not technically feasible, the Licensee must provide the Requesting Operator with a response detailing the reasons why it considers roaming is not feasible (accompanied by any applicable technical information) and submit that evidence to Industry Canada if the Requesting Operator requests that Industry Canada review the reasons provided by the Licensee in accordance with this condition.

45. If after 60 days from the date that the Responding Licensee receives the Roaming Proposal, the Responding Licensee and the Requesting Operator have not entered into a Roaming Agreement or have not agreed to any interim arrangement, the Licensee must submit or agree to submit the matter to arbitration in accordance with CPC-2-0-18, *Industry Canada's Arbitration Rules and Procedures*, as amended from time to time.

## 4. Other Issues Impacting Roaming and Tower Sharing Negotiations

### 4.1 Costs

46. Costs incurred at each step of the roaming and tower sharing processes will generally be borne by the party carrying out the step. For instance, the cost of technical analyses in the preliminary information stage or carried out in order to prepare or respond to a Proposal to Share or a Roaming Proposal will be borne by the parties conducting the analyses. The Requesting Operator would not have to compensate the Responding Licensee for costs associated with providing the existing technical information about the site, including the Responding Licensee's review of such requests and technical analysis. Furthermore, the Requesting Operator would not have to compensate the Responding Licensee for costs associated with providing existing technical information related to the mandatory roaming arrangement requested.

47. Although it is anticipated that, in general, costs associated with the arbitration process will be apportioned equally between the party requesting sharing and the responding party, the Arbitration Rules allow the Arbitrator the discretion to allocate costs.

48. Generally, costs associated with any public consultation or land-use consultation will be the responsibility of the Requesting Operator.

### 4.2 Implementing the Conditions Following a Licensing Process

49. Responding Licensees must respond to requests for information and Proposals to Share or Roaming Proposals received from a provisional licence winner prior to licence issuance.

### 4.3 Disputes over Technical Feasibility and Seeking Intervention or Clarification From Industry Canada

50. If a Responding Licensee, after conducting its technical assessment, considers a Roaming Proposal or a Proposal to Share not to be technically feasible, then the Responding Licensee must inform the Requesting Operator of this as soon as possible and provide the appropriate technical rationale. If the Requesting Operator disagrees with this assessment, it may ask Industry Canada to render a decision on technical feasibility.

51. Industry Canada expects that roaming and tower sharing will be technically feasible in the vast majority of cases. Where a disagreement exists over other issues, it can be dealt with either through commercial negotiations or through the binding arbitration process, if necessary.

52. Industry Canada will assess issues relating to technical feasibility. Unless otherwise directed, a technical feasibility review will not alter the timelines to complete negotiations or proceed to arbitration, if required.

53. Parties can also contact Industry Canada at any time during negotiations where clarification is required with respect to the application or interpretation of the conditions of licence. All issues relating to commercial terms (such as rates or terms contained in agreements) are to be dealt with through negotiation with recourse to arbitration.

### 4.4 Negotiation Process Time Frame

54. The Requesting Operator and Responding Licensee may choose to negotiate or use any agreed upon arbitration or mediation process in order to finalize the negotiation process within the timelines set out in the conditions of licence. Note that, by agreement, the parties may choose to extend their negotiations. However, should the timelines outlined in the conditions of licence expire, then, in the absence of any final or interim agreement, either party may initiate the arbitration process and both parties will be compelled to follow the process established by Industry Canada.[11]

### 4.5 Arbitration

55. If the parties cannot complete negotiations and come to an agreement, they may choose any method of dispute resolution. In lieu of an agreement on dispute resolution, the licensees must agree to use the mandatory arbitration procedures as specified in CPC-2-0-18, Industry Canada's Arbitration Rules and Procedures.

### 4.6 Compliance and Enforcement of the Conditions of Licence

56. The Minister of Industry has the authority under Subsection 5(2) of the *Radiocommunication Act* to suspend or revoke a radio authorization where the Licensee has contravened the terms or conditions of that authorization. Where a Licensee is found to be in non-compliance with these conditions of licence, Industry Canada may consider the suspension or revocation, in whole or in part, of the Licensee's radio and/or spectrum licences associated with the site where the breach of licence occurred. In addition, the Licensee may be subject to prosecution if it is operating equipment without complying with the terms of its authorization, including these conditions of licence.

### 4.7 Monitoring the Effectiveness of the Conditions of Licence

57. The revised conditions of licence have been developed to further facilitate roaming and tower sharing agreements in order to advance the policy objectives of supporting competition, encouraging investment and reducing tower proliferation. Should these conditions of licence prove to be insufficient in facilitating these goals, the Minister of Industry, in accordance with Paragraph 5(1)(b) of the *Radiocommunication Act*, may consider further amending the terms and conditions of the licences or seeking other policy and/or legislative solutions.

58. Many spectrum licences have been issued with a high expectation of renewal; however, that expectation only applies where the licence conditions are being met. As a result, a renewal may be denied or a licence not fully renewed where there is a breach of any of the conditions of licence. This has been clearly articulated in various policy and licensing documents and has remained a consistent criterion for the renewal of all long-term licences.

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[11] Refer to CPC-2-0-18 *Industry Canada's Arbitration Rules and Procedures* (http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf09079.html).

59. Furthermore, to the extent that non-compliance impairs or frustrates the policy objectives for which these licence conditions were established, consideration may be given in future licensing processes to more prescriptive and/or restrictive policy measures. Such policy changes could affect Industry Canada's future plans for spectrum use, licensing and renewal.

60. In addition to the regular reporting requirements specified in the conditions of licence, licensees are required to provide Industry Canada with information relating to roaming and tower sharing activities as per this CPC, upon request. Where the response includes information that the licensee deems to be confidential or commercially sensitive in nature, the information should be labelled as such. Industry Canada will treat all information received in accordance with the *Access to Information Act*.

## Part B – Conditions of Licence

### 1. Conditions of Licence for Mandatory Antenna Tower and Site Sharing and to Prohibit Exclusive Site Arrangements

The mandatory tower and site sharing conditions of licence apply to all Licensees in all bands who are telecommunications common carriers as defined in the *Telecommunications Act*.

1. The Licensee must facilitate sharing of antenna towers and sites, including rooftops, supporting structures and access to ancillary equipment and services (“Sites”) and not cause or contribute to the exclusion of other telecommunications common carriers from gaining access to Sites. Without limiting the generality of the foregoing:

   - where the Licensee is party to an agreement that includes a provision excluding other operators from the use of a Site, then, in order to facilitate the sharing of Sites, the Licensee must consent to waiving that portion of the agreement to facilitate a Request to Share;

   - as applicable, the Licensee must consent to or, in a commercially reasonable manner, seek the consent of third parties to the assignment, sublease or other rights of access to Sites pursuant to any agreement or arrangement to which the Licensee is a party; and

   - the Licensee must not enter into or renew agreements that exclude other operators from using a Site.

2. The Licensee must share its sites containing antenna-supporting structures, where technically feasible, when requested to do so by any other telecommunications common carrier as defined in the *Telecommunications Act* or by a provisional licence winner who will be operating as a telecommunications common carrier in accordance with a licensing process (A Requesting Operator).

3. In order to satisfy the condition of Site sharing in accordance with this licence, the Licensee must respond within two weeks of receiving a complete[12] request for a preliminary information package (PIP) from a Requesting Operator as follows:

   - The following information must be included in the PIP response where it is available to the Responding Licensee: the unique sharing request identifier assigned by the Requesting Operator; tower loading profile, including imminent future use[13] and the summary of existing leases; contracted third party lease arrangement contacts; compound layout; tower foundation design and Transport Canada and/or NAV Canada form(s); as well as site access information, such as contact, procedure and any specific restriction related to a site visit. The PIP response must also

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[12] A PIP request will be considered complete if it contains, at a minimum, a unique sharing request identifier assigned by the Requesting Operator and two of the following: (1) the Licensee’s site reference number (2) the site address (3) geographical coordinates. Some of this information may be available from Industry Canada’s Spectrum Direct website (http://www.ic.gc.ca/eic/site/sd-sd.nsf/eng/Home). Information may also be obtained from the Licensee.

[13] See Part A, Section 2.2 (Process Overview) of this document for specifics regarding this provision.

include other information relating to the Site relevant to formulating a Proposal to Share that the Licensee has in its possession or control;

- The Licensee must provide Industry Canada with a copy of any PIP that includes reservations for imminent future use. A copy of the initial PIP, as well as any subsequent changes made to these reservations during the negotiations, must be submitted to Industry Canada via email at rts-ipp@ic.gc.ca; and

- Upon reasonable notice by the Requesting Operator, the Licensee shall facilitate access[14] to the Site so that a formal Proposal to Share can be formulated.

4. The Licensee must respond to a Proposal to Share from a Requesting Operator within 30 days as follows:

   (a) The Licensee must provide the Requesting Operator with a response in writing and an offer to enter into a Site-Sharing Agreement. Industry Canada expects that Site-Sharing Agreements, including access to ancillary equipment and services, will be offered at commercial rates that are reasonably comparable to rates currently charged to others for similar access; or

   (b) In the event that the Licensee believes that the Proposal to Share is not technically feasible, the Licensee must provide the Requesting Operator with a response detailing the reasons why it considers that site sharing is not feasible (accompanied by any applicable technical information) and submit that evidence to Industry Canada if the Requesting Operator requests that Industry Canada reviews the reasons provided by the Licensee in accordance with this condition.

5. Notwithstanding the Licensee's initial response, if Industry Canada reviews the matter of technical feasibility under Section 4(b) above and finds that sharing is technically feasible, then the Licensee will respond to the Proposal to Share with an offer to enter into a Site-Sharing Agreement in a timely manner.

6. Licensees must negotiate with a Requesting Operator in good faith, with a view to concluding a Site-Sharing Agreement in a timely manner. In order to be considered as negotiating in good faith, Responding Licensees must offer access to ancillary equipment and services at commercial rates that are reasonably comparable to rates currently charged to others for similar access.

7. If after 60 days from the date that the Licensee receives a Proposal to Share, the Licensee and the Requesting Operator have not entered into a Site-Sharing Agreement or have not agreed to any interim arrangement, the Licensee must submit or agree to submit the matter to arbitration in accordance with *Industry Canada's Arbitration Rules and Procedures*,[15] as amended from time to time. The Licensee shall agree that the Arbitral Tribunal shall have all necessary powers to determine all of the questions in dispute (including those relating to determining the appropriate terms of the Site-Sharing Agreement and those relating to procedural matters under the arbitration)

[14] See Part A, Section 2.2 (Process Overview) of this document for specifics regarding this provision.

[15] Refer to CPC-2-0-18 *Industry Canada's Arbitration Rules and Procedures* (http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf09079.html).

and that any arbitral award or results under this condition of licence shall be final and binding with no right of appeal, subject to applicable provincial or territorial legislation. The Licensee must participate fully in such arbitration and follow all directions of the Arbitral Tribunal in accordance with *Industry Canada's Arbitration Rules and Procedures* and any arbitration procedures established by the Arbitral Tribunal.

8. If within 60 days, the Licensee has not received a response from the Requesting Operator to an Offer to Share, the Licensee may treat the Offer to Share as withdrawn with no further obligations.

9. The Licensee must submit regular reports to Industry Canada, upon request, on the status of antenna tower and site sharing negotiations and on the number of sites and degree of sharing in their network. Reports will initially be required on a semi-annual basis detailing the preceding six-month period. Licensees must submit reports to Industry Canada using a standardized template, available on Industry Canada's Spectrum Management and Telecommunications website.[16] Reports will not be required if there has been no change to the requested data since the previous reporting period. The reports must be sent via email to rts-ipp@ic.gc.ca.

[16] Refer to the Framework for Mandatory Roaming and Antenna Tower and Site Sharing webpage (http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/h_sf10290.html).

## 2. Conditions of Licence for Mandatory Roaming

The conditions of licence described below apply to all Licensees in the Cellular, Personal Communications Services (PCS), Advanced Wireless Services (AWS), Mobile Broadband Service (MBS) and Broadband Radio Service (BRS) bands.

1. The Licensee must provide automatic digital roaming (roaming) by way of a Roaming Agreement(s) on all of its networks in the Cellular, PCS, AWS, MBS and BRS bands in all of its licensed service areas to any other Licensee in these bands, including a provisional licence winner in accordance with a licensing process in these bands (A Requesting Operator).

2. The roaming which must be offered in accordance with this licence condition is defined by the following characteristics:

   - Roaming must enable a subscriber (a Roamer) already served by the Requesting Operator's network (Home Network) to originate or terminate communications on the Licensee's network (Host Network), wherever technically feasible;

   - The roaming offered must provide connectivity for voice and data services, including access to the public-switched network and the Internet, regardless of the spectrum band or underlying network technology used, provided that the Roamer's device is technically capable of accessing the Licensee's network. Roaming should provide a Roamer with the ability to access voice and data services offered by the Home Network at a level of quality comparable to that offered for similar services by the Licensee's Network. For greater certainty, this condition does not require the Licensee to provide to a Roamer a service which the Licensee does not itself provide on the Host Network, nor to provide to a Roamer a service or level of service which the Requesting Operator will not or does not itself provide;

   - Roaming as provided for in this condition does not include resale;

   - Roaming can commence as soon as the Requesting Operator is offering service on its own radio access network and a Roaming Agreement is in place;

   - Roaming does not require communications hand-off between Home and Host Networks, such that there is no interruption of communications in progress; and

   - Roaming should function without the need for any special facilitating action by the customer.

3. In order to satisfy the condition of roaming in accordance with this licence, the Licensee must respond to a request for information by a Requesting Operator within two weeks of receiving the request by providing a preliminary information package (PIP) to the Requesting Operator that includes preliminary technical information, such as technical data, engineering information, network requirements and other information relevant to formulating a Roaming Proposal.

4. The Licensee must respond to a Roaming Proposal from a Requesting Operator within 30 days as follows:

   (a) The Licensee must provide the Requesting Operator with a response in writing and an offer to enter into a Roaming Agreement. Industry Canada expects that roaming agreements will be offered at commercial rates that are reasonably comparable to rates currently charged to others for similar roaming services; or

   (b) In the event that the Licensee believes that the Roaming Proposal is not technically feasible, the Licensee must provide the Requesting Operator with a response detailing the reasons why it considers that roaming is not feasible (accompanied by any applicable technical information) and submit that evidence to Industry Canada if the Requesting Operator requests that Industry Canada review the reasons provided by the Licensee, in accordance with this condition.

5. Notwithstanding the Licensee's initial response, if Industry Canada reviews the matter of technical feasibility under Section 4(b) above and finds that roaming is technically feasible, then the Licensee will respond to the Roaming Proposal with an offer to enter into a Roaming Agreement.

6. Licensees must negotiate with a Requesting Operator in good faith, with a view to concluding a Roaming Agreement in a timely manner.

7. If after 60 days from the date that the Licensee receives the Roaming Proposal, the Licensee and the Requesting Operator have not entered into a Roaming Agreement or have not agreed to any interim arrangement, the Licensee must submit or agree to submit the matter to arbitration, in accordance with *Industry Canada's Arbitration Rules and Procedures*,[17] as amended from time to time. The Licensee shall agree that the Arbitral Tribunal shall have all necessary powers to determine all of the questions in dispute (including those relating to determining the appropriate terms of the Roaming Agreement and those relating to procedural matters under the arbitration) and that any arbitral award or results under this condition of licence shall be final and binding with no right of appeal, subject to applicable provincial or territorial legislation. The Licensee must participate fully in such an arbitration and follow all directions of the Arbitral Tribunal in accordance with *Industry Canada's Arbitration Rules and Procedures* and any arbitration procedures established by the Arbitral Tribunal.

[17] Refer to CPC-2-0-18 *Industry Canada's Arbitration Rules and Procedures* (http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf09079.html).

This is **Exhibit "98"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

# Telecom Decision CRTC 2017-56

PDF version

Ottawa, 1 March 2017

*File numbers: Bell Mobility Tariff Notices 1, 1A, 1B, and 2; Rogers Communications Partnership Tariff Notice 42; and TELUS Communications Company Tariff Notice 501*

## Wholesale mobile wireless roaming service tariffs – Final terms and conditions

*The Commission* ***directs*** *changes to be made to the proposed final terms and conditions for the mandated wholesale mobile wireless roaming service (mandated wholesale roaming) offered by Bell Mobility, RCCI, and TCC (collectively, the incumbents). These changes, once implemented and approved by the Commission, will ensure that, among other things, the incumbents' tariffs (i) reflect the policy established in Telecom Regulatory Policy 2015-177; (ii) define the scope of mandated wholesale roaming to avoid potential anti-competitive behaviour by the incumbents; (iii) recognize the principle that the incumbents are not required to provide access to their networks to service providers and their customers that do not qualify for mandated wholesale roaming; and (iv) prevent customers that purchase mandated wholesale roaming, or their mobile virtual network operators, from making unauthorized use of the incumbents' networks.*

*The Commission will address the proposed wholesale roaming rates at a later date.*

*In addition, the Commission determines that it will forbear, on a final basis, from the approval of off-tariff agreements for mandated wholesale roaming. This determination will take effect on the date the rates, terms, and conditions for mandated wholesale roaming are approved on a final basis.*

*The Commission's determinations in this decision will, consistent with its determinations set out in Telecom Regulatory Policy 2015-177, facilitate sustainable competition that provides benefits to Canadians, such as reasonable prices and innovative services, as well as continued innovation and investment in high-quality mobile wireless networks.*

### Background

1. A mobile wireless carrier (wireless carrier) requires spectrum and a mobile wireless network to provide retail mobile wireless services to subscribers (also referred to as "end-users"). Wholesale mobile wireless roaming service (wholesale roaming) enables the end-users of a wireless carrier (i.e. the home network carrier) to automatically access voice, text, and data services using a visited wireless carrier's

network (also referred to as “the host network”), including its radio access network (RAN),[1] when they travel outside their home carrier’s network footprint.

