

# **APPENDIX 2**

## **Appendix A**

# **Economic Review of Mandated Wholesale Access for Wi-Fi First Service Providers, Investment and Competition in the Mobile Wireless Telecommunications Industry in Canada**

**Prepared for Ice Wireless Inc.**

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# **Economic Review of Mandated Wholesale Access for Wi-Fi First Service Providers, Investment and Competition in the Mobile Wireless Telecommunications Industry in Canada**

Rebuttal of expert evidence filed in *Reconsideration of Telecom Decision 2017-56 Regarding Final Terms and Conditions for Wholesale Mobile Wireless Roaming Service, CRTC 217-259*

Prepared for Ice Wireless, Inc.

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## I. Introduction

1. In Telecom Regulatory Policy 2015-177, *Regulatory framework for wholesale mobile wireless services*, the Canadian Radio-television and Telecommunications Commission (the “CRTC” or “Commission”) determined that it is necessary to regulate the wholesale mobile wireless roaming rates that Bell Mobility Inc. (“Bell”), Rogers Communications Canada Inc. (“Rogers”), and TELUS Communications Company (“TELUS”) charge other wireless carriers.<sup>1</sup> Wholesale roaming enables customers of a wireless carrier (the “home network”) to access voice, text, and data services by using a visited wireless carrier’s network (the “host network”) when they are outside their home carrier’s network footprint. The CRTC determined that such regulation was necessary because wholesale roaming by National Wireless Carriers was not subject to a sufficient level of competition.<sup>2</sup>
2. While TRP 2015-177 provided mandated wholesale roaming access for other Canadian wireless carriers,<sup>3</sup> the Commission determined that it was not appropriate to mandate wholesale access for mobile virtual network operators (“MVNOs”)<sup>4</sup> because the Commission considered that doing so would discourage investments in wireless network infrastructure made (or planned) by National Wireless Carriers and new entrants.<sup>5</sup> However, the National Wireless Carriers must provide wholesale roaming to all subscribers served by their wholesale roaming partners, which includes the subscribers of any MVNO operating on a wholesale roaming partner’s network.<sup>6</sup>
3. Sugar Mobile Inc. (“Sugar Mobile”) is a Wi-Fi First service provider affiliated with Ice Wireless Inc. (“Ice Wireless”), a Canadian wireless carrier operating a network in Yukon, the Northwest Territories, Nunavut, and Northern Quebec. Sugar Mobile targets cost-conscious consumers that exhibit a consumption profile with limited cellular usage by offering its end-users unlimited voice and text messaging in Canada and the United States when they are connected to a Wi-Fi network and 400 MB of cellular data for just \$19 per month.<sup>7</sup>

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<sup>1</sup> Bell, Rogers, and TELUS are collectively referred to as the “National Wireless Carriers”.

<sup>2</sup> Telecom Regulatory Policy CRTC 2015-177, *Regulatory framework for wholesale mobile wireless services*, 5 May 2015 (“TRP 2015-177”), <https://www.crtc.gc.ca/eng/archive/2015/2015-177.htm>.

<sup>3</sup> Other Canadian wireless carriers include among others Bragg Communications Inc. cob Eastlink (“Eastlink”), Videotron Ltd. (“Videotron”), Saskatchewan Telecommunications (“SaskTel”), Freedom Mobile Inc. (“Freedom Mobile”) which is owned by Shaw Communications Inc. (“Shaw”), and Ice Wireless.

<sup>4</sup> An MVNO is a wireless service provider that does not own spectrum or operate its own radio access network (“RAN”), but instead relies on the spectrum and RAN of a wireless carrier (and possibly other facilities/services) to provide mobile wireless services to consumers.

<sup>5</sup> TRP 2015-177, *supra* note 2, ¶¶121-125.

<sup>6</sup> TRP 2015-177, *supra* note 2, ¶167.

<sup>7</sup> 400MB of non-Wi-Fi data is roughly equivalent to 1,200 minutes, 40,000 text messages, or 2,000 webpages. Additional increments of 500MB of permanent/roll-over non-Wi-Fi data can be purchased for \$19; <https://www.sugarmobile.ca>.

4. In Telecom Decision 2017-56, *Wholesale mobile wireless roaming service tariffs – Final terms and conditions*, the Commission confirmed that mandated wholesale roaming is intended to provide incidental, and not permanent, access to the National Wireless Carriers’ networks, and clarified that public Wi-Fi does not form part of a wireless carrier’s home network for the purpose of establishing incidental use. Furthermore, the wholesale roaming customer must ensure that any access to the National Wireless Carrier’s network on behalf of its MVNO customers occurs on the same basis, and with the same limitations, as it obtains roaming services.<sup>8</sup>
5. In its decision, the Commission stated that wireless service providers cannot meaningfully ensure the availability, quality, and reliability of public Wi-Fi facilities since there are no contractual or other arrangements between operators of public Wi-Fi facilities and the wireless service provider.<sup>9</sup> Moreover, according to the Commission, including public Wi-Fi in the definition of a home network would discourage wholesale roaming customers from pursuing investments in their network infrastructure.<sup>10</sup>
6. On June 1, 2017, the Governor in Council, on the recommendation of the Minister of Industry, referred TD 2017-56 back to the CRTC for reconsideration. The Governor in Council determined that the Commission must consider whether:<sup>11</sup>
  - a. including Wi-Fi connectivity in the definition of “home network” would improve affordability of mobile wireless services for Canadian consumers;
  - b. the evidence demonstrates that the potential negative impact on investment from the inclusion of Wi-Fi connectivity in the definition of “home network” outweighs the positive impact on the affordability; and
  - c. the potential impact on investment could be mitigated by imposing conditions on mandated wholesale roaming services.

The CRTC initiated the current proceeding, Telecom Notice of Consultation 2017-259, *Reconsideration of Telecom Decision 2017-56 regarding final terms and conditions for wholesale*

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<sup>8</sup> Telecom Decision CRTC 2017-56, *Wholesale mobile wireless roaming service tariffs – Final terms and conditions*, 1 March 2017 (“TD 2017-56”), ¶31, <https://www.crtc.gc.ca/eng/archive/2017/2017-56.htm>.

<sup>9</sup> TD 2017-56, *supra* note 8, ¶28.

<sup>10</sup> TD 2017-56, *supra* note 8, ¶¶29-30.

<sup>11</sup> *Order of the Governor in Council*, P.C. 2017-0557, 1 June 2017, <http://www.pco-bcp.gc.ca/oic-ddc.asp?lang=eng&Page=secretariats&txtOICID=2017-0557&txtFromDate=&txtToDate=&txtPrecis=&txtDepartment=&txtAct=&txtChapterNo=&txtChapterYear=&txtBillNo=&rdoComingIntoForce=&DoSearch=Search+%2F+List&viewattach=34464&blnDisplayFlg=1>.

*mobile wireless roaming service*, in response to the Order of the Governor in Council.<sup>12</sup> The CRTC has invited parties to comment on how an expanded definition of “home network” would impact the affordability of retail mobile wireless services, investment in mobile telecommunications infrastructure, and competition in the market for retail mobile wireless services.

7. Ice Wireless has asked me to comment on the economic issues related to investment and competition in the mobile wireless telecommunications industry raised in TNC CRTC 2017-259. In particular, Ice Wireless asked me to review, and rebut as needed, economic evidence submitted on behalf of the three National Wireless Carriers and Shaw Communications Inc. (“Shaw”) related to the impact of including public Wi-Fi in the definition of a “home network” on investment and competition in the mobile wireless telecommunications industry in Canada.
8. I am a Vice-President at the economic consulting firm Analysis Group, Inc., and have previously (co-)authored expert reports on competition and investment in the Canadian telecommunications industry in CRTC proceedings and Cabinet reviews of telecom regulatory policy. I have a Ph.D. in economics from the Vancouver School of Economics at the University of British Columbia and specialize in industrial organization, antitrust and competition economics, and applied microeconomics. My curriculum vitae is attached as Appendix B.
9. The report is organized as follows: Section II provides an executive summary, Section III reviews the evidence on industry concentration and the nature of competition in the Canadian wireless telecommunications sector, and Section IV analyses how rates for mobile wireless telecommunications services vary internationally and within Canada. Section V describes the business model of Wi-Fi First service providers and how they can provide a competitive option for some consumers, and Section VI reviews the academic literature on investment in the mobile wireless telecommunications sector and its implications related to Wi-Fi First service providers in Canada.

## **II. Executive Summary**

10. The economic evidence presented in this report demonstrates that relevant Canadian mobile wireless telecommunications markets are highly concentrated. Economic theory has shown that highly concentrated industries with significant barriers to entry (and certain other characteristics) are prone to coordinated behaviour among competitors that leads to higher, non-competitive pricing. A recent investigation by the Competition Bureau found that “as a result of coordinated behaviour among Bell, TELUS and Rogers, mobile wireless service prices in Canada are higher in

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<sup>12</sup> Telecom Notice of Consultation CRTC 2017-259, *Reconsideration of Telecom Decision 2017-56 regarding final terms and conditions for wholesale mobile wireless roaming service*, 20 July 2017 (“TNC 2017-259”), <https://www.crtc.gc.ca/eng/archive/2017/2017-259.htm>.

regions where Bell, TELUS and Rogers do not face competition from a strong regional competitor.”<sup>13</sup>

11. Because of a concentrated industry characterized by coordinated behaviour among the National Wireless Carriers, Canadian consumers pay some of the highest prices and consume less mobile wireless services relative to many other developed countries. A plethora of evidence from various studies using different data sources and methodologies corroborate these findings.
12. Expanding the definition of a “home” network to include Wi-Fi connectivity would result in Wi-Fi First service providers entering the market. Wi-Fi service providers offer an innovative product likely to appeal to consumers with limited need for cellular usage, thereby providing a competitive option that is likely to constrain the pricing of National Wireless Carriers for at least some segments of consumers.
13. The most recent academic research on competition and investment in the wireless telecommunications industry finds an inverted-U relationship between the intensity of competition and investment. More specifically, it finds that there is no trade-off between competition and investment as long as profits are above a certain threshold, above which a wireless carrier’s investment increases with the intensity of competition. Furthermore, this empirical research also shows that wireless operators which host an MVNO invest more than their rivals, directly contradicting the assertions of experts for the National Wireless Carriers. Given the low intensity of competition in Canadian mobile wireless telecommunications markets (and corresponding high profitability levels of the National Wireless Carriers), any increase in competition from mandating access to Wi-Fi First service providers is unlikely to depress investment in wireless network infrastructure.

### **III. The Canadian Mobile Wireless Telecommunications Sector is Highly Concentrated and Characterized by Coordinated Behaviour among National Wireless Carriers**

14. Economic evidence submitted on behalf of the National Wireless Carriers severely mischaracterizes the level of concentration in the Canadian mobile wireless telecommunications industry and then draws erroneous comparisons to the level of concentration in countries that

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<sup>13</sup> Competition Bureau, “Competition Bureau statement regarding Bell’s acquisition of MTS,” February 15, 2017; <http://www.competitionbureau.gc.ca/eic/site/cb-bc.nsf/eng/04200.html>. Areas with a strong regional competitor are Saskatchewan, Manitoba, Thunder Bay, and Quebec.

mandated MVNO access either as a condition for merger approval or in response to a review of market conditions. For example, the Sanderson Report states:<sup>14</sup>

*“Comparing Canada to countries that have regulated mandated access for MVNOs, in nearly every instance, market concentration was higher than industry concentration in Canada is today. [...] Out of 17 countries with mandated MVNO access, the HHI [Herfindahl-Hirschman Index] was higher at the time of mandating MVNO access compared to the current HHI in Canada in 14 countries. If the Commission were to change the definition of “home network”, it would be mandating MVNO access in a market that is less concentrated compared to the concentration levels that existed in most any other country where mandated MVNO access has been imposed by regulators. Moreover, currently the HHI in Canada is one of the lowest among countries that do not mandate MVNO access.”*

Similarly, the Eisenach Report states:<sup>15</sup>

*“[T]he Canadian market is among the least concentrated in the world, as measured by the Herfindahl-Hirschman Index (HHI), and that concentration is declining.”*

*“[M]ost EU markets are more concentrated than either the US or Canada.”*

15. Contrary to the economic evidence submitted on behalf of the National Wireless Carriers, proper analysis of the Canadian mobile wireless telecommunications sector shows that the relevant markets are highly concentrated. Highly concentrated industries are prone to coordinated actions by dominant firms in the form of parallel accommodating behaviour or through multi-market conduct across geographies and business lines that can lead to tacit collusion. Coordinated behaviour among the National Wireless Carriers is not simply an abstract potential risk with a low likelihood of occurring. In its recent investigation of BCE Inc.’s (“Bell”) acquisition of Manitoba Telecom Services Inc. (“MTS”), the Competition Bureau found that – due to coordinated behaviour among Bell, TELUS, and Rogers – Canadian consumers living in areas without a strong regional competitor pay substantially higher mobile wireless prices and use substantially less data compared to areas with a strong regional competitor.<sup>16</sup>

**A. Proper Market Concentration Analysis Reveals that the Mobile Wireless Telecommunications Sector in Canada is Highly Concentrated**

16. Both the Sanderson and Eisenach Reports rely on the Herfindahl-Hirschman Index (“HHI”) to assess the level of concentration in Canada. The HHI is a commonly used and accepted measure of market concentration, calculated by summing the squared share of each firm competing in a

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<sup>14</sup> Sanderson Report (*Investment and Competition Effects from Creating Mandated MVNO Access to Wireless Networks in Canada by Redefining MVNO Networks to Include Public Wi-Fi*), submitted on behalf of Bell Mobility, pp. 16-17.

<sup>15</sup> Eisenach Report (*Expert Report of Jeffrey A. Eisenach, Ph.D.*), submitted on behalf of TELUS, pp. 4 and 37.

<sup>16</sup> *Supra* note 13.

market.<sup>17</sup> For a market concentration statistic like the HHI to be meaningful, it must be calculated based on a relevant antitrust market.

17. Relevant geographic markets for mobile wireless telecommunications services (at the retail level) are much smaller than the entire Canadian market. Canada has a regional spectrum licensing regime and smaller carriers operate only in certain regions of the country. National mobile wireless carriers can, and do, set different prices for mobile wireless plans in different Canadian provinces. The Competition Bureau's analyses is consistent with this finding: For example, in its investigation of Bell's acquisition of MTS, the Competition Bureau determined that the relevant geographic market was no broader than the province of Manitoba.<sup>18</sup> As further shown in Section IV, actual pricing by the National Wireless Carriers (including flanker brands) reveals that the competitive conditions are substantially different across provinces and territories and aggregating provincial markets – even for convenience – is unsound.<sup>19</sup> Hence, the national HHI relied upon by the Sanderson and the Eisenach Report is a critically flawed measure of market concentration and obfuscates actual market concentration in the mobile wireless sector in Canada.
18. The concentration index calculated at the provincial level, based on relevant geographic markets, reveals that actual market concentration in the mobile wireless industry in Canada is much higher than the flawed national HHI statistic would suggest.<sup>20</sup> The provincial HHI index substantially exceeds the national HHI index except for the province of Quebec as shown in Table 1:

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<sup>17</sup> US Department of Justice, *Herfindahl-Hirschman Index*, <https://www.justice.gov/atr/herfindahl-hirschman-index>. The Department of Justice considers markets in which the HHI is in excess of 2,500 points to be highly concentrated.

