

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

Comments of
Canadian Wireless Telecommunications
Association

May 15, 2019

EXECUTIVE SUMMARY

(a) Competition in the Retail Market

1. The mobile wireless retail market continues to show signs of increasing and sustainable competition. In addition to the three national network providers (“National Providers”), the wireless retail market includes Canada’s regional facilities-based new entrants (“Regional Providers”) who, encouraged by Government policies that recognize the importance of facilities-based competition, have made, and continue to make, significant investments in acquiring spectrum and building and expanding their wireless networks.
2. These competitors engage in ongoing rivalrous behavior evidenced by vigorous and aggressive marketing activities. For example, Regional Providers have entered markets with lower rates and innovative service offerings, which have been aggressively matched by the National Providers. These activities have led to a significant downward trend in prices, including a 53.6% decline in mobile telecommunications service prices from Q1 2014 to Q2 2018.
3. The contributions of the Regional Providers to consumer choice and the competitiveness of the retail market are further evidenced by their growing success in attracting subscribers. For example, in Q1 of 2019, Freedom attracted 46% of all net new wireless subscribers, while Videotron acquired 38.3%.
4. Rivalrous behaviour is not limited to price competition. Facilities-based wireless providers also compete, or in some cases are positioning themselves to compete, on quality and coverage. In order to do so, Canada’s facilities-based providers continue to invest billions each year to improve and expand Canada’s wireless network infrastructure. As a result of these investments, Canadians enjoy among the best performing and most expansive mobile wireless networks in the world.
5. The clear signs of robust rivalrous behaviour, increasing infrastructure investment, mobile adoption, consumer choice, as well as declining prices, provide ample evidence that the Government’s longstanding policy of preferring facilities-based competition is generating positive results. However, more time is required for the full benefits of this policy to be realized.
6. The Regional Providers are still in the process of establishing themselves in the market, and insufficient time has passed for the full benefits of their recent initiatives, together with the National Providers competitive responses, to be felt. These activities, together with the recent finalization of wholesale roaming tariffs, the auctioning of the 600Mhz spectrum and upcoming allocation of additional spectrum for mobile wireless use, will further contribute to the realization of the Government’s and the Commission’s objectives, as well as those set forth in the *Telecommunications Act*. Deviating from policies favouring facilities-based competition risks interrupting this positive momentum without any commensurate benefit for Canadian consumers.

(b) Wholesale MVNO Access

7. The current number of MVNOs in the wireless retail market is not a symptom of a competition problem. MVNO penetration levels reveal little about the health of the wireless retail market or its ability to generate desired outcomes. More importantly, an attempt to artificially create a larger MVNO presence by regulating network access will have a significant negative impact on the industry's ability to continue to innovate, upgrade and expand its wireless networks for the benefit of all Canadians.
8. Only through significant investment by Canada's facilities-based wireless operators can Canadians be assured robust, secure, world-class wireless networks that satisfy their increasing demands for wireless connectivity and allow them to maximize their participation in the digital economy. Canada's facilities-based wireless providers have embraced the challenge of building, and continuing to expand and upgrade, such networks.
9. Canada's facilities-based wireless providers have invested close to \$70 billion in wireless infrastructure and acquiring spectrum rights, with annual capital expenditures in the last couple of years averaging approximately \$3 billion per year. In addition, over \$1 billion a year is being spent by facilities-based providers on research and development to help create the latest innovations in telecommunications. As a result of these investments, Canadians enjoy world-class wireless networks which consistently rank amongst the best performing and most expansive networks in the world.
10. The Notice of Consultation references these recent investments as justification for reversing its previous position that mandating wholesale wireless access would not have a significant negative effect on investment. In reality, the extensive investments in recent years are a testament to the effectiveness of facilities-based competition in encouraging investment. The massive investments required to meet the increasing demand for wireless services, expand coverage to the unserved and underserved, and introduce the next-generation of wireless services, 5G, to Canadians is a key reason not to deviate from policies that prefer facilities-based competition.
11. Mandated MVNO wholesale access would have a negative impact on investment by facilities-based carriers. With MVNOs not assuming any of the risk of network investment, the resulting decline in facilities-based provider investment would threaten Canada's leadership role in wireless telecommunications, stifle the momentum of Regional Providers and their important contribution to sustainable competition, worsen the urban/rural digital divide and jeopardize Canada's opportunity to be a world leader in the development and deployment of 5G technology and services. It would also hamper Canadians' and nearly every industry sector's ability to utilize the latest mobile innovations to increase productivity, grow the economy, and create well-paying middle-class jobs.

12. 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. In contrast, the negative effects of mandated MVNO wholesale access on investment are well-established. This negative impact has also been recognized time and time again by the Commission, which has concluded in past proceedings that the costs of mandated wireless access outweigh any potential benefits. Since those decisions, the need for massive ongoing investment in innovation, infrastructure and spectrum has not decreased, rather it continues to increase.

(c) Future of Mobile Wireless Networks in Canada

(i) Small Cell Deployment

13. Access to infrastructure for the deployment of wireless networks currently falls under a patchwork of federal, provincial and municipal jurisdictions, which adds complexity, cost and confusion to the efficient deployment of wireless networks. We appreciate that, because of this patchwork of regulations, the Commission is limited in what it can do to address these issues under current federal legislation. However, we are encouraged by recent public statements by the Commission that suggest the *Telecommunications Act* should be amended to provide the Commission with additional authority in this area.
14. Unnecessarily limiting the types of public infrastructure on which service providers can attach small cell equipment will frustrate the goal of providing advanced wireless telecommunications to Canadians. To address this, Section 43 of the *Telecommunications Act*, including the meaning of the term “transmission lines” in Section 43(2), should be clarified and, if necessary, expanded to give the CRTC authority to set rates and settle disputes regarding access and attachment rights for wireless equipment when it is placed on all types of public infrastructure, including light posts, bus shelters, and sides of buildings.

(ii) Future Innovation in Wireless Services

15. The wireless industry is dynamic and marked by an incredible pace of technological change. Each new generation of wireless standards and technology introduces new capabilities, not only at the network level, but also at the application level, as the new network capabilities are utilized to create new products and services that were previously unavailable and in some cases unimaginable. As Canada’s wireless industry prepares to introduce 5G, it is imperative that the regulatory framework for mobile wireless services continue to encourage the massive investments that will be required to support the innovation and economic benefits that 5G promises.

INTRODUCTION

16. CWTA is pleased to provide its comments to Telecom Notice of Consultation CRTC 2019-57 (Consultation). CWTA is the recognized authority on wireless issues, developments and trends in Canada. Its membership is comprised of companies that provide services and products across the wireless industry, including wireless carriers and manufacturers of wireless equipment, who combine to deliver Canada's world-class wireless services, one of the key pillars on which Canada's digital and data-driven economy is built.
17. In setting out the scope of the Consultation, the Commission states that its focus "is to ensure that its mobile wireless service regulatory framework facilitates sustainable competition that provides reasonable prices and innovative services, as well as continued investment in high-quality mobile wireless networks in all regions of the country."¹ In this regard, it set out 3 main topics for discussion: (i) competition in the retail market; (ii) wholesale mobile wireless service regulatory framework (roaming and MVNO access); and (iii) future of mobile wireless networks in Canada.
18. As explained below, under policies supporting facilities-based competition, sustainable competition in the wireless retail market is gaining momentum, resulting in continuing growth in the number of wireless subscribers, increasing data consumption, declining prices and more choice for consumers. Equally important, continuing innovation and investment by Canada's facilities-based carriers is providing Canadians with even faster and higher quality networks, as well as broader coverage and even more reliable services. Given this positive momentum, it makes no sense to reverse course and implement policies that prefer service-based competition, such as mandating MVNO wholesale access. This is especially the case when such a reversal would disproportionately harm the regional facilities-based new entrants ("Regional Providers"), the very providers who the Government has identified as key to ensuring sustainable competition in the market. It would also harm the underserved and unserved Canadians whose ability to participate in the digital economy, including the benefits of 5G, is dependent on increasing investments in network infrastructure.

A. COMPETITION IN THE RETAIL MARKET

19. The Notice of Consultation asks interveners to consider whether the retail market is "meeting the needs of Canadians and achieving the policy objectives of the Act"². In other words, the competitive health of the current wireless retail market should be evaluated based on its ability to produce desired outcomes, not simply on static measures such as the number or type of competitors. As detailed below, it is clear that the current wireless retail market is experiencing increasing competition, and facilities-based competition continues to be the best way to achieve desired consumer outcomes.