2. In Telecom Regulatory Policy 2015-177 (the wholesale wireless framework), the Commission determined that it was necessary to mandate the provision of Global System for Mobile communications (GSM)-based wholesale roaming services by Bell Mobility Inc. (Bell Mobility), Rogers Communications Canada Inc. (RCCI),[2] and TELUS Communications Company (TCC) [collectively, the incumbents] to other Canadian wireless carriers and to regulate the rates, terms, and conditions for such services.

3. Previously, the provision of wholesale roaming was forborne from the requirement for the service provider to file a tariff, and the service was made available pursuant to negotiated agreements and Innovation, Science and Economic Development Canada’s (ISED) conditions of licence for mandatory roaming (ISED’s roaming conditions of licence).[3] The Commission’s determination to re-regulate the rates, terms, and conditions was made primarily in light of its finding that wholesale roaming was not subject to a sufficient level of competition to protect the interests of users. The Commission therefore directed the incumbents to provide GSM-based wholesale roaming (hereafter referred to as “mandated wholesale roaming”) to Canadian wireless carriers other than themselves in accordance with the interim rates, terms, and conditions established by the Commission in the wholesale wireless framework.

4. The Commission also determined in the wholesale wireless framework that it was not appropriate to mandate wireless carriers to provide mobile virtual network operators (MVNOs)[4] with wholesale access to their networks (wholesale MVNO access). MVNOs may obtain access to wireless carriers’ networks through negotiated agreements.

5. However, to further the development of a competitive market for wholesale network access, the Commission determined that the incumbents must provide domestic GSM-based roaming to all end-users served by their wholesale roaming customers, including any end-users of MVNOs operating on the wholesale roaming customers’ networks (the MVNO subscriber roaming condition).

[1] The RAN includes equipment such as towers and antennas; a core network, which includes equipment such as switches and routers; backhaul, which connects the RAN and the core network; billing and operational support systems; interconnections to other networks; and an interconnection to the Internet.

[2] RCCI holds all the business activities, including assets and liabilities, of the former Rogers Communications Partnership, which ceased to exist on 1 January 2016. For ease of reference, “RCCI” will be used in this decision.

[3] These conditions are set out in *Conditions of Licence for Mandatory Roaming and Antenna Tower and Site Sharing and to Prohibit Exclusive Site Arrangements* (CPC-2-0-17 Issue 2, March 2013).

[4] An MVNO is a wireless service provider that does not own spectrum or operate its own RAN; instead, it relies on the spectrum and RAN of a wireless carrier and, in some cases, other facilities and/or services, to provide mobile wireless services to end-users.

6. The Commission directed the incumbents to issue interim tariff pages reflecting the interim roaming rates and other determinations set out in that decision. However, several of their wholesale roaming customers objected to the terms and conditions included in the interim tariffs that were issued, arguing that they were more onerous than the terms and conditions in their existing roaming agreements.

7. In response to these concerns, certain uniform terms and conditions for the incumbents' wholesale roaming tariffs were established on an interim basis, and set out in a letter from the Secretary General of the Commission, dated 30 November 2015. These terms and conditions incorporated by reference the most recent existing agreements (other than the rates) between the incumbents and their wholesale roaming customers negotiated prior to 5 May 2015,[5] to the extent that those agreements were not inconsistent with the other interim terms and conditions.

8. On 18 December 2015, the incumbents filed tariff applications containing their respective proposed final tariff pages.

9. The Commission received interventions regarding the terms and conditions proposed in these applications from Bragg Communications Incorporated, operating as Eastlink (Eastlink); the Canadian Network Operators Consortium Inc. (CNOC); Ice Wireless Inc. (Ice Wireless), on behalf of itself and its MVNO affiliate, Sugar Mobile Inc. (Sugar Mobile); Quebecor Media Inc., on behalf of Videotron G.P. (Videotron); Vaxination Informatique (Vaxination); and WIND Mobile Corp. (WIND).[6] The public record with respect to these terms and conditions, which closed on 30 September 2016, is available on the Commission's website at www.crtc.gc.ca or by using the file numbers provided above. The record for the proposed rates set out in these applications remains open. The Commission will address these rates at a later date.

10. In Telecom Regulatory Policy 2016-313, the Commission forbore on an interim basis from the regulation of off-tariff negotiated agreements for mandated wholesale roaming until the associated rates, terms, and conditions, are approved on a final basis. The Commission indicated that it would address the question of whether off-tariff agreements should be permitted on a final basis once the tariffs are final.

## Issues

11. The Commission has identified the following issues to be addressed in this decision:

- Should there be a general condition that clarifies what type of access to an incumbent's network wholesale roaming provides?

[5] Telecom Regulatory Policy 2015-177 was issued on 5 May 2015.

[6] WIND is now known as Freedom Mobile Inc.

- Are further restrictions required to ensure that a wholesale roaming customer and its MVNOs have access to the incumbent's network only on an incidental basis?
- Should prohibitions on in-footprint roaming and traffic offloading be included in the final tariffs?
- What is the appropriate scope of available network provisions?
- What method of network interconnection is appropriate?
- How should network changes be dealt with?
- What quality of service provisions are appropriate?
- Should wholesale roaming customers be mandated to provide traffic forecasts and, if so, how often?
- Should automatic hand-off / seamless roaming provisions be included in the incumbents' tariffs?
- Should call hand-back provisions be included in the incumbents' tariffs?
- Should the Commission make changes to other sections of the tariffs?
- Should off-tariff agreements be allowed?

12. For clarity, the Commission's analysis and determinations in this decision are based on the following primary considerations:

    - The tariff for a mandated service sets out the scope of the service that the Commission requires a company to provide in order to foster competition. Commercial terms from negotiated agreements that do not define the scope of the mandated service are not appropriate for the tariff.
    - The terms and conditions in the tariff may incorporate by reference technical standards and complementary side-agreements (often referred to as annexes or technical agreements), as long as there is sufficient detail in the tariff for a customer to understand the service they are to receive and for the Commission to determine the appropriate cost elements.
    - Consistent with the *Telecommunications Act* (the Act), a company must provide the mandated service only under the terms and conditions set out in the tariff. A Commission forbearance decision permitting companies to enter into off-tariff agreements is required for wireless carriers to enter into any agreement to offer the mandated wholesale service using rates, terms, or conditions different from those set out in the tariff.

- Any service that may be related to the mandated service but that does not fall within the scope set out in the tariff – for example, transport elements that are needed to interconnect but that are excluded from the tariffed service – must be provided in accordance with a separate tariff item, or by commercial agreement if the service is forborne.

- A carrier’s approved terms of service apply to all of its tariffed services, unless otherwise specified. Given that TCC’s General Tariff Terms of Service apply to all of its tariffs – including its Carrier Access Tariff – the company may reference those Terms of Service in this case as well. In addition, RCCI’s Access Services Tariff includes an introductory section called “Definitions and General Terms” that is based on the Commission’s Competitive Local Exchange Carrier (CLEC) Model Tariff and, like TCC’s Terms of Service, applies to all services in its Access Services Tariff unless otherwise specified. Because Bell Mobility is introducing its first tariff, it does not have approved terms of service.

## Should there be a general condition that clarifies what type of access to an incumbent’s network wholesale roaming provides?

### Positions of parties

13. The incumbents included in their proposed tariffs a general prohibition on the resale of their networks to ensure that wholesale roaming customers would not use mandated wholesale roaming as a substitute for reseller (including MVNO) arrangements to gain permanent access to the incumbents’ networks for themselves or their MVNOs.

14. The incumbents worded their prohibitions in such a way that an MVNO’s end-users would not be prevented from roaming on their networks. Bell Mobility and TCC each included a clause that explicitly permits roaming on their networks by end-users of MVNOs operating on their wholesale roaming customers’ networks. RCCI did not refer directly to MVNOs in its tariff but instead defined a roaming customer as including the end-user of a reseller.

15. The incumbents proposed that non-compliance with their prohibitions be grounds for suspension to end-users followed by termination of the service.

16. Eastlink, Videotron, and WIND supported the incumbents’ proposed prohibitions on the resale of their networks. WIND, supported by Videotron, submitted that the prohibitions are consistent with ISED’s roaming conditions of licence, which state, in part, the following:

> 35. Roaming enables a subscriber (a Roamer) already served by one carrier’s network (the Home Network) to originate or terminate voice or data traffic on another carrier’s network (the Host Network). Accordingly, a subscriber cannot roam unless he or she is already served on another radio access

network. A carrier must therefore be offering service on its own network before its subscribers may benefit from roaming on another network, thus it does not include resale.

17. WIND also referred to the Commission's definition of roaming from the wholesale wireless framework, which is reproduced in paragraph 1 above. The company submitted that the Commission's definition clarifies that the wholesale roaming tariff is not to be used as a substitute for reseller arrangements. WIND argued that this definition, along with a general prohibition on resale, would ensure that all roaming is incidental, and that no other restrictions are required.

18. Similarly, Videotron referred to paragraph 45 of the wholesale wireless framework, submitting that it clarifies that wholesale roaming is not to be used as a substitute for reseller arrangements:

> 45. …Wholesale roaming provides incidental access to the host network by the customers of a wireless carrier when these customers are outside their home network's footprint. In contrast, wholesale MVNO access provides an MVNO's customers with permanent access to the host network…

19. CNOC and Ice Wireless disagreed with the proposed prohibitions, submitting that they were in direct conflict with the MVNO subscriber roaming condition and would prevent the introduction of new and innovative business models in the provision of wireless services to Canadians.

20. To illustrate its point, Ice Wireless referred to the example of the mobile wireless service offered by its affiliate Sugar Mobile. This service, which works through an application installed on unlocked mobile devices, enables end-users to access unlimited voice, text, and data over public Wi-Fi networks, free of charge. When the end-users are not in an area with public Wi-Fi connectivity, they are able to access up to 200 megabytes of non-Wi-Fi data per month at a fixed rate. To provide this data, Sugar Mobile entered into an MVNO agreement to access (and resell) the wireless network of Ice Wireless, a carrier with spectrum and wireless facilities in the North. Ice Wireless has a roaming agreement with RCCI, and Ice Wireless and Sugar Mobile customers are able to access RCCI's network when they are outside Ice Wireless's network footprint.

21. Ice Wireless submitted that through services such as Sugar Mobile's, customers primarily rely on public Wi-Fi networks and are only incidentally using the incumbent's network. It argued that the proposed prohibitions would prevent the development of new business models because the use of the Wi-Fi connection would not be considered a "home network."

22. The incumbents, as well as Eastlink, Videotron, and WIND, submitted that Wi-Fi network use should not be considered use of the home network. RCCI submitted that the right to mandated wholesale roaming does not extend to Wi-Fi service providers and that under ISED's roaming conditions of licence, mandated wholesale roaming

is limited to licence holders for certain service bands that do not include Wi-Fi bands. It also submitted that, in the specific case of Sugar Mobile raised by Ice Wireless, the vast majority of Sugar Mobile's customers will never set foot in Ice Wireless's operating territory and that, therefore, 100% of these customers' mobile wireless data usage will be on RCCI's network. It argued that this is pure resale (permanent access) of an incumbent's network without its permission. Videotron submitted that the fact that end-users appreciate and use Wi-Fi offloading opportunities cannot become a vehicle for eliminating all incentives to invest in a carrier's network.

**Commission's analysis and determinations**

23. Ice Wireless has argued the Commission's MVNO subscriber roaming condition would justify new service models such as Sugar Mobile's.

24. The Commission's primary goal when implementing this condition was to give new entrants the opportunity to resell their own networks and to maximize the use of their networks. The Commission determined that permitting this type of entry would further the development of a competitive wholesale network access market. The Commission was aware that it would be difficult for small carriers to attract MVNO customers if the MVNOs' end-users were able to use only a smaller wireless carrier's network, which would be the case if MVNOs had no way of gaining access to mandated wholesale roaming because they are not wireless carriers.

25. Wholesale roaming provides access to the incumbents' networks on an incidental basis, and the MVNO subscriber roaming condition permits wholesale roaming customers to provide their MVNOs with access to their roaming arrangements only on the same terms and conditions as they themselves would obtain access. It does not provide permanent access.

26. It would be inconsistent with the wholesale wireless framework to permit mandated wholesale roaming to be used as a means to obtain permanent access to the incumbents' networks. Such an approach would render meaningless the Commission's decision not to mandate MVNO access to these networks and would require the Commission to fundamentally redefine the meaning of wholesale roaming.

27. Wireless carriers are increasingly investing in Wi-Fi facilities as an additional way to provide wireless services to their customers. They may use a combination of licensed and unlicensed spectrum to provide service, but they do so by using cellular protocols. Currently, for example, unlicensed spectrum in the 2.4 and 5 gigahertz bands is used for offloading data traffic. When a Wi-Fi network is owned or operated by a wireless carrier, it is commonly referred to as "carrier Wi-Fi," which is an efficient and appropriate technical model by which to provide wireless services.

28. However, carrier Wi-Fi is not the same as public Wi-Fi facilities. Unlike carrier Wi-Fi, public Wi-Fi facilities are not owned or operated by wireless service

providers, nor are there necessarily any contractual or other arrangements between the Wi-Fi operators and the service providers that use them. Accordingly, wireless service providers cannot assure their end-users of the availability, quality, or reliability of such facilities in any meaningful or sustainable way. While the Commission has not yet had to address whether carrier Wi-Fi could be considered a home network for the purpose of roaming, it is clear that public Wi-Fi cannot be so considered for the reasons discussed.

29. For example, neither Ice Wireless nor Sugar Mobile own or operate a network on unlicensed spectrum, and Sugar Mobile customers access their service on Wi-Fi at home or on the type of Wi-Fi offered in coffee shops, for example. Such use of generally available public Wi-Fi requires no infrastructure investment by the wholesale roaming customer or its MVNOs, and neither company would have any control over public Wi-Fi provisioning or the availability and reliability of the service. As such, based on the definition of roaming set out in the wholesale wireless framework, public Wi-Fi cannot form part of the home network, since there would be no way to distinguish between a company’s home network and every piece of network equipment in use by anyone in Canada. Moreover, including public Wi-Fi in the definition of “home network” would undermine the policy objectives of mandated wholesale roaming, since it would discourage wholesale roaming customers from investing in their facilities.

30. While it is appropriate for the incumbents’ tariffs to clearly prohibit a wholesale roaming customer or its MVNOs from using mandated wholesale roaming to access the incumbent’s network on a permanent basis, the wording of the proposed tariffs is unnecessarily complex on this point. Not all of the incumbents provided a clear definition of wholesale roaming as a separate provision, and their use of the phrase “resale of the Service” could cause confusion, since the wholesale roaming customer is effectively permitted to resell the service – that is, to provide incidental access to the incumbent’s network – under the tariff.

31. Accordingly, the Commission

- confirms that mandated wholesale roaming provides incidental, and not permanent, access to the incumbents’ networks;
- clarifies that public Wi-Fi does not form part of a wireless carrier’s home network for the purpose of establishing what constitutes incidental use of the visited network pursuant to the relevant wholesale roaming tariff; and
- clarifies that the MVNO subscriber roaming condition only permits wholesale roaming customers to provide their MVNO customers with access to their roaming arrangements on the same terms and conditions as they would obtain roaming services. The wholesale roaming customer must ensure that any access to the incumbent’s network on behalf of its resellers, including MVNOs, occurs on the same basis, and with the same limitations, as set out in the relevant wholesale roaming tariff.

32. The Commission therefore **directs** the incumbents to reword the clauses in their tariffs to remove references to prohibiting the resale of roaming services, and instead to include the following:

- a definition of "roaming service," which should also indicate that wholesale roaming service provides access to the incumbent's network on an incidental basis and not on a permanent basis;
- definitions of "home network" and "visited network" that exclude public Wi-Fi; and
- the following text from paragraph 167 of the wholesale wireless framework: "[Incumbent] must provide roaming on their GSM-based mobile wireless networks to all subscribers served by their wholesale roaming partners, including the subscribers of any MVNOs operating on their wholesale roaming partners' networks." plus the following sentence: "The wholesale roaming customer must ensure that any access to [incumbent]'s network on behalf of its reseller or MVNO customers occurs on the same basis, and with the same limitations, as set out in this wholesale roaming tariff."

## Are further restrictions required to ensure that a wholesale roaming customer and its MVNOs have access to the incumbent's network only on an incidental basis?

### Proposed mobile phone number restriction

#### Positions of parties

33. Bell Mobility and RCCI included in their proposed tariffs a condition stating that, to be able to roam, end-users of a wholesale roaming customer and its resellers (including MVNOs) must have a mobile phone number associated with an exchange within the wholesale roaming customer's footprint.

34. Videotron submitted that a mobile phone number restriction was reasonable in principle to protect the incumbents' networks from the threat of resale. It submitted that this measure would be effective and easy to verify.

35. WIND expressed concern that this restriction would prevent it from assigning telephone numbers from non-geographic code blocks intended for use with Internet of Things[7] applications. The company submitted that if it were forced to obtain additional geographic code blocks in the many exchanges in which it operates in order to offer Internet of Things applications, there could be an unnecessary strain on numbering resources.

[7] The Internet of Things is the network of physical objects that are connected to each other and to the Internet, and that are capable of communicating with humans but also between themselves through electronic identification systems.

36. CNOC and Ice Wireless expressed similar concerns about numbers from non-geographic code blocks.

37. More generally, they submitted that the restriction was inappropriate and should be removed. CNOC took the position that this restriction would prohibit subscribers from making use of roaming when they reside outside a wireless carrier's network footprint but choose to maintain service with the wireless carrier to have access to a telephone number that is local to the wireless carrier's network footprint.

38. Ice Wireless submitted that RCCI's proposed restriction could potentially harm the business model of emerging mobile wireless services such as Sugar Mobile's. It argued that in cases where a wholesale roaming customer's end-user does not use wireless service within the wholesale roaming customer's network footprint, they should not be arbitrarily prohibited from using an incumbent's network. Ice Wireless submitted that there are no valid regulatory or commercial reasons that require resellers' or MVNOs' operations to be restricted to the wholesale roaming customer's network footprint.

39. RCCI agreed with Videotron that the proposed condition would be effective and that mobile phone numbers would be easy to verify. It submitted that a wireless carrier bears responsibility for ensuring that its customers are using its own network.

