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CT-2022-002

OTTAWA, ONT.

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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 IN THE MATTER OF an application by the Commissioner of Competition for one or more orders pursuant to section 92 of the *Competition Act*.

B E T W E E N:

COMMISSIONER OF COMPETITION

Applicant

- and -

**ROGERS COMMUNICATIONS INC. and
SHAW COMMUNICATIONS INC.**

Respondents

- and -

**ATTORNEY GENERAL OF ALBERTA
and VIDEOTRON INC.**

Intervenors

RESPONDING WITNESS STATEMENT OF WILLIAM WEBB

I, WILLIAM WEBB, of the City of London, England, MAKE OATH AND SAY:

1. I am an engineer who specialises in wireless communications.
2. I am currently the Chief Technology Officer at Access Partnership, a leading global public policy firm focused on the technology sector based in London (United Kingdom). In my capacity as Chief Technology Officer at Access Partnership, I play a key role in overseeing the development and dissemination of technology for Access Partnership's clients and vendors. These include many of the world's leading technology companies.

3. I have over thirty years of experience in technological communications, providing technical and strategic advice across the wireless communications space around the world.

4. I earned a Bachelor of Engineering, MBA, PhD and Doctor of Science in electronics and wireless communications from the University of Southampton in the United Kingdom.


5. I am a Visiting Professor at Southampton University, and a Fellow of the Royal Academy of Engineering, a Fellow of the Institute of Electrical and a Fellow of Electronic Engineers and the Institute of Engineering and Technology (“IET”). I have been awarded multiple honorary doctorates by leading UK universities and in 2018 was awarded the IET’s prestigious Mountbatten Medal for technology entrepreneurship.

6. I have published 17 books and over 100 papers, and have obtained 18 patents.

7. I have been engaged by Davies Ward Phillips & Vineberg LLP, counsel to Shaw Communications Inc. (“**Shaw**”), as an independent expert in this proceeding. I prepared an initial Expert Report dated September 24, 2022, which I attached to a Witness Statement of that same date.

8. I have now prepared a Responding Expert Report dated October 20, 2022, which I have attached as **Exhibit “1”** to this Witness Statement.

SWORN remotely by William Webb of the City of London, England before me at the City of Toronto, in the Province of Ontario on the 20th day of October, 2022 in accordance with O. Reg. 430/20 Administering Oath or Declaration Remotely.



Commissioner for Taking Affidavits

}



WILLIAM WEBB

THIS IS EXHIBIT "1" REFERRED TO IN THE WITNESS STATEMENT OF WILLIAM WEBB SWORN BY WILLIAM WEBB AT THE CITY OF LONDON, ENGLAND, BEFORE ME IN THE CITY OF TORONTO, IN THE PROVINCE OF ONTARIO THIS 20TH DAY OF OCTOBER, 2022 IN ACCORDANCE WITH O. REG. 431/20, ADMINISTERING OATH OR DECLARATION REMOTELY.

Connia Chen

A Commissioner for Taking Affidavits

THE COMPETITION TRIBUNAL

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B E T W E E N:

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Applicant

– and –

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

Respondents

– and –

**ATTORNEY GENERAL OF ALBERTA
and VIDEOTRON LTD.**

Intervenors

**RESPONDING EXPERT REPORT of DR. WILLIAM WEBB
(October 20, 2022)**

I. EXECUTIVE SUMMARY

A. INTRODUCTION AND MANDATE

1. My name is Dr. William Webb. I am an engineer who specialises in wireless communications. I have over thirty years of experience in wireless communications, including in providing technical and strategic advice. I am currently the Chief Technology Officer at Access Partnership, a leading global public policy firm focused on the technology sector based in London (United Kingdom).
2. My background, experience and qualifications are described in detail in my Expert Report in this matter dated September 24, 2022 (my "**First Report**"). Further, my *curriculum vitae* is attached to my First Report as Appendix "A".
3. Where I use capitalized terms in this Report that are not otherwise defined, I am relying on the meanings given to those terms in my First Report.
4. I have been asked by counsel to Shaw to provide this Report in response to certain technical matters set out in the Witness Statements and Expert Reports delivered in this proceeding by the Commissioner on September 23, 2022. More specifically, I have been asked to:
 - (a) Respond to technical matters set out in the Expert Report of Michael A M Davies dated September 22, 2022 (the "**Davies Report**"); and
 - (b) Respond to statements of a technical nature in the various Witness Statements delivered by the Commissioner, including to respond to topics addressed in those Witness Statements that touch upon matters addressed in my First Report.

B. MY DUTIES AS AN INDEPENDENT EXPERT

5. As with my First Report, I confirm that I prepared this Report in accordance with my duty to provide opinions that are fair, objective and non-partisan, and that relate only to matters that are within my areas of expertise. I confirm that I continue to have no stake, directly or indirectly, in the outcome of this matter. I also confirm that my fees for this engagement, including the preparation of this Report, are not contingent in any way on

the opinions and conclusions expressed in this Report or on the outcome of this proceeding.

6. My Acknowledgment of Expert Witness is attached to my First Report as Appendix “B”.

C. TECHNOLOGICAL PRIMER AND MATERIALS RELIED ON

7. In order to assist non-technical readers with the review of my opinions and conclusions, I attached as Appendix “C” to my First Report a Technological Primer that provides definitions and explanations of various technical terms. That Technological Primer is equally applicable and relevant to this Report.
8. In preparing this Report, I have consulted several sources, including publicly available information, industry publications and numerous ordinary course documents of the parties involved in the Proposed Transaction, including the Transaction documents.
9. I have included in **Appendix “A”** to this Report a list of the documents referenced in this Report.

D. OVERVIEW OF THIS REPORT

10. I have carefully reviewed the Davies Report, as well as the Witness Statements of Stephen Howe (Chief Technology and Information Officer of BCE Inc.) dated September 23, 2022 (the “**Howe Statement**”), Nazim Benhadid (Senior Vice President, Network Build & Operate of TELUS Corporation) dated September 20, 2022 (the “**Benhadid Statement**”) and Tom Nagel (Senior Vice President of Strategy & Development, Wireless for Comcast Cable Communications, LLC) dated September 22, 2022 (the “**Nagel Statement**”).
11. Nothing that I have reviewed in the Davies Report or these Witness Statements causes me to change the opinions and conclusions I provided in my First Report. Having carefully reviewed this evidence and the technological matters that they raise, it remains my opinion that if Freedom is sold to Videotron, Freedom would **not be** a less effective competitor from a technological perspective than Freedom under Shaw’s ownership today. In fact, I remain of the view that Freedom under Videotron’s ownership will be a more effective competitor from a technological perspective in 5G than if Freedom continues under Shaw’s ownership.

12. I have organized the balance of my Report as follows:
- (a) **Section II** responds to certain characterizations and statements made by Mr. Davies concerning communications services and wireless networks;
 - (b) **Section III** discusses, in direct response to Mr. Davies, my analysis of the current and future position of Shaw and Freedom to roll out 5G wireless services;
 - (c) **Section IV** responds to the analysis of Mr. Davies concerning the competitive strength of the proposed divested Freedom entity if acquired by Videotron in comparison with the competition afforded by Shaw, with specific reference to Shaw Go WiFi and the Nagel Statement;
 - (d) **Section V** responds to the analysis of Mr. Davies concerning the competitive strength of the proposed divested Freedom entity if acquired by Videotron in comparison with the competition afforded by Shaw, with specific reference to backhaul and the evidence set out in the Howe Statement and Benhadid Statement;
 - (e) **Section VI** responds to the analysis of Mr. Davies concerning the reliability of telecommunications networks; and
 - (f) **Section VII** responds to evidence in the Howe Statement concerning benefits for wireless network deployment associated with owning an extensive wireless access network in the same footprint, including lower costs, shorter deployment times and greater ability to innovate.