<sup>18</sup> *Supra* note 13. In 2004, the Competition Bureau in its review of the Rogers-Microcell merger similarly found that pricing and the set of mobile wireless carriers tends to differ by location, which supports defining relevant geographic markets at the provincial level. See Competition Bureau, "Acquisition of Microcell Telecommunications Inc. by Rogers Wireless Communications Inc., Technical Backgrounder," April 2005; <http://www.competitionbureau.gc.ca/eic/site/cb-bc.nsf/eng/00257.html>).

<sup>19</sup> The folly of calculating a national concentration measure when relevant geographic markets are smaller crystallizes when considering the hypothetical scenario in which a separate monopoly operates in each province: the national HHI measure treating each firm separately would – nonsensically – suggest only a moderate level of industry concentration simply because Canadians are living in different provinces.

<sup>20</sup> While relevant geographic markets may be narrower than a province, the CRTC reports consistent and reliable market share data only at the provincial level.

**Table 1: Wireless Service Subscriber Market Share and Concentration, by Province and Territory (2015)**

Province	Bell	TELUS	Rogers	Other	HHI
British Columbia	20	42	37	0	3,533
Alberta	25	53	23	0	3,963
Saskatchewan	15	13	5	66	4,775
Manitoba	8	7	36	49	3,810
Ontario	30	22	47	1	3,594
Quebec	31	28	28	13	2,698
New Brunswick	57	26	17	0	4,214
Nova Scotia	54	33	12	0	4,149
Prince Edward Island	57	31	12	0	4,354
Newfoundland and Labrador	71	27	1	0	5,771
Northern Territories	99	0	0	1	9,802
Canada (National)	29	28	33	10	2,814

**Source:**

CRTC, *Communications Monitoring Report 2016*, Table 5.5.8.

19. The statistics shown in Table 1 reveal that the Sanderson and Eisenach Reports rely on an erroneous concentration measure and consequently underestimate, by a substantial amount, the actual level of market concentration in the Canadian mobile wireless telecommunications sector.
20. As noted above, the Sanderson Report then goes further and compares the national HHI, which substantially underestimates actual concentration level in the Canadian mobile wireless telecommunications sector, to market concentration in countries with and without mandated MVNO access. The report concludes that most countries with mandated MVNO access have higher concentration than Canada, and the national HHI in Canada is one of the lowest among countries that do not mandate MVNO access.<sup>21</sup>
21. Table 3 and Table 4 in Appendix A reproduce the tables shown in the Sanderson Report replacing the national HHI with the provincial HHI that more accurately reflects relevant geographic markets and the level of market concentration in the Canadian mobile wireless telecommunications sector. Contrary to what the Sanderson Report would suggest, actual market concentration for all Canadian provinces and territories (with the exception of Quebec) exceeds the market concentration of most countries in which MVNO access has been mandated. Furthermore, almost all countries that do

<sup>21</sup> Sanderson Report, pp. 16-18 and Tables 2 and 3.

not mandate MVNO access have market concentration levels that are substantially lower than market concentration in Canadian provinces and territories (but for Quebec).

22. In Austria and Germany, MVNO access was mandated as a condition of merger approval. Table 5 in Appendix A reveals that the post-merger HHI in Austria and Germany—the level of market concentration at which the regulatory agencies decided to impose mandated MVNO access—is substantially lower than market concentration in the large majority of Canadian provinces and territories.<sup>22</sup>
23. It is crucial to accurately account for market concentration based on relevant geographic markets. Using province-level market concentration measures, an approach consistent with the Competition Bureau’s analysis of mergers of mobile wireless carriers, shows that the conclusions drawn by the Sanderson and Eisenach Report on the level of market concentration in the Canadian wireless telecommunications sector are erroneous.

#### **B. The Canadian Mobile Wireless Telecommunications Market Is Characterized by Coordinated Behaviour among National Wireless Carriers**

24. As noted above, highly concentrated industries can be prone to coordinated behaviour among dominant firms. Such coordinated behaviour involves interactions among a group of firms that is profitable because of the accommodating response from other firms. While the coordinating firms may not explicitly collude or even communicate with each other, they may develop a tacit understanding that each firm will respond cooperatively to the behaviour of other firms. Coordinated behaviour may relate to price, service levels, or any other dimension of competition (e.g., wholesale markets). For example, a wireless service provider may decide to raise its price for a smartphone plan (or cost of a SIM card, activation/connection fee, etc.) if it expects other carriers to follow suit, even if it would not have been profitable to do so independently. That is, the price increase is profitable only as a result of the accommodating response of other market participants.
25. Firms operating in concentrated markets characterized by high barriers to entry generally find it easier (and less costly) to engage in coordinated behaviour because it is easier for a small group of firms to independently recognize mutually beneficial terms of coordination, monitor each other’s

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<sup>22</sup> The Sanderson Report contains conflicting information on mandated MVNO access. It states that “wireless carriers were required to provide MVNO access as a condition of approval of a merger or acquisition. This has occurred in Austria, Denmark, Finland, Germany, Ireland, Italy, and Norway.” (p.16) Yet only Austria, Finland, and Germany are identified in Tables 2 and 3 or shown on Figure 2 as countries with mandated MVNO access as a condition of merger approval. Furthermore, the merger in Finland in the fall of 2015 that apparently led to mandated access as a condition of the merger approval did not materially change the concentration in the Finnish wireless market (Viestintävirasto (Finnish Communications Regulatory Authority), “Market Shares of Mobile Subscriptions,” <https://www.viestintavirasto.fi/en/statisticsandreports/statistics/2013/marketsharesofmobilesubscriptions.html>).

conduct, and detect (and respond to) deviations. Wireless telecommunications markets exhibit high barriers to entry: First, a mobile wireless carrier must obtain scarce spectrum through either an auction or a resale. Second, the carrier then must deploy a network of towers, antenna and transceivers, and secure backhaul infrastructure. Finally, the carrier must obtain access to popular smartphones, get a retail distribution network, and build operational and customer support systems. Other factors that make Canadian mobile wireless markets susceptible to coordination are transparent pricing that is closely monitored by competitors, and the ability to signal future pricing intentions using promotional pricing with pre-specified end dates.

26. Coordinated behaviour can include a variety of conduct. When a multi-product firm (or a single-product firm operating in a number of distinct geographic markets) competes with another similar firm, they overlap and compete in multiple markets. The multiplicity of contact has a tendency to soften competition because it relaxes the incentive constraints that limit the extent of (tacit) collusion. In essence, firms compete less aggressively out of fear that the competitor can retaliate ('punish') in many markets.<sup>23</sup> Previous studies, including one on the US mobile wireless industry, have shown that multimarket conduct can lead to tacit collusion and non-competitive prices.<sup>24</sup> An alternative form of coordinated behaviour is parallel accommodating conduct, which includes situations in which a competitor's response is individually rational and not motivated by the possibility of being subjected to retaliation or deterrence, yet the response weakens competition by facilitating prices increases above competition levels.<sup>25</sup>
27. In its nine-month investigation of Bell's acquisition of MTS, the Competition Bureau conducted a thorough analysis of mobile wireless prices in Canada and found that "as a result of coordinated behaviour among Bell, TELUS and Rogers, mobile wireless service prices in Canada are higher in

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<sup>23</sup> Bernheim, B.D., and M.D. Whinston (1990): "Multimarket Contact and Collusive Behavior," *RAND Journal of Economics*, 21(1), pp. 1-26.

<sup>24</sup> Parker and Röller (1997) demonstrate that cross-ownership and multi-market conduct are important factors explaining non-competitive prices in the US mobile wireless industry following deregulation (Parker, P.M., and L.-H. Röller (1997): "Collusive Conduct in Duopolies: Multimarket Contact and Cross-Ownership in the Mobile Telephone Industry," *RAND Journal of Economics*, 28(2), pp. 304-322). Ciliberto and Williams (2014) show that multimarket contact facilitates tacit collusions in the SU airline industry (Ciliberto, F. and J.W. Williams (2014): "Does Multi-Market Conduct Facilitate Collusion? Inference on Conduct Parameters in the Airline Industry," *RAND Journal of Economics*, 45(4), pp. 764-791.

<sup>25</sup> Parallel accommodating behaviour is a type of coordinated conduct that does not require monitoring and punishing for non-compliance (Harrington, J.E. (2013): Evaluating Mergers for Coordinated Effects and the Role of Parallel Accommodating Conduct," *Antitrust Law Journal*, 78(3), pp. 651-668). U.S. Department of Justice and Federal Trade Commission, *Horizontal Merger Guidelines*, August 19, 2010, pp. 24-25, <https://www.justice.gov/atr/public/guidelines/hmg-2010.pdf>. Accommodating responses blunt a firm's incentive to lower the price and steal customers from its competitors. It also enhances a firm's incentive to raise price by mitigating the risk of losing customers to a rival.

regions where Bell, TELUS and Rogers do not face competition from a strong regional competitor.”<sup>26</sup>

28. The Competition Bureau (the “Bureau”) found that one of the key features driving the coordinated behaviour among Bell, TELUS and Rogers is their multi-market exposure. As described above, fear of retaliation results in a form of tacit collusion in which firms do not offer competitive prices:

*“Multi market exposure among Bell, TELUS and Rogers is significant, and encompasses a number of geographies and business lines at both the wholesale and retail level. Information collected during the inquiry supported the likelihood that Bell, Rogers and TELUS weigh the advantages from vigorous competition in one area against the danger of retaliation in other areas. Ultimately, the Bureau found that multi market exposure softens competition among Bell, TELUS and Rogers.”*<sup>27</sup>

29. The presence of a strong regional competitor can disrupt the effects of coordination among the National Wireless Carriers.<sup>28</sup> Yet, close to 70% of Canadian consumers live in areas without effective competition from a strong regional competitor.<sup>29</sup>

30. This section showed that the Canadian mobile wireless telecommunications industry in Canada is highly concentrated. Economic theory and evidence demonstrates that highly concentrated markets can be prone to coordinated actions among dominant firms. In the context of the Canadian wireless industry, this is not a remote theoretical possibility unlikely to occur. The Competition Bureau’s recent in-depth investigation in the context of Bell’s acquisition of MTS concluded, based on confidential internal company data, that many Canadian consumers (close to 70% living in areas without effective competition) pay significantly higher prices for wireless telecommunications services as a result of coordinated behaviour among Bell, TELUS, and Rogers.

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<sup>26</sup> *Supra* note 13. The Bureau’s investigation revealed that the threat of retaliation from competitors is a significant factor in pricing decisions.

<sup>27</sup> *Supra* note 13.

<sup>28</sup> Effective coordination among firms may be constrained in the presence of a firm that is structurally different since the asymmetry is an obstacle to behaviour that is profitable for each firm; or by a vigorous and effective competitor (a “maverick”) who plays a disruptive role and stimulates competition (Competition Bureau, *Merger Enforcement Guidelines*, October 6, 2011, ¶6.37-6.38).

<sup>29</sup> “The results of this analysis showed that mobile wireless pricing in Saskatchewan, Thunder Bay, Quebec and Manitoba is substantially lower than in the rest of Canada. These are all areas that have a strong regional competitor” (*Supra* note 13). According to the 2016 census, 69.7% of Canadians live in areas the Competition Bureau determined lack a strong regional competitor (Statistics Canada, “Population size and growth in Canada: Key results from the 2016 Census,” <https://www.statcan.gc.ca/daily-quotidien/170208/dq170208a-eng.htm>).

## **IV. Canadian Consumers Pay High Rates and Consume Less Wireless Telecommunications Services**

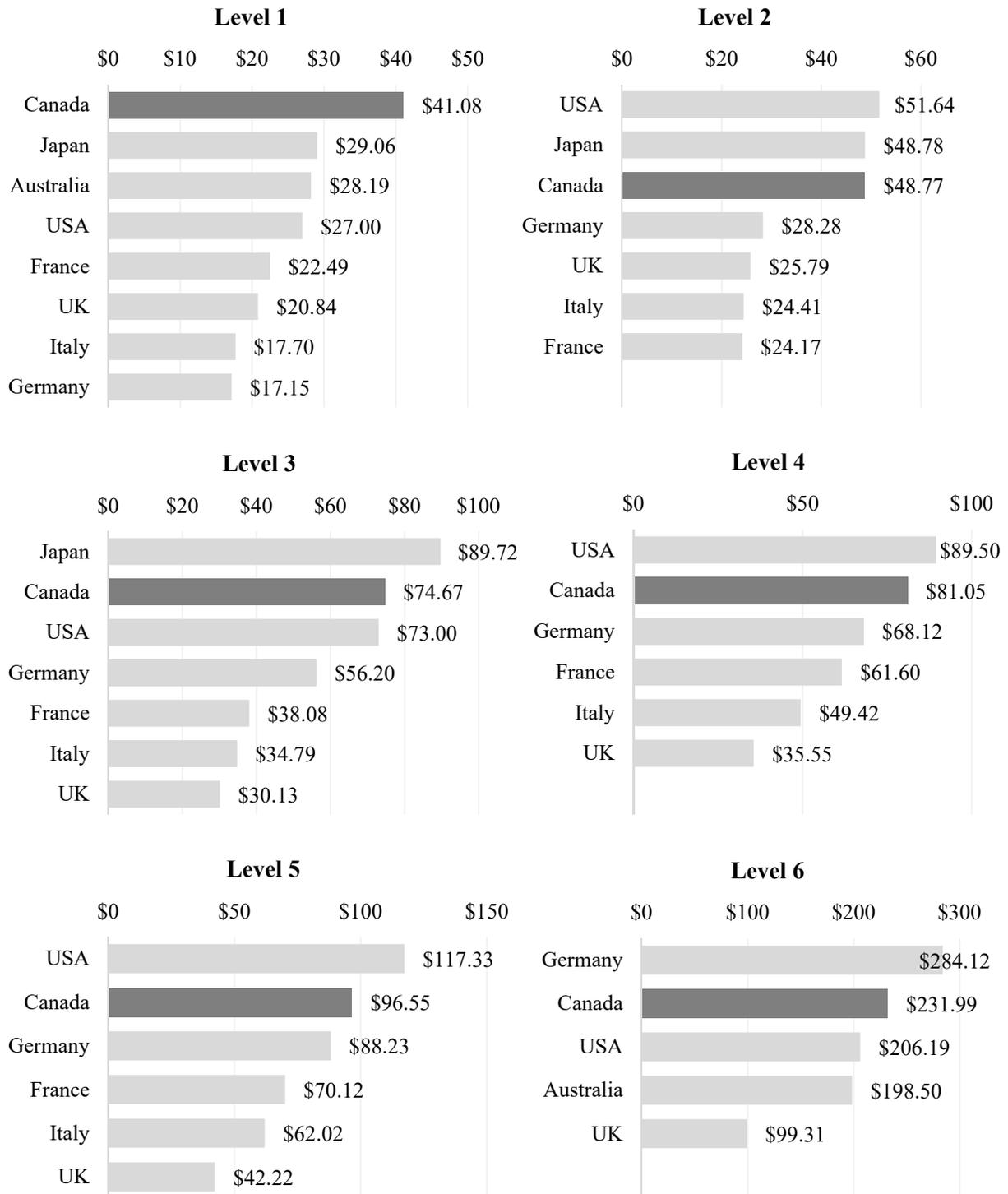
### **A. International Comparisons**

31. The CRTC commissioned an international price comparison study prepared by NGL Nordicity Group Ltd. (“Nordicity”) that found, based on a detailed comparative price analysis, that Canada ranked among the highest in pricing of mobile wireless telecommunications services across all levels of service baskets.<sup>30</sup> For example, among the eight jurisdictions selected for comparison, Canadians paid the highest prices for an entry-level or low volume usage service basket (Level 1), the third-highest prices for service basket Level 2, and the second-highest prices for service baskets Level 3 to Level 6 as shown in Table 2:

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<sup>30</sup> NGL Nordicity Group Ltd., “2016 Price Comparison Study of Telecommunications Services in Canada and Select Foreign Jurisdictions,” March 22, 2016 (“Nordicity Study”), <https://www.crtc.gc.ca/eng/publications/reports/compar/compar2016.pdf>. The Globe and Mail, “How Canada’s Internet, wireless rates compare with international prices,” August 11, 2016, <https://theglobeandmail.com/report-on-business/how-canadas-internet-wireless-rates-compare-with-international-prices/article31379589/>. Financial Post, “Canadian mobile phone bills still rank among the most expensive in G7: CRTC report,” <http://business.financialpost.com/technology/canadian-mobile-phone-bills-still-rank-among-most-expensive-in-g7-crtc-report>.

**Table 2: International Price Comparison for Mobile Wireless Telecommunications Services (Nordicity Study)**



**Source:**  
Nordicity Study, 2016.

32. These findings in the 2016 Nordicity Study are consistent with earlier reports prepared by Wall Communications:

*“Relative to the seven foreign jurisdictions included for this study, Canada’s average Level 1 basket price is the highest of the group. For the Level 2 and 3 baskets, Canada ranks on the high side of the group, with lower average prices than only Japan and the U.S. Similarly, Canada’s ranks on the high side of the group for both the Level 4 and 5 baskets, with a lower average price than only the U.S.”*

(Wall Communications Report, 2015)<sup>31</sup>

*“Relative to the seven foreign jurisdictions surveyed for this study, Canada’s Level 1 mobile wireless service basket price is the highest of the group. In the case of the Level 2 and 3 baskets as well as the new Level 4 service basket, Canada ranks on the high side of the average for the group of surveyed countries. Canada’s mobile wireless service price ranking this year is similar to previous years’ studies.”*

(Wall Communications Report, 2014)<sup>32</sup>

33. While each one of these annual CRTC-commissioned studies is, by its nature, a snapshot, the collection of evidence reveals that Canadian consumers persistently pay some of the highest rates for mobile wireless communications services.
34. The basket methodology used in the Nordicity Study and previous CRTC-commissioned studies is unable to capture all elements of consumer surplus.<sup>33</sup> Prices determine the volume of transactions chosen by consumers, and this volume effect of prices is not captured by the basket methodology.<sup>34</sup> High prices and a lack of competition in wireless telecommunications markets are most often associated with volume effects and restrictions on output.<sup>35</sup> Volume effects can be assessed via adoption and usage measures.
35. When the market for mobile wireless telecommunications services is growing, the speed and level of market penetration (i.e., diffusion and adoption) is often viewed as an important summary measure of how well the market is performing for potential consumers. As market penetration

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<sup>31</sup> Wall Communications Inc., “Price Comparisons of Wireline, Wireless and Internet Services in Canada and with Foreign Jurisdictions,” 2015 Edition, March 30, 2015, <http://www.crtc.gc.ca/eng/publications/reports/wall2015/rp1506wall.pdf>.

<sup>32</sup> Wall Communications Inc., “Price Comparisons of Wireline, Wireless and Internet Services in Canada and with Foreign Jurisdictions,” 2014 Update, March 31, 2014, <https://www.crtc.gc.ca/eng/publications/reports/rp140714.pdf>.

<sup>33</sup> Consumer surplus is the difference between the amount consumers are willing and able to pay and the amount they actually pay.

<sup>34</sup> Consumers choose different quantities based on the price.

<sup>35</sup> See for example Eisenach Report, ¶ 60.

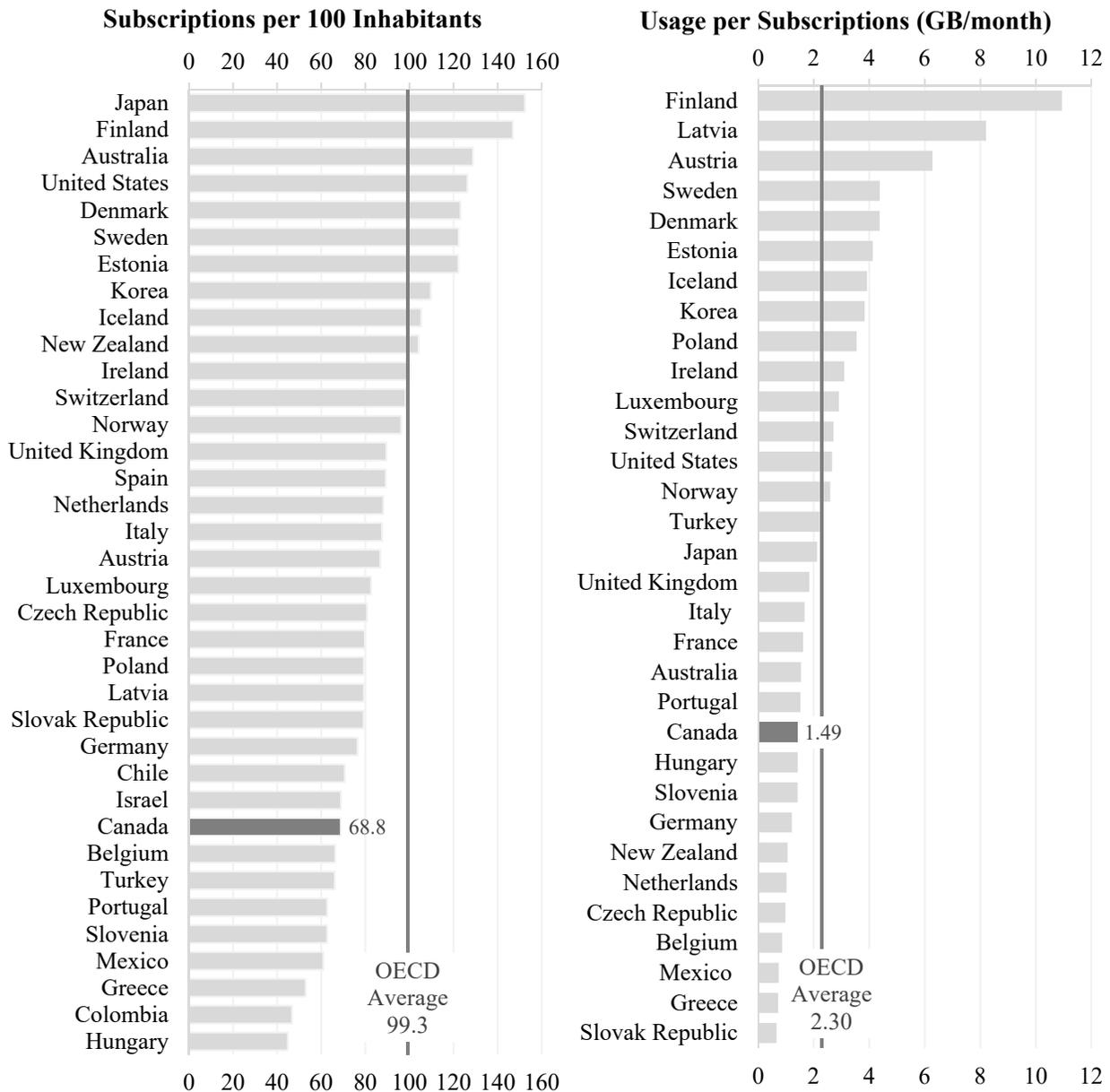
approaches saturation, mobile wireless usage becomes the more relevant indicator.<sup>36</sup> Canada lags substantially behind other OECD countries in both mobile adoption and mobile usage.

36. According to the *OECD Digital Economy Outlook 2017*, Canada has one of the lowest rates of mobile broadband subscriptions among OECD countries. Moreover, as Figure 1 shows, Canadian mobile data usage is substantially below the OECD average; usage in many leading developed countries is more than double mobile usage in Canada.

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<sup>36</sup> Li, Y. and B. Lyons (2012): “Market structure, regulation, and the speed of mobile network penetration,” *International Journal of Industrial Organization*, 30(6), pp. 697-707.

**Figure 1: Mobile Broadband Subscriptions and Usage (OECD)**



**Source:**  
OECD Digital Economy Outlook 2017.

37. Admitting that low mobile wireless adoption rates in Canada are “factually correct,” the Eisenach Report dismisses this evidence as “economically uninformative” since in Dr. Eisenach’s view, the comparatively low mobile wireless adoption in Canada is due to European consumers owning multiple SIM cards to avoid international roaming fees when traveling across borders.<sup>37</sup> There are two obvious flaws in this explanation: First, three of the top four countries in terms of mobile

<sup>37</sup> Eisenach Report, ¶ 79.

wireless subscriptions per 100 inhabitants—Japan, Australia, and the United States—are non-European. Canada with 68.8 mobile subscriptions per 100 inhabitants considerably lags mobile subscriptions in Japan (152.4), Australia (128.8), and the United States (126.3). Second, to the extent that subscriptions *per 100 inhabitants* might bias a comparison of mobile adoption rates against Canada, it would simply exacerbate Canada’s already substantial gap in usage *per subscription*.<sup>38</sup> When comparing the ranking of countries on mobile subscriptions per 100 inhabitants with mobile usage per subscriptions, it is apparent that countries with higher mobile subscriptions rates also tend to have higher mobile usage. Canada lags substantially behind in both mobile adoption and mobile usage.

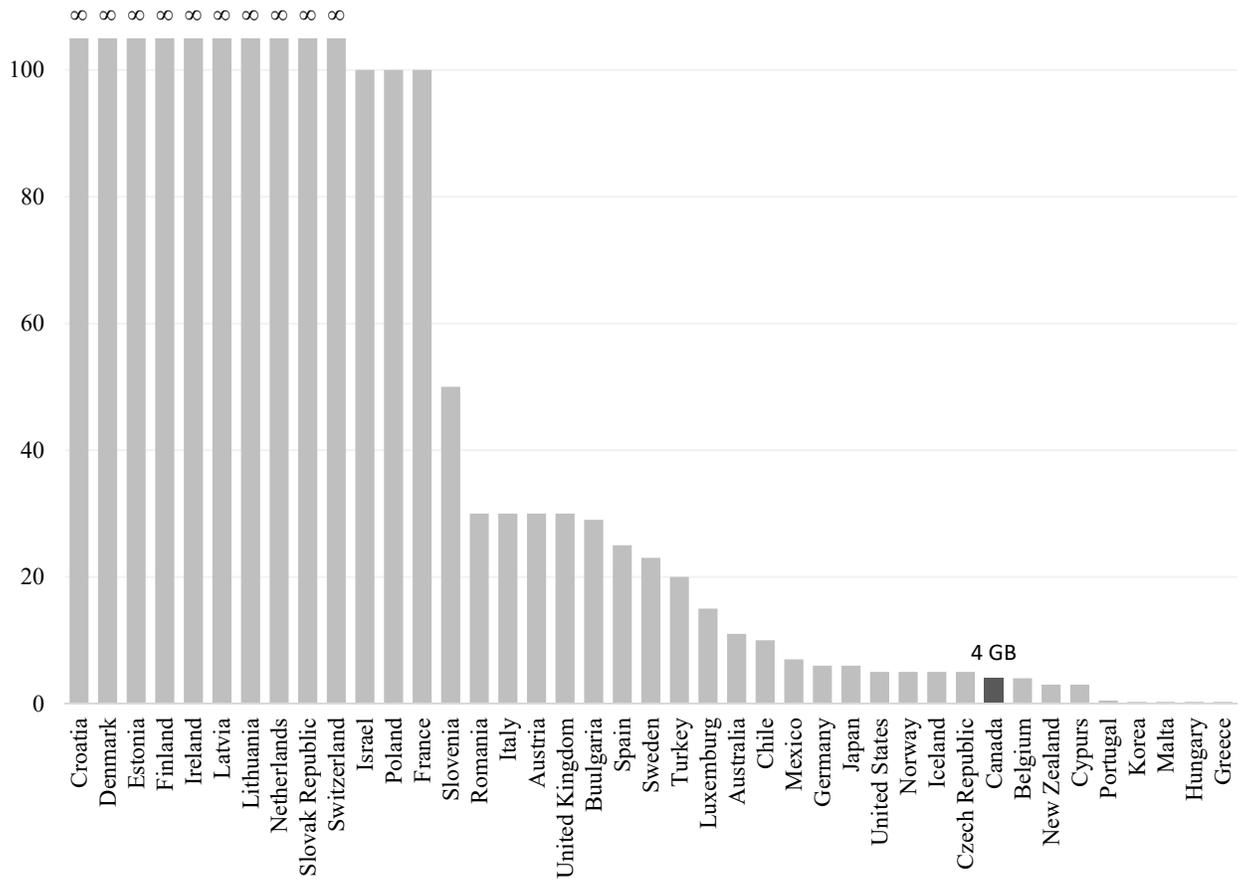
38. The Sanderson Report instead reports a “smartphone adoption” measure defined as smartphone connections as a percentage of all device connections to show that Canada is “leading” most other countries.<sup>39</sup> Such a measure is problematic since the remaining connections in this statistic (i.e., connections other than smartphone) do not only include basic/feature phones but, particularly in advanced mobile markets, also include portable access devices such as hubs, sticks, and dongles, as well as built-in access devices such as tablets, laptops, and other smart devices (e.g., watches). Advanced mobile countries may well have a lower “smartphone adoption” only because the adoption of tablets, laptops, and other smart devices is higher relative to Canada. Furthermore, since this smartphone measure is a *percentage of all connections*, it cannot possibly measure the extent to which Canadians in general are adopting smart devices, and hence, participating in the digital economy.
39. Other international price and usage comparisons corroborate the findings from the Nordicity Study and the OECD Digital Economy Outlook. For example, an alternative measure of comparing mobile wireless telecommunications prices is to analyze the data allowances offered with smartphone plans. The Rewheel / Digital Fuel Monitor research study measures the (maximum) number of gigabytes that are included in smartphone plans that can be purchased for 30 Euros or less. Compared to other OECD countries, many of which offer unlimited data allowances, gigabyte allowances in Canada are much smaller and among the lowest in the OECD, as shown in Figure 2:

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<sup>38</sup> To compare usage per 100 inhabitants, one would need to scale usage per subscription by a factor reflecting the number of subscriptions per inhabitant. If the number of subscriptions per inhabitant is comparatively lower in Canada, then the usage per subscription gap observed for Canada is even larger when measured as usage per 100 inhabitants.