¹ Telecom Notice of Consultation CRTC 2019-57 ("Notice of Consultation"), at paragraph 22

² Telecom Notice of Consultation CRTC 2019-57, at paragraph 28

20. The needs of Canadians as they relate to mobile wireless services are well-articulated by the Government of Canada in its *Spectrum Outlook 2018 to 2022*³. In noting that Canada has “a world-class telecommunications infrastructure”, the Government stated that it will ensure “Canadian consumers, businesses and public institutions continue to benefit from advanced wireless telecommunications services and applications.”⁴ To facilitate this outcome, the Government identified three key desired outcomes⁵:

- Quality: faster and higher quality networks to do what Canadians need them to do;
- Coverage: better coverage and reliable services available to Canadians no matter where they live and work; and
- Prices: affordable and more choice in services.

21. These objectives are not controversial. They reflect the policy objectives in the *Telecommunications Act*, are consistent with the Commission’s stated focus in the Notice of Consultation⁶, and are shared by CWTA and its members. As discussed below, these objectives can be best achieved by way of policies that support facilities-based competition. With respect to the objective of more choice and greater affordability, this Section A highlights how policies that support facilities-based competition are leading to increasing and sustainable competition, marked by more consumer choice and a downward trend in prices. When it comes to quality and coverage, Section B shows how facilities-based competition has resulted in Canadians’ enjoying some of the highest quality and most expansive mobile wireless networks in the world.

(i) Facilities-Based Competition:

22. The Canadian government has a long-standing and sound preference for facilities-based competition, founded on the understanding that it is the only market structure capable of delivering sustainable competition and encouraging the level of investment in network infrastructure that it is necessary to achieve desired outcomes for Canadians.⁷ Even when

³ ISED, <https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11403.html>

⁴ Ibid

⁵ Ibid

⁶ “The Commission’s focus in this proceeding is to ensure that its mobile wireless regulatory framework facilitates sustainable competition that provides reasonable prices and innovative services, as well as continued investment in high-quality mobile wireless networks in all regions of the country.” Notice of Consultation at paragraph 22.

⁷ (a) “Facilities-based competition is beneficial because such competition is most likely to lead to robust and effective long-term competition...service providers that control their own end-to-end networks have greater incentives for investment, innovation and cost efficiency.” Competition Bureau, Telecom Notice of Consultation CRTC 2013-551, *Review of wholesale services and associated policies*, Comments, 27 June 2015, page 4 (as cited in BCE Inc. comments to the proposed *Order Issuing a Direction to the CRTC on Implementing the Canadian Telecommunications Policy Objectives to Promote Competition, Affordability, Consumer Interests and Innovation*, 8 April, 2019, at paragraph 12 – “BCE Comments on Policy Direction”).

(b) “Facilities-based competition, in which competitors primarily use their own telecommunications facilities and networks to compete instead of leasing from other carriers, is typically regarded as the ideal and most sustainable

intervening in the market, the Commission has been careful not to deviate from facilities-based competition as the foundation for achieving the Government's policy objectives.

23. When establishing the current wholesale mobile wireless services regulatory framework in Telecom Regulatory Policy 2015-177, the Commission found evidence of rivalrous behaviour in the mobile wireless market and that the Regional Providers contributed to competitiveness in many regions.⁸ Therefore, the Commission decided that the best way to support the mobile wireless retail market was to ensure that the Regional Providers had access to the 3 national wireless providers ("National Providers") for the purpose of wireless roaming at regulated rates and terms. Importantly, the Commission determined that such access should not be mandated for non-facilities-based operators given the serious negative impacts it would have on continued investment in network infrastructure; a key to delivering advanced mobile wireless services to Canadians.
24. The Commission further decided that this policy would stay in place for 5 years "to allow for the development of sustainable competition, and to encourage continued innovation and investment in high-quality telecommunications facilities in the mobile wireless services market."⁹ As discussed below, since Telecom Regulatory Policy 2015-177, strong, sustainable competition in the wireless retail market is gaining momentum, resulting in continuing growth in the number of wireless subscribers, increasing data consumption, declining prices and more choice for consumers. Equally important, continuing innovation and investment by Canada's facilities-based carriers is providing Canadians with even faster and higher quality networks, as well as broader coverage and even more reliable services.

(ii) Consumer Choice

25. The mobile wireless retail market continues to show signs of increasing and sustainable competition. In addition to the three national network providers ("National Providers"), the wireless retail market includes Canada's Regional Providers who, encouraged by Government policies that recognize the importance of facilities-based competition, have made, and continue to make, significant investments in acquiring spectrum and building and expanding their wireless networks. By investing in their own independent wireless networks, Regional Providers are positioning themselves to compete not only on price, but also quality of service and network coverage.

form of competition." CRTC, Telecom Regulatory Policy CRTC 2015-236, *Review of wholesale wireline services and associated policies* (TRP 2015-326, paragraph 5) (cited in BCE Comments on Policy Direction)

(c) [T]he Governor-in-Council considers that "facilities-based competition is a durable form of competition that delivers the greatest benefits to consumers, imposes competitive market discipline on incumbents and strengthens investment in telecommunications infrastructure." Order in Council P.C. 2007-1 (cited in BCE Comments on Policy Direction).

⁸ Telecom Regulatory Policy CRTC 2015-177

⁹ Telecom Regulatory Policy CRTC 2015-177, at paragraph 194

26. As a result, Canadians in each provincial market are now served by at least four facilities-based carriers. When one includes flanker brands and resellers¹⁰, there are approximately 20 wireless brands in Canada, each striving to differentiate themselves from one another by offering a wide variety of mobile wireless plans at different price points. Canadians in major cities have a choice of at least 10 service providers and brands. In non-urban areas there are typically 3 National Providers, plus flanker/reseller brands and one or more Regional Provider.
27. The contribution of the Regional Providers to consumer choice and the competitiveness of the retail market is evidenced by their growing success in attracting subscribers. For example, from Q1 2015 to Q1 2019, Freedom wireless subscribers have increased from 800,000 to 1.52M, an increase of 90%, while Videotron subscriptions have increased from 662,100 to 1.19M, an increase of 80.3%. In 2018, Freedom and Videotron accounted for over 28% of net mobile subscriber additions in Canada,¹¹ while in Q1 of 2019, Freedom attracted 46% of all net new wireless subscribers and Videotron acquired 38.3%.

(iii) Rivalrous Behaviour

28. The Commission has stated that evidence of rivalrous behaviour is important when assessing the competitiveness of the market.¹² Evidence of rivalry “may include falling prices, vigorous and aggressive marketing activities, or an expanding scope of activities by competitors in terms of products, services and geographic boundaries”.¹³ All of these factors are present in the ongoing battle for new wireless subscribers.
29. Wireless providers continue to introduce new and innovative service offerings, including bonus data promotions, device subsidy models, and rollover data allowances, all in an effort to win new subscribers. For example, for the week of April 22, 2019, the website Mobilesyrup.com listed 74 different in-market promotions from 17 different providers and brands.¹⁴ The fact that MobileSyrup, as well as other 3rd party websites such as whistleout.ca and PlanHub.ca, regularly track and update service plan offerings illustrates the high level of rivalry between wireless providers.
30. When it comes to affordability, as Regional Providers have entered markets with lower rates and innovative service offerings, National Providers have aggressively introduced matching or alternative offerings. These activities have led to a significant downward trend in prices. Statistics Canada reports that prices for mobile telecommunications services have declined 53.6% from Q1

¹⁰ Resellers refers to non-MNO brands such as 7-Eleven Speak Out, PC Mobile, Petro-Canada Mobility, Zoomer, DCI Wireless and Good2Go Mobile, who have entered into commercial arrangements with a mobile network operator to sell wireless services.