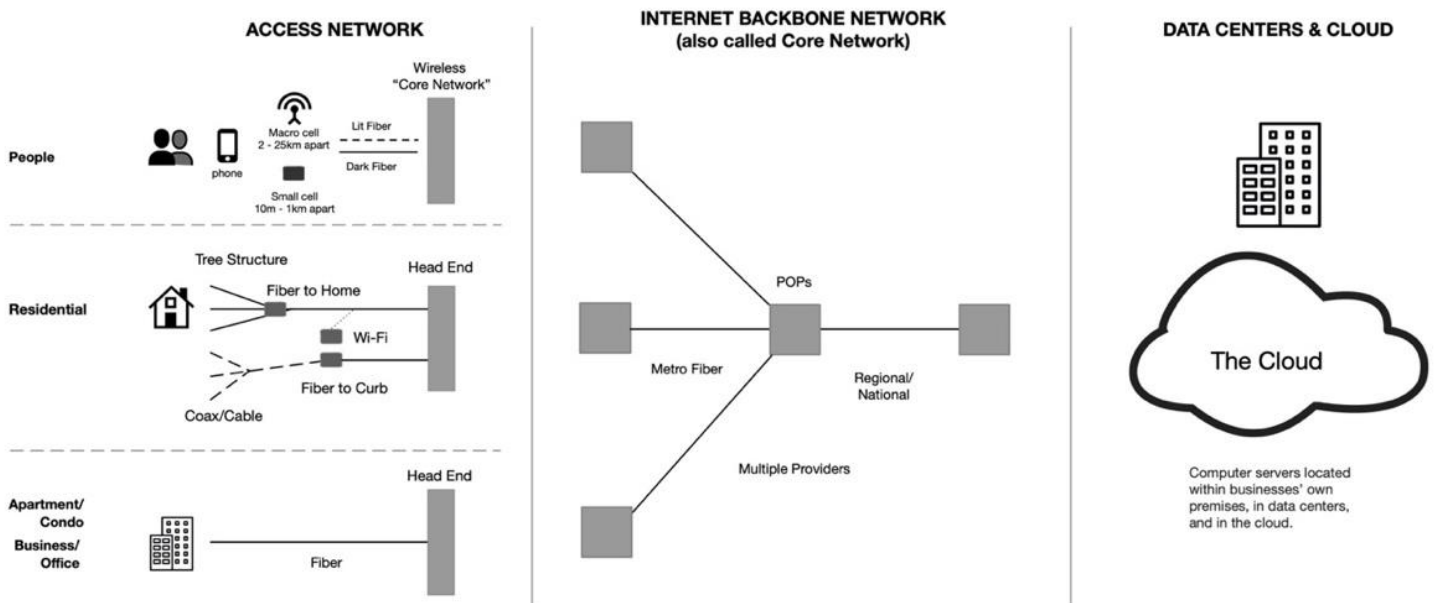
II. RELEVANT COMPONENTS OF A WIRELESS NETWORK

13. Based on my review of the Davies Report, I understand that Mr. Davies was asked to:
- (a) describe the extent to which Shaw was in a position to roll out 5G wireless services at the time of the announcement of the proposed merger with Rogers in March 2021 and how advanced in that process the Company was at that time;

- (b) describe the extent to which competitors such as Rogers, Shaw and others in the wireless services market compete with respect to the reliability of their network and the extent to which network outages experienced by Rogers may be relevant to that question; and
 - (c) provide an opinion on the competitive strength of the proposed divested Freedom entity if acquired by Videotron in comparison with the competition afforded by Shaw through its Freedom and Shaw Mobile wireless products.
- 14. Prior to specifically addressing these topics, Mr. Davies – in the first approximately 60 pages of the Davies Report – provides background information concerning communications services and networks. While I agree with many aspects of Mr. Davies’ discussion of these background matters, there are certain areas where I disagree with Mr. Davies.
- 15. At paragraph 20 of the Davies Report, Mr. Davies describes two types of networks: wireless networks and wireline networks. Mr. Davies goes on to state that each of these networks utilizes a largely separate set of infrastructure. I agree.
- 16. Mr. Davies explains in paragraph 21 of his Report that a communications network consists of four main categories of assets:
 - (a) User Equipment (UE), such as wireline modems and mobile phones;
 - (b) The Access Network;
 - (c) The Internet Protocol backbone network, and its connections with other networks, such as the Internet; and
 - (d) Data centres and cloud infrastructure.
- 17. In describing these four main categories of assets, Mr. Davies does not distinguish between (i) the main assets of a *wireline* network, and (ii) the main assets of a *wireless* network. The absence of this critical distinction is inconsistent with the way in which telecommunications technologists, in my experience, typically describe these different types of networks. As a result, his description of communications networks is confusing and unclear.

18. More significantly, the exclusion by Mr. Davies of spectrum as a main category of asset that comprises a modern wireless network is, in my opinion, a significant oversight. Spectrum is the asset of highest importance to a wireless network. In my experience, spectrum is the most differentiating feature between the performance of competing wireless networks. I discuss the relative importance of spectrum to wireless networks in paragraphs 29 and 30 of my First Report.
19. Mr. Davies also does not describe the relative importance of the four categories of assets that are set out in the Davies Report. In doing so, Mr. Davies is unduly amplifying the importance of ancillary elements of a network (such as User Equipment, the backbone network, and data centres and cloud infrastructure) in a manner that could cause a misapprehension that wireline and wireless networks are more connected with, and dependent on, one another than is actually the case.
20. In describing these main categories of assets that make up communications networks, Mr. Davies provides an image at Figure 1 of the Davies Report (reproduced below), which is described as “a general view of a typical network and associated assets”:

Davies Report – Figure 1 – *Wireline and Wireless Infrastructure and their Interrelationship*



21. While I generally agree with what Mr. Davies has attempted to depict in Figure 1, I do note some important errors and omissions. For example, in the “People” section of the “Access Network” Column in Figure 1, the connection from the cells to the core network is depicted as being solely through fibre optic connections. That is not an accurate depiction. In my experience, these connections between cells to the core network are most often based on wireless microwave connections, rather than fibre.
22. In addition, in the “Residential” section of the “Access Network” Column in Figure 1, Wi-Fi is not connected into the fibre prior to it being split into last mile coaxial cable or fibre to the home, as is shown. Wi-Fi is part of the modem/router that is in the home or office and connected to the fibre or cable at the point it enters the home.
23. The middle column of Figure 1 indicates that the “Internet Backbone Network” is also called “Core Network”. I disagree with this characterization. In my experience, and as I describe in the Technological Primer attached as Appendix “C” to my First Report, the Core Network manages voice and data traffic, connects and manages the different parts of the network and connects to other networks (including the Internet). It is also responsible for functions such as device authentication, generating charging records and user management. The Core Network is not, as Mr. Davies suggests in the Glossary in the Davies Report (at page 91), the “high-capacity communication facilities that connect primary nodes” or the “path for the exchange of information between different sub-networks”.
24. In contrast to the Core Network, I agree that “Backbone” is the “high-capacity communication facilities that connect primary nodes” or the “path for the exchange of information between different sub-networks” or, as I describe in paragraphs 57 to 59 of my First Report, the facilities used for *inter-city* and *intra-city* wireline transport by multiple organizations. As described in paragraph 59 of my First Report, cell sites connect to the core network through last mile backhaul, which in turn may connect to an intra-city line, which in turn connects to inter-city transport lines (in those cases where there is no local core network), which in turn connects to the core network.
25. This confusion in terminology may stem from the fact that wireless and wireline networks have different architectures, and terms such as backhaul are used in different manners depending on the particular architecture of a network. For example, a

telecommunications glossary published by the CRTC, and available on its website, defines “Backbone” as “*the core network segments* which connect two or more network nodes together for the purpose of transiting network traffic between edge nodes”. The CRTC’s glossary defines “Internet Backbone” as “the set of all network connections established between the routing computers that move aggregated end-user IP traffic through the Internet.”¹ In my experience, these definitions are perfectly appropriate in the context of wireline networks, but less applicable to wireless networks.