<sup>39</sup> Sanderson Report, pp. 11-12. (“Cisco reports that in Canada in 2016, smartphones account for 59.2% of all device connections, lagging only China in the G20.<sup>25</sup>” Footnote 25: “[...] Cisco uses a broad definition of device connections, which include smartphones, non-smartphones, tablets, laptops, gaming consoles, entertainment systems, and other smart devices.”) (“As shown in Table 1 below, Canada’s smartphone adoption rate is currently ranked 6<sup>th</sup> in the G20 country groups.<sup>26</sup>” Footnote 26: “Smartphone adoption rate is smartphone connections expressed as a percentage share of total connections (excluding machine-to-machine)”).

**Figure 2: Maximum Data Allowance in 4G Smartphone Plans for 30 Euros**



**Note:**

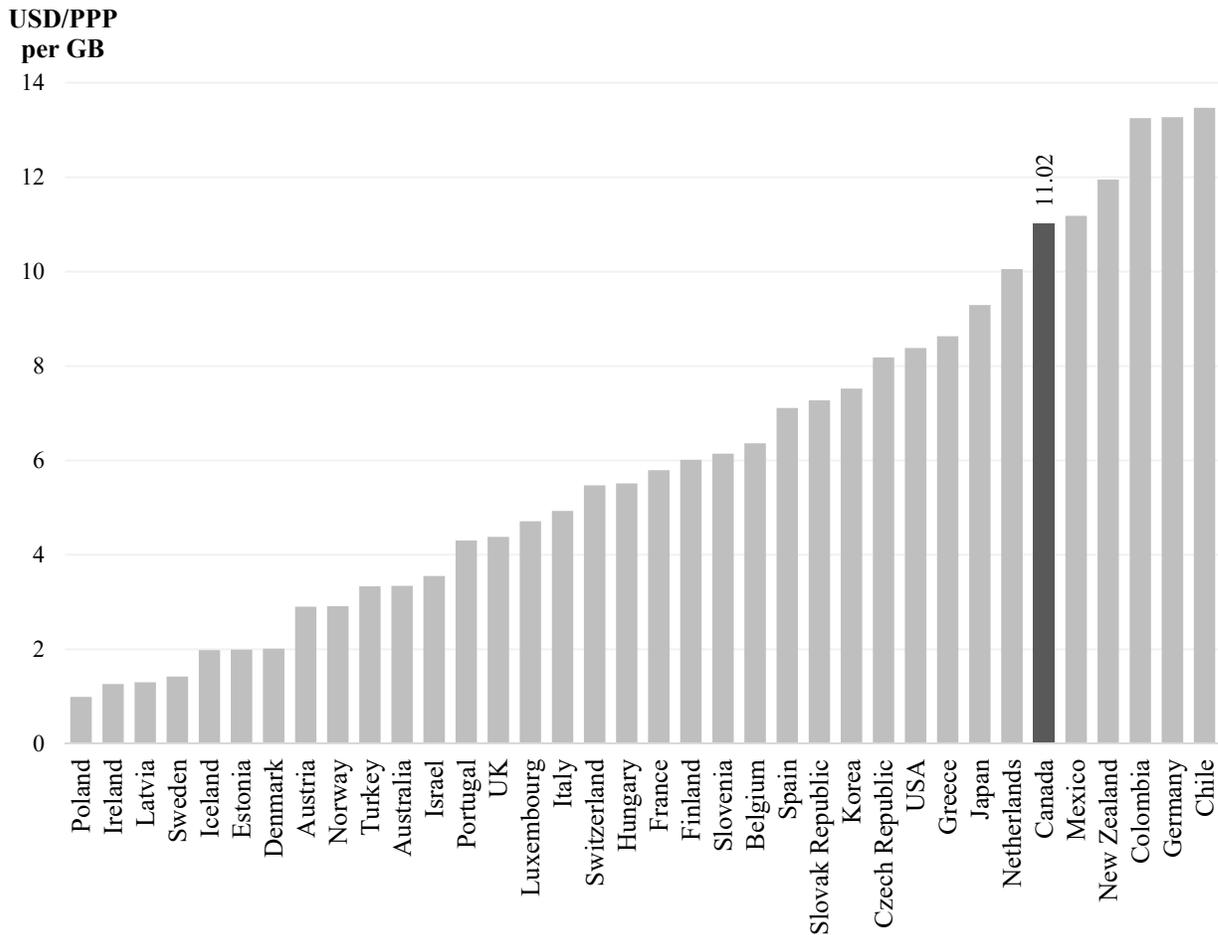
The data include 4G smartphone plans with at least 1,000 minutes included for 137 operators (main and sub-brands) and 65 MVNOs in April-May 2017.

**Source:**

Rewheel/Digital Fuel Monitor, 1H2017.

- Strategy Analytics compiles tariff data for the OECD Mobile Broadband Price Benchmarking system and tracks the average price per gigabyte for post-paid mobile broadband offered from the three most prominent wireless service providers in each of 36 countries: Figure 3 reveals that the average price per gigabyte in Canada is among the highest among the 36 countries.

**Figure 3: Average Price per GB for Post-paid Mobile Broadband (OECD, Q4 2016)**



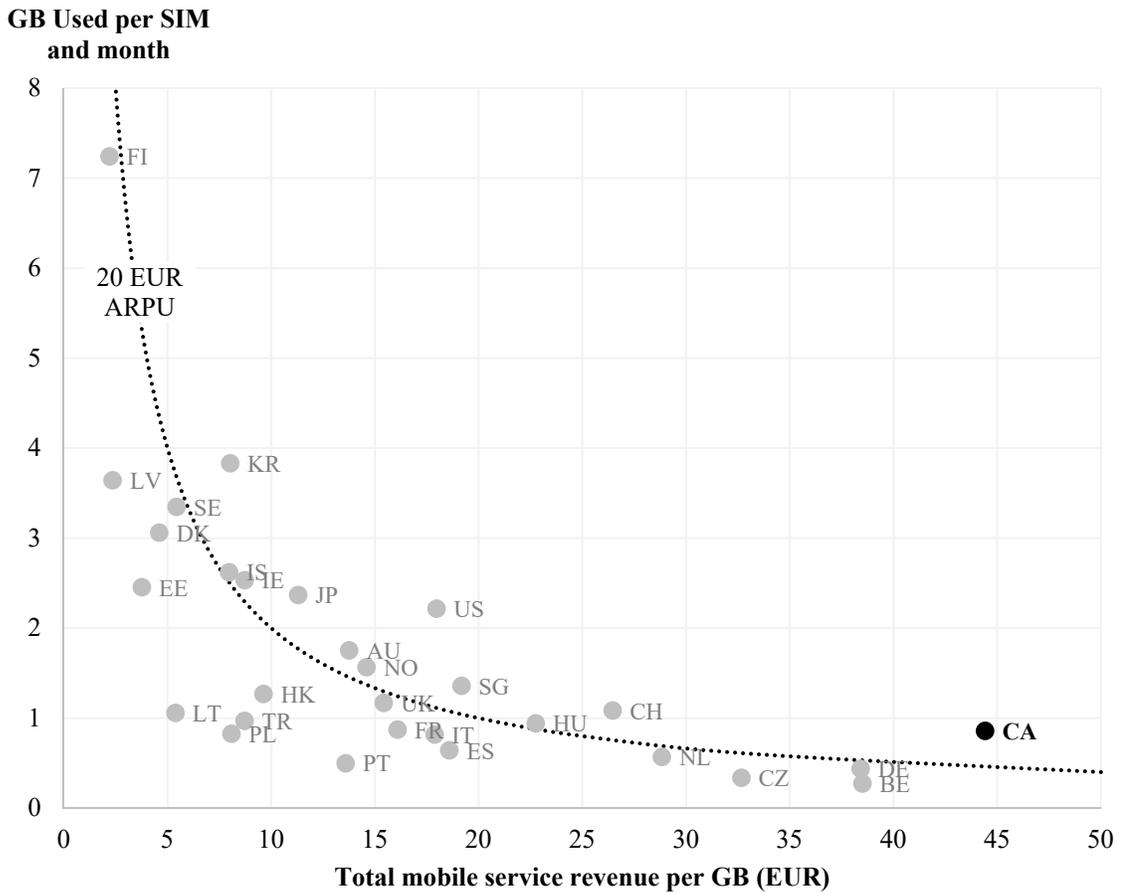
**Source:**

Strategy Analytics, Teligen Tariff & Benchmarking, OECD Mobile Broadband Price Benchmarking.

41. Another perspective is provided by Tefficient’s analysis of the development and drivers of mobile usage. The Tefficient report compares total mobile wireless service revenue per gigabyte to the average mobile data usage across countries.<sup>40</sup> As illustrated in Figure 4, Canada has the highest effective revenue per gigabyte but Canadian mobile usage is low among the countries surveyed.

<sup>40</sup> Tefficient, “Unlimited pushes data usage to new heights,” Industry analysis #5 2016 – updated version Mobile data 1H 2016, January 5, 2017, <http://media.tefficient.com/2016/12/tefficient-industry-analysis-5-2016-mobile-data-usage-and-pricing-1H-2016-ver-2.pdf>.

**Figure 4: Total Mobile Service Revenue per GB and Mobile Data Usage**



**Source:**  
Tefficient AB.

42. The above evidence from a set of international comparisons using different data sources and various methodologies demonstrates that Canadians pay high prices for mobile wireless telecommunications services, and adoption and usage lag substantially behind the average in OECD countries (not to speak of the gap in adoption and usage relative to leading countries).

**B. Within-Canada Comparisons**

43. Not all evidence that Canadians pay high rates for mobile telecommunications services comes from international comparisons. Price comparisons across provinces within Canada provide additional evidence that many Canadian consumers pay supra-competitive prices for mobile wireless telecommunications because they live in areas without a strong competitor to the National Wireless Carriers.

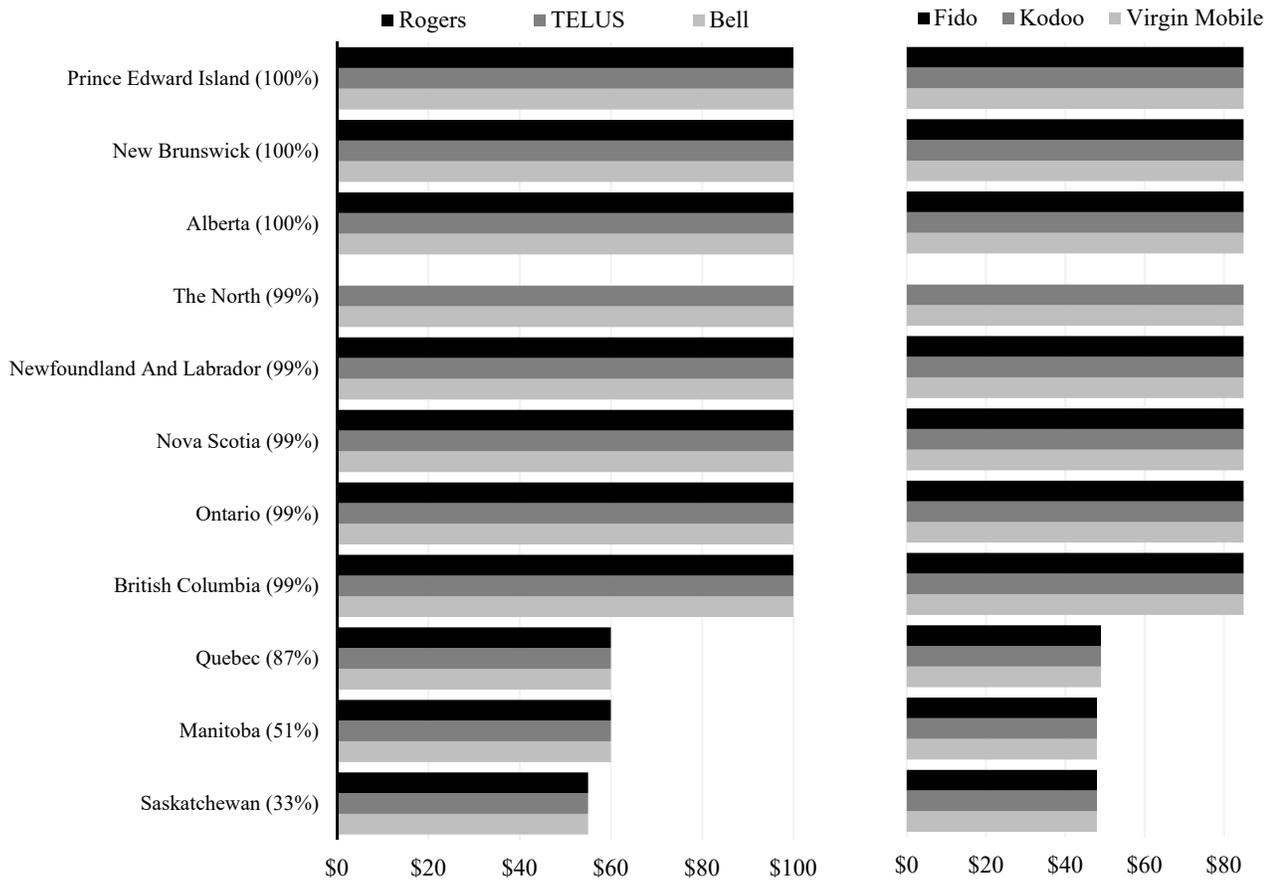
44. Publicly posted prices on the website of the National Wireless Carriers reveal stark differences in pricing across provinces.<sup>41</sup> Figure 5 and Figure 6 show the monthly costs of two types of smartphone plans offered by the National Wireless Carriers main brands (Bell, Rogers and TELUS) and flanker brands (Fido, Koodo and Virgin Mobile). The first type of plan offers 4GB of data along with unlimited nationwide minutes. Across most of Canada, this plan is offered for \$100 from the main brands. Remarkably, due to effective competition and the presence of a strong regional competitor, residents of Quebec, Manitoba and Saskatchewan are able to obtain this plan from the same service providers for prices that are up to 45% lower.<sup>42</sup> Moreover, the price discount underestimates the value discrepancy because plans in the provinces with lower pricing offer more data. The same pattern exists in the pricing of flanker brands. Residents of Quebec, Manitoba and Saskatchewan can obtain the same plan at a 44% discount relative to the rest of Canada. The comparison shows that mobile wireless prices are lower in areas in which the aggregate share of the National Wireless Carriers (main and flanker brands) is lower.
45. A similar price differential across provinces exist for smartphone plans designed for more modest usage (includes 300 local minutes and 1 GB of data). Although the figures show that provinces in which the aggregate share of the National Wireless Carriers is smaller have prices that are up to 43% lower for plans offered by the main brand (and up to 36% lower for plans offered by flanker brands), the comparison is not as straightforward because plans are not uniform across provinces. In Quebec for example, the minimum data option offered is sometimes higher than the 1GB option offered in other provinces. However, despite sizable difference in data allowances, smartphone plans in Quebec remain over 20% less expensive compared to provinces in which the aggregate market share of the National Wireless Carriers is higher.