¹¹ Bell 30.04%; Rogers 20.38%; TELUS 21.94%

¹² CRTC 94-19

¹³ Ibid

¹⁴ <https://mobilesyrup.com/2019/04/22/google-freedom-rogers-bell-canada-telus/>

2014 to Q2 2018¹⁵, while the Commission reports that the average revenue per 1GB of data/month decreased 40% between 2015 and 2017.¹⁶

31. Wireless providers have also launched new brands, such as Lucky Mobile (Bell) and Fizz (Videotron), that target consumers seeking lower priced services. Xplornet has launched a new LTE wireless service in Manitoba under the brand Xplore Mobile, providing Manitobans a 4th facilities-based wireless service provider from which to choose. In addition, all wireless providers spend significant amounts on marketing and advertising campaigns to differentiate their services. There would be little justification for such expenditures if there was not intense competition for subscribers.
32. A few narrowly-focused market interventions by the Commission have also contributed to the robust competition for subscribers amongst facilities-based providers. For example, provisions dealing with device unlocking, cancellation fees, and term limits in the Wireless Code have eliminated concerns about switching costs, while wholesale roaming tariffs have recently been finalized.
33. It is important to note that facilities-based wireless providers do not compete on price alone. They also compete, or in some cases are positioning themselves to compete, on quality and coverage. To do so, they continually invest in improving and expanding their wireless networks so that they can enter new markets and offer improved quality of services. The attached Exhibit A provides recent examples of such investments. As discussed further in Section B this is an important aspect of facilities-based competition, one that other forms of competition, such as service-based competition, does not provide.
34. The increasingly competitive nature of the wireless retail market is also evidenced in recent public statements by the National Providers as well as industry analysts. For example:
 - “On the competitive marketplace around wireless, I would say that Q4, once again, was an intensive competitive period for the industry. It started early in the quarter and it just kept going on a regular and consistent basis in terms of competition and competitive offers setting up” – Rogers CEO Joe Natale, Rogers Q418 Conference Call, January 24, 2019.
 - “In wireless, network revenue...was partly offset ...the competitive environment putting pressure on rate plan prices.” TELUS Q3 2018 Press Release, November 8, 2018.

¹⁵ Statistics Canada, Telecommunications service price indexes, second quarter 2018, <https://www150.statcan.gc.ca/n1/daily-quotidien/190201/dq190201a-eng.htm>

¹⁶ CRTC Communication Monitoring Reports

- “Wireless postpaid net additions of 109,000 decreased by 6,000 over the same period a year ago due to competitive intensity.” TELUS Q3 2018 Press Release, November 8, 2018.
- “On the wireless side...clearly, the four players are building out, they are more competitive, and that is why we are going into other segments as well, to try to pick up revenue, and obviously making significant investments in IoT opportunities.” BCE CEO, George Cope, Bell Q4 2018 Conference Call, February 7, 2019
- “[W]e believe the slower ARPU growth trend...reflect a more competitive market that will likely intensify further as we go through 2019” ScotiaBank, Equity Research/Daily Edge, Thursday April 18, 2019.

35. The clear signs of robust rivalrous behaviour, increasing infrastructure investment, mobile adoption, consumer choice, as well as declining prices, provide ample evidence that the Government’s longstanding policy of encouraging facilities-based competition is generating positive results. However, more time is required for the full benefits of this policy to be realized.

36. The Regional Providers are still in the process of establishing themselves in the market, and insufficient time has passed for the full benefits of their recent initiatives, together with the National Providers competitive responses, to be felt. These activities, together with the recent finalization of wholesale roaming tariffs, the auctioning of the 600Mhz spectrum and upcoming allocation of additional spectrum for mobile wireless use, will further contribute to the realization of the Government’s and the Commission’s objectives, as well as those set forth in the *Telecommunications Act*. Deviating from policies preferring facilities-based competition risks interrupting this positive momentum without any commensurate benefit for Canadian consumers.

B. WHOLESALE MVNO ACCESS

(i) No Correlation between MVNO Penetration and Consumer Outcomes

37. In the Notice of Consultation, the Commission expresses concern that, in its view, an appropriate mix of facilities-based competitors and MVNOs has not developed and states that its preliminary view is that “it would be appropriate to mandate that the national wireless carriers provide wholesale MVNO access as an outcome of this proceeding.” CWTA strongly disagrees with the Commission’s preliminary view. A low number of MVNOs is not proof of a competition problem.

38. In most jurisdictions around the world, the primary role of MVNOs is to serve as distribution channels for MNOs (not as competitors).¹⁷ As shown above in Section A, there is ample evidence of

¹⁷ *Competitive effects of MVNOs and assessment of regulated MVNO access*, NERA Economic Consulting, 26 October 2018 (hereinafter “Competitive Effects of MVNOs – NERA”), paragraph 23. Also, as used in this submission, “MNO” refers to facilities-based wireless providers.

rivalrous behaviour amongst Canada's MNOs and it stands to reason that an MNO would voluntarily enter into an agreement with an MVNO if the MVNO can help the MNO obtain subscribers that might otherwise be captured by one of its MNO competitors. However, if the MNO thinks that it can successfully compete for the customer on its own or that the MVNO does not bring a sufficient value proposition to the table then the MNO is rightfully unlikely to enter into a commercial relationship with the MVNO.

39. As NERA Economic Consulting ("NERA") summarizes in its study prepared for New Zealand's review of its wireless market:

An MNO will contract with an MVNO if that maximizes the MNO's customer base and market share. Similarly, MVNOs will only be successful in a competitive market if they can add value relative to the existing MNO offerings. An MNO may decide that for certain customer segments it is more efficient for it to "in-house" its distribution and MVNOs may not seek to enter if they cannot identify profitable niches.¹⁸

40. Banerjee and Dippon reached similar findings in their study examining the nature of voluntary MNO/MVNO relationships. The authors conclude that "voluntary relationships are plausible only if MVNOs add value by widening and/or deepening MNO-served markets"¹⁹
41. In Canada, MNOs have entered into voluntary MVNO arrangements with brands such as 7-Eleven Speak Out, PC Mobile, Petro-Canada Mobility, Zoomer, DCI Wireless, and Good2Go Mobile Canada. But, as in other countries, Canadian MNOs have also responded to increased competition by creating "in-house" brands, also known as flanker brands²⁰. These flanker brands, or own-brand MVNOs, have the same purpose as independent MVNO arrangements as they target different customer groups than the main MNO brand; typically those who are more price sensitive and who are looking for lower cost plans. As shown in Figure 1 below, when one includes both independent MVNOs and own-branded MVNOs, Canada has the 4th largest MVNO subscriber market share amongst OECD countries.²¹

¹⁸ Ibid at paragraph 24

¹⁹ Banerjee, A. and Dippon, C. Voluntary Relationships Among Mobile Network Operators and Mobile Virtual Network Operators: An Economic Explanation, published in February 2009 issue of *Information Economics and Policy*, abstract.

²⁰ Fido, Chatr, Lucky, Virgin Mobile, Koodo, Public Mobile, Fizz

²¹ *Competitive effects of MVNOs* page 7, figure 4 – reproduced here as Figure 1

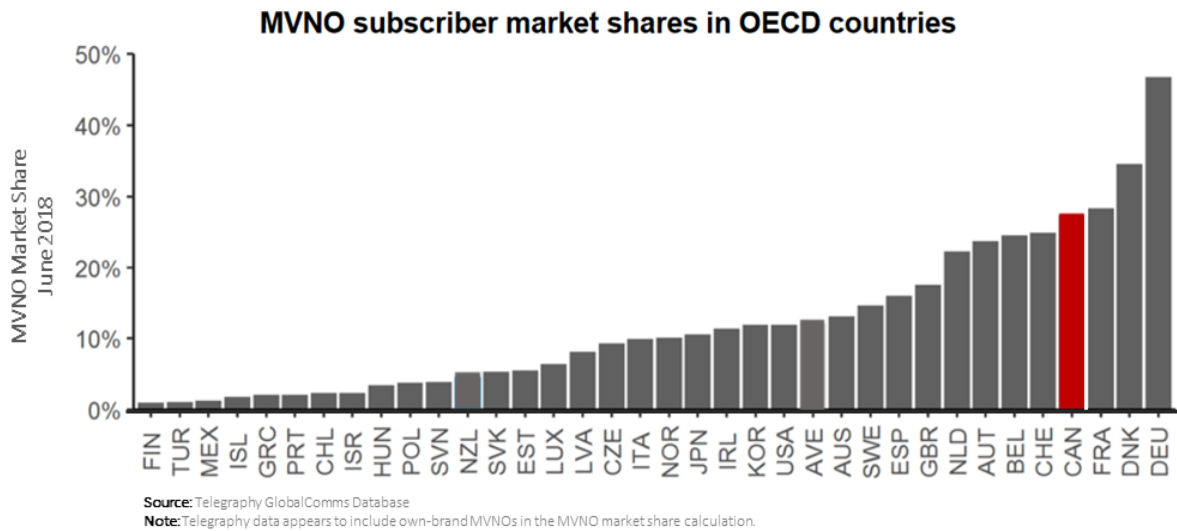


Figure 1: MVNO subscriber market shares (OECD)