26. In paragraph 221 of the Davies Report, Mr. Davies states that prior to the Proposed Transaction, there were at least three distinct *wireless* networks in British Columbia and Alberta (Rogers, Bell/TELUS – which Mr. Davies considers to be a single network – and Shaw), each of which generally relied upon one of three typically distinct and separate *wireline* networks for their connectivity. Mr. Davies then offers the opinion in paragraph 224 of the Davies Report that if the Proposed Transaction is permitted to proceed, there would only be two wholly-distinct and separate wireline networks providing connectivity for wireless networks in British Columbia and Alberta: the wireline networks used by Bell/TELUS and Rogers.
27. While this appears to be an issue of semantics and definition, I disagree with Mr. Davies that the Proposed Transaction would reduce the number of wireline networks in British Columbia and Alberta from three to two.
28. I do not agree with Mr. Davies that Backbone assets that support a wireless network “behind the scenes” are understood in the industry as a wireline network. Rather, a wireline network is more commonly understood in the telecommunications industry as infrastructure which delivers connectivity directly to consumers and businesses. However, if I were to accept Mr. Davies’ definition, then there would be, to my knowledge, at least four operators in British Columbia providing connectivity (or a wireline network) to Freedom in the period after the closing of the Proposed Transaction.
29. In particular, in addition to Rogers, I would have to count the wireline networks/Backbone of Bell and TELUS separately, which would bring the total to three

¹ See, CRTC Telecommunications Glossary, Data Collection System Guide, available at: <https://crtc.gc.ca/eng/dcs/glossaryT.htm> [SJRB-CCB00897264].

operators. I base this conclusion on the evidence of BCE Inc. at paragraph 9 of the Howe Statement, which states that the network reciprocity arrangement between BCE Inc. and TELUS does not extend to wireless transport, core networks or “to any aspect of Bell and Telus’ respective wireline networks”.

30. In addition to these three operators, I understand that Zayo Group has a network that provides connectivity for Freedom’s wireless network in British Columbia and Alberta. Based on publicly available information, I understand that Zayo Group’s global fibre network features deep, dense metro networks in key markets across the US, Canada and Western Europe, including in Vancouver, Calgary and Edmonton (which are, of course, in British Columbia and Alberta). I have reproduced below an image of Zayo Group’s global fibre network:

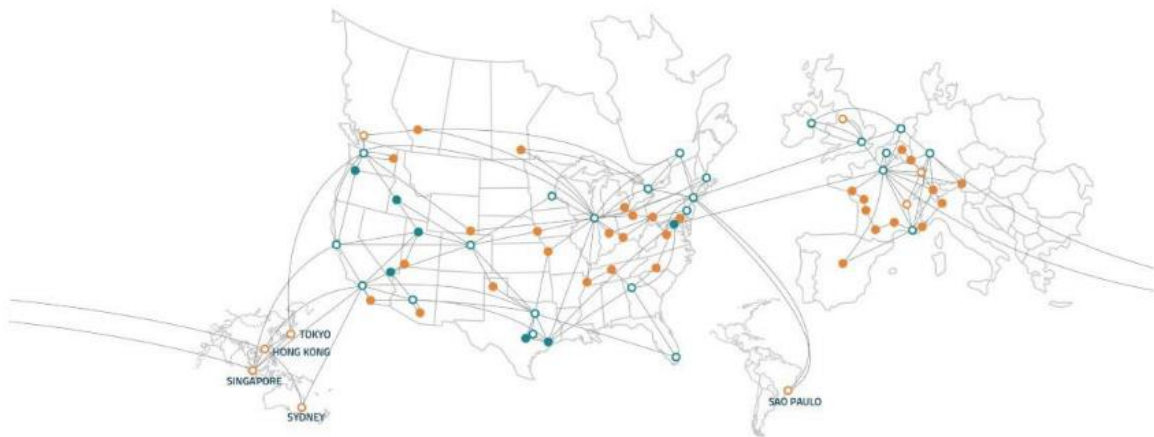


Figure 2.²

31. Mr. Davies goes on in paragraphs 29 to 32 of the Davies Report to describe wireline access networks. Mr. Davies explains that “for residential services the access network generally consists of fibre infrastructure to a local **Fibre Distribution Hub (FDH)** then to the home via coax or optical fibre.” Mr. Davies goes on to note that “while much of the

² Zayo Mapbook (March 2021) [SJR-CCB00897202] which displays Zayo’s global fibre network and extensive metro fibre networks including in British Columbia and Alberta.

infrastructure is distinct, the wireless network typically possesses some critical dependencies on the wireline infrastructure”:

- (a) Use of metro fibre or other wireline fibre links for macro cell and small cell backhaul.
 - (b) The Internet backbone, sometimes referred to as the Core Network, or Internet Core Network, is the connection between large urban areas via metro fibre and regional/national fibre through interchange “Points of Presence” (POPs).
 - (c) Wi-Fi access points (residential or public Wi-Fi hotspots) may be used by wireless devices, such as mobile phones, to connect to the Internet; these Wi-Fi access points are themselves typically connected to the Internet backbone via residential coax/cable or enterprise metro fibre.
32. I agree with Mr. Davies that wireless networks need the form of connectivity described above, such as fibre links from cell sites and access to Backbone. However, I disagree with Mr. Davies that these are “critical dependencies” on a wireline network. That is because, in my experience, wireless operators typically have multiple options to access these connections from various third-party providers. Moreover, as I explained in my First Report, many of these connections can be achieved through wireless microwave links, rather than through connections to a wireline network.
33. In addition, I disagree that Wi-Fi access points are in any way “critical dependencies” that a wireless network has on wireline infrastructure. I address this topic in greater detail below in the context of my discussion of Shaw Go WiFi.

III. ROLL-OUT OF 5G WIRELESS SERVICES

34. In Part VII of the Davies Report, Mr. Davies sets out the basis for his conclusion that, based on the information available to him, Shaw was fully prepared from both technical and business perspectives to participate in the 3500 MHz auction had it not been for the agreement with Rogers on the proposed merger.

35. Mr. Davies then qualifies this conclusion by noting in paragraph 200 of the Davies Report that Shaw would have had to conduct upgrades to its network had it acquired 3500 MHz spectrum. These upgrades would have included adding/upgrading radios, ensuring proper fibre connectivity and deploying small cells.

36. [REDACTED]

37. Moreover, as I explained in my First Report, Shaw now has limited options to gain and deploy spectrum suitable for 5G in the event that the Proposed Transaction does not proceed. It can acquire spectrum either in the forthcoming 3800 MHz auction or buy 3500 MHz spectrum from another operator; or refarm or repurpose existing spectrum such as that used for 4G to upgrade to 5G. There are significant limitations associated with each of these options, which I address in my First Report and will not repeat here.

38. The analysis of Shaw's ability to roll-out 5G wireless networks in the Davies Report also does not address the core 5G-related issue discussed in my First Report, which is whether Freedom under the ownership of Videotron will be a more (or less) effective competitor due to costs that would be required to be incurred to develop a 5G network. On this issue, having carefully reviewed the analysis of Mr. Davies, I remain firmly of the opinion that Freedom's costs to develop a true 5G network under Shaw's ownership are significantly greater than under Videotron's ownership due to the fact that Videotron already owns significant blocks of 3500 MHz spectrum throughout Freedom's wireless footprint.

39. While Freedom under Videotron's ownership is well-positioned to roll-out 5G on a timely and effective basis, including primarily because of the combined entity's access to 3500 MHz spectrum, Freedom under Shaw's continued ownership does not, in my opinion,

have a viable path to a timely and effective roll-out of 5G. I acknowledge the observation of Mr. Davies in paragraph 257 of the Davies Report that the new Freedom-Videotron will face a transition period to roll-out 5G. However, in my opinion, that transition period is insignificant in comparison to the issues facing Freedom under Shaw's continued ownership with respect to the roll-out of 5G, given that the latter entity has none of the critical mid-band spectrum needed to effectively roll-out 5G.

IV. SHAW GO WI-FI

40. In paragraphs 104 to 118 of the Davies Report, Mr. Davies sets out his understanding of Shaw's Wi-Fi hotspots and Wi-Fi offloading. Mr. Davies goes on to explain in paragraphs 230 and 246 of the Davies Report his view that [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]. I strongly disagree with this assessment.

As I explain below, the Home Wi-Fi hotspots do not currently provide any meaningful offload benefits for Shaw. The proposed Freedom-Videotron entity will not incur higher costs if it does not gain access to these hotspots, including because the Freedom network is currently heavily underutilized.