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<sup>41</sup> As of October 12, 2017.

<sup>42</sup> My understanding is that prices in Thunder Bay are also significantly lower than in other areas in Canada due to the presence of a strong regional competitor. Bell's recent acquisition of MTS eliminated the existing competitive constraint provided by MTS as a strong regional competitor. As part of the conditions of merger approval, the Competition Bureau required Bell to divest some MTS post-paid subscribers and dealer locations to TELUS; and to divest assets (spectrum, retail stores, and subscribers) and provide transitional services to Xplornet. The Commissioner was satisfied that these remedies and Xplornet's planned entry into the mobile wireless market in Manitoba address his concerns related to the Bell's acquisition of MTS (*Supra* note 13).

**Figure 5: Price of Wireless Plan with 4GB of Data and Unlimited Nationwide Minutes**



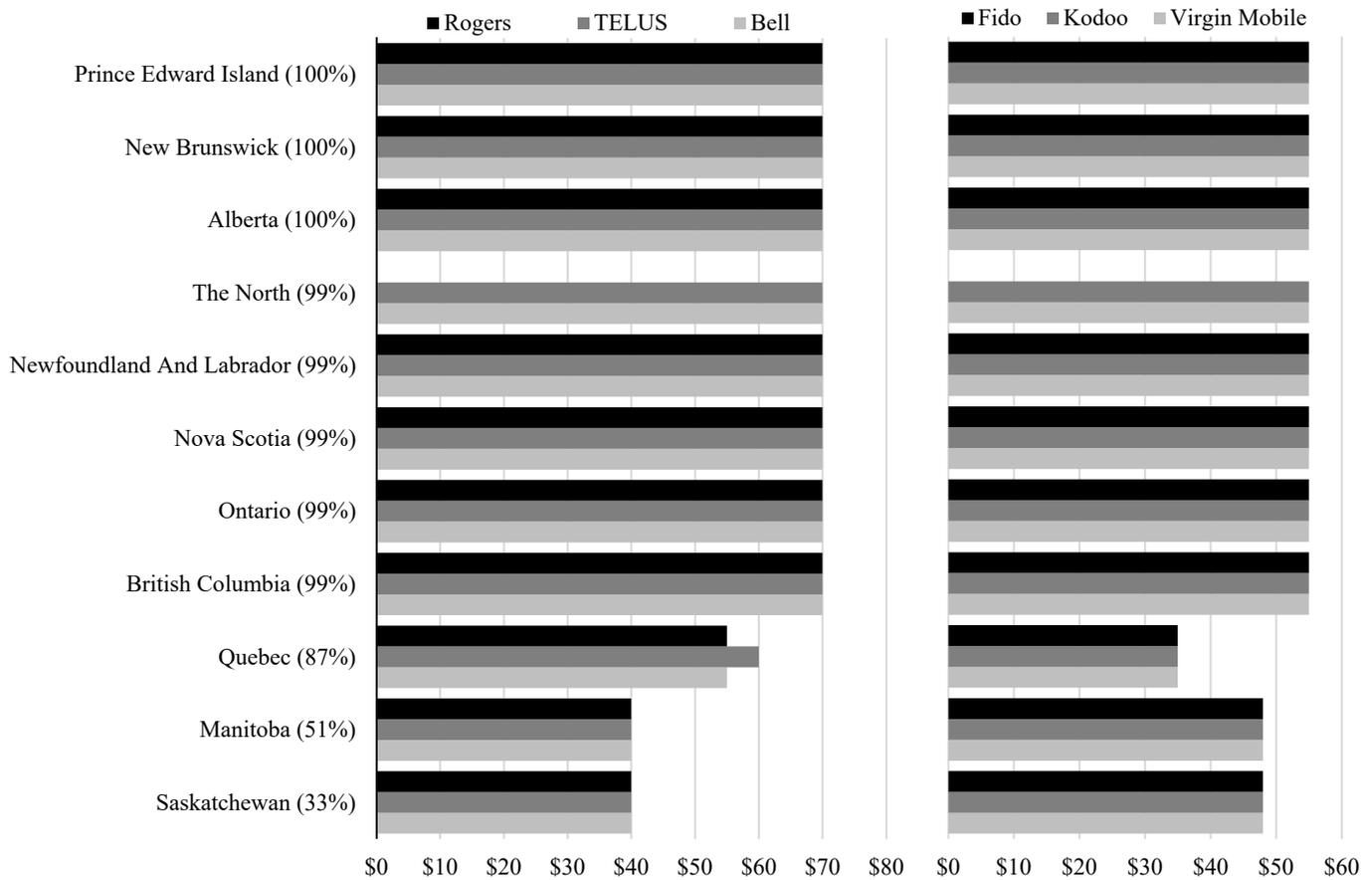
**Notes:**

- [1] Percentage in brackets refers to the aggregate market share of Bell, TELUS, and Rogers.
- [2] Prices are based on bringing your own device.
- [3] The North includes: Northwest Territories, Nunavut and Yukon.
- [4] Flanker brand plans in Quebec include 6GB of data.
- [5] Flanker brand plans in Saskatchewan and Manitoba include 5GB of data.
- [6] TELUS and Bell offer a bonus 3GB in Quebec for a total of 7GB of data.
- [7] Main brand plans in Manitoba include 6GB.
- [8] Main brand plans in Saskatchewan include 5GB of data.
- [9] Aggregate market share of the National Wireless Carriers (main and flanker brands) is shown in parentheses next to each province.

**Source:**

Company websites.

**Figure 6: Price of Wireless Plan with 1GB of Data and 300 Minutes**



**Notes:**

- [1] Prices are based on individual plans and bringing your own device.
- [2] The North includes: Northwest Territories, Nunavut and Yukon.
- [3] Plans in Manitoba include unlimited Manitoba calling.
- [4] TELUS' plans in New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland offer 500MB for \$60.
- [5] Rogers' plans in New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland offer unlimited Canada-wide minutes; a 500MB plan is available for \$65.
- [6] In Quebec, TELUS offers 7GB (4GB + 3GB bonus), Bell offers 6GB (3GB + 3GB bonus) and both plans have unlimited Canada-wide minutes; Rogers offers unlimited Province-wide calling.
- [7] Plans in Saskatchewan include unlimited local calling.
- [8] Plans from Koodo and Virgin Mobile in Manitoba and Saskatchewan offer 5GB data and unlimited Canada-wide minutes; a 500MB plan is available for \$40.
- [9] Fido's plans in Saskatchewan and Manitoba offer 5GB of data and unlimited Canada-wide minutes, a 100MB/100min plan is available for \$35.
- [10] Virgin Mobile, Koodo and Fido also offer 500MB plans for \$45 in New Brunswick, Nova Scotia, Prince Edward Island, The North and Newfoundland.
- [11] Aggregate market share of the National Wireless Carriers (main and flanker brands) is shown in parentheses next to each province.

**Source:**

Company websites.

46. The Competition Bureau conducted an extensive analysis of mobile wireless prices in Canada as part of its review of Bell's acquisition of MTS earlier in 2017.<sup>43</sup> Using internal company data, the Bureau found that mobile wireless prices in Saskatchewan, Thunder Bay, Quebec and Manitoba are substantially lower than in the rest of Canada:

*“A simple review of the Bell, TELUS and Rogers websites demonstrates the magnitude of these price differences. To illustrate, as of February 14, 2017, Bell’s website offered a 5GB plan in Ontario for \$105 but that same plan was offered for \$60 in Manitoba. The same pattern is apparent when considering “flanker” brands. For example, as of February 14, 2017, Bell’s flanker brand, Virgin, offered on its website a 5GB plan in Ontario for \$75 and offered that same plan in Manitoba for \$48.”<sup>44</sup>*

47. The Bureau's systematic analysis further determined that the price differential is significant and persistent. While the Bureau’s statement refers to advertised prices, the Bureau further clarified that the pattern and magnitude of price differentials observed in advertised prices is consistent with its analysis of confidential internal company data:

*“[...] Bell, TELUS and Rogers all posted pricing on their websites that corroborates the results of the price study both in terms of the observed pricing pattern and the general magnitude of the pricing differential.”<sup>45</sup>*

48. The Eisenach Report claims that the price comparison in the Nordicity Report is inaccurate because it does not account for quality and cost differences.<sup>46</sup> (Eisenach Report, ¶47). It is challenging to accurately control for differences in quality, cost, and usage patterns in international price comparisons.<sup>47</sup> However, the Bureau’s investigation of Bell’s acquisition of MTS revealed, based on confidential internal company data, that the 70% of Canadians living in areas without a strong regional competitor pay significantly more for mobile wireless services and that these *within-country* differences could not be explained by quality or other factors:

*“[t]he Bureau concluded that these differences in price could not be explained by factors such as quality, differences in demand or demographics, but instead were based on the existence or non-existence of a strong regional competitor.”<sup>48</sup>*

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<sup>43</sup> *Supra* note 13.

<sup>44</sup> *Supra* note 13.

<sup>45</sup> *Supra* note 13.

<sup>46</sup> Eisenach Report, ¶47, ¶72-75.

<sup>47</sup> The Eisenach Report provides no evidence that consumers are willing to pay an amount for improved quality (e.g., 1% increase in LTE connections or 1Mbps increase in 4G speed) sufficient for quality-adjusted mobile wireless prices in Canada to be on par or lower relative to the comparison countries.

<sup>48</sup> *Supra* note 13.

49. Similarly to the international comparisons, the Bureau's investigation revealed that high prices and the lack of competition in areas without effective competition lead to lower usage (output).

*"The Bureau's investigation also found that, generally, Canadians in areas with a strong regional competitor use substantially more data than Canadians in areas without a strong regional competitor."<sup>49</sup>*

50. While Dr. Eisenach may be aware of only the Nordicity Report showing that Canadians pay high rates for mobile wireless services,<sup>50</sup> a plethora of evidence from various sources and using different methodologies confirm the findings in the Nordicity Report: Not only do Canadians pay high prices for mobile wireless telecommunications services, adoption and usage lag substantially behind the average among OECD countries. Furthermore, the Competition Bureau's extensive investigation as part of its review of Bell's acquisition of MTS revealed that most Canadians, around 70%, pay high prices for mobile wireless services because of the coordinated behaviour of Bell, Rogers, and TELUS. Canadians living in areas with effective competition from a strong regional competitor pay lower prices and use substantially more data.

## **V. Wi-Fi First Service Providers Offer a Disruptive Innovation that Will Likely Appeal to Some Consumers**

### **A. The Promise of Wi-Fi First**

51. Innovative approaches are required to meet the increasingly growing demand in mobile data traffic and connectivity. One solution has been the use of Wi-Fi as a means to offload heavy data traffic from overcrowded mobile networks. Wi-Fi offloading consists of migrating data traffic from infrastructure-based networks (i.e., cellular towers) to Wi-Fi networks. Some wireless carriers, which primarily offer their services by operating their network infrastructure sometimes resort to Wi-Fi to address extra bandwidth demand in large metropolitan areas. Another form of Wi-Fi offloading sometimes provided by mobile operators entails a Wi-Fi hotspot as a service bundled with a mobile subscription. Wi-Fi offloading allows wireless carriers to use an alternative for increasing or, at least, maintaining service performance during peak demand periods.

52. In contrast, Wi-Fi First service providers offer their services primarily on Wi-Fi networks and only incidentally use cellular networks as a backup. The advent of these new players in the market has followed the growth in Wi-Fi availability and capability due to technological developments, which has made Wi-Fi networks an increasingly more viable alternative to cellular networks. In areas

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<sup>49</sup> *Supra* note 13.

<sup>50</sup> Eisenach Report, ¶62.

without Wi-Fi, customers of a Wi-Fi First service provider could access a cellular network if their service provider has an agreement with the wireless carrier.

53. Wi-Fi First service is a disruptive technology challenging the current model of wireless carriers. It is a business model that relies on software—not infrastructure—enabling smartphones to automatically be connected to the Internet using Wi-Fi. Customers of a Wi-Fi First service provider can connect to the Internet for voice calls, text messaging, and data at prices that are substantially lower than those typically offered by a traditional mobile smartphone plan. Wi-Fi First is likely to appeal to price-sensitive consumers and has the potential to expand wireless penetration rates across Canada.<sup>51</sup> Wi-Fi First service providers could considerably change the mobile wireless industry in Canada by introducing pricing pressure and more intense competition—even if only fringe competition for consumers with limited need for cellular usage. Increased wireless competition will ultimately benefit all Canadians.
54. Canadians depend on mobile wireless telecommunications services for many important aspects in their lives: personal and work communication, safety, convenience, as well as entertainment. These services make up a significant portion of Canadian household spending, disproportionately so for low-income households.
55. Wi-Fi First service is expected to improve the choice and affordability of mobile wireless telecommunications services, yet the competitive constraint Wi-Fi First service providers can exert on the market is likely restricted to consumers with limited use of mobile wireless networks. However, in areas of Canada characterized by the absence of a strong regional competitor and coordinated behaviour of the National Wireless Carriers, Wi-Fi First service providers are expected to influence competition even for consumers with increased needs for cellular networks due to high mobile wireless prices.
56. The potential for Wi-Fi First service to disrupt the mobile wireless industry and increase penetration has been well-documented in the press, as the following examples demonstrate:

*“Change is in the air: “Wi-Fi first” technology will be great for consumers, disruptive for mobile firms”*

Economist, June 18, 2015<sup>52</sup>

*“Bandwidth.com to Spin Off Wi-Fi Cellphone Service Republic Wireless: Bandwidth.com considering IPO late next year after successful debut of rival Twilio: Republic Wireless will spin out from its parent company and become an independent entity, a sign that cheaper, Wi-*

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<sup>51</sup> This will likely occur even in those parts of the country that are more competitive due to the presence of a strong regional carrier.