42. As a result, Canadians not only have a choice of at least 4 MNOs in each province, flanker brands and MVNOs are also available in many locations. In major cities, Canadians will typically have a choice of 10 or more service providers/brands to choose from and in non-urban areas consumers can typically select from the National Providers and at least one Regional Provider, together with one or more flanker brand and/or MVNO. Altogether, these brands are competing for a relatively small market drawn from a population of just over 37 million people. To put this in perspective, the number of subscribers of Sprint, the smallest of the main 4 MNOs in the United States, is approximately 53 million subscribers, or 16 million more than the entire Canadian population. Therefore, it should come as no surprise that there may not be a viable business case for an independent MVNO distribution channel in Canada that is comparable in size or number to those in some other countries where MVNOs can assist MNOs in reaching a much larger population.
43. Nor is there evidence that the presence of MVNOs is necessary to provide desired consumer outcomes. In fact, NERA has found that “it is difficult to discern any statistically significant correlation between MVNO penetration and consumer outcomes globally.”²² By way of example, the NERA study shows that the U.S. and Japan rank 1st and 3rd respectively in terms of the number of independent MVNOs in OECD countries²³, yet most international price comparison studies show the U.S. and Japan as having higher average wireless prices than countries with much fewer independent MVNOs. NERA concludes that “factors besides MVNO penetration are the key drivers of price outcomes.”²⁴

²² *Competitive Effects of MVNOs – NERA, page 7*

²³ *Ibid*

²⁴ *Ibid, page 9*

44. This is not surprising when one recognizes that lower retail prices is not the objective of MNO/MVNO partnerships:

The main idea is that such an entity attempts to leverage its popularity and brand appeal with certain segments of the population to cross-sell mobile telecommunications services....In this scheme of things, the customer segments that MVNOs reach may produce either lower or higher average revenue per use (ARPU) than the traditional MNO, but it is always the possibility of additional profits (not just revenue) that motivates the MNO-MVNO relationship.²⁵

45. Importantly the authors further state:

.....the mere absence of a voluntary MNO-MVNO relationship does not automatically prove either MNO malfeasance or market failure. Therefore, a blanket regulatory policy that compels MNOs to partner with aspiring MVNOs, regardless of actual market circumstances, cannot guarantee improvements in economic welfare.²⁶

46. MVNO penetration levels reveal little about the health of the wireless retail market or its ability to generate desired outcomes. More importantly, an attempt to artificially create a larger MVNO presence by way of regulating network access will almost certainly have a significant negative impact on the industry's ability to continue to innovate, upgrade and expand its wireless networks for the benefit of all Canadians.

(ii) Importance of Investment

47. Canada's telecommunication policy has long recognized the importance of investment in wireless network infrastructure and facilities-based competition as the best way to encourage such investment. Only through significant investment by Canada's facilities-based wireless operators can Canadians be assured robust, secure, world-class wireless networks that satisfy their increasing demands for wireless connectivity and allow them to maximize their participation in the digital economy. Canada's facilities-based wireless providers have embraced the challenge of building, and continuing to expand and upgrade, such networks, consistent with the government's policy.
48. To date, Canada's facilities-based wireless providers have invested approximately \$50B in capital investments to build Canada's wireless networks; with spending in recent years averaging close to \$3B per year²⁷. Canadian operators' investment in telecommunications as a percentage of revenue

²⁵ Banerjee and Dippon at page 6

²⁶ Banerjee, A. and Dippon, C. Voluntary Relationships Among Mobile Network Operators and Mobile Virtual Network Operators: An Economic Explanation, published in February 2009 issue of *Information Economics and Policy*, page 3

²⁷ Nordicity, The Benefits of the Wireless Telecommunications Industry to the Canadian Economy in 2017 (March 2019), plus review of publically available wireless operator financial statements.

is 1st in the G7 and 4th amongst OECD nations.²⁸ Canada’s facilities-based wireless providers also invest more capital per subscriber than any other country in the G7 plus Australia.²⁹

49. Facilities-based wireless providers not only invest in network infrastructure, they also spend billions on acquiring spectrum rights, annual license fees, and research and development. With respect to spectrum rights, Canada’s facilities-based providers, including the Regional Providers, have spent over \$17.5B to acquire the right to use radio spectrum and over \$3B in annual spectrum license fees. The wireless industry is also one of the most innovative sectors in Canada. In addition to the massive investments made each year in Canada by telecom equipment suppliers, Canada’s wireless providers spend over \$1 billion a year in research and development.³⁰
50. As a result of these investments, Canadians enjoy world-class wireless networks which consistently rank amongst the best performing and most expansive networks in the world. For example, Canada’s wireless networks deliver the 2nd fastest average download speeds in the world; 152% faster than the global average and 91% faster than the United States.³¹ While speed is important, consistency is also a significant metric when evaluating the performance of wireless networks. According to OpenSignal:

...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 amongst the fastest countries in our analysis but also the most consistent.³²

51. Canadian wireless network providers face great challenges in building and maintaining wireless networks across a country as vast as Canada, with one of the most varied seasonal climates, and which is relatively sparsely populated. By way of example, compare the size and population of Canada to that of the European Union:

	Canada	European Union	Difference
Size – km2	9,984,670	4,422,773	Canada 125% Larger
Population	37,060,000	512.6 million	Canada 92.8% Smaller

52. Even when one adjusts for areas of Canada that are uninhabited, as shown in Figure 2 below, Canada remains one of the most sparsely populated countries in the World, meaning that to reach the same number of customers, Canadian wireless providers have to invest significantly more capital to build farther reaching infrastructure.

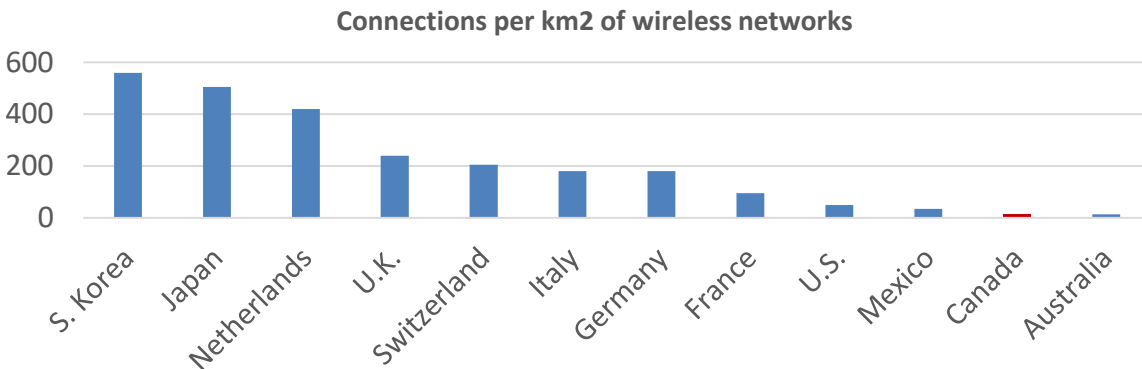
²⁸ OCED Digital Economy Outlook, October 2017

²⁹ Bank of America Merrill Lynch, Global Wireless Matrix, December, 2018

³⁰ Research Infosource Inc: Canada’s Top 100 Corporate R&D Spenders 2018

³¹ <https://www.speedtest.net/global-index> - results posted as of March 18, 2019

³² *The 5G Opportunity: How 5G will solve the congestion problems of today’s 4G networks*, OpenSignal, February 2019.



Note: Given that a substantial portion of their territory is uninhabited, total land area was adjusted based on the coverage of the network in Canada (20%), Australia (31%), and the United States (80.7%). 100% coverage assumed for the other countries.