A. BACKGROUND ON SHAW'S WI-FI HOTSPOTS

41. I describe my understanding of Shaw's Wi-Fi hotspots in Part VI of my First Report, and will not repeat that understanding here. However, I do highlight certain aspects of Mr. Davies' description of those hotspots that I do not agree with.
42. In particular, in my opinion, Mr. Davies overstates the technical ability of the Shaw Home Wi-Fi hotspots to provide meaningful offload capacity. In describing Shaw's wireline network, Mr. Davies notes in paragraph 91 of the Davies Report that Shaw: "has approximately a hundred thousand public Wi-Fi deployments throughout its service territory, in Alberta and British Columbia, Saskatchewan, Manitoba and Ontario and it also has almost 1M home hotspots that can also provide Wi-Fi to Shaw subscribers within range".

43. I agree with Mr. Davies that the Home Wi-Fi hotspots provide Wi-Fi to Shaw subscribers “within range”, but the concept of “within range” requires further elaboration. As I explained in my First Report, indoor Wi-Fi signals rarely travel more than 10 to 20 meters, depending on the building they are located in. As such, Freedom and Shaw Mobile customers that are, realistically, “within range” of a Home Wi-Fi hotspot must literally be in their homes (or in the homes of another Shaw or Freedom customer). For example, the Wi-Fi technology used in the Shaw Home Wi-Fi hotspots (being the modems given to customers for home Internet access) would generally not allow a passenger in a passing vehicle to connect (seamlessly or otherwise) to the hotspots in order to avoid accessing the mobile network.
44. For these reasons, it is not accurate in my opinion to consider the Home Wi-Fi hotspots as part of Shaw’s mobile wireless network or service.

B. WI-FI OFFLOAD

45. In describing Shaw’s Wi-Fi hotspots, Mr. Davies states in paragraph 92 of the Davies Report that “Shaw also utilizes Wi-Fi hotspots throughout its customer footprint to help with mobile coverage and capacity”. Mr. Davies adds in paragraph 114 of the Davies Report that Shaw’s “significant usage of Wi-Fi to densify its mobile network creates a degree of reliance on Wi-Fi Offload as a capacity remedy for its mobile network”. I strongly disagree with these conclusions, which in my opinion misapply the term “offload” and reflect a misunderstanding of the role of Wi-Fi in Shaw’s mobile wireless network.
46. While the term “Wi-Fi offload” does not have a singular agreed upon definition in the telecommunications industry, it generally refers to the concept of diverting data from a mobile wireless network to a wireline network through Wi-Fi technology. The concept can mean very different things in different contexts and to different users.
47. In the broadest sense, Wi-Fi offload is a feature of virtually every mobile wireless network that I am aware of. It is not unique to Shaw. In my experience, customers with mobile phones and other wireless devices are accustomed to accessing Wi-Fi – either at home, at their office or in a variety of other settings. When they do so, they are

“offloading” or diverting data that could be transmitted over a mobile wireless network to a wireline network through Wi-Fi.

48. Many portable devices such as mobile phones allow their users to transmit data through both mobile wireless and Wi-Fi/wireline networks. They do so in an autonomous manner, in that they are not directed by any network or network operator to move from one to another. Instead, the software embedded within these portable devices makes a decision as to which network (mobile wireless or Wi-Fi/wireline) to access. The manufacturers of these devices design the algorithms that are used to determine how the device chooses between mobile wireless and Wi-Fi/wireline networks, with the result that each type of device may access these networks in slightly different ways.
49. For example, the first connection between a mobile device and a Wi-Fi network is typically made by the user identifying the Wi-Fi network from his or her device and then entering the appropriate password to “login” to the Wi-Fi network. Once the user has “logged in” to the Wi-Fi hotspot in this manner, the mobile device will typically save the authentication information and allow the user to automatically connect the device to that Wi-Fi network whenever it subsequently comes within the range of the Wi-Fi signal.
50. While the manner in which mobile devices select between Wi-Fi and mobile wireless networks varies from device to device (because of different manufacturer settings), mobile devices are generally programmed to prefer Wi-Fi networks for data intensive but non-urgent tasks. These tasks include updates to operating systems and applications, uploading of materials such as photographs, back-up of user data, and similar data-intensive applications. Similarly, mobile devices are generally programmed to refrain from sending/receiving such data-intensive material while only connected to a mobile wireless network. As such, it is common in my experience for a mobile device that has not been connected to a Wi-Fi network for some time (e.g. a few hours) to send/receive a large amount of data immediately upon being re-connected to a Wi-Fi network.
51. Many devices – such as laptops and tablets – do not have the ability to connect to mobile wireless networks, with the result that all of the data they transmit is through Wi-Fi.

52. Once again, I reiterate that none of this “offloading” or diverting of traffic from mobile wireless networks to Wi-Fi is unique to Shaw or the Shaw Home Wi-Fi hotspots. This offloading is a common feature of networks around the world.
53. The result of this “Wi-Fi offloading” that is a daily occurrence in networks around the world is that mobile devices are generally understood to transmit a majority of their data over Wi-Fi, and not over mobile wireless networks. It is difficult to verify the precise percentage of Wi-Fi offloading because, to my knowledge, there is no central entity that collects this data. I am familiar with several sources which estimate that mobile devices transmit over 70% of all of their data over Wi-Fi.³ According to a recent report from Innovation Science and Economic Development Canada (“**ISED**”) dated May 2021, over 60% of mobile data traffic is offloaded on Wi-Fi technology today. And this percentage is expected to increase in the coming years.⁴
54. It is important to note that Wi-Fi uses different spectrum bands and licensing modalities than mobile wireless networks. The spectrum bands used by Wi-Fi are unlicensed, with the result that anyone can use them – operators, private individuals and businesses. As a result, data sent over Wi-Fi networks – whether they are the Shaw Wi-Fi hotspots or other Wi-Fi hotspots/networks – does not impact on the capacity of a mobile wireless network.
55. However, the use of Wi-Fi by *consumers* should not be confused with a dependency of any mobile network on Wi-Fi. That is because consumers use Wi-Fi to transmit data, whether at home, at the office or in countless other locations, and that Wi-Fi usage typically has no connection to or relationship with the consumers’ mobile wireless service provider. Again, I emphasize that Freedom and Shaw are no different than any other carrier in Canada – and countless other carriers around the world – in that their subscribers use Wi-Fi to transmit data in countless locations.

³ See for example: <https://wifinowglobal.com/news-and-blog/wi-fi-percentage-of-us-smartphone-traffic-at-74-says-netradar/> [SJRБ-CCB00896564]; and <https://ustelecom.org/wifi-dominates-android-mobile-data-usage/#:~:text=The%20average%20white%20smartphone%20user,or%2020.7%20percent%20on%20cellular> [SJRБ-CCB00897265].

⁴ See, ISED, Decision on the Technical and Policy Framework for Licence-Exempt Use in the 6 GHz Band, (May 2021) Gazette Notice No. SMSE-006-21 available at: <https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11698.html> [SJRБ-CCB00897175].

56. In contrast to the consumer's perspective, from a mobile operator's perspective, the term "offload" generally has a narrower definition. It generally refers to data that the mobile wireless operator, through its own actions, causes to be diverted to Wi-Fi. Mobile operators may engage in this intentional form of data diversion because it is typically much cheaper for a user to have data transmitted over Wi-Fi than over a mobile wireless network.⁵ Mobile operators can cause this "offloading" to happen by pre-populating or downloading to mobile devices the identity and password of particular routers such that the devices will automatically log onto Wi-Fi when the device is in range. These routers could be those installed by the mobile operator or accessible to their customers through arrangements such as Shaw Go Wi-Fi.
57. In my experience, mobile operators generally do not install home Wi-Fi routers themselves since the benefits are relatively small and the costs are high. However, in instances where a mobile operator is also a fixed wireline operator, then the fixed operator will typically provide a router as part of a home broadband package and the incremental cost of configuring this router to have public-facing accessibility is minimal.
58. In my experience, this operator-directed Wi-Fi offloading is far less prevalent than the more generic, consumer-oriented offloading I described earlier in this Report. For example, a user might spend most of his or her time at home or at the office where they have manually logged into the available Wi-Fi networks. Only when, for example, visiting a friend or at a restaurant (or in some other public setting) might the mobile devices of these users access an operator-related router with active offloading being deployed. Even in instances where the user has accessed an operator-related router without active offloading being deployed, the user would typically still have the option of manually logging into the Wi-Fi network to offload data in the broader sense of the term.
59. To place all of this into its proper perspective, consider that if all mobile devices suddenly had no Wi-Fi access of any sort then, based on the assumption of 70% to 80% Wi-Fi off-load reported above, the amount of data transmitted over mobile wireless

⁵ Wi-Fi data transmission is generally free to the user whereas cellular data transmission may be charged directly or may result in the user consuming their monthly allowance and then facing surcharges.

networks would immediately increase around 3-fold.⁶ Few mobile networks could accommodate such an increase and widespread congestion would result.