<sup>52</sup> <https://www.economist.com/news/business/21654602-wi-fi-first-technology-will-be-great-consumers-disruptive-mobile-firms-change>.

*Fi-based cellphone services are able to stand on their own in a hotly competitive wireless market.”*

Wall Street Journal, December 1, 2016<sup>53</sup>

*“Google, Cablevision Challenge Wireless Industry’s Business Model: Companies Ready Phone Plans That Dial Up Pressure on an Industry Already at War Over Prices: Google Inc. and Cablevision Systems Corp. are preparing new cellphone services that would turn the wireless industry’s business model on its head, increasing pressure on companies already dealing with an intensifying price war.”*

Wall Street Journal, January 26, 2015<sup>54</sup>

*“While Limited, Wi-Fi-First Phones Are a Good, Frugal Bet”*

New York Times, June 30, 2016<sup>55</sup>

*“Cellphone Start-Ups Use Wi-Fi First to Handle Calls and Take On Rivals”*

New York Times, February 16, 2015<sup>56</sup>

57. Interventions of the National Wireless Carriers argue that mandated access for Wi-Fi First service providers is not needed or desirable because public Wi-Fi networks may not offer the same quality of service as Mobile Network Operators (“MNOs”). This argument however conflicts with the needs of Canadian consumers, consumer choice, and competitive markets in general. Not all Canadians drive Mercedes cars. When offered a choice among different cars, many price-sensitive consumers choose a lower quality make of a car that better suits their needs and budget.

58. Well-functioning competitive markets respond to different consumer preferences by offering a range of products and services of various quality that appeal to different types of consumers depending on their respective price sensitivity.

*“[S]ociety is almost always better off when consumers enjoy a wide range of choices between high-quality, high-priced and low-quality, low-priced opportunities than when they face a severely restricted choice set.”<sup>57</sup>*

## **B. The Entry of Wi-Fi Service Providers in Canada Is Likely to Increase Adoption among Price-Sensitive Consumers with Limited Cellular Consumption Needs**

59. Not all consumers exhibit truly ‘mobile’ behaviour. Many use their mobile device predominantly in a ‘nomadic’ fashion with a lot of time (and use) occurring at home, at work/school, at a friend’s

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<sup>53</sup> <https://www.wsj.com/articles/bandwidth-com-to-spin-off-wi-fi-cellphone-service-republic-wireless-1480598533>.

<sup>54</sup> <https://www.wsj.com/articles/google-cablevision-challenge-wireless-industrys-business-model-1422248642>.

<sup>55</sup> <https://www.nytimes.com/2016/06/30/technology/personaltech/while-limited-wi-fi-first-phones-are-a-good-frugal-bet.html>.

<sup>56</sup> <https://www.nytimes.com/2015/02/16/technology/small-phone-companies-use-wi-fi-to-punch-above-their-weight.html>.

<sup>57</sup> Scherer, F.M. (1980): *Industrial Market Structure and Economic Performance*, (Houghton Mifflin), p. 394.

house, or in a café, library, or hotel. All those sites likely have public Wi-Fi connectivity. This shift to Wi-Fi enabled devices and locations is changing how consumers connect their devices.<sup>58</sup> Most mobile users are connecting their devices to Wi-Fi at some point, and most users rely on a mix of cellular connectivity and Wi-Fi connectivity. Depending on their consumption behaviour, a portion of consumers is likely to have limited needs for cellular connectivity.

60. According to Cisco, there are currently close to 600,000 public Wi-Fi hotspots (including home spots) available and this number is expected to grow 19-fold over the next five years.<sup>59</sup> Given the widespread availability of public Wi-Fi and its expected growth in the near future, Wi-Fi First service providers can become a competitive option for at least some consumers.
61. Wholesale roaming rates—whether commercially negotiated or mandated—make permanent roaming on cellular networks economically unattractive. This is one of the reasons why Wi-Fi First service providers tend to focus on offering affordable service for consumers with limited need for cellular network use. Wi-Fi First service is only economical for consumers if they predominantly rely on Wi-Fi and only incidentally rely on cellular networks for backup. As such, Wi-Fi First service providers cannot compete for all consumers and there will be many Canadian consumers with substantial usage and need for cellular connectivity for which the National Wireless Carriers (or regional competitors) remain their preferred choice. Yet, the entry of Wi-Fi service providers into the Canadian market might lead to the development of a competitive option that can improve the adoption and affordability of wireless telecommunications services among a segment of price sensitive consumers.
62. The Sanderson Report contains three figures, one for each type of regulations that provide for mandated MVNO access,<sup>60</sup> from which it is concluded that “mandating MVNO access did not cause a material increase in the growth rate of mobile penetration in any country where such access was mandated. Instead, the slope of the line showing penetration rate growth over time is not steeper after mandated access was provided to MVNOs. Instead, the rate of growth in penetration continued on its earlier path even after mandating MVNO access.”<sup>61</sup>

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<sup>58</sup> Cisco, “The New World of SP Wi-Fi: Cisco IBSG Research Uncovers What Canadians Want from W-Fi and Mobile,” [https://www.cisco.com/c/dam/en\\_us/about/ac79/docs/sp/SP\\_Wi-Fi\\_Consumer\\_Briefing\\_Doc\\_Canada.pdf](https://www.cisco.com/c/dam/en_us/about/ac79/docs/sp/SP_Wi-Fi_Consumer_Briefing_Doc_Canada.pdf).

<sup>59</sup> Cisco, VNI Mobile Forecast Highlight 2016-2021, [https://www.cisco.com/c/dam/assets/sol/sp/vni/forecast\\_highlights\\_mobile/index.html#~Country](https://www.cisco.com/c/dam/assets/sol/sp/vni/forecast_highlights_mobile/index.html#~Country). For homespots (or community hotspots), subscribers allow part of the capacity of their residential gateway to be open to casual use. These homespot may be provided by a broadband or other provider directly, or through a partner.

<sup>60</sup> The Sanderson Report categorizes regulations into three types by the process through which it gives rise to mandated MVNO access: i) through an analysis of market power, ii) through merger review, and iii) as a condition of spectrum licensing (Sanderson Report, p. 12).

<sup>61</sup> Sanderson Report, p. 15.

63. This conclusion is problematic for multiple reasons. First, eyeballing lines of mobile adoption over time (diffusion curves) and comparing the slope of two different segments of the line is meaningless in the absence of a benchmark for mobile wireless technology adoption. Mobile network penetration tends to follow a classic S-shaped growth curve because of adoption externalities and eventual market saturation. The slope of the diffusion curve, that is, the growth of mobile penetration at a particular point in time, depends on the proportion of the market that is as yet unserved.<sup>62</sup> Second, regulatory decisions such as whether to mandate MVNO access are endogenous.<sup>63</sup> That is, the decision to mandate MVNO access is not random but related to market conditions such as pricing, intensity of competition, adoption, or a merger awaiting approval. In the absence of a proper econometric identification strategy that addresses endogeneity, no causal inference can be made on the effect of mandated MVNO access on adoption.<sup>64</sup>
64. The potential for reaching erroneous conclusions regarding the effect of mandated MVNO access when the decision to mandate occurs in response (or anticipation) of other market events is illustrated by a retrospective study from the Austrian Competition Authority (BWB) on the merger between H3G and Orange in Austria in 2012.<sup>65</sup> As a condition of merger approval, the merging parties committed to enter into an upfront MVNO agreement with a new entrant and committed to grant wholesale access to up to 16 MVNOs based on the same reference offer but limited to 30% of H3G's network. The remedies failed to attract new entrants in a timely and effective way. Cable TV provider UPC signed the upfront MVNO agreement but entered the market only two years later in December 2014. No other MVNOs entered until 2015 when several MVNOs entered the market.
- “Prior to the merger, there were four mobile network operators (MNOs) in the market and Austrian consumers enjoyed several years of falling prices. After the mergers were cleared in the end of 2012, prices started to increase. In the course of 2015, several new mobile virtual network operators (MVNOs) entered the market and prices started to decrease again.”*
65. Naïvely comparing penetration rates (or prices) before and after MVNO access was mandated (in the absence of the reason *why* access was mandated) entirely misses the true competitive effect of

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<sup>62</sup> *Supra* note 36, p. 699.

<sup>63</sup> See for example Grajek and Röller (2012) on the importance of accounting for the endogeneity of regulation (Grajek, M. and L.-H. Röller (2012): “Regulation and Investment in Network Industries: Evidence from European Telecoms,” *Journal of Law and Economics*, 55(1), pp. 189–216).

<sup>64</sup> Causal inference draws conclusions about a causal connection based on the occurrence of an event, whether something is, or is likely to be, the cause of something else. If the regulatory decision to mandate MVNO access is related to market conditions (e.g. intensity of competition, merger), it is not possible to conclude from the mere correlation of mandated MVNO access with an outcome variable (e.g. adoption) that there is a causal connection. The correlation could be due to other market factors that led to regulation.

<sup>65</sup> Bundeswettbewerbsbehörde (BWB), “The Austrian Market for Mobile Telecommunication Services to Private Consumers: An Ex-Post Evaluation of the Mergers H3G/Orange and TA/Yess!,” Sectoral Inquiry BWB/AW-393, Final Report, March 2016, [https://www.en.bwb.gv.at/Documents/BWB2016-re-Ex-post evaluation of the mobile telecommunications market.pdf](https://www.en.bwb.gv.at/Documents/BWB2016-re-Ex-post%20evaluation%20of%20the%20mobile%20telecommunications%20market.pdf).

MVNOs. The example of Austria where prices increased following the merger between H3G and Orange and only decreased again with the entry of MVNOs two years later demonstrates the potential for MVNOs to constrain mobile wireless prices of dominant carriers with market power.

### C. Relying solely on Commercially Negotiated Agreements is Unlikely to Lead to the Entry of Wi-Fi First Service Providers in Canada

66. The Dippon Report discusses several Wi-Fi First service providers in the United States and notes that “they all are the results of commercial negotiations” that grant network access through MVNO agreements.<sup>66</sup> The Dippon Report then argues that the CRTC should not change the definition of a “home network” to include public Wi-Fi because “there is no reason to believe that the parties could not negotiate similar agreements” in Canada.<sup>67</sup>

67. This argument entirely fails to consider the differences in wholesale wireless roaming markets in Canada and the United States, differences that are both structural and behavioural. MNOs in the United States are indeed eager to negotiate roaming agreements with MVNOs because if they were to walk away, MVNOs would simply sign an agreement with one of their competitors. Matt Carter, Sprint’s President of Wholesale and Emerging Solutions, said that agreements with MVNOs are “a good strategic play for us. [...] It’s another army to help us garner more subscribers on the network.” Critically, he went on to point out that “[i]f we didn’t do this [form agreements with MVNOs], someone else would,” highlighting the competitiveness of the wholesale wireless roaming market in the United States.<sup>68</sup>

68. The competitive environment in the Canadian wholesale wireless roaming market is markedly different. The CRTC determined in TRP 2015-177 that :

*“[w]ith respect to rivalrous behaviour in the market for wholesale network access for MVNOs, the national wireless carriers have exhibited limited interest in providing potential MVNOs with access that would enable the provision of retail mobile wireless voice, text, and data services on a national or regional basis. The Commission considers that the inability of these parties to negotiate access to necessary wholesale inputs demonstrates that there is no rivalrous behaviour between the national wireless carriers in the provision of GSM-based wholesale MVNO access at a national level.”<sup>69</sup>*

69. This lack of access has a direct effect on potential competitors. For example, Elliott Noss, CEO of Canadian wireless provider Ting who operates in the United States, said Ting “would love to be in

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<sup>66</sup> Dippon Report (*Expert Report of Christian M. Dippon, PhD On Behalf of TELUS Communications Company*), ¶ 39-40.

<sup>67</sup> Dippon Report, ¶ 44.

<sup>68</sup> FierceWireless, “Sprint, T-Mobile Execs Explain the MVNO Explosion,” <http://www.fiercewireless.com/special-report/sprint-t-mobile-execs-explain-mvno-explosion>.

<sup>69</sup> TRP 2015-177, *supra* note 2, ¶ 86, <https://www.crtc.gc.ca/eng/archive/2015/2015-177.htm>.

Canada [but] nobody will—at least at this juncture—sell us network.”<sup>70</sup> Similarly, Derek Ting, the CEO of TextNow, an MVNO headquartered in Canada but competing only in the United States, confirmed that the wholesale market dynamic is significantly different and the National Wireless Carriers do not offer attractive wholesale rates: “US carriers are much more motivated to play offence against each other but here they're just playing defence.”<sup>71</sup>

70. Another characteristic that differs between the two markets is the extent of network sharing. Canadian MNOs have entered into a range of network sharing agreements in various parts of the country (e.g., Bell and TELUS). Network sharing can be an effective solution to reduce costs, facilitate network roll-out, increase coverage, and improve network efficiency. However, network sharing likely results in reduced excess capacity and a diminished incentive to sell capacity to MVNOs or price aggressively at the retail level. The extent to which the (unilateral) incentive is reduced depends on the particulars of the cost sharing arrangements.<sup>72</sup>

71. Aside from unilateral effects, there is an increased risk that the network sharing agreements in Canada lead to tacit coordination among the National Wireless Carriers to refuse to supply MVNOs.<sup>73</sup>

72. As mentioned in Section III.B, the Competition Bureau determined that mobile wireless prices in large parts of Canada are elevated due to coordinated behaviour among the National Wireless Carriers, and found that one of the key features driving the coordinated behaviour among Bell, TELUS and Rogers is their multi-market exposure. Such multi-market exposure among the National Wireless Carriers is significant and covers different geographies and business lines at both the wholesale and retail level. Since there is no other competitor able to disrupt the effects of coordination among the National Wireless Carriers in the national wholesale wireless roaming market, it is possible that the lack of rivalrous behaviour and unwillingness of National Wireless Carriers to provide MVNOs with access is another manifestation of coordinated behaviour among Bell, TELUS and Rogers.