Figure 2: Source- MEI, State of Competition in Canada’s Telecommunications Industry, May 2017

53. Despite these challenges, Canada’s facilities-based wireless providers have built world-class LTE networks that, as of 2018, are available to 99% of Canadians, and LTE-Advanced networks that are available to 92% of Canadians.³³
54. While the levels of investment generated by facilities-based competition has undoubtedly benefited consumers and provided the vast majority of Canadians with access to the most advanced wireless services, much work remains. Significant continuing investments are required to meet the increasing demand for wireless services and expand coverage to the unserved and underserved. Massive investments will also be required to introduce the next-generation of wireless services, 5G, to Canadians.
55. As Canada endeavors to transform into a data-driven, digital economy, its wireless networks will play an ever-more prominent role in such efforts. We are increasingly becoming a wireless society, with Canadians consuming more wireless data than ever, and estimates predict continued mobile data consumption growth. According to the Cisco VNI Forecast Highlights, 2018:³⁴
 - Canada’s mobile data traffic grew by 38% in 2017;
 - In Canada, mobile data traffic will grow 4-fold from 2017 to 2022, a compound annual growth rate of 34%; and
 - In Canada, mobile data traffic in 2022 will be equivalent to 2x the volume of the entire Canadian internet in 2005.

³³ CRTC Communications Monitoring Report 2018

³⁴ Cisco, VNI Mobile Forecast Highlights 2018.

56. The recent CRTC *Communications Monitoring Report 2018* found that the average wireless subscriber used 163% more data in 2017 than they did in 2014. According to Ericsson, when taking both wireless networks and Wi-Fi into account, the average smartphone in North America will generate approximately 50GB of traffic per month by the year 2023.³⁵
57. This increase in usage will coincide with the introduction of the next generation of wireless infrastructure, known as fifth-generation or 5G. 5G will revolutionize the way Canadians interact with the world. It will not only enhance current uses of mobile communications but also pave the way for new digital and data-driven businesses and services. Whether it is transportation, natural resources, retail, entertainment, advanced manufacturing, agriculture, “smart cities”, or healthcare, there are very few sectors that will not be transformed by the introduction of 5G wireless networks. In large part, Canada’s successful transition to a digital and data-driven economy will depend on a successful and timely introduction of 5G wireless.
58. In a recently published report commissioned by CWTA, Accenture found that “the adoption of 5G technology in Canada will propel innovation across industries and significantly improve Canadians’ quality of life and the economy to the tune of a nearly \$40B annual GDP uplift by 2026.”³⁶ Accenture adds that 5G will also contribute to sustained job creation and add close to 250,000 permanent jobs by 2026.
59. The benefits of 5G are a result of its transformative characteristics. While current networks focus primarily on data transmission (i.e. throughput), 5G networks are being designed to not only provide faster transmission speeds but also to ensure more widespread coverage, to handle more connected devices and traffic types, and to support different use cases, including mission critical applications that require ultra-reliability and ultra-low latency. 5G will connect infrastructure, vehicles, sensors, buildings, machinery, and people in a way that will change how we use technology and data to work, play, and interact. According to Accenture³⁷, initial 5G deployment in Canada will require \$26B in capital investment between 2020-2026, not including the costs associated with the acquisition of spectrum and annual spectrum license fees.
60. To support Canadians’ growing demand for mobile wireless services, including 5G, ISED is making additional radio frequencies available for mobile use (e.g. 600Mhz, 3500Mhz, and mmWave bands). Facilities-based providers recently spent \$3.5B (including approximately \$930M by Regional Providers) acquiring rights to use the low-band 600Mhz spectrum, while Scotiabank estimates that the cost for the highly coveted 3500MHz mid-band spectrum that is scheduled to be auctioned in 2020 will be approximately \$3.7B, but could end up well above that amount depending on the auction framework.³⁸ The first auction of mmWave or high-band spectrum is scheduled to take place in 2021.

³⁵ Ericsson Mobility Report, November 2018.

³⁶ Accenture, Fuel for Innovation: Canada’s Path in the Race to 5G, <https://bit.ly/2tAEhn3>

³⁷ *Ibid*

³⁸ Converging Networks, Scotiabank, March 4, 2019.

61. When one combines the investments required to meet the increasing demand for mobile data, connect underserved and unserved Canadians, deploy 5G network infrastructure, and acquire rights to the new spectrum bands, it is clear that significantly more, not less, investment is required to ensure that Canadians have access to advanced wireless telecommunications services and enjoy the benefits of 5G. It is also clear that most, if not all, of this investment will have to come from facilities-based carriers.

(iii) Discouraging Investment

62. The Commission has repeatedly declined to mandate wholesale MVNO access out of concern that doing so would undermine investments in spectrum and networks.³⁹ The Notice of Consultation states that one of the Commission's key objectives remains to "continue investment in high-quality mobile wireless networks in all regions of the country."⁴⁰ The Notice of Consultation also notes that since its decision in CRTC 2015-177 "there have been positive signs with respect to investment, since facilities-based competitors, both national and regional, have continued to invest in their networks."⁴¹ In addition, the Commission correctly states that, with the introduction of 5G wireless technology, the wireless market is "on the verge of a major transformation"⁴² and that "wireless carriers will be required to make significant investments in network infrastructure."⁴³

63. Despite these facts, the Commission now appears to be minimizing the significant negative impact on network investment that would be caused by mandated MVNO wholesale access. Curiously, the Commission justifies its new position by citing "the extensive investments that have been made in recent years."⁴⁴ In reality, the extensive investments in recent years are a testament to the effectiveness of facilities-based competition in encouraging investment, and the need for continuing significant investment in network infrastructure is a key reason not to deviate from this policy.

64. As indicated in expert evidence submitted during recent CRTC proceedings,⁴⁵ international studies show that mandating reseller or MVNO access is associated with a 17% to 33% reduction in investment intensity.⁴⁶ It was also shown how the European Union (EU) experienced drops in investment when it mandated access to broadband networks, and how that experience has led the

³⁹The CRTC's analysis in Telecom Regulatory Policy 2015-177, Telecom Decision 2017-56, and Telecom Decision 2018-97 concluded that mandated alternative wireless service provider access to the national carriers' networks would be too harmful to investment and would not be in the public interest.

⁴⁰ Notice of Consultation, paragraph 22

⁴¹ Ibid at paragraph 36

⁴² Ibid at paragraph 18

⁴³ Ibid at paragraph 19

⁴⁴ Ibid at paragraph 39

⁴⁵ TN CRTC 2017-259

⁴⁶ Bell Mobility Intervention in TN CRTC 2017-259, paragraph E30, referencing the report by Margaret Sanderson (Sanderson Report).

EU to realize that if big private-sector investments are to occur, for example in the future 5G wireless networks, it cannot repeat the same mistakes.⁴⁷

65. Israel is another interesting case study. Israel has been cited by some commentators as an example of how regulatory intervention has delivered positive outcomes; namely, lower prices. What these commentators do not mention is the devastating impact that regulatory intervention has had on the quality of wireless services and network investment in the country.⁴⁸
66. In an article entitled, *Israel Telecom Regulator Looks Ahead, Wants Less Competition*, Bloomberg reports that “[o]nce among the most advanced nations for cellular speeds, Israel has fallen toward the other extreme” which has “created a gap with other advanced economies in internet and cellular speeds that could leave Israel late to adopt industrial innovations such as autonomous vehicles and internet of things”. Regulatory intervention, including mandating MVNO wholesale access, has resulted in “cash-strapped companies hav[ing to] cut back on infrastructure spending”, with the Communications Ministry now considering a policy reversal “designed to improve [mobile operators] finances so they can build infrastructure the economy will need in the future.” When one considers the small land area and high population density of Israel compared to Canada, it is clear how similarly misguided policies could result in even greater damaging effects for Canada.
67. While mandating 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 Providers’ networks at discounted rates.
68. The Commission’s MVNO network access proposal comes at a critical time in the evolution of the wireless market in Canada. Regional Providers are beginning to demonstrate their ability to capture a significant share of new wireless subscribers and become sustainable competitors in the wireless market. To get there, Regional Providers have invested billions in network infrastructure and spectrum, enabling them to compete not just on price, but on differentiated services and network coverage. Artificially introducing more MVNOs into the market will threaten the Regional Providers’ momentum and their role in bringing sustainable competition to the retail wireless market.

⁴⁷ See Rogers Intervention in TN CRTC 2017-259, Appendix 2, Report provided by Monti Stampa Furrer & Partners (Furrer Report). The European experience is also referenced in Shaw Intervention paragraphs 58-59.

⁴⁸ <https://www.bloomberg.com/news/articles/2018-10-31/looking-ahead-israel-telecom-regulator-wants-less-competition> . Note also that according to Ookla Speedtest, Israel now ranks 64th in the world in terms of average mobile download speeds - <https://www.speedtest.net/global-index>.