60. In this regard, I note that ISED recognizes that Wi-Fi “serves a crucial function in support of Canadian commercial wireless service providers, who rely on it to offload traffic from their mobile cellular networks and without which additional commercial mobile spectrum would be required to support current mobile services”.⁷ This would be the case for all wireless carriers in Canada, and globally, not just for Freedom and Shaw.
61. In contrast, if mobile devices had no operator-related Wi-Fi controls (such as Shaw Go Wi-Fi), then data traffic might increase by less than 10% which most networks [REDACTED] [REDACTED] would be able to accommodate with relatively little, if any, change in performance.

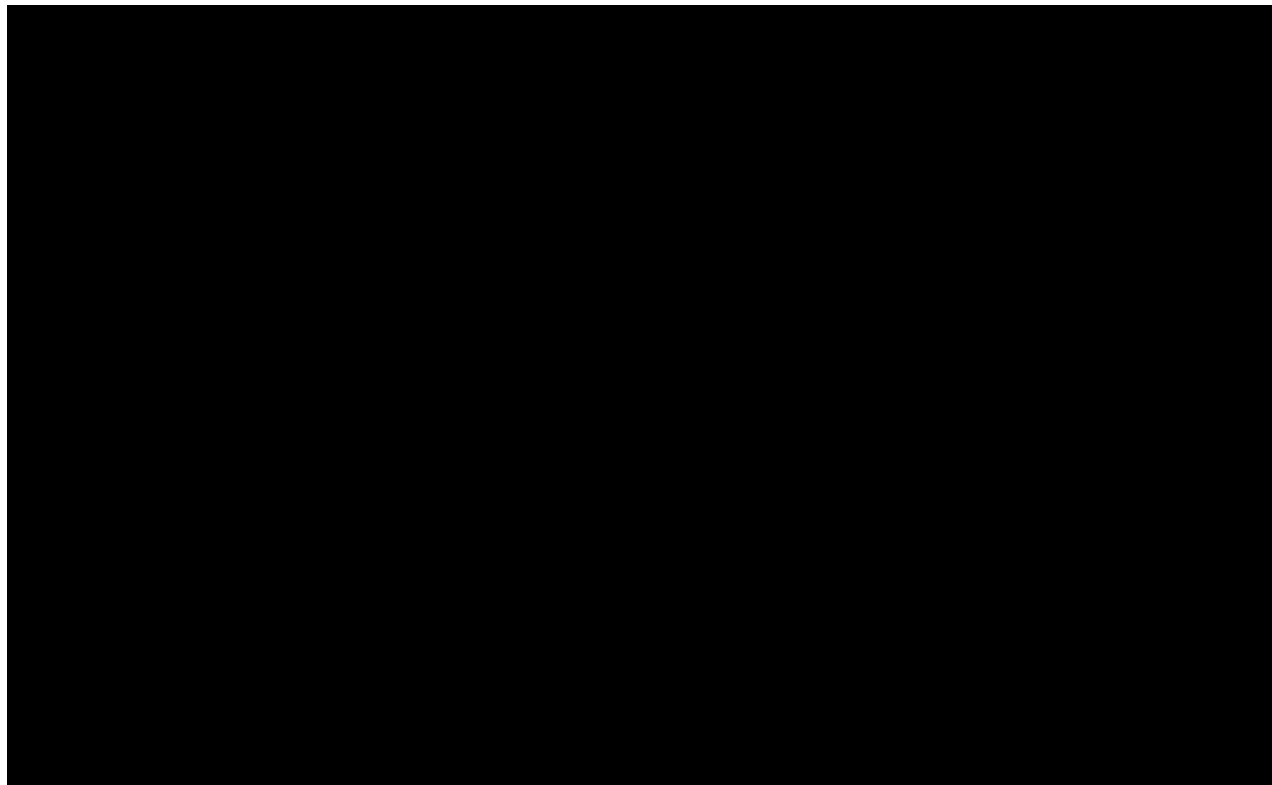
C. OFFLOAD FROM SHAW GO WI-FI

62. In paragraphs 114 and 115 of the Davies Report, [REDACTED] [REDACTED] Mr. Davies’ estimates are not consistent with my understanding or with a proper reading of the documents he relies on to arrive at his estimates.
63. [REDACTED] [REDACTED] That estimate aligns with my experience.

⁶ If approximately 75% of traffic is carried over Wi-Fi and 25% over mobile wireless, then Wi-Fi carries three times more traffic than mobile wireless.

⁷ See, footnote 4.

64. [REDACTED]



65. Mr. Davies' analysis is flawed for at least three reasons:

(a) Mr. Davies appears to ignore that the data shown above from the Shaw Q3 F21 discussion materials is presented on a **per device basis** per month, with the result that his calculations are inaccurate. For example, the [REDACTED] of LTE traffic per month is per device, not total usage. Based on Shaw's internal data, depicted in Figure 3 below, the total number of unique users that access the wireless LTE network of Freedom/Shaw Mobile per month is greater than the total number of unique users that access Shaw Go Wi-Fi and Home hotspots. Only approximately [REDACTED] of Freedom users access Wi-Fi. Thus, the denominators in

the numbers Mr. Davies calculates are somewhat different. Mr. Davies does not attempt in his analysis to reconcile these differences. To account for the different numbers of users, one might consider reducing the total Wi-Fi traffic relative to the total LTE traffic by perhaps as much as approximately [REDACTED], based on Figure 3 below.

- (b) Further, in my experience, and as discussed above, most of the Home hotspot traffic is likely to be from users within their own home, which would be “offloaded” even if there were no Home hotspot by users simply inputting the password for their home Wi-Fi network.⁸
- (c) Finally, as explained above much of the Wi-Fi traffic is related to actions that only happen once a mobile device connects to Wi-Fi such as updates to the phone, to apps, and synchronisation of pictures and videos. This data would almost certainly never have been transmitted across the mobile network. It is quite likely that over 70% of all traffic transmitted over Wi-Fi by mobile phones would never have been transmitted over the wireless network.

⁸ I understand that the just under [REDACTED] of Home hotspot Wi-Fi usage by Freedom and Shaw Mobile customers refers customers accessing the secondary Home hotspot Wi-Fi network within their own home, rather than their primary Wi-Fi network. This can happen when a customer has failed to manually connect their phone to the personal identity of the router. This [REDACTED] of Home hotspot Wi-Fi usage would also include traffic of guests to a subscribers home who are also Freedom or Shaw Mobile customers. Unlike a guest who subscribes to a competing wireless carrier would do, guests who are also Freedom or Shaw Mobile customers do not have to ask the host for their Wi-Fi password to access the home network because they will automatically connect to the broadcasted secondary Wi-Fi network. In either instance, this [REDACTED] of data is not “offload” from the wireless network since it would almost certainly never have been carried over the mobile wireless network.

assertion, which is contrary to my understanding of the capacity constraints – or lack thereof – associated with the wireless network of Shaw.

68. I have reviewed and considered information provided to me by Shaw concerning the capacity of its wireless network.¹⁰ Based on my review and analysis of this information, it is my opinion that Freedom is not at all in need of a “capacity remedy”. It has ample capacity to accommodate significant growth in its wireless network without any need for Wi-Fi offloading.