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<sup>70</sup> CBC News, “The Canadian Mobile Phone Service You Can’t Get Here,” July 31, 2013; <https://www.cbc.ca/news/business/the-canadian-mobile-phone-service-you-can-t-get-here-1.1337824>.

<sup>71</sup> The Globe and Mail, “Canadian Cellphone Startup Has Success Stateside, But Shut Out at Home,” July 2, 2017, <https://beta.theglobeandmail.com/report-on-business/small-business/startups/canadian-cellphone-startup-has-success-stateside-but-shut-out-at-home/article35509946>. See also Emch Report (*An assessment of wholesale roaming policy in Canada: The interaction of competition, regulation, access, and investment*), filed on behalf of Shaw Communications Inc., ¶¶ 67-69.

<sup>72</sup> OECD (2014): “Wireless Network Structures and Network Sharing,” *OECD Digital Economy Papers*, No. 243, OECD Publishing, Paris, pp 67-70; <https://dx.doi.org/10.1787/5jxt46dzl9r2-en>.

<sup>73</sup> Wholesale competition is lessened if MNOs do not remain independent wholesale providers over the shared network infrastructure.

## VI. Mandated Wholesale Access for Wi-Fi First Service Providers Is Unlikely to Reduce Investment in Canada

73. Experts for the National Wireless Carriers have cited academic research to support their assertion that expanding the definition of ‘home network’ to allow for alternative service providers (e.g., Wi-Fi First)—through mandated access—is expected to reduce investment. Their reports, however, i) predominantly refer to research on the fixed (wireline) telecommunications industry rather than the mobile wireless telecommunications industry, ii) present a biased and selective view of the academic literature, and iii) most importantly, exclude the most recent (and most advanced) research on competition and investment specifically in the wireless telecommunications industry. A closer review of relevant research with the most-recent economic evidence reveals that—given the state of the Canadian telecommunications market—increasing competition by mandating access for Wi-Fi First service providers is unlikely to negatively impact investments in wireless network infrastructure.

74. Largely, the academic literature has investigated the relationship between competition and investment in the context of the fixed telecommunications industry, and the research cited by experts for the National Wireless Carriers is almost exclusively related to competition and investment matters in fixed broadband networks. Two previous reports filed in recent CRTC proceedings and Cabinet reviews of telecom regulatory policy extensively review the academic literature on competition and investment in fixed telecommunications industry, and how its findings apply to the Canadian broadband market.<sup>74</sup> They revealed that no clear consensus view has emerged on the relationship between regulation, investment incentives, and industrial policy, or the effect of mandated access to next-generation infrastructure in the presence of broadband competition.

*“Several attempts have been made to uncover the relationship between competition and investment within specific industries. In the telecommunications industry, most papers have analysed the impact of competition on investment in the fixed broadband market. Cambini and Jiang (2009) review this literature and find that the impact is rather ambiguous. Likewise, Grajek (2012) finds that competition through access regulation negatively affects investment in fixed broadband networks, whereas Bacache, Bourreau, and Gaudin (2014)*

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<sup>74</sup> Ginn, M. and M. von Wartburg, “Economic Review of the Provision of Wholesale Telecommunications Services and Associated Policies in Canada,” June 27, 2014, prepared for the Canadian Network Operators Consortium as part of its submission in response to Telecom Notice of Consultation CRTC 2013-551, *Review of wholesale services and associated policies*; von Wartburg, M., “Economic Review of Bell Canada’s Petition to the Governor in Council to Vary TRP CRTC 2015-326, *Review of Wholesale Wireline Services and Associated Policies*,” December 21, 2015, prepared for the Canadian Network Operators Consortium as part of its comments on Bell’s petition.

*find that access regulation has no effect on new entrants' investment in fixed broadband networks.*"<sup>75</sup>

75. Moreover, specifically related to the Canadian fixed broadband market, announcements of sizeable next-generation broadband infrastructure investments (following the announcement of mandated access), public statements and investor reports from incumbent broadband providers, and financial analyses of broadband networks in Canada are entirely consistent with the CRTC's assessment that incumbent carriers will likely continue to invest in wireline infrastructure to respond to consumer demand and compete.<sup>76</sup> Earlier this year, a Moody's Investor Services report similarly concluded that competition between Canadian telecommunications and cable companies drives continued network investment in fibre-optic network infrastructure.<sup>77</sup>
76. Thus, even evidence from the fixed telecommunications industry indicates that mandated access is unlikely to reduce investment by incumbents in markets where telecommunications and cable companies compete. This conclusion can also be drawn from recent research into the mobile wireless telecommunications industry, the relevant industry to focus on in the current proceeding. The academic literature investigating the empirical relationship between competition and investment in the mobile wireless telecommunications industry is still nascent. The Sanderson and Dippon Reports rely solely on an early study by Kim et al. (2011) that finds that mandated MVNO access is associated with reduced investment intensity—defined as capital expenditures divided by

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<sup>75</sup> Hounghbonon, G.V. and F. Jeanjean (2016): "What level of competition intensity maximises investment in the wireless industry," *Telecommunications Policy*, 40(8), pp. 774-790, at 776. (Cited are Cambini, C., and Y. Jiang (2009): "Broadband Investment and Regulation: A Literature Review," *Telecommunications Policy*, 33(10-11), pp. 559-574; Grajek, M. and L.-H. Röller (2012): "Regulation and Investment in Network Industries: Evidence from European Telecoms," *Journal of Law and Economics*, 55(1), pp. 189–216; and Bacache, M., M. Bourreau, and G. Gaudin (2014): "Dynamic Entry and Investment in New Infrastructures: Empirical Evidence from the Fixed Broadband Industry," *Review of Industrial Organization*, 44(2), pp. 179–209).

<sup>76</sup> Telecom Regulatory Policy CRTC 2015-326, *Review of wholesale wireline services and associated policies*, 22 July 2015 ("TRP 2015-326"), ¶141, <https://www.crtc.gc.ca/eng/archive/2015/2015-326.htm>.

<sup>77</sup> Moody's Investor Service, "Broadband Communications - Canada: Unique Market Structure Guides Capital Spending for Broadband Providers," March 21, 2017, [https://www.moody's.com/research/Moodys-Competition-in-Canadian-broadband-sector-on-the-upswing-as-PR\\_363869](https://www.moody's.com/research/Moodys-Competition-in-Canadian-broadband-sector-on-the-upswing-as-PR_363869); Financial Post, "Investment race heating up between Canada's cable companies, telecoms: Moody's," March 21, 2017, <http://business.financialpost.com/technology/investment-race-heating-up-between-canadas-cable-companies-telecoms-moodys>.

revenue—by MNOs.<sup>78</sup> The authors used annual firm-level data of 58 MNOs from 21 developed countries (including Canada) from 2000 to 2008.<sup>79</sup>

77. The statistical evidence of this study on the effect of mandated MVNO access on investment intensity cited by the Sanderson and Dippon Reports is relatively weak, that is, the results are not statistically significant at the most commonly used 5% significance level.<sup>80,81</sup> Since small sample sizes lead to imprecise results, this finding is not particularly surprising given the limited number of jurisdictions with mandated MVNO access in the authors' sample.

78. More importantly, setting the weak evidence aside, the Kim et al. (2011) study suffers from two key shortcomings identified by researchers.<sup>82</sup> First, the authors impose a linear restriction on the relationship between investment and competition. By doing so, they assume that the effect of competition—specifically mandated MVNO access—on investment is the same regardless of the level of competition in the market. This is problematic because the theoretical relationship between competition and investment is ambiguous. The empirical evidence showing that competitive markets generally exhibit higher levels of investment and innovation relative to monopoly industries is consistent with Nobel-prize winning economist Kenneth Arrow's 'escape the competition' effect.<sup>83</sup> The effect arises because a monopolist has a reduced incentive to invest in innovation and new technology (compared to a competitive firm) since the more a firm earns more

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<sup>78</sup> Kim, J., Y. Kim, N. Gaston, R. Lestage, Y. Kim, and D. Flacher (2011): "Access regulation and infrastructure investment in the mobile telecommunications industry," *Telecommunications Policy*, 35(11), pp. 907-919. The authors caution that "MVNO entry and regulation may encourage MNOs to adjust their investment level. As competition among MNOs places pressure on infrastructure capacity, services-based competition triggered by MVNOs may promote a more efficient use of network resources. Therefore, a lower investment intensity should not be interpreted as evidence that access agreements lead to under-investment, independently of any market and technological contexts" (p. 915). Furthermore, "a lower investment intensity should not necessarily be interpreted as evidence against granting market access to MVNOs. For example, lower investment is not necessarily undesirable where duplication of, or over-investment, in existing networks matter" (p. 916).

<sup>79</sup> The study's data period covers a time when mobile markets were highly voice-centric. These results may not carry over for data-centric mobile markets in which subscriber and usage growth is very different from what they were when mobile provided mainly voice telephony.

<sup>80</sup> A lack of statistical significance implies that it cannot be ruled out that the relationship identified by the study's authors is simply due to random chance.

<sup>81</sup> Woolridge, J.M. (2005): *Introductory Econometrics: A Modern Approach*, 2<sup>nd</sup> Ed. (Mason, OH: Thomson/South-Western), p.119 ("We must first decide on a significance level or the probability of rejecting  $H_0$  when it is in fact true. For concreteness, suppose we have decided on a 5% significance level, as this is the most popular choice."); Stock, J.H. and M.W. Watson (2011): *Introductory Econometrics* 3<sup>rd</sup> Ed. (Boston: Pearson/Addison Wesley), pp. 77-78 ("In many cases, statisticians and econometricians use a 5% significance level."). None of the estimated parameters on the effect of mandated MVNO access in the main specification (or the sensitivity analysis) is significant at the 5%-level, and most estimated parameters on this effect in the sensitivity analyses are not even statistically significant at the 10%-level.

<sup>82</sup> Hounghonon and Jeanjean (2016), *supra* note 75.

<sup>83</sup> Arrow, K.J. (1962): "Economic welfare and the allocation of resources to invention," in R.R. Nelson (Ed.), *The rate of direction of inventive activity: Economic and social factors* (New York: Princeton University Press), pp. 609-626.

from the old technology the lower the incentive to invest in the new technology.<sup>84</sup> On the other hand, intense competition may reduce post-investment profits thereby creating a disincentive for investment: The prospect of earning monopoly rent incentivizes investment and innovation (Schumpeterian effect).<sup>85</sup> In a general equilibrium framework, Aghion, Bloom, Blundell, Griffith, and Howitt (2005) find an inverted-U shaped relationship between competition and innovation, both theoretically and empirically.<sup>86</sup> Although Kim et al. (2011)—the study cited in the Sanderson and Dippon Reports—extensively discuss the two opposing effects and the inverted-U relationship between competition and investment, the authors’ empirical specification does not allow for such a nonlinear effect for MVNOs.

79. Second, the research by Kim et al. (2011) does not control for the endogeneity of competition.<sup>87</sup> As explained above, since mandated MVNO access is typically not random but rather the outcome of regulatory processes that evaluate the level of competition in the market and the existence of voluntary MVNO access agreements for MNVO, the study is unable to isolate the causal effect of the regulatory policy on investment.<sup>88</sup>

80. The most recent available evidence on investment in the mobile wireless industry is a study by Houngebonon and Jeanjean (2016) which relaxes the linear restriction and uses an instrumental variable approach to correct for the endogeneity of competition. Using firm-level data on 110 wireless operators from 2005 through 2012, the authors build a dynamic model linking infrastructure investment and competition and find an inverted-U shaped relationship in the mobile wireless industry.<sup>89</sup> More specifically, a wireless carrier’s investment increases with the intensity of competition as long as its profit is above the thresholds of 37-40 per cent of its total revenue.<sup>90</sup>

81. This inverted-U shaped relationship estimated by Houngebonon and Jeanjean implies that while there is a tradeoff between the intensity of competition and investment if a firm’s EBITDA ratio is

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<sup>84</sup> Monopoly firms can rely on old technologies for longer (i.e., recoup their investment over a longer period) as they are not faced with pressure from competitors to upgrade to newer technologies.

<sup>85</sup> Schumpeter, J.A. (1942): *Capitalism, socialism, and democracy* (New York: Harper & Brothers).

<sup>86</sup> Aghion, P., N. Bloom, R. Blundell, R. Griffith, and P. Howitt (2005): “Competition and innovation: An inverted-u relationship,” *Quarterly Journal of Economics*, 120(2), pp. 701-728.

<sup>87</sup> Houngebonon, G.V. and F. Jeanjean (2016): “What level of competition intensity maximises investment in the wireless industry,” *Telecommunications Policy*, 40(8), pp. 774-790. The intensity of competition is measured as the ratio of a firm’s operating profit to its total revenue which proxies for the Lerner index of market power. This ratio is used generally in empirical papers on competition (See for example Aghion, P., N. Bloom, R. Blundell, R. Griffith, and P. Howitt (2005): “Competition and Innovation: An Inverted-U Relationship,” *Quarterly Journal of Economics*, 120 (2), pp. 701-728.

<sup>88</sup> *Supra* note 63.

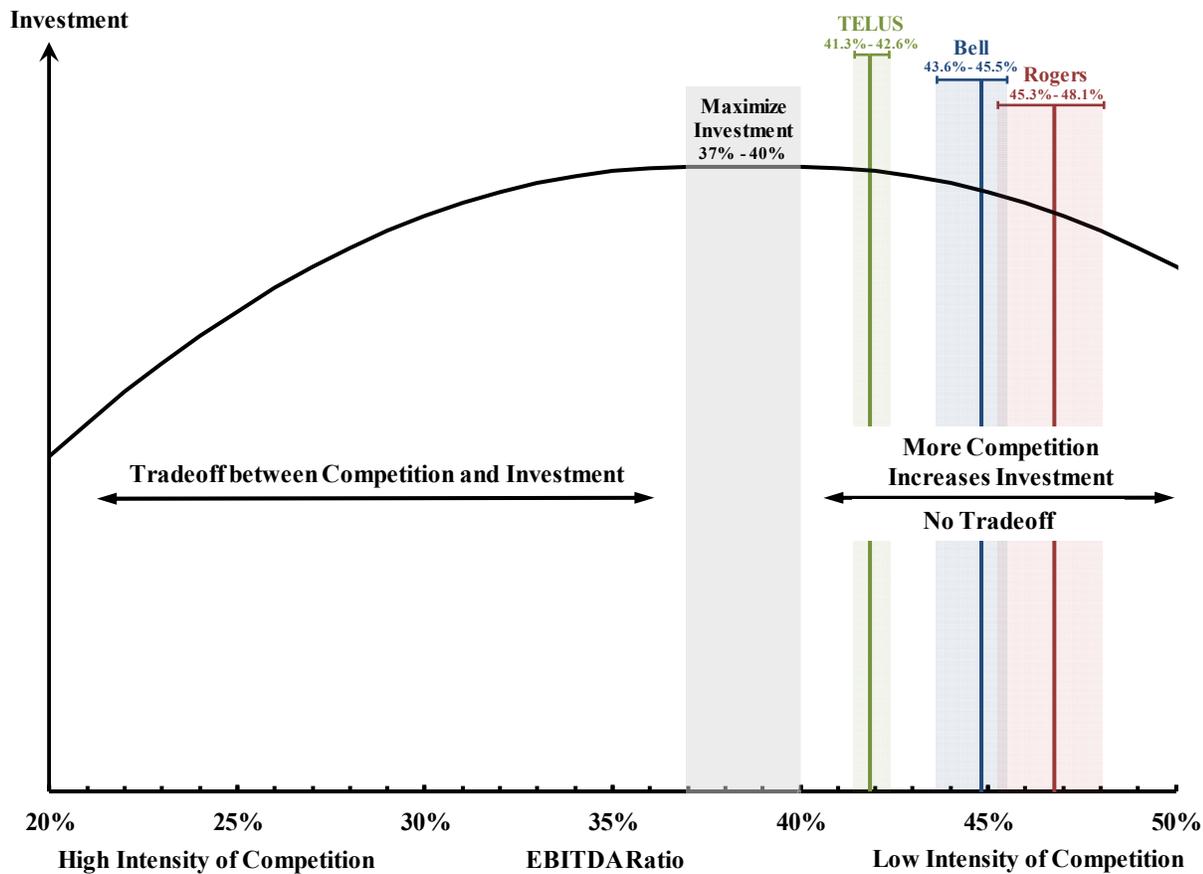
<sup>89</sup> This inverted-U shaped relationship is robust to i) alternative measures of investment, ii) heterogeneity of demand and cost parameters such as market size and network deployment cost, iii) different modeling specifications; and iv) various estimators.