40. With respect to the concern that the proposed condition would prevent carriers from offering Internet of Things or machine-to-machine services, RCCI submitted that it did not anticipate many situations in which a non-geographic number would be required under the tariff. It submitted that should a wireless carrier seeking to legitimately roam on its network require a non-geographic area code, it would accommodate the request. Bell Mobility also indicated that it is able to accommodate non-geographic numbers.

41. With respect to CNOC's position that requiring wholesale roaming customers to issue phone numbers from exchanges within their network footprint would prevent wireless carriers from offering data-only plans and other differentiated offerings, RCCI submitted that there was no reason why end-users could not be provisioned with a phone number from an exchange where the wholesale roaming customer offers service.

### Commission's analysis and determinations

42. The definition of roaming service and the other changes set out in paragraph 32 of this decision are sufficient to address RCCI's concerns.

43. Furthermore, a mobile phone number may indicate that an end-user is generally located in a specific network footprint. However, there are situations in which there is a legitimate reason for an end-user to have a phone number associated with an exchange situated outside their home carrier's network footprint. This includes porting a mobile phone number from one exchange to another or issuing a non-

geographic number block to support Internet of Things or machine-to-machine services.

44. Bell Mobility and RCCI indicated that they do not oppose the use of such numbers by wholesale roaming customers. Given that these types of numbers are not tied to an exchange, they could not be used to determine whether the user is generally located in a specific network footprint.

45. Therefore, the proposed condition on its own would not reliably prevent wholesale roaming customers from deliberately misusing or abusing the service by reselling access to the incumbents' network outside the home network footprint, and it could result in otherwise legitimate uses of the service being prohibited. Accordingly, it would not be appropriate to include in the tariff rules related to numbering, such as those proposed by Bell Mobility and RCCI.

46. In light of the above, the Commission **directs** Bell Mobility and RCCI to remove from their proposed tariffs the clauses prohibiting customers from gaining access to roaming services if their mobile phone numbers are associated with exchanges situated outside their home carrier's network footprint.

## Proposed sales, marketing, and device restrictions

### Positions of parties

47. RCCI proposed provisions designed to prevent resale that would prohibit the wholesale roaming customer from

- marketing and selling its retail service outside the wholesale roaming customer's network footprint,
- marketing or promoting its retail service in a manner that would be expected to result in permanent roaming on RCCI's network, and
- providing a technological device that has as its sole or predominant purpose permitting end-users to engage in permanent roaming.

48. CNOC submitted that the incumbents should not be permitted to dictate how another party chooses to market and sell its services. It also submitted that the proposed device restriction is too broad and vague.

49. WIND submitted that it would be inappropriate for the Commission to approve conditions that limit where or how a company can market its services. It submitted that a prohibition on intentionally selling services that are designed to result in permanent roaming would be more than sufficient to accomplish the objective of encouraging facilities-based deployment by new entrants.

50. Ice Wireless submitted that RCCI's proposed restriction on sales and marketing could potentially harm the business model of new mobile wireless service models

such as Sugar Mobile's. It argued that there is no valid commercial or regulatory reason for prohibiting the sale of a wholesale roaming customer's services outside its network footprint if there are appropriately defined conditions that mandate incidental use of the incumbent's network, using a revised definition of permanent roaming that includes Wi-Fi usage.

51. RCCI cited CNOC's concerns with the proposed device restriction, submitting that the Sugar Mobile subscriber identity module (SIM) cards that Ice Wireless is distributing outside its territory are a good example of the type of device that would contravene the condition. RCCI submitted that it would not interpret the condition to apply to feature phones or smartphones that a roaming partner sells to its customers, assuming that they would use RCCI's network incidentally.

**Commission's analysis and determinations**

52. The definition of roaming service and the other changes set out in paragraph 32 of this decision are sufficient to address RCCI's concerns.

53. Furthermore, RCCI's proposed restrictions on sales and marketing would be very difficult to monitor and enforce, and would be onerous on wholesale roaming customers. They would, for instance, require a wholesale roaming customer to continuously monitor the actions of resellers outside its network footprint and to control how resellers market their services. In addition, a condition that effectively allows an incumbent to control the marketing practices of its competitors creates the potential for anti-competitive abuse.

54. The proposed condition restricting the provision of technological devices that have as their sole or predominant purpose permitting the user to engage in permanent roaming is also problematic. RCCI did not propose a definition for this type of device, and it would be very difficult for the wholesale roaming customer to determine if a device has as its sole or predominant purpose permitting the user to engage in permanent roaming. In addition, this condition would be very difficult to monitor and enforce.

55. In light of the above, the Commission **directs** RCCI to remove the following from its proposed tariff:

- the condition that the wholesale roaming customer and its resellers are not to sell or market their services, other than prepaid top-up cards, at physical retail locations situated outside the home carrier's network footprint;
- the condition prohibiting the wholesale roaming customer and resellers from marketing or promoting services in a manner that would result in their end-users permanently roaming; and
- the condition that the wholesale roaming customer is not to provide, and ensure that its resellers do not provide, a technological device to their end-

users that has as its sole or predominant purpose permitting them to engage in excessive roaming.

## Proposed permanent roaming restrictions

### Positions of parties

56. The incumbents submitted that even with resale prohibitions in the tariffs, permanent roaming restrictions are also necessary. TCC submitted that the purpose of such restrictions is to further the policy that roaming is to be incidental and to set out the limits of wholesale roaming. Bell Mobility submitted that permanent roaming restrictions are needed to clarify when roaming becomes *de facto* resale of the underlying network. RCCI indicated that without resale and permanent roaming restrictions, the incumbents risk having their services abused by unscrupulous service providers, resellers, or MVNOs.

57. Eastlink and Videotron submitted that since the objective of preventing resale of the incumbents' networks would already be accomplished by resale prohibitions, permanent roaming restrictions are not necessary. However, they also submitted that if any permanent roaming restrictions are included, such restrictions should be designed to minimize as much as possible the effect on end-users who are legitimately roaming for an extended period, and should not impose onerous administrative burdens on wholesale roaming customers.

58. Eastlink submitted that three scenarios that could result in a wholesale roaming customer's end-users permanently roaming on an incumbent's network should be considered.

59. The first scenario involves wholesale roaming customers that may deliberately misuse or abuse wholesale roaming to resell the incumbents' service outside their home network footprint. Eastlink submitted that resale prohibitions are all that is required to prevent MVNOs or regional facilities-based wireless service providers from selling wireless services in these ways.

60. The second scenario involves end-users who purchase a lower-priced service not yet offered in their area by, for example, deliberately providing misleading information at the time of service registration. Eastlink submitted that this type of behaviour is rare and that wholesale roaming customers have sufficient incentive to address such behaviour by their own end-users without the proposed restrictions.

61. The third scenario involves end-users who select an appropriate wholesale roaming customer as a service provider but then roam outside the home network footprint for legitimate reasons (e.g. study, work, or a family emergency) on temporary, but protracted, bases. Eastlink submitted that Canadian consumers should not be precluded from taking advantage of the lower prices and faster networks that may be available from regional wireless service providers simply because they may need to travel outside their home network footprint on an extended basis from time to time.

62. CNOC, Ice Wireless, and WIND also submitted that permanent roaming restrictions are unnecessary. Ice Wireless and WIND indicated that wholesale roaming customers have a market-based incentive to reduce permanent roaming by their end-users as much as possible due to the high cost of domestic roaming. CNOC submitted that permanent roaming restrictions would harm small wireless carriers that have limited network coverage.

63. In response to interrogatories from Commission staff, parties proposed models under which permanent roaming could be defined and monitored. RCCI proposed an approach whereby it would monitor the roaming of individual end-users of the wholesale roaming customer. WIND proposed a high-level approach based on the wholesale roaming customer's total roaming usage on the visited network divided by the total customer usage on the home network plus the visited network.

64. Bell Mobility and TCC opposed WIND's proposal on the basis that it had nothing to do with the permanent roaming that it is meant to address.

65. Bell Mobility, Eastlink, TCC, and Videotron proposed that permanent roaming restrictions be applied based on the total traffic of a wholesale roaming customer, which would allow some end-users to access an incumbent's network on a non-incidental basis over a temporary period of time. These proposals were based on defining a threshold whereby permanent roaming by a given wholesale roaming customer's individual end-users would be allowed, to the extent that the aggregated roaming amount by all the end-users in any given month does not exceed a certain threshold of overall roaming traffic for that wholesale roaming customer.

66. CNOC, Ice Wireless, RCCI, Vaxination, and WIND opposed the threshold proposals. Vaxination submitted the incumbents are requesting *ex ante* rules that are hard to regulate, and that *ex post* analysis on a case-by-case basis might be more appropriate. WIND submitted that the additional monitoring that would be required is unnecessary and would be extremely costly to implement. Similarly, Ice Wireless submitted that the proposals were inconsistent with the Policy Direction.[8]

67. RCCI submitted that a threshold approach is unnecessary since the purpose of permanent roaming restrictions is to stop widespread roaming abuse, not individual roamers while they deal with an out-of-town emergency, for example. Bell Mobility replied that the proposed restrictions are reasonable and mitigate the potential for abuse and needless back and forth between carriers.

**Commission's analysis and determinations**

68. With respect to Eastlink's first scenario described above, the Commission has directed the incumbents to make explicit in their tariffs that wholesale roaming

[8] *Order Issuing a Direction to the CRTC on Implementing the Canadian Telecommunications Policy Objectives*, P.C. 2006-1534, 14 December 2006

provides incidental access to the incumbent's network. If a wholesale roaming customer provides its end-users with roaming service on the incumbent's networks in accordance with this definition, it is not deliberately reselling permanent access to the service outside its home network footprint.

69. The record of the proceeding does not support the conclusion that Eastlink's second scenario constitutes a serious concern to the integrity of the mandated wholesale roaming regime. Further, it would be in the wholesale roaming customer's best interest to verify that its end-users are using roaming service legitimately. Given that the wholesale roaming customer must pay the incumbent for roaming by its end-users, the wholesale roaming customer has incentive to monitor their roaming usage, and to detect and prevent this type of behaviour.

70. Some legitimate permanent roaming, as described in the third scenario, should be permitted as a consumer- and competition-friendly practice. The incumbents' tariffs should not target or prevent end-users from temporarily roaming outside their home carrier's network footprint for legitimate reasons.

71. RCCI's proposal that permanent roaming be defined on an end-user basis presents multiple problems. For example, it does not target the problem that permanent roaming restrictions are meant to address – that is, the misuse of wholesale roaming by the wholesale roaming customer (i.e. resale).

72. WIND's proposed formula based on total traffic generated by the wholesale roaming customer does not specifically address traffic generated by permanent roaming. In addition, WIND did not provide any evidence to support its proposed roaming traffic limit.

73. With regard to the threshold proposals that would allow for a certain amount of permanent roaming, certain problems could arise:

- end-users who simply access the visited network even once a day could be identified as permanently roaming;
- the wholesale roaming customer would need to incur costs to monitor and identify permanently roaming end-users and develop a tracking system to track individual end-user roaming;
- there is a lack of solid quantitative evidence to justify choosing one specific enforcement threshold over another;
- setting the threshold too low could have a negative effect on end-users since the wholesale roaming customer may need to limit the number of end-users who permanently roam for legitimate reasons to stay under the threshold; and
- setting the threshold too high could inadvertently allow, to an inappropriate extent, the very abuse that incumbents should be permitted to protect against (i.e. the resale of permanent access to their networks).

74. In light of the above, implementing an *ex ante* approach that sets out a specific threshold in the tariffs could be counter-productive. Further, given the confirmation in this decision that mandated wholesale roaming provides incidental access, and not permanent access, to an incumbent's network, and the clarification of the MVNO subscriber roaming condition, the possibility of a wholesale roaming customer or an MVNO being able to resell permanent access to an incumbent's network should be greatly reduced.

75. Accordingly, the Commission determines that permanent roaming restrictions are not required in the incumbents' tariffs. The Commission therefore **directs**

- the incumbents to remove the proposed restrictions related to permanent roaming from their tariffs; and
- Bell Mobility and TCC to remove from their tariffs the proposed clauses requesting that wholesale roaming customers provide a corporate certificate attesting that they have complied with permanent roaming conditions.

### Conclusion

76. As determined above, it would not be appropriate for the incumbents to include any of the proposed restrictions in their tariffs. However, the principles behind these restrictions could nonetheless be helpful as indicators of whether a wholesale roaming customer has allowed the incumbent's network to be accessed on a permanent basis.

77. If disputes arise between the incumbents and their wholesale roaming customers with respect to whether roaming is surpassing an acceptable level, these parties may request that the Commission determine whether a wholesale roaming customer is making improper use of the service, or has permitted an MVNO to do so.

78. The Commission may use some or all of the following indicators to help it determine whether the wholesale roaming customer has misused or allowed its MVNO to misuse the service, depending on the particular facts of the case:

- it has deliberately issued phone numbers from exchanges outside its home network footprint to its end-users;
- it has sold or marketed its services outside its home network footprint;
- it has sold or marketed its services in a manner that would result in its end-users gaining permanent access to the incumbent's network;
- it has provided its end-users with a device that has for its sole or predominant purpose permitting them to gain permanent access to the incumbent's network; and

- it has otherwise failed to take commercially reasonable steps to limit roaming on the incumbent's network by its end-users to incidental levels that are within the scope of the service. In considering this factor, the Commission may take into account evidence of broad traffic patterns and network use trends concerning a significant proportion of wholesale roaming customer or MVNO end-users.

## Should prohibitions on in-footprint roaming and traffic offloading be included in the final tariffs?

79. In-footprint roaming occurs when a wireless carrier's retail customers roam on another carrier's network while they are within their home carrier's network footprint. Traffic offloading occurs when a wholesale roaming customer uses GSM-based roaming to move end-user traffic to the incumbent's network even when the wholesale roaming customer's network is in the geographic area.

### Positions of parties

80. The incumbents included prohibitions on in-footprint roaming and traffic offloading in their proposed tariffs.

81. Bell Mobility's definition of roaming service states that the company does not permit roaming on its network by a wholesale roaming customer's end-users in areas covered by the wholesale roaming customer's own network. It also proposed that the wholesale roaming customer not be permitted to offload traffic in areas where both it and Bell Mobility have operating public mobile networks.

82. TCC proposed that tariffed rates for roaming would apply in its network footprint (i) in areas where a wireless carrier does not have spectrum, or (ii) in areas where a wireless carrier has spectrum, but has not yet deployed the spectrum. The company proposed that commercially negotiated rates would apply in areas within its available footprint not covered by (i) or (ii). It proposed that the wholesale roaming customer should strive to avoid any capacity offloading in areas where the customer and TCC have networks. It also proposed consequences for ongoing offloading issues.

83. RCCI's proposed tariff specifies that roaming service is available to the wholesale roaming customer's end-users when they travel outside their carrier's footprint.

84. Several parties opposed the proposed prohibitions and argued that they should be removed from the final tariffs.

85. WIND submitted that Bell Mobility's proposed prohibition on in-footprint roaming does not fully account for the fact that there is no solid boundary that defines a wireless network. It also submitted that available technologies for blocking roaming are coarse at best and that in-footprint roaming cannot be prevented with absolute certainty.

86. In WIND’s view, the wholesale roaming provider should be required to provide the appropriate data to WIND so that WIND can avoid in-footprint roaming by its end-users. It proposed that there be consequences to the host carrier for delayed or inaccurate information and a mandatory requirement that the host carrier implement any requested location area code (LAC) blocking on a timely basis.

87. WIND also proposed that wireless carriers seeking access to wholesale roaming be required to adopt measures to minimize in-footprint roaming through settings in the network priority list in end-users’ mobile devices. It recommended that the proposed restrictions in Bell Mobility’s and TCC’s tariffs concerning traffic offloading be removed and that, instead, a network priority list be created in end-users’ mobile devices to limit in-footprint roaming.

88. CNOC submitted that the proposed restrictions unreasonably limit access to roaming in areas where a wireless carrier has deployed spectrum or network facilities but where coverage gaps remain. In its view, the restrictions provide Bell Mobility and TCC with unilateral power to determine whether a wireless carrier has or has not deployed spectrum, or has covered an area.

89. Eastlink submitted that the proposed definitions of roaming and geographic limits contravene ISED’s roaming conditions of licence, the intention of the wholesale wireless framework, and the operational realities of roaming.

90. Eastlink also submitted that RCCI’s proposed provision would dictate that roaming end-users can only roam outside the wholesale roaming customer’s network footprint, which is defined as areas where wholesale roaming customers have contiguous towers. It submitted there are many coverage gaps within areas where the wholesale roaming customer has built a contiguous set of telecommunications antennas and that wholesale roaming customers require access to wholesale roaming within these coverage gaps until they are able to fill them.

91. Eastlink further submitted that ISED’s roaming conditions of licence do not differentiate between roaming within and outside a wholesale roaming customer’s network footprint, and that TCC’s proposal to charge a different rate inside the footprint would contravene the wholesale wireless framework.

92. Videotron submitted that the incumbents’ proposed restrictions hold great potential to impose onerous and unreasonable operational constraints on new entrants.

93. In Videotron’s view, there will inevitably be numerous localized situations in which a carrier’s network signal is unavailable to its end-users, despite the availability of signals from one or more of its competitors. These situations include antenna placement and topography, the propagation characteristics of the network’s frequency bands, and the presence of vegetation. The lack of signal may also result from local land use authorities refusing to authorize the placement of a new antenna by the network operator.

94. Videotron referred to the first version of ISED's roaming conditions of licence, published in 2008,[9] which restricted the availability of roaming to end-users out of range of their carrier's home network. In Videotron's view this restriction was prone to abuse by the incumbents and overly complicated to operationalize. Videotron suggested that it was these difficulties that led ISED to remove the restriction in its *Revised Frameworks for Mandatory Roaming and Antenna Tower and Site Sharing* (ISED's revised mandatory roaming framework).[10]

95. Videotron argued that the incumbents' proposals create an opportunity for mischief on their part in the present context as well, specifically by being able to continually threaten to withdraw essential roaming services from new entrants for lack of compliance with the proposed restriction.