69. For example, I have been provided and have discussed with Shaw the information set out in Figure 4 below, which demonstrates the utilization of Freedom’s wireless network in March 2022. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

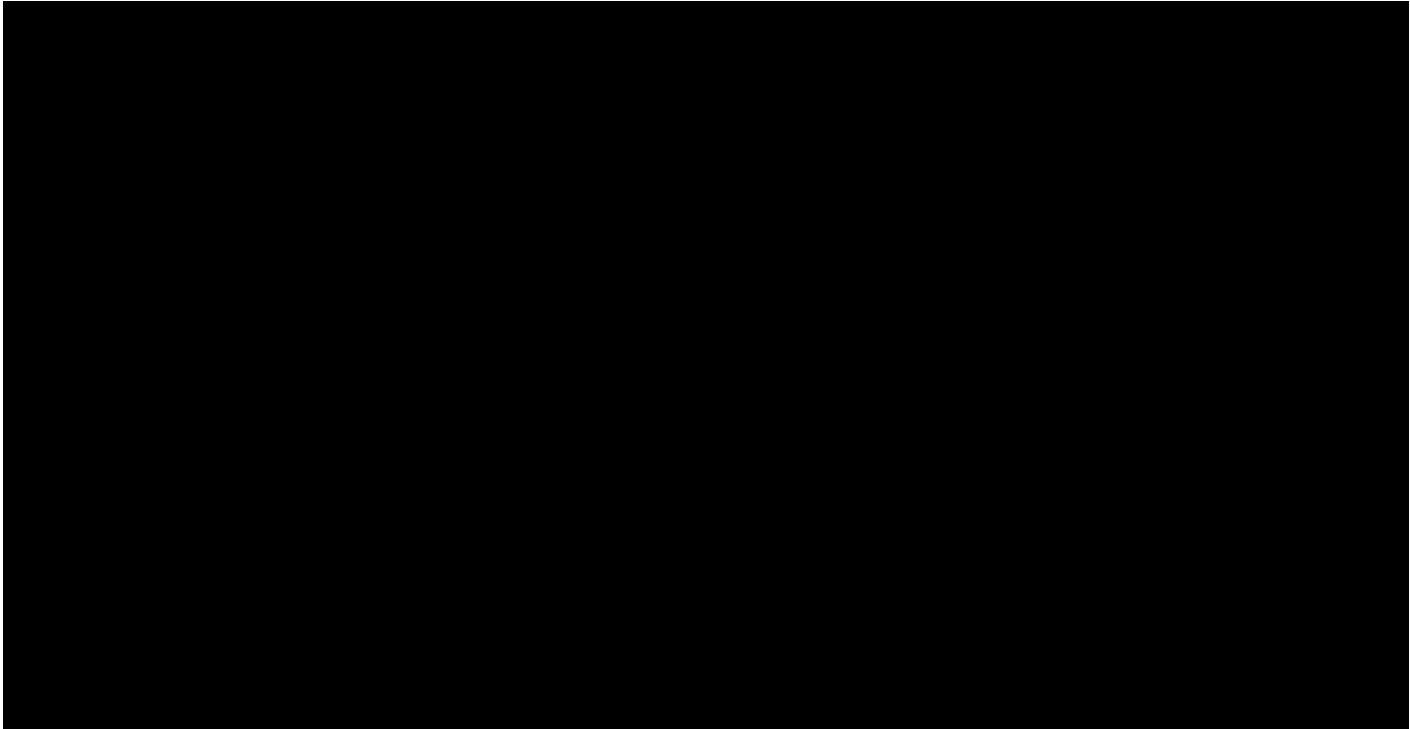
[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

10 [REDACTED]

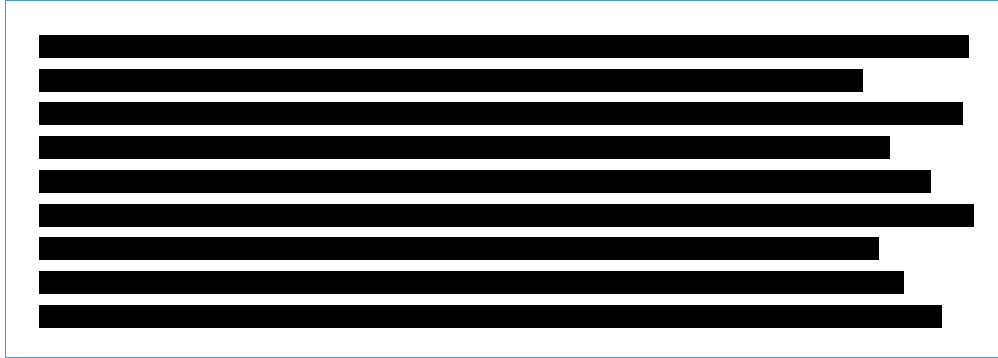


██████

70. In any event, I note that Mr. Davies appears to recognize that Wi-Fi is not part of a carrier’s “regular capacity planning”. In the context of his discussion of the role of small cells in wireless networks, Mr. Davies states as follows in paragraph 96 of the Davies Report: “small cell deployments are different than Wi-Fi as small cells are a part of the regular capacity planning of a carrier”. While I disagree with Mr. Davies’ opinions and conclusions concerning Wi-Fi offloading, I agree with his observation that small cells tend to be part of the regular capacity planning of wireless network operators.

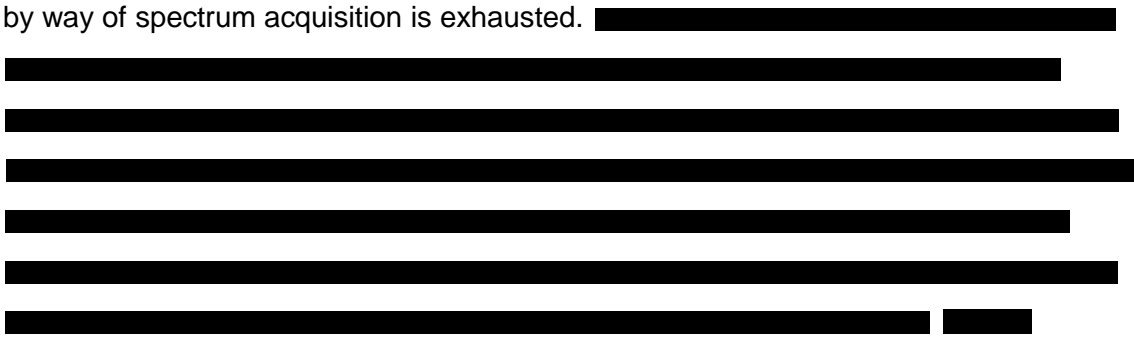
████████████████████

71. With respect to the role of small cells, Mr. Davies also opines as follows in paragraph 97 of the Davies Report:



72. I agree with Mr. Davies that small cells are used to provide “densification” of the wireless network to improve network coverage and capacity. However, I strongly disagree that small cells provide the most important factor in wireless system capacity growth. As I explained in my First Report, in my experience, the most important competitive differentiator of service between wireless networks is spectrum, followed by cell sites, backhaul, core network, and then other aspects of the RAN. Mr. Davies places other factors such as “increased use of radio spectrum” in a footnote. I note that most mobile operators around the world are increasing the capacity of their networks predominantly through adding additional spectrum to existing macro cells rather than through the installation of small cells.¹²

73. I expect this to remain the case for at least the next few years until the capacity added by way of spectrum acquisition is exhausted. [REDACTED]



¹² See, for example <https://techinformed.com/5g-small-cell-deployments-forecast-to-surge/> which notes “At the moment, macro cells have satisfied 5G capacity demands...” [SJRБ-CCB00897195].

¹³ [REDACTED]

74. [REDACTED]

75. Moreover, while I agree that small cells can be installed indoors, as I note in my First Report, small cells (which tend to be capable of transmitting both 4G and 5G signals) are generally deployed outdoors since this provides greater coverage. In my experience, it is unlikely that an indoor Wi-Fi location would be able to accommodate the larger equipment and antennas needed for small cells given that they are typically the size of a large briefcase or bigger as opposed to Wi-Fi routers that are the size of a book.

76. With respect to the issue of Wi-Fi offloading, I have also reviewed and considered the Witness Statement of Mr. Tom Nagel, the Senior Vice President of Strategy & Development, Wireless for Comcast Cable Communications, LLC (“Comcast”) dated September 22, 2022.