<sup>90</sup> Houngebonon and Jeanjean (2016), *supra* note 75.

below 37-40 per cent, no such trade-off exists when the EBITDA ratio exceeded the 37-40 per cent threshold. More specifically, the authors find that a wireless carrier’s investment increases with the intensity of competition, as long as its profit is above 37-40 percent of its total revenue.

82. Figure 7 illustrates the inverted-U shaped relationship between the intensity of competition and investment estimated by Hounghonon and Jeanjean (2016), together with the range of EBITDA ratios reported by the National Wireless Carriers over the last four years (2013-2016). It is apparent that the average EBITDA ratio of Rogers (46.8%), Bell (44.8%), and TELUS (46.2%) substantially exceeds the threshold below which there exists a tradeoff between investment and competition.<sup>91</sup> Rather, in the range where the National Wireless Carriers operate, additional competition is estimated to increase investment.

**Figure 7: Intensity of Competition and Investment (Hounghonon and Jeanjean, 2016)**



**Sources:**

Hounghonon and Jeanjean (2016).

Annual Reports of Bell, TELUS, and Rogers for EBITDA ratio of wireless segment (2013-2016).

<sup>91</sup> The CRTC reports an EBITDA margin of 44.6% for the whole wireless industry in 2015 (CRTC, *Communications Monitoring Report 2016*, Figure 5.0.3; <http://www.crtc.gc.ca/eng/publications/reports/PolicyMonitoring/2016/cmr.pdf>). Other wireless service providers generally do not report segment-specific profitability.

83. Particularly interesting, and at odds with the assertions of experts for the National Wireless Carriers,<sup>92</sup> are Hounqbonon and Jeanjean’s empirical findings related to MVNOs and the level of investment of wireless carriers that host an MVNO on their network:

*“The regression also controls for whether or not a wireless operator hosts an MVNO. The estimates suggest that wireless operators which host an MVNO invest more than their rivals. This superior investment reflects the additional expenditures needed to provide upstream network access to the downstream MVNO” (emphasis added).*<sup>93</sup>

This research finding also suggests a lack of a policy rationale for subjecting Wi-Fi First service providers (or MVNOs in general) to higher wholesale rates since it would only limit their effect on competition and not improve investment incentives given the state of the Canadian mobile wireless telecommunications markets.

84. It is interesting to note that the empirical findings of Hounqbonon and Jeanjean are not in conflict with the earlier research of Kim et al. (2011). Rather, they confirm that investment can be inefficiently low in markets characterized by high intensity of competition and low operating profits. However, the available data shown in Figure 7 suggests that these conditions are not present in Canada. Instead, the evidence on the Canadian market indicates that no trade-off exists between increased competition and network investment. Given the low intensity of competition in the Canadian mobile wireless telecommunications market, any increase in competition is unlikely to depress investment in wireless network infrastructure—instead, investment may even increase with additional competition from Wi-Fi First service providers.

85. Academic research cited by experts for the National Wireless Carriers relates predominantly to the fixed telecommunications industry and presents a biased and selective view of the academic literature. The most recent research on competition and investment in the wireless telecommunications industry addresses shortcomings in previous research and suggests that—given the state of the Canadian telecommunications market—increasing competition by mandating access for Wi-Fi First service providers is unlikely to have any negative impact on investments in wireless network infrastructure.

86. The Commission should strive for a market structure that maximizes consumer welfare while preserving investment incentives. The most recent economic evidence applied to the Canadian

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<sup>92</sup> Sanderson Report, pp. 6-7 and 20-23; Dippon Report, ¶86; Emch Report, ¶33 and ¶40, citing Kim et al. (2011). This research was not published until after the CRTC denied a request from the Canadian Network Operators Consortium Inc. (“CNOC”) to review and vary its determinations made in TRP 2015-177 that it would not be appropriate to mandate MVNO access since it would significantly undermine network investments as a whole (Telecom Decision CRTC 2016-60, *The Canadian Network Operators Consortium Inc. – Application to review and vary Telecom Regulatory Policy 2015-177*, 18 February 2016, <https://www.crtc.gc.ca/eng/archive/2016/2016-60.htm>; *Supra* note 2).

<sup>93</sup> *Supra* note 90, p. 784.

context suggests that—given the state of the Canadian telecommunications market—specific remedies, such as expanding the definition of ‘home network’ to allow for alternative service providers (e.g., Wi-Fi First) can be employed to increase competition without a negative impact on investments in wireless network infrastructure. Such a remedy is unlikely to reverse the low intensity of competition in the sector in general, but it can improve the affordability of telecommunications services for price-sensitive Canadians, in particular those with low household income.

## Appendix A: Additional Tables and Figures

**Table 3: Market Concentration at the Time of Mandating MVNO Access in Countries where MVNO Access is Mandated Compared to Market Concentration in Canada**

<b>Country</b>		<b>HHI</b>
The North	CRTC 2015	9,801
Newfoundland and Labrador	CRTC 2015	5,771
Ireland	Q1 2002	4,870
Saskatchewan	CRTC 2015	4,775
Prince Edward Island	CRTC 2015	4,354
Norway	Q3 2003	4,319
New Brunswick	CRTC 2015	4,214
Nova Scotia	CRTC 2015	4,149
Colombia	Q3 2015	4,106
Peru	Q4 2015	3,973
Alberta	CRTC 2015	3,963
Manitoba	CRTC 2015	3,810
Korea	Q3 2010	3,792
France	Q2 2011	3,773
Japan	Q3 2007	3,649
Ontario	CRTC 2015	3,593
Spain	Q4 2005	3,589
British Columbia	CRTC 2015	3,533
Chile	Q3 2011	3,465
Finland	Q3 2015	3,229
Argentina	Q3 2014	3,139
Italy	Q1 2007	3,085
Austria	Q3 2012	2,966
<i>Canada (National)</i>	<i>CRTC 2015</i>	<i>2,714</i>
Quebec	CRTC 2015	2,698
Germany	Q2 2014	2,625
Malaysia	Q1 2016	2,517
Brazil	Q2 2014	2,462
Hong Kong	Q4 2000	1,944

**Sources:**

[1] Sanderson Report, Table 2.

[2] CRTC, *Communications Monitoring Report 2016*, Table 5.5.8.

**Table 4: Market Concentration in Countries with and without Mandated MVNO Access Compared to Canada**

<b>Country</b>	<b>Mandated MVNO Access</b>		<b>HHI</b>
<b>Northern Territories</b>	<b>CDN</b>	<b>CRTC 2015</b>	<b>9,801</b>
<b>Newfoundland and Labrador</b>	<b>CDN</b>	<b>CRTC 2015</b>	<b>5,771</b>
Ireland	✓	Q1 2002	4,870
<b>Saskatchewan</b>	<b>CDN</b>	<b>CRTC 2015</b>	<b>4,775</b>
<b>Prince Edward Island</b>	<b>CDN</b>	<b>CRTC 2015</b>	<b>4,354</b>
Norway	✓	Q3 2003	4,319
<b>New Brunswick</b>	<b>CDN</b>	<b>CRTC 2015</b>	<b>4,214</b>
<b>Nova Scotia</b>	<b>CDN</b>	<b>CRTC 2015</b>	<b>4,149</b>
Colombia	✓	Q3 2015	4,106
Peru	✓	Q4 2015	3,973
<b>Alberta</b>	<b>CDN</b>	<b>CRTC 2015</b>	<b>3,963</b>
<b>Manitoba</b>	<b>CDN</b>	<b>CRTC 2015</b>	<b>3,810</b>
Australia		Q2 2017	3,884
Greece		Q2 2017	3,812
Korea	✓	Q3 2010	3,792
France	✓	Q2 2011	3,773
Japan	✓	Q3 2007	3,649
<b>Ontario</b>	<b>CDN</b>	<b>CRTC 2015</b>	<b>3,593</b>
Spain	✓	Q4 2005	3,589
<b>British Columbia</b>	<b>CDN</b>	<b>CRTC 2015</b>	<b>3,533</b>
New Zealand		Q2 2017	3,488
Belgium		Q2 2017	3,483
Chile	✓	Q3 2011	3,465
Czech Republic		Q2 2017	3,419
Portugal		Q2 2017	3,371
Finland	✓	Q3 2015	3,229
Argentina	✓	Q3 2014	3,139
Italy	✓	Q1 2007	3,085
Slovakia			2,980
Austria	✓	Q3 2012	2,966
United Kingdom		Q2 2017	2,741
<i>Canada (National)</i>	<i>CDN</i>	<i>CRTC 2015</i>	<i>2,714</i>
<b>Quebec</b>	<b>CDN</b>	<b>CRTC 2015</b>	<b>2,698</b>
Germany	✓	Q2 2014	2,625
Malaysia	✓	Q1 2016	2,517
Brazil	✓	Q2 2014	2,462
Denmark		Q2 2017	2,331
Hong Kong	✓	Q4 2000	1,944

**Sources:**

[1] Sanderson Report, Table 3.

[2] CRTC, *Communications Monitoring Report 2016*, Table 5.5.8.

**Table 5: Post-Merger Market Concentration in Countries Mandating MVNO Access as a Condition of Merger Approval Compared to Market Concentration in Canada**

<b>Country</b>		<b>HHI</b>
Northern Territories	CRTC 2015	9,801
Newfoundland and Labrador	CRTC 2015	5,771
Saskatchewan	CRTC 2015	4,775
Prince Edward Island	CRTC 2015	4,354
New Brunswick	CRTC 2015	4,214
Nova Scotia	CRTC 2015	4,149
Alberta	CRTC 2015	3,963
Manitoba	CRTC 2015	3,810
Ontario	CRTC 2015	3,593
<b>Austria (post-merger)</b>	<b>Q1 2013</b>	<b>3,575</b>
British Columbia	CRTC 2015	3,533
<b>Germany (post-merger)</b>	<b>Q3 2011</b>	<b>3,380</b>
<b>Finland<sup>[A]</sup></b>	<b>Q3 2015</b>	<b>3,229</b>
<i>Austria (pre-merger)</i>	<i>Q3 2012</i>	<i>2,966</i>
<i>Canada (National)</i>	<i>CRTC 2015</i>	<i>2,714</i>
Quebec	CRTC 2015	2,698
<i>Germany (pre-merger)</i>	<i>Q2 2014</i>	<i>2,625</i>

**Notes:**

[A] The HHI in Finland did not meaningfully change at the time the Sanderson Report states that MVNO access was mandated as a condition of merger approval (<https://www.viestintavirasto.fi/en/statisticsandreports/statistics/2013/marketsharesofmobilesubscriptions.html>).

**Sources:**

- [1] Sanderson Report, Table 2.
- [2] CRTC, *Communications Monitoring Report 2016*, Table 5.5.8.
- [3] RTR (Austria), DSP Partners (Germany).

## Appendix B: About the Author

Dr. Markus von Wartburg is a Vice-President in the Montreal office of Analysis Group, Inc., an economic consulting firm. He specializes in the application of econometric methods and microeconomic theory to complex problems in antitrust and competition, commercial litigation, media and telecommunications, finance, and intellectual property. Dr. von Wartburg has (co-)authored expert reports on investment and competition in the Canadian telecommunications industry in CRTC proceedings and Cabinet reviews of telecom regulatory policy. He has a Ph.D. in economics from the Vancouver School of Economics at the University of British Columbia (Dissertation: *Consumer Behaviour and Pricing in the Mobile Telecommunications Industry*), specializing in industrial organization, antitrust and competition economics, and applied microeconomics. Prior to joining Analysis Group, Dr. von Wartburg lectured on strategy and game theory at the University of British Columbia.

### EDUCATION

Ph.D. Economics, University of British Columbia, Vancouver, Canada

M.A. Economics, University of Toronto, Toronto, Canada.

B.A. Economics, Simon Fraser University, Burnaby, Canada.

### PROFESSIONAL EXPERIENCE

2008 - present Analysis Group, Montreal, Canada

*Vice President*

*Senior Economist*

*Economist*

2006 - 2007 University of British Columbia, Vancouver, Canada

*Sessional Lecturer (Department of Economics)*

### TESTIMONY AND EXPERT REPORTS

- Bell Canada's Petition to the Governor in Council to Vary TRP CRTC 2015-326, *Review of wholesale wireline services and associated policies*: on behalf of the Canadian Network Operators Consortium, filed an expert report addressing the economic framework of mandated wholesale fibre-to-the-home (FTTH) high-speed access services in Canada.
- Canadian Radio-Television and Telecommunications Commission (CRTC), Telecom Notice of Consultation 2013-551, *Review of wholesale service and associated policies*: on behalf of the Canadian Network Operators Consortium, filed an expert report (co-authored with Marissa Ginn) and testified on investment and competition in the wholesale telecommunications services market.

## **PROFESSIONAL AFFILIATIONS**

Canadian Economic Association (Member)

American Economic Association (Member)

Canadian Bar Association (Affiliate, Chair of Economics & Law Committee, Competition Law Section)

American Bar Association (Associate, Antitrust Law)