96. RCCI replied that it offers roaming across its entire public mobile network, as required under ISED's revised mandatory roaming framework. RCCI added that Eastlink was incorrect when it submitted that RCCI's tariff contravenes ISED's roaming conditions of licence and the intention of the wholesale wireless framework because it did not believe that RCCI would provide roaming in these coverage gaps in the wholesale roaming customers' networks.

97. Regarding the geographic restrictions on roaming, TCC replied that its definition, based on the Commission's definition of roaming, serves to limit roaming only to those areas where the wholesale roaming customer does not have direct network coverage. It submitted that its proposed geographic restrictions are consistent with the Commission's statement that wholesale roaming enables wireless carriers to (i) provide coverage in areas where they do not have spectrum, and (ii) fill in coverage gaps in areas where they do have spectrum, but have not deployed network facilities.

98. TCC opposed Videotron's interpretation that under ISED's regime, "in-territory" is where a wholesale roaming customer holds spectrum licences and "out-of-territory" is where it does not. Further, TCC submitted that Videotron had confused the Commission's and ISED's regimes, and that ISED's removal of the in-territory/out-of-territory distinction has no bearing under the Commission's GSM-based wholesale roaming tariff framework.

99. TCC also submitted that its proposed geographic limitations are consistent with the Commission's determinations in the wholesale wireless framework, meaning that ISED's revised mandatory roaming framework has no effect.

100. Bell Mobility submitted that its roaming definition is fully consistent with the Commission's definition in the wholesale wireless framework and that there is no

[9] See *Conditions of Licence for Mandatory Roaming and Antenna Tower and Site Sharing and to Prohibit Exclusive Site Arrangements* (CPC-2-0-17, November 2008).

[10] See paragraph 33 of the framework.

inconsistency between the Commission’s definition of GSM-based wholesale roaming and ISED’s definition. In its view, the Commission’s definition means that the wholesale roaming that is mandated pursuant to Commission-approved rates, terms, and conditions excludes areas that fall within the requesting wireless carrier’s network footprint.

101. Bell Mobility submitted that while it appreciates WIND’s commitment to ensure that its end-users’ devices would default to WIND’s network, unforeseen circumstances could necessitate the prohibition of traffic offloading. Bell Mobility cited the example of an extreme situation in which the network of the wholesale roaming customer might become overloaded, disabled, or otherwise not available at all, and all of the roaming end-users’ devices would default to the host network. It submitted that this would be an example of inappropriate traffic offloading.

**Commission’s analysis and determinations**

102. ISED’s revised mandatory roaming framework states the following: “Roaming must enable a subscriber (a Roamer) already served by the Requesting Operator’s network (Home Network) to originate or terminate communications on the Licensee’s network (Host Network), wherever technically feasible.”

103. In the previous version of this framework, ISED indicated that roaming applied when an end-user was out of range of the home network. However, it later excluded the geographic specifications (in-territory and out-of-territory) to reflect the expanded scope of mandatory roaming that would apply to wireless carriers across all their licensed service areas. ISED indicated that while this change increased the possible scope of the condition, it was in the licensees’ best interest to minimize their customers’ roaming traffic.

104. There is no solid and stable boundary to a wireless network, and coverage gaps are inherent to the nature of mobile wireless services. As the Commission found in the wholesale wireless framework, the incumbents already hold market power in the wholesale roaming market and the barriers to entry are high. Moreover, it takes significant time for smaller wireless carriers to expand their facilities and fill coverage gaps. Therefore, given the overlapping nature of public mobile networks, in-footprint roaming and occasional traffic offloading are important to the quality of roaming services.

105. In the wholesale wireless framework, the Commission stated that wholesale roaming enables wireless carriers to (i) provide coverage in areas where they do not have spectrum, and (ii) fill in coverage gaps in areas where they do have spectrum, but have not deployed network facilities. As such, the incumbents’ proposed prohibitions on in-territory roaming and traffic offloading contradict the spirit of the framework, as well as its strategic objectives. They also seriously undermine the viability of the roaming service for end-users. However, the proposal for wholesale roaming customers to adopt measures for end-users’ mobile devices to minimize

in-footprint roaming would be an appropriate way to reduce the impact on incumbents' networks.

106.In light of all the above, the Commission determines that in-footprint roaming and traffic offloading are appropriate. The Commission therefore **directs** the incumbents to

- remove from their tariffs the proposed restrictions on in-footprint roaming and traffic offloading; and
- add a clause that states that the wholesale roaming customer must take all reasonable steps to ensure that their end-users configure their devices to register on the wholesale roaming customer's network in priority over all other available networks where roaming is permitted, to minimize in-footprint roaming and traffic offloading.

## What is the appropriate scope of available network provisions?

### Positions of parties

107.The incumbents proposed that private networks be excluded from their available public mobile network or available network footprint (available network) for wholesale roaming. Bell Mobility proposed that private networks and geographic areas served through satellite backhaul be excluded from its available network.

108.Ice Wireless requested that the incumbents clarify in their tariffs that only the parts of the incumbents' geographic areas that are *exclusively* served by a private network, and in Bell Mobility's case, satellite backhaul, are to be excluded from their available network. RCCI replied that it would revise its tariff to reflect Ice Wireless's concern.

109.Regarding Bell Mobility's proposed exclusion of geographic areas served by satellite backhaul, CNOC submitted that provided an area is served by a GSM network, the manner in which transport is established to the area should not be relevant. It further submitted that no such exclusion was set out in the wholesale wireless framework. CNOC submitted that this restriction is inappropriate and should be removed.

110.Bell Mobility referred to the limited capacity and high costs associated with its ability to provision wireless connectivity to these sparsely populated rural and remote communities. It submitted that providing roaming access to these areas would likely increase traffic volumes, which would almost certainly result in capacity overload, delays, and network outages, and would be highly prejudicial to the end-users living in these communities.

### Commission's analysis and determinations

111.In remote areas where Bell Mobility relies on satellite backhaul, this method represents the most cost-effective mode of transportation. Further, roaming traffic volume is likely to be limited given the small populations in these areas. Bell Mobility's proposed exclusion would mean that the wholesale roaming customer would not be able to provide service to its end-users visiting these areas. This would lessen the attractiveness of the wholesale roaming customer's service to its end-users who wish to visit these areas and the overall effectiveness of the wholesale roaming customer as a competitive option. Therefore, it would not be appropriate for Bell Mobility to exclude areas served by satellite backhaul from its available network.

112. However, it would be appropriate for the incumbents to exclude from their available networks geographic areas that are *exclusively* served by a private network because, by definition, their large customer bases do not have access to private networks.

113. In light of the above, the Commission **directs**

- the incumbents to revise their definitions of available network to clarify that geographic areas that are exclusively served by a private network are excluded from their available networks; and

- Bell Mobility to revise its definition of available network to remove its proposed exclusion of geographic areas served by satellite backhaul from its available network.

## What method of network interconnection is appropriate?

### Positions of parties

114. Bell Mobility proposed to implement interconnection with wholesale roaming customers in a mutually agreed-upon manner. RCCI proposed that there would be no direct interconnection for signalling, voice, or data unless both RCCI and the wholesale roaming customer agreed to it in writing. TCC proposed that the technical information relevant for roaming would be exchanged between the parties but did not specify whether the method of interconnection would be direct or indirect.

115. CNOC submitted that the interconnection method can have a significant effect on the wireless carrier's network operations and the cost to access and use wholesale roaming. Consequently, it submitted that interconnection requirements or any other item that has a material impact on the cost of accessing wholesale roaming should be included in the incumbents' tariffs.

116. CNOC submitted that to the extent the incumbents directly interconnect with each other or any other wireless carrier, requiring a wholesale roaming customer to interconnect in a different way – for example, through the use of "clearinghouses" such as Syniverse – that results in significant additional costs would represent an unreasonable disadvantage to the wholesale roaming customer, contrary to subsection 27(2) of the Act.

117. RCCI replied that it would be impossible to provide the required level of detail in a standard document given the unique nature of interconnections between carriers, and that interconnection details are best left to an accompanying off-tariff agreement.

118. Bell Mobility submitted that virtually every GSM-based wireless carrier in the world uses third-party providers for both network signalling interconnection and virtual private networks to route data traffic back to the home network. Further, Bell Mobility stated that CNOC had mischaracterized third-party providers, such as Syniverse, as clearinghouses, when in fact using such providers is the standard method of interconnection.

119. Bell Mobility also submitted that direct interconnection is generally not used by GSM-based wireless carriers because it is more cost-efficient to interconnect with only one third-party provider that then provides connections to all other GSM-based wireless carriers. As a result, it submitted that additional tariff wording specifying the method of interconnection is not required given the ubiquity of the current interconnection standard for roaming.

### Commission’s analysis and determinations

120. Cost and efficiency are two factors that are considered in the selection of network interconnection methods. For efficiency, multiple wholesale roaming customers interconnect indirectly to an incumbent via a third party with which the incumbent maintains a single interconnection channel, which also minimizes the incumbent’s interconnection and maintenance costs. Direct interconnection with each wholesale roaming customer would multiply the incumbents’ interconnection and maintenance costs by the number of wholesale customers, which is not justified by traffic volumes. If direct interconnection were mandated, the higher aggregate costs would have to be passed on to wholesale roaming customers and, ultimately, to end-users.

121. If the incumbents were directly interconnecting with each other but not providing a direct interconnection option to other wholesale roaming customers of similar scale, this may indicate preferential treatment. However, there is no evidence in this proceeding to conclude that this treatment would be discriminatory, undue, or unreasonable pursuant to subsection 27(2) of the Act.

122. Should off-tariff agreements continue to be acceptable, any wholesale roaming customer that generates a sufficiently high level of traffic to make direct interconnection economically viable would likely have more negotiating power with the incumbents, and would therefore be able to negotiate an appropriate off-tariff agreement with an incumbent. Accordingly, it would be reasonable to include indirect interconnection in the incumbents’ tariffs as a backstop to ensure that wholesale roaming customers that do not have a high level of negotiating power will be able to access wholesale roaming at an appropriate rate – that is, one that is lower than they would otherwise be able to negotiate themselves.

123. The tariffed rate for wholesale roaming should include all the necessary costs for the wholesale roaming customer to interconnect with the incumbent on an indirect basis. No additional costs or fees should be required. Further, the tariffs must set out at a base level what functionality is included.

124. In light of the above, the Commission determines that mandated wholesale roaming is to be provided using indirect interconnection.

125. The Commission therefore **directs** the incumbents to

- modify their tariffs as necessary to implement this determination, and
- specify in their tariffs what is included in the interconnection portion of mandated wholesale roaming service.

## How should network changes be dealt with?

### Positions of parties

126. The incumbents proposed wording in their respective tariffs to cover changes to their networks that are made to implement new, or amend existing, network functionalities. They also proposed various notification periods.

127. Bell Mobility and RCCI proposed to use commercially reasonable efforts to give wholesale roaming customers at least 30 days' written notice of any change. RCCI also proposed that it be permitted to "turn down" a level of service that it also turns down for its own customers, provided that it uses commercially reasonable efforts to give 30 days' notice of the change.

128. TCC proposed language indicating that it may make changes to wholesale roaming from time to time by, among other things, adding, removing, replacing, or modifying the service, provided that the same changes apply to equivalent services provided by TCC to its own customers. TCC proposed to use commercially reasonable efforts to provide wholesale roaming customers with 90 days' written notice prior to implementing a change.

129. Both Bell Mobility and TCC proposed a change process whereby the incumbent and wholesale roaming customers would discuss the effects of any changes on the wholesale roaming customers, and the necessary actions to be performed.

130. Videotron and WIND submitted that network changes should be subject to six months' notice, consistent with the determinations set out in Telecom Letter Decision 94-11. Videotron submitted that changes to wholesale roaming can have a substantial effect on wholesale roaming customers and their relationships with their end-users, while WIND argued that there is no public policy reason why the proposed shorter notice time frames would be acceptable for material changes that affect wholesale roaming.

131. Eastlink submitted that there is no reason why Bell Mobility and RCCI could not use commercially reasonable efforts to provide 90 days' notice of major changes to their networks. It also expressed concern about the lack of specific language ensuring that changes made by the incumbents do not prejudice wholesale roaming customers. Eastlink further submitted that the provisions in the incumbents' tariffs regarding network changes are inconsistent with ISED's roaming conditions of licence and their existing domestic roaming agreements and that, therefore, these provisions should be updated to include language clarifying that changes can be made only in specific situations.

132. Bell Mobility submitted that in the same way that 60 days is sufficient time to provide traffic forecasts, 60 days is sufficient time to respond to notice of network changes.

133. TCC submitted that Telecom Letter Decision 94-11 applied to wireline services and that in that decision, the Commission had acknowledged that some changes occur with less than six months' notice. TCC also submitted that WIND had acknowledged the current reality when it stated that LAC boundary changes only require 90 days' notice so that LAC blocking could be reassessed by the wholesale roaming customer. It also submitted that 90 days is a generally acceptable notification standard in many commercial contracts that have been agreed to since Telecom Letter Decision 94-11 was issued.

134. RCCI replied that the Commission's requirement for a minimum of six months' notice in the wireline context was based on finding a balance between providing a reasonable notification period that would avoid disputes and ensuring that the introduction of innovative services would not be delayed. It submitted that the pace of innovation in the modern mobile wireless domain is significantly faster than it was over 20 years ago in the wireline voice domain. It submitted, therefore, that a six-month notification period would be far too long.

**Commission's analysis and determinations**

135. For technical reasons, changes to networks are inherent to the nature of network-based services. However, the associated terms and conditions should not allow the incumbents to use the necessity of those changes to the competitive disadvantage of their wholesale roaming customers and the general disadvantage of end-users.

136. The incumbents proposed wording that would appear to allow them to make, in addition to network changes, changes to mandated wholesale roaming. While it is acceptable, as a network management practice, for the incumbents to make changes to their networks that might have temporary and indiscriminate effects on roaming services provided to end-users using their networks, it should be clear in the tariffs that the incumbents should not make network changes that affect the roaming services set out in the terms and conditions of the tariff without Commission approval.

137. While there might be situations in which the need to make network changes can arise on short notice, many network changes are planned and are reasonably predictable. In these cases, sufficient notice should be given to wholesale roaming customers to enable them to make any required adjustments in a timely manner.

138. The industry has changed significantly since 1994, and a six-month notification period might be excessive in the context of today's dynamic industry. However, for many types of changes, 30 days' notice could also prove to be too short and provide insufficient time for wholesale roaming customers to react to the changes, to the detriment of end-users. Therefore, 90 days' notice, where possible using commercially reasonable efforts, would be appropriate.

139. Further, the opportunity to discuss and properly manage the effects of changes is important to the quality of roaming services provided to end-users. Accordingly, it would be appropriate for RCCI to include in its tariff a provision to this effect, similar to the ones proposed by Bell Mobility and TCC.

140. Network changes should not create competitive disadvantages for wholesale roaming customers, and language should be included in the tariffs to protect against such a result. Specifically, incumbents should be prohibited from implementing network changes that would result in unjust discrimination against wholesale roaming customers and their end-users, or that would confer an undue preference on the incumbents or their end-users.

141. In light of the above, the Commission **directs** the incumbents to

- reword their tariffs to limit the scope of acceptable potential changes to include network changes only, and not to include modifications to the Commission-mandated wholesale roaming service;
- add a provision to their tariffs stating that network changes that can be made unilaterally are limited to those that affect all end-users in a similar manner, irrespective of their wireless carrier, to prevent unjust discrimination; and
- modify the tariff clauses related to network changes to indicate that the incumbents must make all commercially reasonable efforts to provide wholesale roaming customers with 90 days' notice of the changes.

142. The Commission also **directs** RCCI to include a provision in its tariff stating that RCCI and the wholesale roaming customer shall discuss the effect of any network change on the customer's end-users and shall agree to the necessary actions to be performed.

## What quality of service provisions are appropriate?

### Positions of parties

143. In item 100.5(a) of its tariff, Bell Mobility proposed wording such that it would not be obligated to offer or provide a quality, functionality, technology, service, or level of service in excess of the lesser of that (a) generally offered by the wholesale roaming customer to its own end-users on its public mobile network, or (b) offered by Bell Mobility to its own end-users on its available public mobile network.

144. RCCI and TCC proposed that the wholesale roaming customer's end-users have access to voice and data services at a level of quality comparable to that which they offer their own end-users for similar services. TCC clarified that it would not be required to provide the wholesale roaming customer's end-users with a service that the customer does not itself provide.

145. Bell Mobility and RCCI proposed to include a disclaimer that services would be provided on an as is/as available basis, and that they would not guarantee or warrant the performance, availability, coverage, uninterrupted use, security, or operation of the services. They also proposed to indicate that the services could be temporarily refused, interrupted, or limited at any time due to certain limitations.

146. RCCI also proposed that it should not be obligated to offer data transmission speeds in excess of the lesser of those that it generally offers its own end-users or those that the wholesale roaming customer generally offers its own end-users (in both cases, RCCI excluded data transmission speeds offered separately at a premium rate or for a surcharge).

147. In Videotron's view, Bell Mobility's wording in item 100.5(a) would permit it to lessen the quality of service offered to a wholesale roaming customer based on its unilateral and subjective assessment of the quality of that customer's own retail services. Videotron also submitted that if Bell Mobility's proposed wording were to be approved, the quality of service limit should be defined only in terms of the different levels of GSM technology – for instance, an incumbent should not be obligated to provide a wholesale roaming customer with long-term evolution (LTE) services if the customer only provides third-generation (3G) service to its own end-users.

148. Similarly, WIND submitted that Bell Mobility's proposed wording in item 100.5(a) would potentially allow it to provide a lesser quality of service to roaming WIND end-users compared to Bell Mobility's end-users, assuming all other factors are the same – for example, that both companies' end-users are using the Bell Mobility network's 3G capabilities.

149. Eastlink and Ice Wireless submitted that Bell Mobility's tariff item 100.7 regarding limitations on roaming places unacceptable conditions on the quality of service offered, and that it should be modified. Ice Wireless submitted that the service limitations described in this item broadly exclude all warranties of performance,

availability, coverage, uninterrupted use, security, and operation of services, in direct conflict with the warranties Bell Mobility provides under item 100.5(a) regarding quality, functionality, and level of service.