69. Having to compete with mandated MVNOs, who can easily enter and exit markets without having to risk substantial capital investment or acquire spectrum, would not only drastically reduce the Regional Providers capacity to invest in independent network facilities⁴⁹, but also force the Regional Providers to carefully revisit their business models and reconsider plans to expand and upgrade networks. Such regulatory intervention will deprive Canadians of the benefits of future investments in innovation and differentiated services that can only be delivered through facilities-based competition. In their place would be fleeting and inefficient service-based providers who, because they do not have their own independent networks, cannot offer services that differentiate themselves from the operators on whose networks they run.
70. At a time when the Commission and governments at all levels in Canada have placed the expansion of both wired and wireless coverage to unserved and underserved Canadian near the top of their agendas, 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 Regional Providers such as Eastlink to “suspend certain planned investments into smaller communities where the wholesale regime would impede us from obtaining a reasonable return on our investment”.⁵⁰ 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 MVNO wholesale access.
71. Unleashing the economic and societal benefits of 5G requires not only massive investments in infrastructure and spectrum. It will also require innovation, experimentation and collaboration with vertical industries to bring innovative products and services to Canadians. New capabilities like network slicing will enable different combinations of network services (e.g. ultra-reliability and ultra-low-latency, enhanced mobile broadband, Massive M2M) to be dynamically delivered according to the requirements of the person or machine using the services. Even more so than in previous generations of wireless services, competition in 5G will be characterized by this higher demand for differentiation of services. As Bauer and Bohlin⁵¹ conclude, ex ante access regulation will not only constrain network upgrade investment (as was the case with fixed broadband in many countries) but also have knock-on effects on 5G innovation and value creation, including⁵²:
- Constrain entrepreneurial freedom, experimentation, investment and innovation at the network level. The innovation process may be biased in favor of incremental edge innovations and against riskier architectural and infrastructure innovations that may have higher longer-term payoffs;

⁴⁹ Sanderson Report, page 7.

⁵⁰ Eastlink comments to the Government’s proposed policy direction to the CRTC at paragraph 6.

⁵¹ Bauer J and Bohlin E, Roles and Effects of Access Regulation in 5G Markets, September 4, 2018.

⁵² Examples listed, Ibid

- Impede innovations by ASPs [application and service providers] that require differentiated network quality of service support and network slicing; and
- Create “fixed points” that orient the business model of market participants on regulation rather than the creation of new business models. Thus, players will more likely rely on regulated forms of access. This will, in turn, reduce the number of innovation experiments.

72. Mandated MVNO wholesale access would have a negative impact on investment by facilities-based carriers, and with MVNOs not assuming any of the risk of network investment, the resulting decline in investment would threaten Canada’s leadership role in wireless telecommunications, stifle the momentum of Regional Providers and their important contribution to sustainable competition, worsen the urban/rural digital divide and jeopardize Canada’s opportunity to be a world leader in the development and deployment of 5G technology and services. It would also hamper Canadians’ and nearly every industry sector’s ability to utilize the latest mobile innovations to increase productivity, grow the economy, and create well-paying middle-class jobs.

(iv) No Justification for Regulatory Intervention

73. Justifying regulatory intervention requires compelling evidence that the benefits of such intervention clearly outweigh any negative consequences. In the case of mandating MVNO wholesale access, no such evidence exists.
74. The benefits of mandating MVNO wholesale access are purely speculative. Even if it were to have the effect of putting downward pressure on retail prices, it would be impossible to know if the downward trend were unique, or simply a continuation of what is already occurring under the current regulatory framework. In contrast, the negative effects of mandated MVNO wholesale access on investment are well-established both in practice and in economic theory. This negative impact has also been recognized time and time again by the Commission, which has determined that the costs of mandated wireless access outweigh any potential benefits.⁵³ Since those decisions, the need for investment in innovation, infrastructure and spectrum has increased.
75. Banerjee and Dippon write that when imposing or considering the imposition of open access obligations on MNOs:

....regulators frequently cite welfare-enhancing objectives, such as increased competition, consumer choice, lower retail prices, innovation, service diversity, and more efficient use of scarce spectrum resources. The benefits cited may or may not themselves be in dispute; however, whether mandatory policies should be used to secure them is far from certain. When voluntary MNO-MVNO relationships do not form because favorable

⁵³ The CRTC’s analysis in Telecom Regulatory Policy 2015-177, Telecom Decision 2017-56, and Telecom Decision 2018-97 concluded that mandated alternative wireless service provider access to the national carriers’ networks would be too harmful to investment and would not be in the public interest.

sufficient conditions do not exist, no economic welfare gain can accrue from forcing such relationships to exist.⁵⁴

76. As noted by Bauer and Bohlin in the context of future 5G services:

It is possible that standardized access reduces the transaction and adaptation costs of MVNOs and improves their business model in the short run. In the context of 5G services, such limited effects will have to be weighed against the negative effects on innovation dynamic and MNO investments, which likely outweigh them.⁵⁵

The same is true regardless what generation of wireless technology being discussed.

77. As discussed above, under policies supporting facilities-based competition, consumer outcomes have continued to improve, and the retail wireless market is experiencing increased competition evidenced by more consumer choice, increased consumption of mobile services, and a downward trend in prices, while at the same time investment in the expansion and upgrading of Canada's world-class wireless networks continues. Given this positive momentum, it makes no sense to reverse course and implement policies that prefer service-based competition, such as mandating MVNO wholesale access.

C. FUTURE OF MOBILE WIRELESS SERVICES IN CANADA

(i) Small Cell Deployment

78. As projected dates for the launch of 5G services approach, many countries are recognizing the need to better facilitate the timely and cost-effective deployment of 5G technologies, such as small cells.⁵⁶ Smaller cells, which are already being deployed as part of 4G networks, are a practical and affordable way to create high capacity mobile connections that are both ubiquitous and reliable. However, to achieve the coverage and capacity levels necessary to deliver 5G services requires a high density of small cells. This will require more precise cell positioning and a greater number of cell sites.

79. Accenture estimates that up to 273,000 small cells will be deployed across Canada over the next five to seven years; a huge increase over the approximately 33,000 large cell towers that have been deployed over the last 20 years or more.⁵⁷

80. Ensuring that the benefits of 5G are fully realized will require:

- (i) Fair and reasonable access to public land, buildings, streetlights and other street-furniture, as well as provincially-regulated electrical utility poles;

⁵⁴ Banerjee and Dippon at page 13

⁵⁵ Bauer and Bohlin at page 30

⁵⁶ Rather than define "Small cells" here we reference the definition in footnote 16 of the Notice of Consultation.

⁵⁷ Accenture, Fuel for Innovation

- (ii) The streamlining of municipal administrative processes, including shorter timelines, appropriate exemptions, and the use of objective standards; and
 - (iii) Reasonable and non-discriminatory fees for the use of the above-referenced infrastructure.
81. Access to infrastructure for the deployment of wireless networks currently falls under a patchwork of federal, provincial and municipal jurisdictions, which adds complexity, cost and confusion to the efficient deployment of wireless networks. We appreciate that, because of this patchwork of regulations, the Commission is limited in what it can do to address these issues under current federal legislation. However, we are encouraged by recent public statements by the Commission that suggest the *Telecommunications Act* should be amended to provide the Commission with additional authority in this area.
82. Notwithstanding the foregoing, one area that deserves examination by the Commission is the scope of its current authority under Section 43(2) of the *Telecommunications Act*. Section 43(2) grants Canadian carriers a right “to enter on and break up any highway or other public place for the purpose of constructing, maintaining or operating its *transmission lines* and may remain there for as long as is necessary for that purpose, but shall not unduly interfere with the public use and enjoyment of the highway or other public place.” (emphasis added).
83. The right to access highways and public spaces is qualified by the requirement to obtain the consent of the municipality or other public authority with jurisdiction over the highway or public space (s.43(3)). In the event that a carrier is unable to obtain consent on acceptable terms, it may apply to the CRTC for permission to construct (s.43.4).
84. In a 2001 dispute between Ledcor Industries Limited (Ledcor) and the City of Vancouver relating to the terms and conditions under which Vancouver would grant Ledcor consent to construct a fibre optic transmission system in Vancouver, the CRTC determined the conditions under which Ledcor could have access to 18 street crossings and in doing so set out general principles to guide municipalities and telecommunications companies in their dealings regarding access to municipal rights-of-way⁵⁸.
85. While the so-called “Ledcor Principles” contain several elements, the key principle relating to costs associated with accessing municipal property is that a municipality is entitled to recover from the carrier its causal costs, but those carriers should not be required to pay a land-based charge as a condition to constructing, maintaining and operating their transmission lines. In addition, with respect to the costs of relocation of transmission lines for municipal work, the CRTC has directed that these costs be shared based on such factors as which party requested the relocation, the reason for the relocation, and when the request was made in relation to the original date of construction.