77. In his Witness Statement, Mr. Nagel notes [REDACTED]

78. For these reasons, Comcast is not a proper comparable to Freedom and Shaw in terms of their Wi-Fi offloading.

79. In any event, for the reasons described above, it is my opinion that Shaw’s Home Wi-Fi hotspots do not currently provide any meaningful, or even measurable, offload benefits for Shaw.

V. BACKHAUL

80. I have reviewed the Witness Statements of Stephen Howe, the Chief Technology and Information Officer of Bell and Nazim Benhadid, the Senior Vice President, Network Build & Operate of TELUS. Each of Messrs. Howe and Benhadid describe in their Witness Statements various benefits that have been enjoyed by Bell and TELUS associated with deploying wireless networks within their respective wireline footprints. In essence, they describe how operators such as Bell and TELUS with widespread fibre networks can more readily provide fibre backhaul to wireless cell sites. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

81. While I do not dispute that Bell and TELUS may have achieved certain advantages by deploying wireless networks within their wireline footprints, it does not follow that other carriers such as Freedom under the ownership of Videotron would find it more difficult or costly to gain access to backhaul. This is because there are numerous alternatives available to Freedom-Videotron to obtain the backhaul they need to support their wireless networks.

82. In this regard, as I explained in my First Report, Freedom can procure backhaul from operators that do have extensive fibre networks, such as Bell and TELUS, even if these operators are not part of the same organisation. For Freedom's current network, [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].

83. In any case, backhaul does not require fibre. Rather, backhaul can be either wired or wireless. For wireless backhaul, in addition to microwave technology, carriers can elect to use self-deployed equipment and spectrum in the mmWave bands. While there is a trend away from wireless to wireline backhaul, wireless remains a viable and in some cases preferred option, as discussed in my First Report.

VI. NETWORK RELIABILITY/RESILIENCE

84. Mr Davies offers the opinion in paragraph 9 of his Report that “the proposed transaction would have an impact on the reliability of wireless networks” because the new Freedom and Videotron entity will rely to a significant extent upon fixed connectivity provided by Rogers using its wireline networks for backhaul and other connectivity for its wireless networks. Mr. Davies also provides the opinion in paragraph 218 of the Davies Report that during the Rogers outage on July 8, 2022, if Rogers and Shaw had been integrated, Videotron would have lost connectivity to [REDACTED]
85. Mr. Davies goes on to opine in paragraph 224 of his Report that “prior to the proposed transaction customers in British Columbia and Alberta had a choice of providers that generally relied upon three distinct wireline networks, however with the proposed divestiture and acquisition, that choice would generally be limited to two wireline networks”.
86. In my opinion, the concerns expressed by Mr. Davies regarding the reliability of wireless networks if the Proposed Transaction proceeds are flawed and misplaced. While a customer has a choice of multiple providers at the point they select their service, once they have selected one provider, they cannot switch to another on a moment’s notice if there is a failure in the wireless network of their chosen provider or the wireline network that provides backhaul or other services to that wireless network. Hence, from a reliability viewpoint, customers only ever have a single-source supply, unless they choose to pay for backup services from multiple providers. Whether there are two or three potential suppliers makes no difference during a network failure event.
87. I agree with Mr. Davies that mobile network operators compete in part on the basis of the reliability of their wireless networks. It is important that telecommunications networks are reliable and resilient for many reasons. Any failures can impact thousands or millions of users and can deeply inconvenience lives and prevent emergency responses.
88. However, in my experience, the best form of resilience is generally redundancy. For many users, if the mobile network fails then they can use Wi-Fi as a fall back. If the fixed wireline network fails, then they can use the mobile network instead, with their mobile

device acting as a hotspot if needed.¹⁴ Of course, if the fixed and mobile networks share a common resource because, for example, they are provided by the same operator and use the same backhaul, and the failure is in this shared resource, then both networks might fail simultaneously, increasing the risk of relying on a single integrated provider for fixed and mobile communications. In principle, if one mobile network fails, then users could move to another mobile network temporarily although this “national roaming” is rarely enabled. This redundancy is discussed further below.

89. An important point to note is that having more fixed or wireless networks does not provide more resilience because users of one network will generally not have access to another and so cannot switch in the case of failure. Imagine that there were two mobile networks. Each of them is equally likely to fail. If, on average, they failed for one day/year then there would be two national failures per year, each impacting 50% of subscribers. Each subscriber would see 1 day of outage per year. Now imagine three mobile networks. There would be three national failures, each impacting 33% of subscribers. Each subscriber would still see 1 day of outage per year. It is likely that the more networks that there are, the lower the revenue per network and the fewer resources each network can devote to resilience issues such as employing cyber-experts. Hence, more networks might increase the failure rate per network and because users generally cannot switch to a different network when theirs fails, will result in users seeing an increased percentage of the time when they cannot communicate.
90. In this regard, I note that Mr. Davies and the representatives of Bell and TELUS put forward many proposed advantages of integrated wireless and wireline networks, including lower costs. I have already provided my views on these proposed advantages. What this evidence does not consider or address is the reality that more integrated wireline-wireless networks can increase risk because their failure might result in failure of both parts of the network simultaneously.
91. Further, in my experience, the factors that cause network failure are generally common across operators. Over a sufficiently long period of time (e.g. 5 years), all operators offering similar services will generally suffer similar levels of outage. In my experience,

¹⁴ Note that this only applies to their selected fixed and selected mobile providers. They cannot, for example, switch between different fixed providers at short notice as explained earlier.

operators that do experience failures tend to act to resolve any underlying issues, with the result that they are less likely to encounter similar failures in the future.¹⁵

92. If backhaul resilience is a concern for a particular operator, then options such as microwave back-up can be installed, allowing a switch-over to a microwave link on failure of the fibre link. This might result in a particular cell site losing some of its capacity, such that high bandwidth services might not be supported, but basic connectivity could continue during the period of the outage which is temporary and typically in my experience generally lasts for a few hours and rarely more than a few days. Within the core network, a ring architecture ensures that should one link fail, then traffic can be routed “the other way” around the ring, providing redundancy.

93. In that regard, I understand that [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]¹⁶

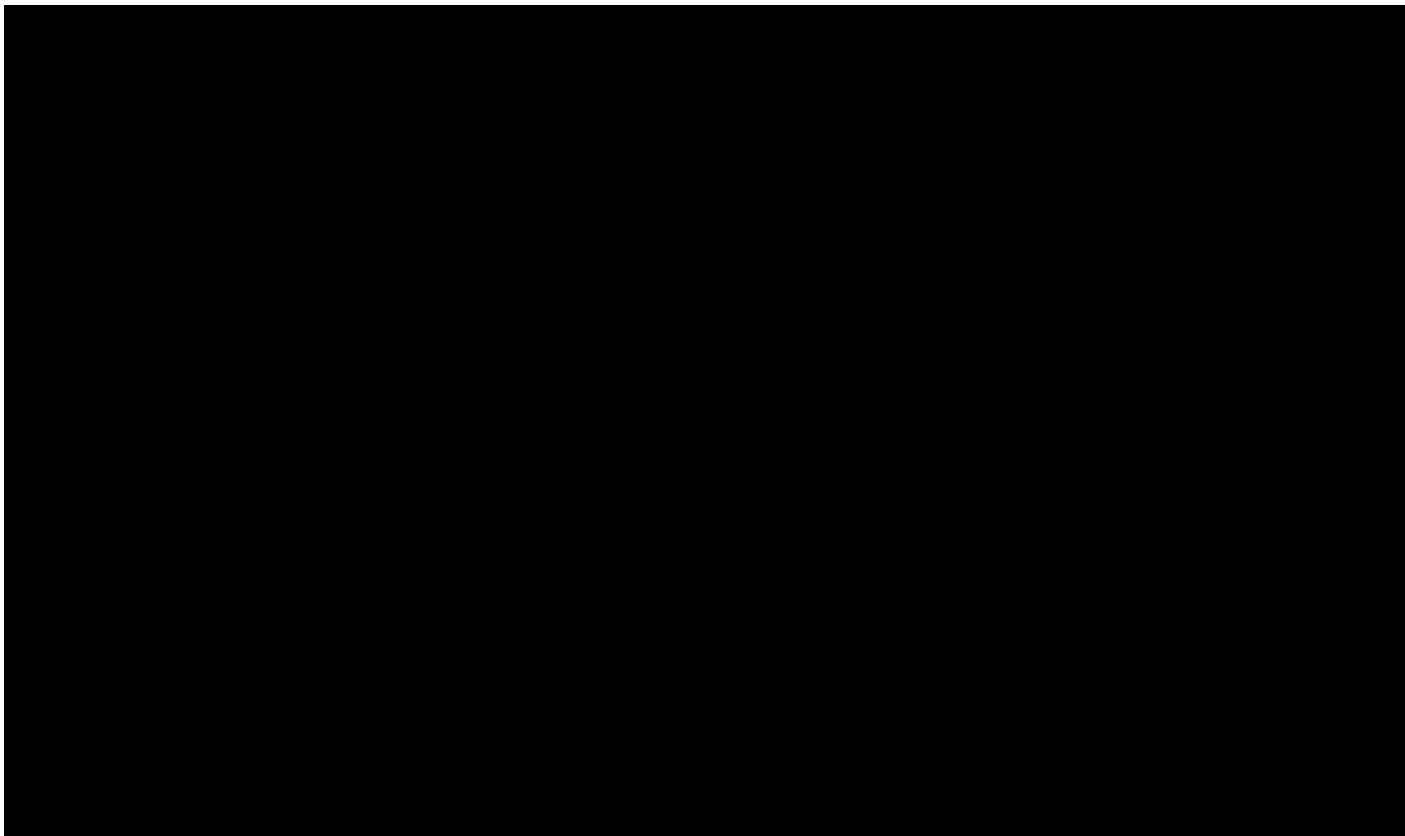
94. I also understand that Freedom has [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].