150. Eastlink, Videotron, and WIND submitted that RCCI should not be permitted to exclude premium quality data transmission services from its obligations to provide roaming. Eastlink submitted that ISED's roaming conditions of licence do not allow the incumbents (or any roaming service provider) to make only certain priced services available to wholesale roaming customers and to either withhold other speeds or make them subject to other limitations.

151. Bell Mobility and RCCI replied that their proposed provisions reflect language used in ISED's roaming conditions of licence.

**Commission's analysis and determinations**

152. As a general matter, it would be appropriate for each of the incumbents to include a single quality of service provision in their wholesale roaming tariffs, rather than the current multiple provisions,[11] for greater clarity and to avoid confusion. These provisions should not be included in the Definitions section of the tariffs.

153. Further, it is important that the quality of service provisions avoid wording that could allow for anti-competitive behaviour in that the incumbents could provide a lesser quality of service for their competitors' end-users.

154. The following specific revisions should be taken into account in the incumbents' revised provisions.

155. Bell Mobility's proposed wording in item 100.5(a) is reasonable. The incumbents should not be required to meet a standard for wholesale roaming customers beyond what the incumbents offer their own end-users or beyond what the wholesale roaming customers provide to their own end-users. Such a requirement would be inconsistent with one of the three objectives the Commission set out in the wholesale wireless framework: to implement efficient regulatory measures with respect to wholesale mobile wireless services, along with continued reliance on market forces where appropriate.

156. For example, if a wholesale roaming customer offers only 3G service on its network and its end-users have only 3G service when roaming on Bell Mobility's LTE network, this should not be not considered anti-competitive because the end-user is getting the level of service to which they have subscribed and that they receive on their home network. This approach is consistent with relying on market forces and encouraging the development of facilities-based competition.

[11] That is, in current items 100.5(a) and 100.7 for Bell Mobility, items 1.27, 4.1.3, and 5.4.1 for RCCI, and items 233.2 and 233.3.2 for TCC.

157. Bell Mobility’s proposed wording is also consistent with the wording in ISED’s roaming conditions of licence.

158. It is also reasonable for the incumbents to specify any potential service limitations on their roaming services due to issues such as congestion, atmospheric or topographical conditions, or equipment modifications, as Bell Mobility and RCCI have proposed. However, if such issues should arise, the incumbent in question should provide the service to its wholesale roaming customers to the same extent that it provides roaming service to its own end-users. As a result, it would be appropriate for Bell Mobility to add language reflecting this, similar to the wording that RCCI has proposed.

159. With regard to RCCI’s proposal to exclude data transmission speeds from the level of service provided, while wholesale roaming services are not currently distinguished by data transmission speeds, the exclusion could create an opportunity for anti-competitive behaviour if the incumbents differentiate speed in the future – that is, RCCI could have the flexibility to provide a lower quality of service to wholesale roaming customers than it provides to its own end-users if certain data transmission speeds are excluded. As a result, RCCI should delete this exclusion from its proposed provision.

160. In light of the above, the Commission **directs**

- the incumbents to include a single quality of service provision in their tariffs located outside the Definitions section;
- the incumbents to ensure that this provision includes language consistent with the following: “provided that the Services shall provide a Roaming Customer with the ability to access voice and data services at a level of quality comparable to that offered for similar services to the Company’s own customers”; and
- RCCI to delete from its proposed tariff the clause regarding the exclusion of data transmission speeds.

161. In addition, the Commission **directs** Bell Mobility and TCC to add the word “generally” before “offered” in current items 100.5(a)(1)b. and 233.3.2.a of their respective tariffs.

## Should wholesale roaming customers be mandated to provide traffic forecasts and, if so, how often?

### Positions of parties

162. Traffic forecasts provide estimated volumes of roaming services that a wholesale roaming customer is likely to need to serve its end-users for a defined period of time. The incumbents submitted that they require traffic forecasts for network planning purposes.

163. Bell Mobility proposed that its wholesale roaming customers provide it with non-binding forecasts of their expected volume of roaming traffic on Bell Mobility's available public mobile network, by province and territory, for the following 12-month period. It indicated that the forecasts should be submitted at least 60 days prior to the beginning of an annual calendar period. Bell Mobility also proposed that whenever a wholesale roaming customer expected a substantial increase in the number of roaming end-users and/or roaming traffic in any calendar quarter, it provide Bell Mobility with a revised forecast for that quarter, at least 30 days before the expected increase.

164. RCCI proposed that wholesale roaming customers provide once a year, at least 30 days prior to the customer's service commencement and at least 30 days prior to the beginning of each subsequent year, a good faith estimate of the aggregate volume of services to be used by roaming end-users during each three-month period of the year. Further, it proposed that if the wholesale roaming customer expected a substantial increase in the number of roaming end-users or use of RCCI's services in any calendar quarter, the customer would provide RCCI with a revised forecast for that quarter at least 30 days in advance.

165. TCC proposed that wholesale roaming customers be required to provide best-effort forecasts for three years two weeks after the request for wholesale roaming and at the beginning of each calendar year.

166. Videotron submitted that TCC's proposed three-year forecast is unlikely to be useful in practice and that it should be reduced to one year.

167. Ice Wireless requested that, to reduce administrative burden, the proposed traffic forecast conditions be modified so that the wholesale roaming customer is required to provide roaming traffic forecasts upon 60 days' written notice and no more than once per 12-month period.

168. Bell Mobility replied that its proposed provisions would provide for reasonable notice regarding any roaming changes.

169. RCCI replied that it relies on traffic forecasts to provide sufficient bandwidth and other resources to the appropriate parts of its network. In its view, doubling the notification period, as requested by Ice Wireless, would not improve RCCI's or its wholesale roaming customers' end-users' experience since forecasts made closer to the applicable period would be more accurate.

170. TCC replied that its three-year forecast is required for long-term network planning and to ensure that there is sufficient capacity to handle the on-boarding of numerous wholesale roaming customers. It also submitted that Videotron had not provided any justification for its claim that the three-year period for traffic forecasts is too long to be useful.

### Commission's analysis and determinations

171. While complying with the various proposed requirements for traffic forecasts may create extra administrative burden for wholesale roaming customers, forecasts are necessary for planning purposes.

172. The incumbents described the forecasts using terms such as "non-binding," "in good faith," and "best effort." These terms may be interpreted to mean that wholesale roaming customers are not prohibited from exceeding the forecasted traffic amount.

173. Given the dynamic nature of the industry, a three-year forecast, as proposed by TCC, is unlikely to be accurate enough to provide useful information. As a result, a shorter forecast period would be more appropriate. A one-year period would balance the administrative burden on wholesale roaming customers with the incumbents' network-planning needs.

174. In light of the above, the Commission finds Bell Mobility's and RCCI's proposed traffic forecast provisions to be reasonable. The Commission **directs** TCC to modify its proposed tariff provision to require a one-year forecast.

## Should automatic hand-off / seamless roaming provisions be included in the incumbents' tariffs?

175. When an end-user is roaming and moves across the network footprints of different wireless carriers, a call or a data session may be dropped. Automatic hand-off, also known as seamless roaming, across networks prevents such interruptions.

176. In the wholesale wireless framework, the Commission determined that the incumbents would not be required to provide wholesale roaming on a seamless basis.

### Positions of parties

177. Each of the incumbents proposed tariff provisions that indicate that automatic hand-off is not available to wholesale roaming customers.

178. Videotron submitted that there is no rationale for excluding the possibility of negotiating automatic hand-off, which provides benefits to consumers, and that the proposed tariffs should allow for this possibility.

179. Eastlink submitted that since the tariffs are intended to state the terms, conditions, and rates associated with services to be provided, there is no need to specify in the tariff all the services that are not provided. It submitted, therefore, that all provisions related to automatic hand-off should be removed from the tariffs.

180. Eastlink also submitted that, since all three incumbents provide automatic hand-off within Canada to their own end-users, it is entirely inappropriate that they do not make it available, even on a limited basis, to their wholesale roaming customers.

### Commission's analysis and determinations

181. The proposed tariff provisions appropriately reflect the Commission's policy determination but are not required in the tariff. Accordingly, the Commission **directs** the incumbents to remove the provisions at issue from their tariffs.

182. The Commission confirms that while the incumbents are not mandated to provide automatic hand-off, wholesale roaming customers may obtain this forborne service on a negotiated basis as an add-on or a separate service.

## Should call hand-back provisions be included in the incumbents' tariffs?

183. When an end-user is roaming on an incumbent's network, long distance calls are made/received on the incumbent's network. There are two options for handling a roaming end-user's long distance calls: (i) the incumbent can directly route the call and charge the wholesale roaming customer, at forborne rates, for calls made by the roaming end-user; or (ii) a technical solution known as call hand-back can be used to automatically route the call from the incumbent's network to the home network.

184. In the wholesale wireless framework, the Commission determined that the incumbents would not be required to provide call hand-back as part of mandated wholesale roaming.

### Positions of parties

185. Bell Mobility's proposed terms and conditions state that the company will route and handle originating long distance calls made by the wholesale roaming customer's end-users while they are roaming on Bell Mobility's network. In addition, Bell Mobility proposed that the wholesale roaming customer may, at its discretion, implement alternative routing of long distance calls, as long as this does not require the involvement of Bell Mobility.

186. Similarly, RCCI proposed that it would route, handle, and charge wholesale roaming customers for long distance calls made by their end-users while they are roaming on RCCI's network.

187. TCC proposed that its wholesale roaming customers would pay all charges incurred for services provided through any connections furnished to them, including long distance calls, and that call hand-back is not available under its tariff.

188. Videotron referred to the constructive nature of Bell Mobility's proposal to allow wholesale roaming customers to implement alternative solutions for the routing of long distance calls that do not involve cost implications for Bell Mobility. Consequently, Videotron requested that the Commission direct the other two incumbents to include such language in their tariffs to ensure that wholesale roaming customers have the flexibility to implement alternative routing for long distance calls at their discretion.

### Commission's analysis and determinations

189. Since it is not part of mandated wholesale roaming, long distance call routing to the incumbents' networks is a separate service, and nothing prevents the incumbents from providing a call hand-back service on a forborne basis as an add-on to the mandated service, with rates, terms, and conditions agreed to by the parties involved.

190. Accordingly, it is not necessary for the incumbents to include provisions related to call hand-back in their tariffs. The Commission therefore **directs** the incumbents to remove these provisions.

## Should the Commission make changes to other sections of the tariffs?

### Should wholesale roaming customers be required to pay a deposit and, if so, what should the amount be?

#### Positions of parties

191. Bell Mobility's proposed terms and TCC's Terms of Service state, among other things, that deposits may be required under three conditions related to the customer's lack of credit history, poor credit rating, or abnormal risk of loss. They also specify interest rates and details about how interest would be calculated and paid. Bell Mobility proposed that the total amount of the deposits not exceed three months' worth of charges for all services provided under the tariff item based on its reasonable estimates, while TCC's Terms of Service state that TCC must not require a customer to pay a deposit or provide a deposit alternative in an amount greater than all anticipated charges, including long distance charges, for three months of service.

192. RCCI proposed a security deposit provision that would require wholesale roaming customers to provide it with an irrevocable letter of credit for $250,000 from one of the top five Schedule I Canadian Banks, at least 30 days before the provision of wholesale roaming begins. Upon RCCI's request, the wholesale roaming customer would be obligated to increase the amount of the security deposit or replace the letter of credit so that the amount is equal to the previous three months' worth of charges it has incurred.

193. Eastlink, Ice Wireless, and WIND submitted that RCCI's requirement for a letter of credit or deposit of $250,000 was unacceptable.

194. Ice Wireless submitted that RCCI's requirement could represent a daunting barrier for smaller providers and requested that RCCI modify its proposed form of security to three months' worth of charges for all services provided under the wholesale roaming tariff.

195. Eastlink submitted that because wholesale roaming is available only to established facilities-based providers with significant investments in their wireless business, deposit requirements are unnecessary. It submitted that if the Commission were to

allow the incumbents to require a deposit, Bell Mobility’s proposed wording would be more reasonable than RCCI’s.

196. WIND submitted that there is no reasonable basis for the Commission to approve a roaming-specific security deposit requirement that differs from the standard security deposit requirements in other mandated wholesale service tariffs. In its view, the wholesale roaming tariff should include standard deposit language comparable to that in the Commission’s competitive local exchange carrier (CLEC) Model Tariff.

197. RCCI replied that there is much greater risk for a new entrant carrier with a regional network footprint to quickly accumulate large debts with wireless roaming services than in the wireline CLEC domain. RCCI submitted that while it may be true that a current or potential wholesale roaming customer would own valuable assets, there was no guarantee that RCCI would receive the funds necessary to settle an outstanding account in the event of a bankruptcy, and that the security deposit terms and conditions were therefore necessary.

**Commission’s analysis and determinations**

198. RCCI’s Access Services Tariff includes provisions for deposits and alternatives that are based on wording in the CLEC Model Tariff and generally align with those proposed by Bell Mobility and those included in TCC’s Terms of Service. RCCI’s circumstances as an incumbent are not sufficiently different from those of Bell Mobility or TCC, or wireline CLECs in general, to require an approach for wholesale roaming deposit terms that is different from what is already included in its Access Services Tariff. In addition, Bell Mobility’s proposed provision, TCC’s Terms of Service, and RCCI’s existing Access Services Tariff provision would allow greater flexibility than RCCI’s proposed wholesale roaming provision, especially in the case of new or smaller providers.

199. As a result, RCCI’s proposed security provision should be deleted. It would be appropriate for the company to reflect in its wholesale roaming tariff the language from the deposit provision in its Access Services Tariff.

200. Bell Mobility’s proposed wording includes many elements of the CLEC Model Tariff deposit provision. In both cases, a deposit is required only under certain circumstances and is limited to three months’ worth of charges for all services provided under the tariff.

201. However, Bell Mobility’s text is missing certain elements that the Commission has previously approved and that are contained in RCCI’s Access Services Tariff, the CLEC Model Tariff, and TCC’s Terms of Service – such as a commitment to informing the customer of the reason for the deposit and providing an option for an alternative to the deposit; that the principal and interest will be reflected on billing statements; and that the service provider must regularly review the continued appropriateness of the deposits and refund or credit the deposit, with interest, or return the guarantee or undertaking, when service is terminated or the conditions

justifying the arrangement are no longer required. It would be appropriate for Bell Mobility to revise its proposed provision to include the missing elements.

202.TCC's Terms of Service provisions are appropriate.

203.In light of the above, the Commission **directs**

- RCCI to delete its proposed security provision and reproduce its Access Services Tariff deposit provision in its wholesale roaming tariff, replacing "interconnection services" with "wholesale roaming services"; and

- Bell Mobility to revise its proposed deposit provision to include missing elements previously approved by the Commission, based on the wording in the CLEC Model Tariff.

### Should wholesale roaming customers be required to maintain insurance?

#### Positions of parties

204.RCCI proposed that wholesale roaming customers be required to maintain, among other things, a comprehensive general liability insurance policy or polices with a combined single limit of not less than $10 million for bodily injury or death and for property damage.

205.Eastlink and Ice Wireless submitted that RCCI's proposed requirement was excessive. They noted that neither Bell Mobility nor TCC had proposed a requirement for insurance, and submitted that the provision should be removed from RCCI's tariff.

206.Eastlink submitted that it has insurance provisions in its tower sharing agreements in cases where there is risk of direct damage to the incumbents' equipment and infrastructure (or vice versa, when the incumbents co-locate on Eastlink's towers) but that there is no theoretical possibility that roaming services could cause injury, death, or direct damage to property.

207.Ice Wireless submitted that RCCI's insurance requirement imposed a considerable burden on wholesale roaming customers, constituting a barrier to obtaining wholesale roaming services for small operators. It also submitted that RCCI is already protected by its own insurance coverage for such perils.

208.RCCI submitted that a requirement for a comprehensive general liability insurance policy is standard for a commercial agreement with the scope and complexity of a nationwide roaming agreement. It also submitted that the limit of not less than $10 million was reasonable.

#### Commission's analysis and determinations

209.Neither Bell Mobility nor TCC included an insurance provision in their proposed tariffs, and the Commission has not approved an insurance provision for the CLEC Model Tariff. RCCI did not provide evidence that one is required in its specific circumstances as an incumbent. As noted above, RCCI may require a deposit in cases where it has concerns about the credit history, credit rating, or abnormal risk of loss associated with a wholesale roaming customer.

210.In light of the above, the Commission **directs** RCCI to delete the proposed insurance provision from its tariff.

### What should the limitations of liability be?

#### Positions of parties

211.Among other things, Bell Mobility's and RCCI's proposed limitation of liability provisions state, with certain exceptions, that these companies will not be liable for any indirect, special, incidental, consequential, punitive, or exemplary damages; loss of revenue; or loss of profits. Their proposed provisions also specify that they will not be liable to the wholesale roaming customer, any roaming end-user, or any other person for damages resulting from errors, omissions, interruptions, delays, transmission errors, transmission defects, breakdown, or defects in the company's network, or the services, or any other cause; and for any act or omission by a third party whose network installations or services are used to provide wholesale roaming or connectivity to the service.

212.Bell Mobility proposed to limit its liability to $100,000, while RCCI proposed a limit of the greater of $1 million or the aggregate of all amounts payable to RCCI during the 12-month period immediately preceding the date of the incident that leads to the initiation of the claim.

213.TCC's Terms of Service specify that the company's liability is not limited in cases of deliberate fault, gross negligence, or anti-competitive conduct by TCC, or in cases of breach of contract where the breach results from TCC's gross negligence. Except in cases where the company's negligence results in physical injury, death, or damage to the customer's property or premises, TCC's wording limits the company's liability to the greater of $20 or three times the amount refunded or cancelled as a result of telephone directory errors and omissions, or as a result of specific service problems.