⁵⁸ CRTC Decision 2001-23. These principles have been applied in subsequent CRTC decisions.

86. These principles have guided the telecommunications industry and municipalities in negotiating access agreements regarding the installation of wireline networks. However, some argue that the term “transmission lines”, and thus the Leduc Principles, do not apply to wireless equipment and/or to access to all types of passive public infrastructure such as light poles, bus shelters, and sides of buildings. Currently, many municipal access agreements do not cover wireless equipment and some municipalities expect carriers to pay land-based and other charges for the installation of wireless equipment that are not permissible with respect to wireline networks. The lack of clarity and resultant disparity will result in increased delays and costs in the deployment of wireless equipment, which will adversely affect Canadians’ access to the latest wireless products and services.
87. Unnecessarily limiting the types of public infrastructure on which service providers can attach small cell equipment will frustrate the goal of providing advanced wireless telecommunications to Canadians. To address this, Section 43 of the Telecommunications Act, including the meaning of the term “transmission lines” in Section 43(2), should be clarified and, if necessary, expanded by Parliament to give the CRTC authority to set rates and settle disputes regarding access and attachment rights for wireless equipment when it is placed on all types of public infrastructure, including light posts, bus shelters, and sides of buildings.

(ii) Future Innovations in Wireless Services

88. The wireless industry is dynamic and marked by an incredible pace of technological change. Each new generation of wireless standards and technology introduces new capabilities, not only at the network level, but also at the application level, as the new network capabilities are utilized to create new products and services that were previously unavailable and in some cases unimaginable. As Canada’s wireless industry prepares to introduce 5G, it is imperative that the regulatory framework for mobile wireless services encourage the massive investments that will be required to support the innovation and economic benefits that 5G promises.
89. As Bauer and Bohlin observe, the 5G ecosystem will be much more complex and heterogeneous than previous generations. Earlier wireless systems, like 3G and 4G, provide a fairly homogenous set of voice, text and data services that are primarily focused on delivering services to a mobile consumer device. 5G will enable a much greater set of network services, such as ultra-reliable and ultra-low latency, enhanced mobile broadband, and Massive M2M, that will support a greater diversity of connected devices and vertical applications. According to Bauer and Bohlin:

Many of these verticals will require specific sector expertise and differentiated network support that will need to be coordinated between multiple stakeholders. This heterogeneity of demands will pose new challenges for network operators and other participants in the 5G ecosystem that require innovative entrepreneurial responses.⁵⁹

⁵⁹ Bauer and Bohlin at page 9.

90. Although we are on the cusp of the introduction of 5G in Canada, it must be recognized that the 5G standards have not yet been finalized, and radio frequencies that are regarded as necessary to 5G have yet to be allocated. As such, there remains a lot that we do not yet know about how 5G will evolve and what types of innovation and vertical applications it will unleash. Regulatory interventions based on an understanding of previous generations of mobile wireless services threaten to stifle innovation.
91. The above discussion regarding mandated MVNO wholesale access is a case in point. Unlike previous generations, 5G is about more than simply providing data connectivity. 5G must meet the demand for contextualized and personalized connectivity. To do so, 5G requires programmable and flexible networks that can deliver the reliability, security and performance requirements of a diverse set of applications. In addition to the negative impacts on investment discussed in Section B above, attempting to mandate access to address such a diverse set of network services and application requirements, especially when we do not fully know what those services and applications will be, threatens to inhibit innovation as well as investment.
92. As Bauer and Bohlin note:

During the early stages of network rollout, MNOs have a strong interest in generating additional uses and demand....Moreover, many new applications in industry, transportation, and health will require sector-specific knowledge and differentiated network support, some of high technical quality of service....Offering a standardized access product will likely be insufficient to explore these innovation spaces. Overall, the likely effect of regulated MVNO obligations at an early stage of 5G development is to reduce investment and slow innovation.⁶⁰

⁶⁰ Ibid at page 30.

EXHIBIT A

Examples of Recent Facilities-based Mobile Wireless Provider Investments

Note: The following list is limited to examples of publicly disclosed investments and does not represent all recent network investments by CWTA members. It is also limited to investments in mobile wireless infrastructure and does not include the many investments made in broadband infrastructure, including fixed wireless.

May 8, 2019 – [Videotron and its partners deploy a 5G-enabled site in the Open-Air Laboratory for Smart Living.](#)

May 2, 2019 – [BCE to spend additional \\$20 billion over five years on advanced networks](#) – which will include investments in wireless networks.

April 15, 2019 – [Freedom Mobile turns on wireless network in Lindsay, Ontario](#)

Freedom Mobile, Shaw's wireless brand, has expanded its network coverage to **Lindsay**, Ontario. In the coming months, **Medicine Hat**, **Lethbridge**, **Prince George**, and **Nanaimo** are expected to be active.

April 11, 2019 – [Eastlink continues mobile expansion into Grande Prairie](#) - Eastlink has invested more than \$4 million in the past year (\$1M in Grande Prairie alone) to expand its mobile network to several more Canadian communities including New Waterford, Baddeck, Tatamagouche in Nova Scotia, Goulds, Torbay, and Bell Island in Newfoundland/Labrador, Saint John, Fredericton, Shediac and Sussex in New Brunswick, and Chelmsford, Val Therese and Kirkland Lake in Ontario.

April 10, 2019 – [Investment in spectrum to be used by Videotron to expand wireless services.](#)

April 8, 2019 – [SaskTel improves wireless LTE in Alberta](#)

SaskTel is improving wireless LTE in **Lloydminster**, AB with a new cell tower and upgrades to its existing tower east of the city. These enhancements will enable more reliable voice and text messaging, as well as smartphone features like video streaming. The upgrades are part of SaskTel's investment of \$301 million in 2018-2019, and over \$1.4 billion from 2018-2023.

March 29, 2019 – [Freedom 'coming soon' to Prince George, Medicine Hat](#)

Freedom is bringing its 'Big Gig' plans and fast Extended Range LTE to the following Canadian cities:

- Lethbridge, AB
- Medicine Hat, AB
- Nanaimo, BC
- Prince George, BC

The 'Big Gig plans' offer several gigs on top of various talk and text service, starting at 5GB + talk plans for \$50/mo. The Extended Range LTE network, meanwhile, can reach farther and even penetrates walls, for improved indoor coverage

March 19, 2019 – [Rogers Invests \\$100 Million in Wireless for 1,000 km of Rural and Remote Highways](#)

Rogers announced \$100M in investments over 5 years to bring wireless to 1,000 km of rural and remote highways, following the Government’s commitment to bring high-speed Internet to all Canadians by 2030. LTE can be accessed for 911 by all Canadians, regardless of their service provider. Locations to gain LTE wireless access include: Route 245 in Antigonish, NS and Highway 5a in Kamloops, BC. Additional locations will be announced later this year.

March 12, 2019 – [Rogers boosts investments in B.C. for new fibre network, improved wireless, 5G technology](#), pledging to double its investments in **British Columbia** this year to expand its LTE network, boost and densify its fibre-powered network in Vancouver, and to lay the groundwork for 5G in the province.

The news comes on the heels of Rogers’ announcement last September to construct a real-world 5G hub on the University of British Columbia (UBC) campus in Vancouver designed to be a blueprint for 5G innovation in Canada.

- The first UBC research investment involves a smart city initiative to assess how 5G networks and applications will improve autonomous vehicle safety, traffic management and fuel efficiency.
- The second investment supports research in reducing 5G frequency interference as multiple connected devices communicate at the same time, over the same spectrum. These findings will help the performance of 5G-powered applications like autonomous vehicles, manufacturing robotics and remote surgery equipment.