95. As is illustrated in the diagram below, [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].¹⁷

¹⁵ See, <https://www.theglobeandmail.com/business/article-how-a-coding-error-caused-rogers-outage-that-left-millions-without/> [SJRБ-CCB00896565].

¹⁶ [REDACTED].

¹⁷ [REDACTED].



[Redacted]

96. I understand that Videotron has informed ISED that [Redacted]
 [Redacted]
 [Redacted]
 [Redacted]
 [Redacted]
 [Redacted] ■ I agree with this characterization.

97. In summary, if there is concern over the resilience of wireless or wireline network, then the best option is to enable redundancy at the network level (that is, having more than one network available). For mobile networks, this might include a regulator mandating national roaming on network failure such that mobile subscribers could temporarily move to a working cellular network until their home network recovers – a policy that I

[Redacted]

understand is already under implementation in Canada.¹⁹ It is also good practice in my experience to deploy redundancy within networks, for example, for the backhaul and core network.

VII. CONVERGED WIRELESS-WIRELINE NETWORKS AND INNOVATION

98. In his Witness Statement, Mr. Howe (the Chief Technology and Information Officer of Bell) describes “benefits for wireless network deployment associated with owning an extensive wireline access network in the same footprint, including lower costs, shorter deployment times, and greater ability to innovate”.
99. The benefits put forward by Mr. Howe can be summarized simply as minimizing the time, cost and municipal access headaches of laying fibre and lowering costs from using a common vendor.²⁰ I have provided my opinion above on the alternatives available to Freedom to laying fibre to cell sites. No details are provided on the types of vendors that Mr. Howe is thinking of but, as far as I am aware, only one major wireless vendor (Nokia) has an extensive wireline offering and no other major wireline vendors have a wireless offering hence the opportunities to use common vendors are very limited.
100. Further, I am unpersuaded by the three examples that Mr. Howe provides to demonstrate that operating a wireline network in an areas where a carrier is deploying a wireless network creates additional opportunities for innovation.
101. [REDACTED]

¹⁹ See, <https://www.canada.ca/en/innovation-science-economic-development/news/2022/09/statement-from-minister-champagne-on-canadas-telecommunications-reliability-agenda-following-rogers-outage-on-july-8-2022.html> [SJRБ-CCB00897194].

²⁰ See, Howe Statement at paras 11 to 13.

[REDACTED]

102.

[REDACTED]

103.

[REDACTED]

104.

[REDACTED]

105. The third example of innovation offered by Mr. Howe is to “build more economical, targeted, and complete service offerings for enterprise customers. For example, dedicated WiFi, 4G and 5G in-building systems, and Internet of Things (“IoT”) solutions can be integrated with wireline connectivity at key locations to provide a comprehensive service offering. Similarly, a wireless back-up service could be included with wireline connectivity to provide a more reliable overall service offering for enterprise customers”.

²¹ See, [https://www.signalsolutions.co.uk/blog/vodafone-are-retiring-their-sure-signal-product-what-now/\[SJRb-CCB00896568\]](https://www.signalsolutions.co.uk/blog/vodafone-are-retiring-their-sure-signal-product-what-now/[SJRb-CCB00896568]).

106. In my experience, these “more complete service offerings” referred to by Mr. Howe can be deployed by any entity regardless of whether it owns the wireline infrastructure and indeed, often system integrators such as Cisco will deploy Wi-Fi and 4G/5G systems within commercial buildings.²² Indeed, in my experience, operators are generally unable to compete against the skills and experience that such system integrators possess. A wireless backup can also be provided by a simple device that switches from wireline to wireless in the case of wireline failure. There is no need for the wireline and wireless services to come from the same provider and indeed, there is merit in them coming from different providers since a failure of the wireline service might also impact the backhaul for the associated cellular service, causing both to fail simultaneously.

October 20, 2022

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²²

See, https://www.cisco.com/c/en_uk/products/wireless/index.html [SJRБ-CCB00896569].

APPENDIX “A”

LIST OF DOCUMENTS

- CRTC Telecommunications Glossary, Data Collection System Guide, available at: <https://crtc.gc.ca/eng/dcs/glossaryT.htm> (SJRБ-CCB00897264)
- Zayo Mapbook (March 2021) (SJRБ-CCB00897202)
- “Wi-Fi percentage of US smartphone traffic at 74%, says Netradar” dated November 30, 2018, available at: <https://wifinowglobal.com/news-and-blog/wi-fi-percentage-of-us-smartphone-traffic-at-74-says-netradar/> (SJRБ-CCB00896564)
- “WiFi Dominates Android Mobile Data Usage” dated January 13, 2017, available at: <https://ustelecom.org/wifi-dominates-android-mobile-data-usage/#:~:text=The%20average%20white%20smartphone%20user,or%2020.7%20percent%20on%20cellular> (SJRБ-CCB00897265)
- ISED, Decision on the Technical and Policy Framework for Licence-Exempt Use in the 6 GHz Band, (May 2021) Gazette Notice No. SMSE-006-21, available at: <https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11698.html> (SJRБ-CCB00897175)
- [REDACTED]
- [REDACTED]
- “5G small cell deployments forecast to surge” dated August 17, 2022, available at: <https://techinformed.com/5g-small-cell-deployments-forecast-to-surge/> (SJRБ-CCB00897195)
- Sylvain Lapointe, Videotron’s 5G Deployment Plan, Wireless Access Network in Rest of Canada, Network Planning and Architecture, Technology Deployments, (June 29,2022) (VID00077879)
- “How a coding error caused Rogers outage that left millions without service” dated July 25, 2022, available at: <https://www.theglobeandmail.com/business/article-how-a-coding-error-caused-rogers-outage-that-left-millions-without/> (SJRБ-CCB00896565)

- [REDACTED]
- [REDACTED]
- [REDACTED]
- Statement from Minister Champagne on Canada's Telecommunications Reliability Agenda following Rogers' outage on July 8, 2022, available at:
<https://www.canada.ca/en/innovation-science-economic-development/news/2022/09/statement-from-minister-champagne-on-canadas-telecommunications-reliability-agenda-following-rogers-outage-on-july-8-2022.html>
(SJRБ-CCB00897194)
- "Vodafone are retiring Sure Signal – What Now?" dated May 14, 2021, available at:
<https://www.signalsolutions.co.uk/blog/vodafone-are-retiring-their-sure-signal-product-what-now/> (SJRБ-CCB00896568)
- Cisco, Wireless and Mobility, available at:
https://www.cisco.com/c/en_uk/products/wireless/index.html (SJRБ-CCB00896569)