214.Ice Wireless submitted that RCCI's proposed tariff sets out a mutual limitation of liability that provides greater certainty to both parties than TCC's term. In its view, TCC's limitation of liability would be extremely prejudicial if it were applied to the damages available to TCC's wholesale roaming customers.

215.Eastlink submitted that a limitation of liability of $1 million is unnecessarily high for wholesale roaming, and that Bell Mobility's proposed $100,000 threshold is more reasonable. Eastlink also expressed concern about the one-sided nature of Bell

Mobility's limitation of liability provision, in particular, and submitted that it should be reciprocal, as it is in RCCI's proposed tariff.

216. WIND submitted that the incumbents' other wholesale tariffs were generally fair and balanced in comparison to the limitations of liability and indemnification provisions in the proposed wholesale roaming tariffs. Like Eastlink, WIND was of the view that the proposed limitation of liability provisions were one-sided. It submitted that they do not properly deal with deliberate fault, gross negligence, anti-competitive conduct, breach of contract where the breach results from the gross negligence of the wholesale roaming provider, or disclosure of confidential information. It also submitted that the proposed term is inappropriate in cases of physical injuries or death.

217. RCCI replied that its tariff includes clauses that limit the liability of RCCI and the wholesale roaming customer, which it submitted was standard in commercial agreements. It acknowledged that its language is one-sided to the extent that it outlines how only one party, RCCI, provides wholesale roaming, but that the key language that limits liability is reciprocal and fully addresses the sources of damage that WIND believes are not dealt with sufficiently.

218. TCC replied that when the terms and conditions in its proposed roaming tariff are reviewed in conjunction with those in its Terms of Service, concerns about its limitation of liability wording become irrelevant. It noted that the Commission has accepted the limitation of liability set out in its Terms of Service for the provision of all regulated wholesale and retail services.

219. In reply to WIND's comment that TCC's limitations of liability are one-sided and do not properly deal with certain matters, TCC submitted that the Terms of Service do deal specifically with these items. It noted, further, that its Terms of Service contain specific confidentiality provisions and, in particular, state the inapplicability of the limitation of liability provisions in the case of unauthorized disclosure of confidential customer information.

**Commission's analysis and determinations**

220. Both TCC's Terms of Service and the CLEC Model Tariff specify that the company's liability is not limited in cases of deliberate fault, gross negligence, anti-competitive conduct, or breach of contract where the breach results from the company's gross negligence. The CLEC Model Tariff also includes disclosure of confidential information in this list. In both TCC's Terms of Service and the CLEC Model Tariff, the company's liability for negligence is limited to three times the amounts refunded or cancelled in relation to specific service problems – unless, in the case of TCC, the total is less than $20. The specified limits do not apply in cases where the company's negligence results in physical injury, death, or damage to the customer's property or premises.

221. Neither Bell Mobility nor RCCI included any of the above items in their proposed limitation of liability provisions. They did, however, specify that they would not be

liable for damages resulting from errors, omissions, interruptions, delays, transmission errors, transmission defects, breakdown, or defects in the company's network, or the services, or any other cause.

222. While their proposed tariff items include what appear to be high, but very different, maximum liability amounts, they are also imposing limits on matters that are excluded from limitation of liability provisions in other approved tariffs.

223. Given the seriousness of the potential issues in question, and for consistency, Bell Mobility and RCCI should exclude from their limitation of liability provisions the same items that have been excluded in other approved tariffs. In addition, it is not appropriate for Bell Mobility and RCCI to specify that they will not be liable for damages resulting from "any other cause," which is a very broad statement.

224. RCCI's Access Services Tariff includes limitation of liability provisions that are based on wording in the CLEC Model Tariff. RCCI's circumstances as an incumbent should not require an approach for limitation of liability terms for wholesale roaming that is different from what is already included in its Access Services Tariff. Reliance on the existing provision in the Access Services Tariff would address the issues noted above.

225. Similarly, the CLEC Model Tariff limitation of liability provision would be an appropriate template for Bell Mobility's provision, and it would be appropriate for the company to replace its existing proposed items with the CLEC Model Tariff provision. The latter references "Refunds in Cases of Service Problems" that include omissions, interruptions, delays, errors or defects in transmission, or failures and defects in the company's facilities, and form the basis of the calculation of the liability limit.

226. As confirmed above, TCC may reference its general Terms of Service, which have been approved by the Commission and which apply to services provided under its retail and wholesale tariffs. However, should a provision in the Terms of Service not be appropriate for the purpose of the wholesale roaming tariff, the Commission could require TCC to include a different provision in its wholesale roaming tariff.

227. While $20 may seem insignificant in the context of wholesale roaming, TCC's tariff alternatively provides for liability up to three times the amount refunded or cancelled by TCC as a result of a service issue in cases where this amount is greater; accordingly, taken as a whole, the term does not appear unreasonable. The key point is that the limit of three times the amount refunded or cancelled by TCC as a result of a service issue is the same as what the other two incumbents will be subject to. However, certain references in TCC's Terms of Service would not apply in the case of wholesale roaming services – for example, the reference to Telephone Directory Errors and Omissions.

228. In light of the above, the Commission **directs**

- Bell Mobility to delete its proposed limitation of liability provision and replace it with wording based on the provision in the CLEC Model Tariff; and

- RCCI to delete its proposed limitation of liability provision and replace it with wording based on the limitation of liability provision in its Access Services Tariff.

## Are the proposed termination and suspension of service provisions appropriate?

### Positions of parties

229. The incumbents proposed a wide variety of suspension and termination provisions to deal with issues related to roaming, technical problems, and non-payment. The proposed provisions included various timelines and notification periods.

230. Videotron submitted that for a matter as important as the termination or suspension of services, which could dramatically and adversely affect the wholesale roaming customer's entire subscriber base, a minimum 30-day written notification period is required.

231. Eastlink submitted that some roaming that Bell Mobility and TCC might consider inappropriate is actually appropriate or unavoidable. It submitted that the incumbents do not have a relationship with its end-users and that, therefore, they could not know why the end-user's usage appears as it does on the roaming network. In Eastlink's view, it would be entirely inappropriate to suspend all roaming access for all end-users of a wholesale roaming customer based solely on the incumbent's incomplete analysis of the traffic on its network.

232. Eastlink also submitted that terminating wholesale roaming could have catastrophic effects on legitimate facilities-based wireless carriers that have invested hundreds of millions of dollars in their networks and core network infrastructure, and rely on wholesale roaming to supplement their own wireless networks. In its view, therefore, the test for termination of service should be specific and reasonable.

233. Finally, Eastlink submitted that it would be inappropriate for all of a wholesale roaming customer's end-users to lose access to domestic roaming service simply because of a billing dispute between two established, properly operating facilities-based service providers.

### Commission's analysis and determinations

234. The incumbents' proposed suspension and termination provisions include differing, complex, and onerous conditions, many of which are not appropriate in a tariff for a mandated service. The proposals include the ability for incumbents to block roaming services to the wholesale roaming customer's individual end-users or to all of the customer's end-users, with varying degrees of notification. The incumbents proposed that they should be able to effect suspension or termination of service because of

technical issues caused by individual end-users, and in cases of any kind of breach of the terms of the tariff – including the prohibitions related to resale and permanent roaming that they had proposed.

235. While the suspension or termination of roaming service to an individual end-user may be necessary for technical reasons in certain circumstances, the proposed provisions are too broad and have the potential to be abused in an anti-competitive manner by allowing the incumbents to interfere with the ability of their wholesale roaming customers' end-users to use the service. Suspension and termination clauses are meant to address the relationship between the incumbent and its wholesale roaming customer, not the incumbent and the wholesale roaming customer's individual end-users.

236. Provisions that permit termination or suspension of service to individual end-users for technical reasons that are the same as those under which the incumbents would terminate or suspend access to the network by their own end-users would be appropriate. However, all other elements of the suspension and termination provisions should be substantively the same across all three incumbents' tariffs to allow for consistent interpretation and rights of wholesale roaming customers, based on the following principles:

- the incumbents may only suspend or terminate the service being provided to a wholesale roaming customer under the tariff because of a failure to pay or a breach of the deposit provisions, or because the customer is using the service in a manner inconsistent with the service definition set out in the tariff; and
- the incumbents must follow an incremental approach to suspending and terminating the service provided to the wholesale roaming customer, with appropriate notice.

237. In terms of what the appropriate amount of notice would be, the Commission has previously approved suspension and termination provisions that apply to wholesale services – for example, in the incumbents' General Terms of Service, the CLEC Model Tariff, and RCCI's Access Services Tariff. In particular, the CLEC Model Tariff provides for a process whereby notice of suspension or termination must be provided at least 30 days before the event takes place, and a separate provision states that the service cannot be suspended or terminated in cases where the reason for the suspension or termination is the subject of a dispute, as long as the service is being paid for.

238. Given the above-noted issues with what the incumbents have proposed, it would be both appropriate and efficient for the incumbents to model their suspension and termination provisions on the CLEC Model Tariff. This process will both incent the incumbent and the wholesale roaming customer to work together to resolve any suspension or termination issues that are identified, and ensure that a wholesale roaming customer has sufficient time to bring a dispute to the Commission before

service is suspended or terminated if it feels the reasons for the suspension or termination are invalid.

239. In light of the above, the Commission **directs** the incumbents to revise their proposed suspension and termination provisions to

- allow the incumbent to block roaming service to individual end-users of a wholesale roaming customer only in cases where it would block access to its network to its own end-users, and only for technical reasons;
- permit suspension and termination of wholesale roaming to the wholesale roaming customer for failure to pay, for failure to comply with the deposit provisions, or for use of the network access provided under the tariff in a manner other than that permitted by the definition of the service; and
- set out the process and timelines for notification and suspension or termination based on the wording in the CLEC Model Tariff.

## What trademark and trade name provisions are appropriate?

### Positions of parties

240. Bell Mobility and RCCI proposed conditions that would prohibit a wholesale roaming customer from using the incumbent's trademarks and trade names. These conditions would allow the wholesale roaming customer to inform its end-users of which incumbent's network they use for roaming, but the customer would be restricted in its ability to do anything beyond simply revealing the legal name of the incumbent in question.

241. Ice Wireless submitted that the proposed conditions are unreasonable. In its view, the wholesale roaming customer must be permitted to communicate the geographic coverage of its network to its end-users, and end-users have a right to information about the basic coverage and performance of roaming services while outside their home network. It also submitted that there are no valid commercial reasons for preventing wholesale roaming customers from sharing this information with end-users.

242. As a result, Ice Wireless proposed that these conditions be revised so that the only obligations on wholesale roaming customers would be a restriction from using anything other than Bell Mobility's and RCCI's full legal names, and a prohibition on using their logos, service marks, trademarks, and/or trade names without the express prior consent of the company in question.

### Commission's analysis and determinations

243. In the proceeding leading to the wholesale wireless framework, Eastlink submitted that provisions that prevent wireless carriers from disclosing the identity of their wholesale roaming providers should be prohibited. It argued that these were onerous

provisions that prevented Eastlink from providing simple information to its end-users about the services they were buying, such as where they could expect mobile coverage.

244. In the wholesale wireless framework, the Commission imposed a condition on wholesale roaming providers, pursuant to section 24 of the Act, that prohibits them from preventing wireless carriers from disclosing the identities of their wholesale roaming providers to their current or potential customers (the section 24 condition). This condition applies to all wireless carriers that provide wholesale roaming, regardless of the network technology being used. The intention of the section 24 condition was to ensure that Canadians have the information they need to make informed choices about their wireless services.

245. In attempting to reflect this condition in their proposed tariffs, Bell Mobility and RCCI have included complex language and numerous restrictions on the use of their trademarks and trade names, and on the ability of the wholesale roaming customer to market its services based on the roaming partnership.

246. The original intention of the section 24 condition is clear: the wholesale roaming customer should be able to disclose to its end-users which incumbent's network they use for roaming. If end-users are aware of the wholesale roaming provider's identity, they will be able to easily access publicly available information about the incumbents' coverage areas. In the Commission's view, there is very little potential for harm to the incumbents if wholesale roaming customers are permitted to point to this publicly available information when providing information to their own end-users.

247. The provisions proposed by Bell Mobility and RCCI are overly broad, insofar as they target behaviours that are generally outside the scope of the Act and subject to other legal remedies that would remain available irrespective of the section 24 condition. It is therefore not necessary to include in a tariff provisions such as those related to the unauthorized use of the incumbents' trademarks or trade names, or the making of false, misleading, or deceptive representations in advertising or marketing material.

248. The Commission therefore **directs**

- Bell Mobility and RCCI to remove from their tariffs their proposed provisions regarding the use of trademarks and trade names; and

- the incumbents to include a new tariff provision that replicates the section 24 condition set out in paragraph 148 of the wholesale wireless framework.

**Other terms and conditions**

249. In addition to the issues discussed above, the Commission has identified a number of issues to be addressed, such as wording changes to implement the general approach set out in paragraph 12 above, to clarify concepts, and to correct typographical

errors. Directed wording changes and brief analyses are set out in the Appendix to this decision.

## Should off-tariff agreements be allowed?

250. The incumbents are currently offering wholesale roaming pursuant to interim tariffs that incorporate their existing roaming agreements by reference. They may also offer wholesale roaming on rates, terms, and conditions different from those set out in their interim tariffs through the use of off-tariff agreements.

251. In Telecom Regulatory Policy 2016-313, the Commission forbore from the regulation of off-tariff agreements for the period beginning on the date that decision was issued until the rates, terms, and conditions are approved on a final basis. The Commission indicated its intention to launch a follow-up proceeding to determine whether such agreements would continue to be appropriate following final approval of the tariffs.

252. However, in setting out its determinations about what should and should not be included in the final terms and conditions as a result of the current proceeding, the Commission has created certainty as to what the final tariffs will encompass. The Commission is of the view that it would now be reasonable to make a final determination – without a further follow-up process – that off-tariff agreements should continue to be forborne once the interim tariffs are finalized.

253. As a result, and for greater efficiency, the Commission determines that it will forbear, on a final basis, from the approval of off-tariff agreements for wholesale roaming, on the same basis and for the same reasons as those set out in Telecom Decision 2016-313.

254. This determination will take effect on the date that the rates, terms, and conditions in the wholesale roaming tariffs are approved on a final basis, so as to leave in place the condition found in the interim decision that incumbents not bind their customers to an off-tariff agreement beyond the date when the rates, terms, and conditions are made final.

255. The incumbents will continue to be required to file copies of any off-tariff negotiated agreements entered into, in confidence if they wish, as well as general summaries of these agreements for the public record, within 15 days of the agreements being entered into.

## Final tariff approval process

256. The Commission **directs** the incumbents to file as new tariff notices, by **31 March 2017**, revised proposed tariff pages for wholesale roaming that reflect the determinations in this decision.

257. Parties may review the revised tariff pages and submit interventions by **1 May 2017**. Replies may be submitted by **11 May 2017**.

258. Submissions are to be limited to whether the revised tariffs reflect the determinations in this decision.

## Policy Direction

259. The determinations made in this decision are consistent with the Policy Direction for the reasons set out below.

260. The Policy Direction states that the Commission, in exercising its powers and performing its duties under the Act, shall implement the policy objectives set out in section 7 of the Act, in accordance with paragraphs 1(a), (b), and (c) of the Policy Direction.

261. In Telecom Regulatory Policy 2015-177, the Commission determined that it was necessary to regulate the rates, terms, and conditions pursuant to which the incumbents provide other Canadian wireless carriers with wholesale roaming, and addressed how its determinations are consistent with the Policy Direction.

262. The key issues under consideration in this decision relate to ensuring that terms and conditions of the incumbents' tariffs (i) reflect the policy established in Telecom Regulatory Policy 2015-177, (ii) define the scope of mandated wholesale roaming to avoid potential anti-competitive behaviour by the incumbents, (iii) recognize the principle that the incumbents are not required to provide access to their networks to service providers and their customers who do not qualify for mandated wholesale roaming, and (iv) prevent customers who purchase mandated wholesale roaming, or their mobile virtual network operators, from making unauthorized use of the incumbents' networks.

263. Therefore, subparagraphs 1(a)(ii)[12] and subparagraphs 1(b)(i) and (iv)[13] of the Policy Direction apply to the Commission's determinations in this decision.

264. Consistent with subparagraph 1(a)(ii), the Commission has used measures that are efficient and proportionate to their purpose and that interfere with the operation of competitive market forces to the minimum extent possible. In this regard, the Commission has reviewed the terms and conditions to ensure that only those elements necessary to safeguard the interests of users and the integrity of the incumbents' networks have been included.

[12] Paragraph 1(a)(ii) states that the Commission should "when relying on regulation, use measures that are efficient and proportionate to their purpose and that interfere with the operation of competitive market forces to the minimum extent necessary to meet the policy objectives."

[13] Paragraph 1(b) states, among other things, that "the Commission, when relying on regulation, should use measures that satisfy the following criteria, namely, those that (i) specify the telecommunications policy objective that is advanced by those measures and demonstrate their compliance with this Order, […] and (iv) if they relate to network interconnection arrangements or regimes for access to networks, buildings, in-building wiring or support structures, ensure the technological and competitive neutrality of those arrangements or regimes, to the greatest extent possible, to enable competition from new technologies and not to artificially favour either Canadian carriers or resellers."

265. Consistent with subparagraph 1(b)(i) of the Policy Direction, the Commission considers that the policy objectives set out in paragraphs 7(a), (b), (c), (f), (g), and (h) of the Act[14] are advanced by the regulatory measures established in this decision.

266. Consistent with subparagraph 1(b)(iv) of the Policy Direction, the Commission considers that its determinations, as they relate to network interconnection arrangements or regimes for access to networks, are technologically and competitively neutral and do not artificially favour either Canadian carriers or resellers.