March 8, 2019 [Freedom Mobile expands into Cobourg, Trenton, Belleville, Brockville, Cornwall and Pembroke](#)

February 8, 2019 – **Freedom Mobile** has launched in Victoria, B.C. and Red Deer, AB as it continues to build and expand network coverage. In 2019, **Freedom** will expand to provide affordable wireless to 1.3 million more Canadians across 15 communities in B.C., Alberta and Ontario in 2019, including:

- Nanaimo, Lethbridge
- Medicine Hat, Cornwall
- Brockville, Belleville, Cobourg

January 23, 2019 -- **Rogers** announced improved wireless service in Sproat Lake near Port Alberni on Vancouver Island. Rogers worked with the Alberni-Clayoquot Regional District and local political leaders to build the new cellular tower, which will benefit Rogers and Fido subscribers, residents, businesses & local emergency responders.

January 14, 2019 – **Freedom Mobile’s** deployment of 700 MHz spectrum is now approximately 25% complete, including initial deployment in all its major markets. Voice-over-LTE (VoLTE) is “substantially complete”; enabled on ~35 devices on its network - representing ~800,000 of its total subscriber base.

December 20, 2018 – **Rogers** announced it has improved wireless service at the **Burnaby Lake Sports Complex**, a busy athletics facility on Kensington Avenue and Sprott Street, as well as along a portion of Burnaby Lake. Rogers and Fido customers in this area will have a faster, more reliable and consistent wireless experience than ever before.

December 20, 2018 – **Rogers** announced improved wireless service in **Saskatoon** in the neighbourhood of **Stonebridge**. Now, Rogers and Fido customers in this residential and commercial area will have a faster, more reliable and consistent wireless experience than ever before.

November 29, 2018 – **Rogers** is planting more cell towers in parts of Manitoba, adding a tower in South Transcona, Linden Woods, Beliveau, Provencher Blvd., King Edward St., and Powell Ave. in **Winnipeg** and in **Falcon Lake Town, Woodridge, and Neepawa**. Rogers and Fido customers will benefit from enhanced wireless service.

November 26, 2018 – [Rogers Enhances Wireless Service in King Township](#)

Rogers has announced improved wireless service around the Schomberg Village area along Hwy 27 in King Township. Now, Rogers and Fido customers in these busy areas will have a faster, more reliable and consistent wireless experience than ever before.

November, 2018 – Earlier this month, **Xplornet** Communications Inc. launched its wireless brand Xplore Mobile.

October 31, 2018 – **Rogers** improves network coverage in [Ottawa, Vancouver, claims 5G commercial deployment will be ready in 2020](#). Rogers has improved coverage for both Rogers Wireless and Fido customers in Ottawa, specifically in Manotick Main Street and O’Grady, McKeown and Coker and Orleans Village.

In addition, a similar rollout has gone live in Metro Vancouver area, specifically in Maple Ridge near the Abernathy Connector and at Rupert Street and East 45th. The 4.5G network improvements that Rogers is completing now is for its path to 5G, which the company states aims “to be ready for 5G commercial deployment in 2020.

October 9, 2018 – [Freedom deploys 700MHz spectrum purchased from Quebecor in 2017](#).

Starting in Calgary, this is part of project to improve overall network coverage . Provides 4x4 carrier aggregation, but not in Eastern Ontario (no 2nd, 3rd bands to aggregate). Maximum encoding modulation is 64QAM (other carriers use 256QAM to attain high speeds).

Sept 26, 2018 – [Montreal 5G smart living lab adds new partners](#).

The [Open-Air Laboratory for Smart Living](#), founded in 2016 by **Videotron**, Ericsson, the École de technologie supérieure and the Quartier de l'innovation (QI), is making giant strides. Three new partners – Québec-based K2 Geospatial, tech giant IBM, and the ENCQOR consortium – have signed on and a series of trailblazing projects are currently underway in the Laboratory's unique ecosystem.

Sept 26, 2018 – [Rogers announces wireless service improvements in Salaberry-de-Valleyfield, Quebec](#). **Rogers** and Fido customers around Parc Delpha-Sauve and Baie Saint-Francois should have access to faster wireless networks.

Sept 24, 2018 – [Bell MTS extends LTE Advanced wireless coverage in Southeastern Manitoba](#) - Part of the \$1-billion Bell MTS infrastructure investment plan for the province, this service expansion offers residents and businesses in Southeastern Manitoba access to the latest evolution of the world's leading broadband wireless technology. LTE-A wireless service will be available in Woodridge this week, and launches in Stuartburn and Zhoda in 2019.

Sept 17, 2018 – [BELL subsidiary Northwestel is working with Canadian satellite communications company Telesat to bring faster internet to several Nunavut communities](#). **Bell** is also expanding LTE service to Nunavut. The faster speeds will come to the territory’s capital, Iqaluit, first. In the coming months, all 25 Nunavut communities will have access to the network.

Aug 22, 2018 – Today, [Rogers announced improved wireless service around Dundas Street and Franklin Boulevard in Cambridge](#). Today's announcement is one of several recent **Rogers wireless** investments in Ontario including Brampton and Port Dover. Rogers and Fido customers of this residential and commercial area will have better wireless experiences, including while strolling through South Cambridge Shopping Centre.

In the future, Rogers will bring customers the latest global 3GPP standards, including 4x4 MIMO, four-carrier aggregation and 256 QAM.

Aug 22, 2018 – [Rogers enhances wireless service in Sarnia](#). **Rogers** and Fido customers of this residential and commercial area around Modeland Road and Michigan Line in Sarnia will experience 5G ready technology, including 4x4 MIMO, four-carrier aggregation and 256 QAM.

Aug 15, 2018 – [Rogers is boosting its wireless network services in Saskatoon](#). **Rogers** and Fido users in the Hampton Village in **Saskatoon** will soon have access to faster and more reliable wireless. This is part of a wave of investments Rogers has been committing to in Saskatchewan. The goal is to start moving Rogers' wireless customers closer to **5G**.

July 26, 2018 – [Rogers Enhances Wireless Service in Regina](#). **Rogers** announces improved wireless service in the vibrant community of Harbour Landing in the City of **Regina**. This network enhancement in the City of Regina is part of a multi-year national network plan to bring next generation wireless services to Canadians including Gigabit LTE network and 5G with future ready technology and equipment that is based on the latest global 3GPP standards, including 4x4 MIMO, four-carrier aggregation and 256 QAM.

July 26, 2018 – [Rogers enhancing wireless service in Brampton, Port Dover, Qualicum Beach, Regina and Medicine Hat](#). Today's announcements are part of a multi-year initiative aimed at preparing Rogers' and Fido's networks for gigabit LTE and **5G**.

May 23, 2018 – [Shaw completes its first successful 5G tests](#). Shaw Communications Inc. has announced it's successfully completed its first 5G technical trials in Calgary, in collaboration with Nokia, CableLabs and Rohde & Schwarz. **Shaw** plans to continue conducting 5G technical trials in the coming months.

April 16, 2018 – [Rogers and Ericsson partner to bring 5G to Canadians](#). **Rogers** announced a multi-year network plan that includes working with Ericsson, a North American leader in 5G deployment.

At Rogers Centre today, the companies demonstrated multiple live 5G examples as a part of Rogers 5G testing program. Participants wore virtual reality (VR) glasses to toss a baseball back and forth, virtually shopped in a retail store, and controlled robots with real-time responsiveness. Rogers also demonstrated Quad-band Licensed Assisted Access (LAA) on Gigabit LTE to show how LAA provides high bandwidth, simultaneously across several devices. Rogers Centre is an ideal real-world testing environment with thousands of connected devices, dense concrete, and high peak data usage.

Working with Ericsson, Rogers will trial 5G in Toronto and Ottawa, in addition to select cities over the next year.

April 19, 2018- [Eastlink continues New Brunswick expansion into Fredericton](#)

March 13, 2018 - [Eastlink continues wireless expansion into Saint John](#).

February 2, 2018 – [BELL demonstrates Gigabit LTE wireless](#). **Bell** reports that its LTE Advanced (LTE-A) wireless network has shown data speeds of one gigabit per second in recent deployment testing, claiming to

be the first Canadian wireless provider to hit that benchmark.

June 8, 2017- [Eastlink launches wireless service in St. John's, NL](#)

April 20, 2017 – [BELL announced its award-winning LTE wireless network is now the first in North America](#) capable of delivering Quad Band LTE Advanced (LTE-A) service. With the addition of 256 QAM technology, Bell is ready to deliver broadband speed of up to 750 Megabits per second.

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