Secretary General

## Related documents

- *Consideration of whether the Commission should forbear with respect to off-tariff negotiated agreements for GSM-based wholesale mobile wireless roaming services*, Telecom Regulatory Policy CRTC 2016-313, 5 August 2016
- *Regulatory framework for wholesale mobile wireless services*, Telecom Regulatory Policy CRTC 2015-177, 5 May 2015
- *Notification of Network Changes, Terminal-to-Network Interface Disclosure Requirements and Procedures for the Negotiation and Filing of Service Arrangements*, Telecom Letter Decision CRTC 94-11, 4 November 1994

[14] The cited policy objectives of the Act are 7(a) to facilitate the orderly development throughout Canada of a telecommunications system that serves to safeguard, enrich, and strengthen the social and economic fabric of Canada and its regions; (b) to render reliable and affordable telecommunications services of high quality accessible to Canadians in both urban and rural areas in all regions of Canada; (c) to enhance the efficiency and competitiveness, at the national and international levels, of Canadian telecommunications; (f) to foster increased reliance on market forces for the provision of telecommunications services and to ensure that regulation, where required, is efficient and effective; (g) to stimulate research and development in Canada in the field of telecommunications and to encourage innovation in the provision of telecommunications services; and (h) to respond to the economic and social requirements of users of telecommunications services.

# Appendix to Telecom Decision CRTC 2017-56

## Additional tariff changes and rationale

### Bell Mobility

- 1.(a): Delete "unless a different meaning is called for in the context of another provision in this tariff item." It is unnecessary and adds confusion.

- 1.(a)(1): Delete the definition of "affiliate." It is unnecessary. If this is removed, the definition set out in the Act will apply by default.

- 1.(a)(18): Clearly separate the definition of "Operator" (which should be replaced with the term "wholesale roaming customer" throughout the tariff for consistency with the decision) from the description of the service.

- 1.(a)(21): Delete this clause because clause 1.(a)(23) is to be removed based on the Commission's determinations in the decision.

- 1.(a)(22): Delete or amend the typographical or grammatical error – i.e. the sentence fragment at the end of the definition.

- 1.(a)(24): To avoid confusion, replace the term "roaming customer" with "end-user." Reflect this change throughout the tariff.

- 3.(a)(1): Delete "Subject to their licenses, the Circular and the Framework, the Company and Operator hereby agree, subject to this tariff item, to the establishment of Roaming in accordance with:

    a. the Annexes;"

  and replace with "The Services shall be offered in accordance with:

    a. this tariff;

    b. the annexes;

    c. …"

  Add wording that describes the order of precedence of the documents in accordance with which the tariffed service is provided in case of conflict, indicating that the tariff is always first.

- 3.(b)(1): Delete this clause. It is not necessary.

- 3.(b)(2): Delete or amend the final sentence. The section cannot be subject to itself.

- 8.(c)(1): Add “a reasonable” before “exchange of information.” This change is intended to mitigate the potential for abuse regarding information requirements.

- 9.(a)(3): Revise as follows: “Late payment charges are forborne from regulation, pursuant to Telecom Regulatory Policy CRTC 2009-424 and will be calculated…”

- 12.(a): Replace with wording based on TCC’s proposed clause 233.3.11.

- 15.(a): Delete the second sentence. The third (i.e. final) sentence is sufficient to address this matter.

- 18.: Delete the entire “Roaming Customer Indemnification” clause. It is inappropriate in the circumstances and inconsistent with the approach to limitation of liability set out in the decision.

- 20.(a): Delete the last sentence. It is inconsistent with the approach to termination set out in the decision.

- 23.(a) and (c): Delete these clauses. They are not appropriate for a tariff.

- 23.(d): Delete this clause. Any provision of service not consistent with the tariff occurs as a separate forborne service or through an off-tariff service.

**RCCI**

- 1.: Delete “unless a different meaning is called for in the context of another provision in this Tariff.” It introduces uncertainty.

  Include a statement to indicate that the Definitions and General Terms in Part A of RCCI’s Access Services Tariff apply to its wholesale roaming tariff, insofar as they are not inconsistent with the wholesale roaming tariff.

- 1.2: Revise the definition to refer to statutory holidays as set out in the federal *Interpretation Act*, on which the Commission relies for interpretation.
- 1.11: Delete the end of the sentence, beginning with “responsible for the regulation…” It is unnecessary and potentially confusing.
- 1.16: Clearly separate the definition of “Operator” (which should be replaced with the term “wholesale roaming customer” throughout the tariff for consistency with the decision) from the description of the tariffed service.
- 1.23: Replace “Resellers” with “MVNOs.” For clarity and consistency with the decision, use “MVNO” throughout the tariff instead of “Reseller.”
- 1.26: Merge with the definition of “end-user” in clause 1.7.
- 2.2: Delete.

- 3.1: Add wording that describes the order of precedence of the documents in accordance with which the tariffed service is provided in case of conflict, indicating that the tariff is always first.

  Indicate which of these documents are "as amended from time to time."

- 3.3: Delete all wording after the first sentence. It is unnecessary.
- 4.5: Delete. This is unnecessary and inappropriate for a tariff.
- 4.6: Revise the first sentence by deleting everything after "…equipment identification register ("EIR") program."

  Revise the second (i.e. last) sentence by adding the bold and italicized text, as follows: "In the event Rogers notifies the ***Wholesale Roaming Customer*** of any Devices that have been used for Roaming which Rogers believes have been stolen ***or are unauthorized***, then the ***Wholesale Roaming Customer*** shall use commercially reasonable efforts ***to investigate the registration of the Devices and, where appropriate,*** suspend such Devices," which aligns with wording in Bell Mobility's tariff (at clause 15, as discussed above).
- 6.1.2: Delete. This is not appropriate for a tariff.
- 6.4 and 6.5: In both cases, delete everything after "GSM Association Permanent Reference Documents." This has already been dealt with by adding "as amended from time to time" in clause 3.1.
- 6.6: Replace with the deposit provision found in RCCI's Access Services Tariff under clause 102.6, replacing "interconnection services" with "wholesale roaming services" and "Telecommunications Provider" with "wholesale roaming customer".
- 7: Replace with wording based on TCC's proposed clause 233.3.11.
- 8.1 Correct "wholeor" typographical error.
- 8.2: Delete "or as may be necessary or appropriate pursuant to other legal process." It is not sufficiently clear.

  Delete the sentence that refers to information being transmitted and disclosed to Industry Canada. It is not appropriate for a tariff.
- 8.3: Delete "and the contents of this Tariff." The tariff is a public document.
- 10: Delete "and other documents agreed to by Rogers and the Operator." This is not appropriate for a tariff.
- 11.4: Delete this clause. It is inappropriate in the circumstances and inconsistent with the approach to limitation of liability set out in the decision.
- 11.6: Delete this clause. It is inappropriate in the circumstances and inconsistent with the approach to limitation of liability set out in the decision.

- 13: Add “unforeseeable” before the word “obstacles” in the following phrase of the first sentence: “…or any other obstacles beyond Rogers’ control…”

  Correct grammar/typographical error in the second sentence.

  Delete the third (i.e. final) sentence. It is inconsistent with the approach to termination set out in the decision.

- 14.2: Delete this clause. It is unnecessary and inappropriate for a tariff.

**TCC**

- 233.1 – paragraph 1: Fix typographical errors in the third sentence as indicated in bold italics: “This GSM-based Roaming Service ***allows*** retail customers of Canadian mobile wireless carriers to originate or terminate communications when they are outside of their wireless carrier***’s*** footprint…”
- 233.1 – paragraphs 2 and 3: Delete these paragraphs. They are unnecessary and inappropriate for a tariff.
- 233.2 – Definition of “Contract”: Delete. It is not appropriate or necessary for a tariff.
- 233.2 – Definition of “HPMN Operator”: Replace with the term “wholesale roaming customer” throughout the tariff for consistency with the decision.
- 233.2 – Definition of “Wholesale Roaming”: Delete the second sentence. It is inappropriate for a tariff.
- 233.3.1.: Delete “In respect and subject to other national binding regulations to provide roaming services,” and “mutual.”

  Add wording that describes the order of precedence of the documents in accordance with which the tariffed service is provided in case of conflict and reorder the list, indicating that the tariff is always first.

- 233.3.2.c: Delete this clause. It is unnecessary and inappropriate for a tariff.
- 233.3.3.: The second sentence should be changed to read as follows, with text to be added shown in bold italics and text to be deleted struck out:

  > The provision of this Tariff Item is subject to the Company’s General Terms of Service (as referenced in Item 100), ***insofar as they are reasonably applicable and not inconsistent with this Tariff***~~, and all applicable service conditions, rates and charges, as amended from time to time and approved by the CRTC~~.

  The portion to be deleted is unnecessary in the circumstances.

- 233.3.8.: Delete this clause. It is covered by the service description in clause 233.1.

- 233.3.10.a.: Delete "All other roaming services are subject to commercial negotiation between the HPMN and the VPMN." It is unnecessary and inappropriate for a tariff.

- 233.3.10.c.: Delete "as same may be amended upon the mutual written agreement of the Parties in order to conform with any modifications adopted by the GSM Association" and replace with "as amended from time to time."
- 233.3.17.: Delete the final sentence.
- 233.3.25.h.: Delete this clause. It is inappropriate for a tariff.
- 233.3.26.: Delete this clause. It is inappropriate for the final tariff.

This is **Exhibit "99"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

Raha Araz Mohammad
Commissioner of Oaths etc.
Province of Ontario
LSO P15816.

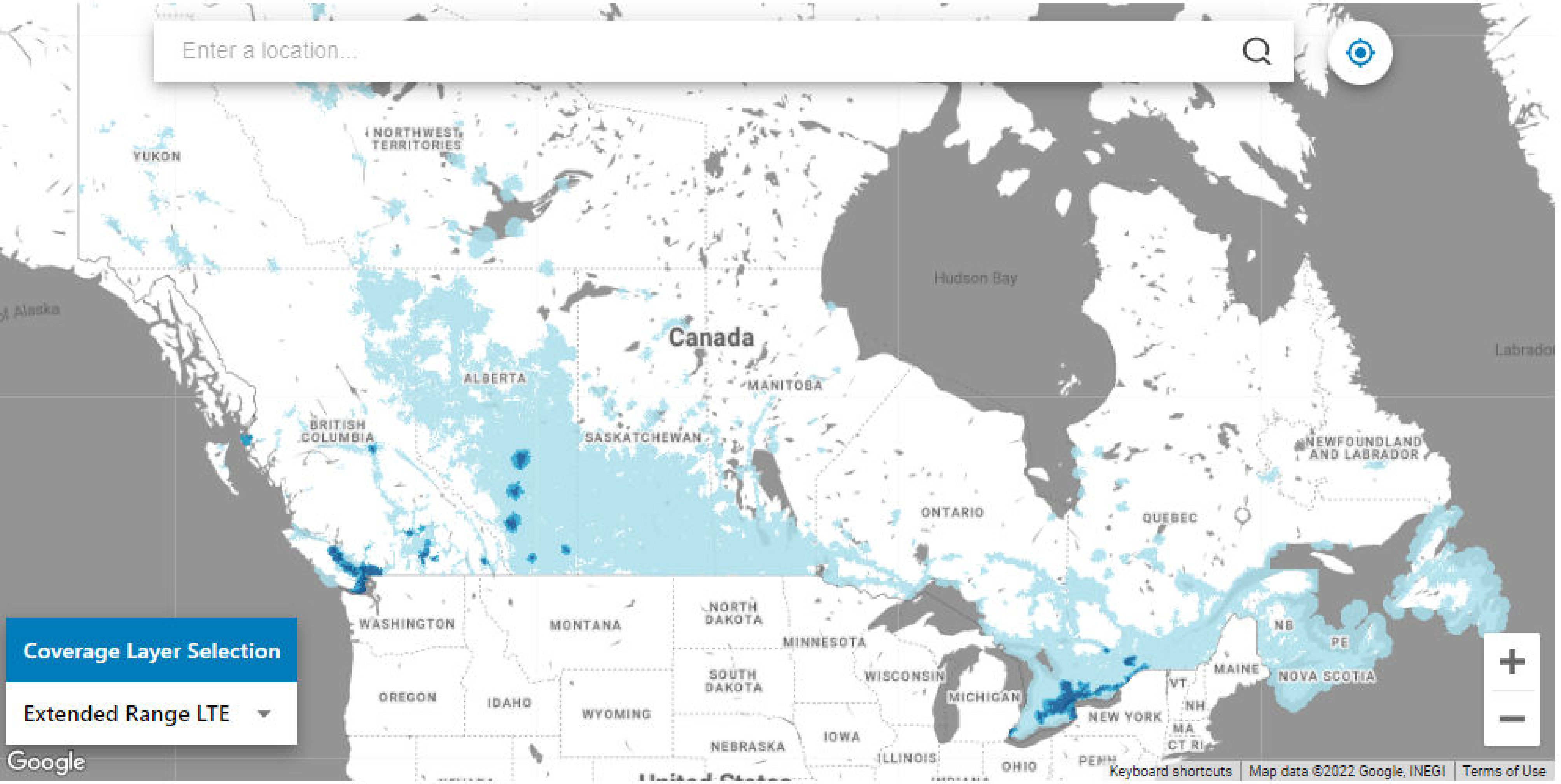
# Coverage map of Canada's largest & most reliable 5G network

Use the map below to check the wireless coverage in your area - whether it's our 5G network, 4G LTE, or even extended coverage. We're also expanding our 5G network across Canada so check back soon as our coverage grows.

Shaw is waiving Long Distance charges for calls and texts to Ukraine so customers can connect with loved ones. Dismiss

# CHECK OUT OUR COVERAGE MAP.

Whether you're on LTE or using WiFi, Shaw Mobile has you covered. That's because it's the only wireless network that automatically connects you to **450,000+ Shaw Go WiFi hotspots** and Fast LTE everywhere else.




Shaw 4G LTE Variable Nationwide

PERSONAL SMALL BUSINESS MEDIUM & LARGE BUSINESS BELL FOR BETTER BELL EMAIL FIND A STORE ON FRANÇAIS

PUBLIC

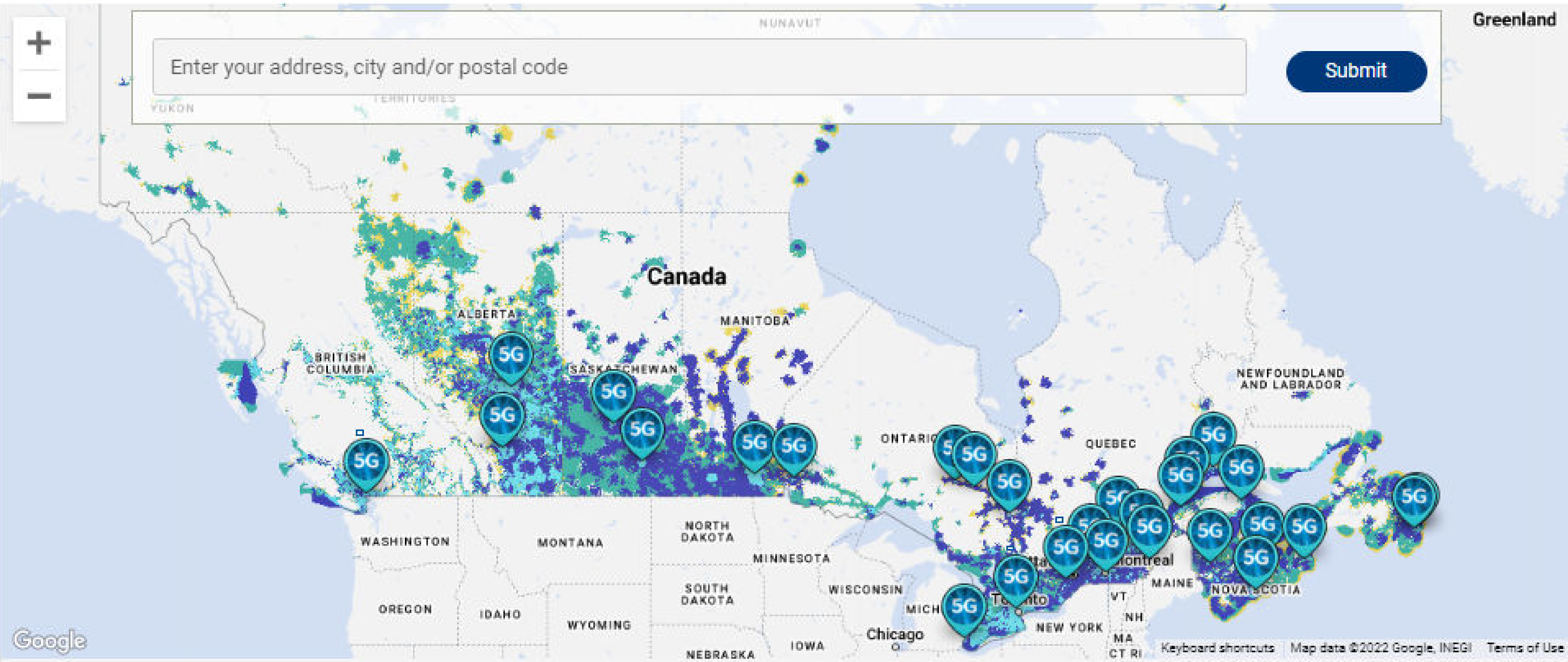
4983

Bell Shop Support MyBell Search this site Log in / Register

Mobility Why Bell Our network Devices Bring your own device Plans Prepaid Accessories Connected things Promotions Travel

Your current region:
**Ontario** Change >

# Coverage map




Coverage shown is approximate and actual coverage may vary.Speed and signal strength may vary due to traffic, topography, environmental conditions and other factors, including Bell's Internet traffic management practices (e.g., priority access to emergency personnel and critical infrastructure personnel). See Bell.ca/ITMP

## Select coverage type

- **5G**
  - 5G
  - Future
- **LTE**
  - LTE Advanced (LTE-A)
  - LTE
- **4G HSPA+**
  - HSPA+
- LTE-M
  - LTE-M

**5G coverage**

With Bell, you'll get 5G coverage across Canada. Although the 5G network will take some time to roll out fully, it will begin with greater speeds in select cities, with more coming soon.

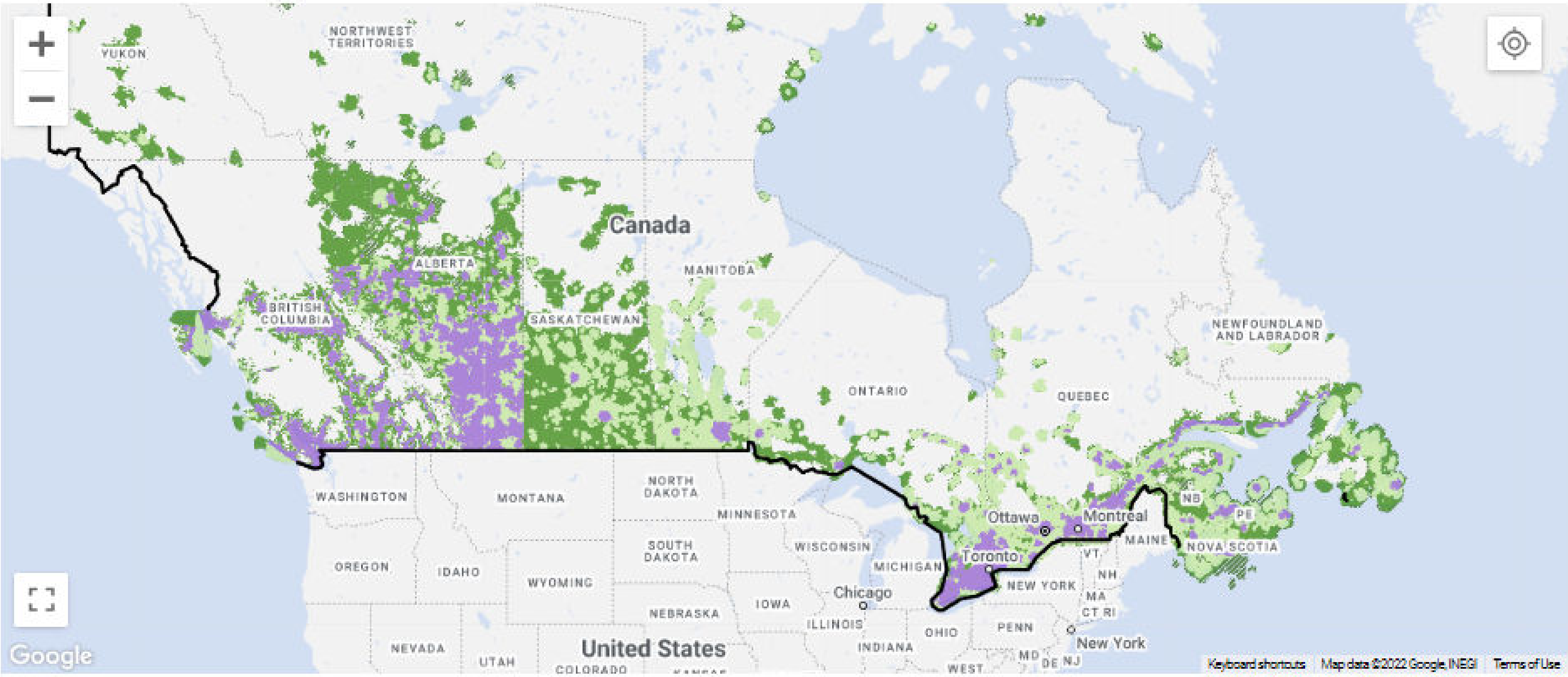
# Faster coverage in more places than anyone else.

Enter Address

Enter your address, city and/or postal code

Go

Search in progress...



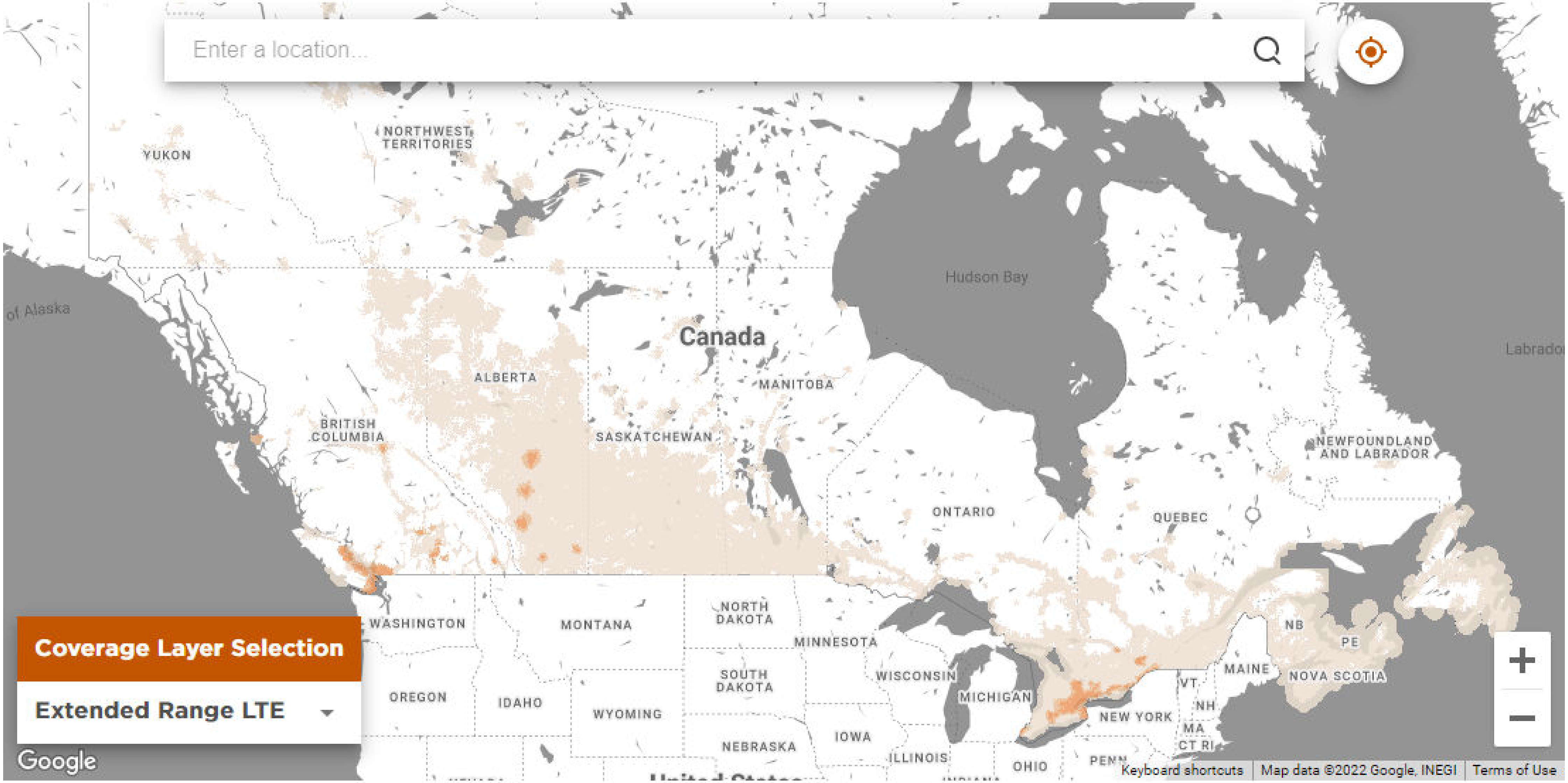

- [x] 5G
  - 5G
- [x] 4G LTE
  - LTE Advanced — Ultra-Fast
  - LTE — Super-Fast
- [x] 4G HSPA+
  - HSPA+ — Fast
- [ ] LPWA
  - LTE-M — IoT Network

PUBLIC 4985



# Check out our coverage map to make sure you're connected.

Not covered? Come back later, we're always expanding!




Freedom 4G LTE Variable Nationwide

**Videotron's ultravast LTE mobile network goes wherever you go, from one coast of Canada to the other. Take advantage of the 5G technology that is gradually being deployed in our mobile network.**

**Find your address**

Enter address or postal code

**Type of coverage**

All coverage (Canada)


**Legend**

- 5G Videotron
- Videotron Network
- Extended Coverage
- Partner Network

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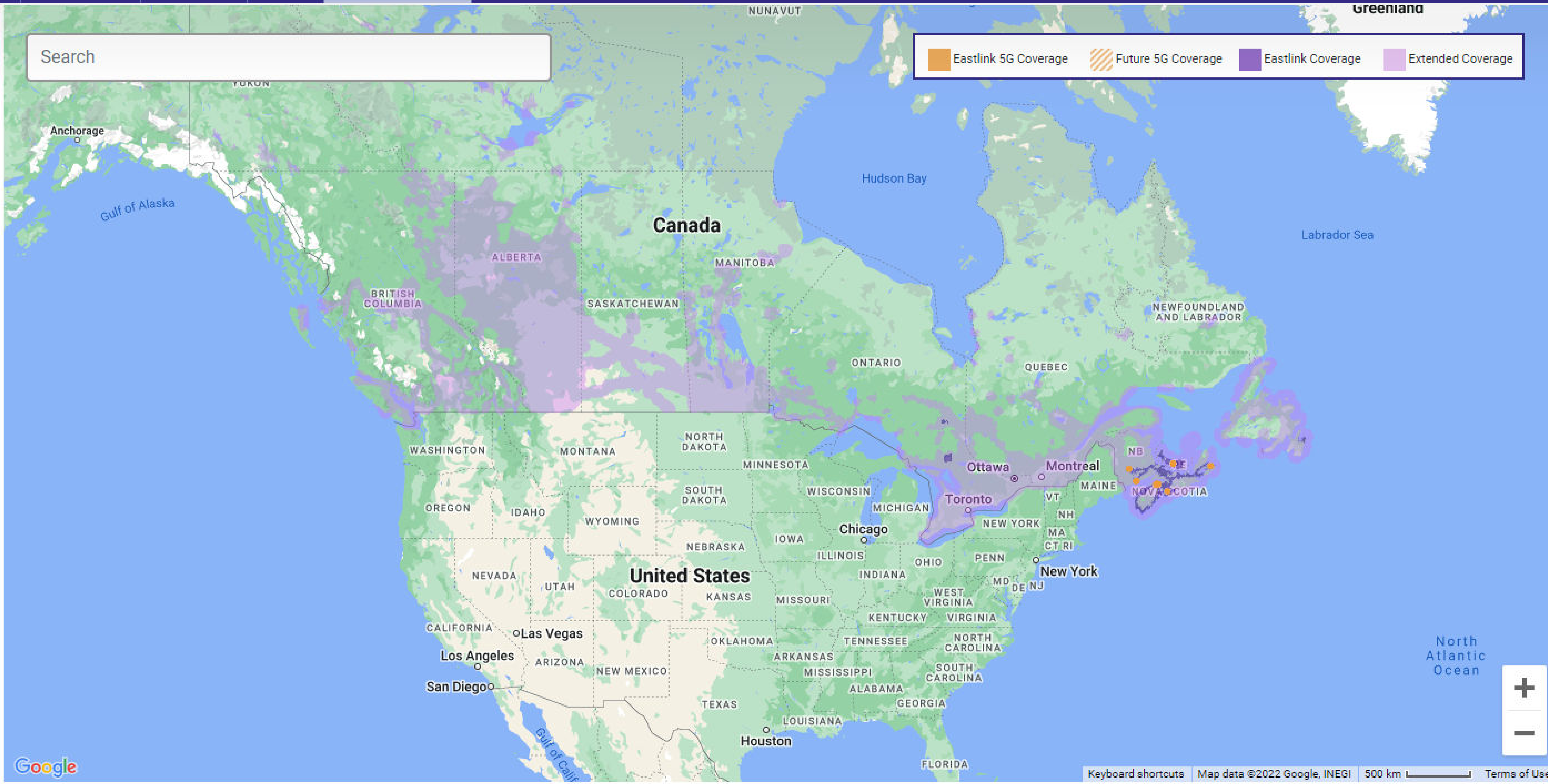
Bundles Internet & WiFi TV Mobile Home Phone Smart Home

Phones Plans 5G Coverage



This is **Exhibit "100"** to the affidavit of Laura Sonley, affirmed remotely by Laura Sonley stated as being located in the city of Ottawa in the province of Ontario, before me at the city of Gatineau in the province of Quebec, on May 5, 2022, in accordance with O. Reg 431/20, Administering Oath or Declaration Remotely.

Commissioner of Oaths etc.

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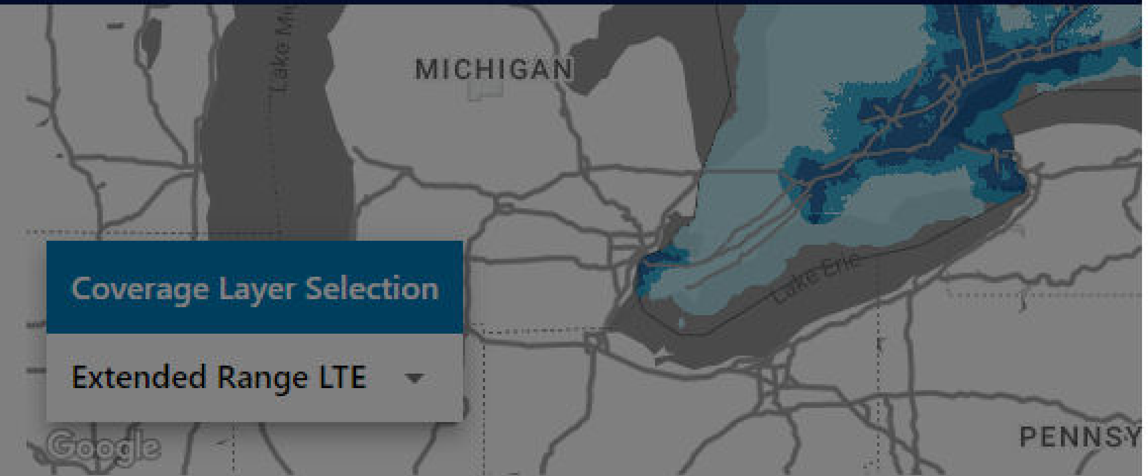
Shaw is waiving Long Distance charges for calls and texts to Ukraine so cu




The Shaw Mobile coverage area is an approximation of the actual wireless servi
and data service while within the Shaw network coverage area may vary due to
guarantee service availability.

Depending on which LTE frequencies your phone supports you will be able to e
**selection of phones** or **bring your own phone**.

## Shaw

Our Shaw Mobile network provides access to the data, talk, text and features included with the Shaw portion of your plan.

**Learn more ›**

## Nationwide

When you travel outside network in Canada, you'll partner's network.

**Learn more ›**

# Nationwide

When you travel outside of our 'Shaw Mobile' network in Canada, you'll be connected to a partner's network. Your phone will display the network name 'Nationwide' when in this area and may also indicate that it's roaming. You'll have access to the 'Nationwide' portion of your plan or pay-per-use rates may apply.

Visit **My Shaw Mobile** to learn more about your current plan.

5G

**5G**

5G networks allows date transmition data up to 100 times faster and reduces latency to close to zero, allowing instant and smooth connections as well as remote responses in real time.

LEARN MORE

**LTE-A**

The fastest network with download speeds of up to 500 Mbps. Watch your favourite videos in HD on your mobile device when you're on the go' without any interruptions!

* To enjoy LTE technology, you must have a device and SIM card that is compatible with the LTE network.

# Other Networks

## 4G HSPA

## Partners

To offer you access to an even broader network, Videotron Business Solutions has teamed up with a number of reliable partners across Canada. They give you access to different technologies and together provide you with our extended coverage.Partner (PRTNR) 3G/2G coverage is offered in Quebec. Included for all customers.

Partners 1 (PRTNR1) 3G/2G and LTE coverage is offered in Canada. It comes included in Canada Business Mobile plans and available with other plans.

Extended coverage (PRTNR2) 3G/2G coverage is offered in Quebec and Canada. Included in Canada Business Mobile plans and available with other plans.

## How do I recognize a partner network?

Our phones are programmed to prioritize the Videotron network. When your phone is outside the Videotron network, it will automatically connect to an available partner network.

When you're connected to a partner network, its name will be displayed on your phone. The networks may be:

- Videotron PRTNR (Québec and the Greater Ottawa region)
- Videotron PRTNR1 (in Canada, outside Québec)
- Videotron PRTNR2 (all of Canada)

## Does my services stay the same when I use a partner network?

Some entertainment and informational purposes special codes (*/#) exclusive to Videotron, as well as international calls to certain countries, may be limited or impossible to make via partner networks.

Although we request an optimal level of performance from our partners, signal quality and technology may vary, and data transmission speed may be slower than on the Videotron network.

During transitions from our network and those of our partners, calls are dropped and must be re-established. Data transfers are also temporarily interrupted.

## What is extended coverage?

Extended coverage refers to all the providers that are a part of the Partner 2 network. It's available across Quebec and nationwide. Extended coverage kicks in when the Videotron network or main partner network is out of range—that's why you'll see PRTNR2 displayed onscreen when you're connected to it.


## Terms

**Extended coverage represents access to partner networks across the country, including the Bell, Rogers, Telus and Videotron networks.*

*The map above is an approximate representation of Eastlink Mobile network coverage. The actual coverage area may vary and is subject to change from time to time. Reception, and access to extended LTE coverage may be affected by various factors, including system availability, signal strength, your device, technical compatibility and environmental conditions.*

*Usage outside the Eastlink network may not be reflected on your bill until subsequent billing cycles.*

PUBLIC

CT-2022-

**THE COMPETITION TRIBUNAL**

IN THE MATTER OF the Competition Act, R.S.C. 1985, c. C-34;

AND IN THE MATTER OF the proposed acquisition by Rogers Communications Inc. or an affiliate thereof of Shaw Communications Inc.;

AND IN THE MATTER OF an application by the Commissioner of Competition for one or more orders pursuant to section 92 of the *Competition Act;*

AND IN THE MATTER OF an Application by the Commissioner of Competition for an interim order pursuant to section 104 of the *Competition Act;*

**B E T W E E N:**

**THE COMMISSIONER OF COMPETITION**

**Applicant**

**- and -**

**ROGERS COMMUNICATIONS INC.**
**SHAW COMMUNICATIONS INC**

**Respondents**

**NOTICE OF APPLICATION FOR INTERIM ORDER**
**(Volume 2)**