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MAY 2017

THE STATE OF COMPETITION IN CANADA'S TELECOMMUNICATIONS INDUSTRY – 2017

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The State of Competition in Canada's Telecommunications Industry – 2017

Montreal Economic Institute

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HIGHLIGHTS

The 2016 edition of this report argued, among other things, against the federal government and the CRTC intervening in the broadband sector as they have in the wireless sector. It also explained why facilities-based competition, as opposed to service-based competition, is the best way to spur innovation. Here are some highlights from this year's edition.

Chapter 1 – How Does Canada Measure Up?

- Canadians continue to enjoy competitive, quality telecommunications services, and are among the biggest consumers of telecommunications services in the world.
- Penetration and usage rates for tablets, smartphones, and LTE connections are among the highest for industrialized countries.
- Canadians continue to enjoy some of the most advanced and efficient wireless and broadband Internet services in the world.
- The prices Canadians pay for wireless services remain generally higher than in Europe and in Australia, but comparable to or lower than in the United States and Japan. However, Canada ranks first in terms of affordability when taking into account income per capita and the state of competition in the market.
- Considering the additional costs associated with the Canadian market's low density of users per km², Canada fares relatively well both in terms of prices and in terms of the quality of services offered.

Chapter 2 – Recent Developments in Canada's Telecom Sector

- The headline-grabber of the past year was undoubtedly the May 2016 announcement of BCE's acquisition of Manitoba Telecom Services Inc. (MTS), the former provincial monopoly and dominant player in Manitoba.
- As the transaction included the sale of about one-third of MTS's Manitoba customer base to TELUS, it would allow both Bell and TELUS to become important wireless players in Manitoba. This could lead to more real competition in Manitoba, not less.
- In February 2017, the Competition Bureau announced that it had cleared the transaction. As many had predicted, regulatory clearance was

conditional on Bell's divestiture of spectrum, stores, and subscribers to a fourth player.

- However, the beneficiary of these divestitures was not Shaw, as expected, but Xplornet, a rural Internet provider with activities across Canada, yet with no previous involvement in the wireless market.
- On March 1st, 2017, the CRTC issued another decision to sanction Ice Wireless for having "improperly allowed the end-users of [Sugar Mobile] to obtain permanent, rather than incidental, access to [the Rogers] cellular network."
- This is in line with its 2015 decision regarding the right of smaller carriers with less extensive infrastructure—but not of resellers—to access the Bell, TELUS, and Rogers networks.
- Finally, the CRTC chose to release its much-awaited decision on basic telecommunications services a few days before Christmas 2016, setting a goal of giving all Canadians access to download speeds of at least 50 megabits per second (Mbps) and upload speeds of at least 10 Mbps.
- To achieve this goal, the CRTC announced a fund of \$750 million over five years to finance high-speed Internet infrastructure in rural and remote areas of the country where such services are not yet available. This fund will be paid for by Internet service providers, but the cost will ultimately be passed on to consumers.

Chapter 3 – Assessing the 2006 Policy Direction: The Good, the Bad, and the Ugly

- In 2006, the government issued a Policy Direction which, among other things, directed the CRTC to rely on market forces as much as possible in exercising its powers and performing its duties.
- For a while, it seemed like the CRTC took the principles of the Policy Direction seriously, launching a comprehensive review of over 80 telecommunications regulations and subsequently removing or streamlining 60% of those regulations.
- Furthermore, the CRTC accelerated the deregulation of retail telecom services when such services faced sufficient competition or when doing so was consistent with the Canadian telecommunications policy objectives.

- Unfortunately, the CRTC has since then largely gone back to its old interventionist ways, as with its 2015 decision mandating the sharing of next-generation networks with market players who made little if any infrastructure investments.
- Another noteworthy example is the Wireless Code's ban on wireless contracts featuring a device subsidy spread over a period of more than 24 months, which limits consumer choices and can have a particularly negative effect on consumers with modest means.
- The blame for the lax enforcement of the principles enshrined in the Policy Direction lies not only with the CRTC, but also with the Harper government, which embraced a more interventionist telecom policy agenda and sent mixed messages to the regulator.
- The most blatant example of this interventionism may be the federal government's reaction to the CRTC's 2011 decision on usage-based billing (UBB), in which it pressured the regulator to allow small ISPs to continue to purchase unlimited amounts of data at a regulated fixed price, an unsustainable practice that interferes excessively with market forces.
- The next generation of wireless networks, 5G, is expected to make all kinds of IoT solutions easier to implement because of much faster speeds, reduced latency, and more flexible protocols for connections. The deployment of this new technology in Canada over the coming years will once again require billions of dollars in investments.
- Only large national (Bell, TELUS, Rogers) and regional (Videotron, Shaw, Eastlink, SaskTel) providers have the means to invest in the wireline and wireless infrastructure that will be required to keep up with IoT developments.
- The development of the Internet of Things will bring to the fore a whole new set of situations in which it may be necessary to treat customers, devices, applications, or platforms differently, and only the carriers that own the infrastructure will be able to manage their networks so as to meet these complex needs.
- If pursued going forward, policies aimed at propping up undercapitalized wireless players and broadband resellers may well slow down the development of the Internet of Things and harm the Canadian economy.

Chapter 4 – The Internet of Things and the New Competitive Environment

- The Internet of Things (IoT), which is now at a stage of development similar to that of the Internet itself in the early 1990s, is growing fast and is set to revolutionize every aspect of our economy and our lives within a few years.
- The home of the future will have appliances, heating units, lights, security systems, etc., connected to a network that home owners will be able to control remotely. Patients will have body sensors that will monitor their blood pressure, heart rate, or sugar level in real time so that their physician can be alerted if their health deteriorates.
- Studies about the development of the Internet of Things forecast extremely rapid growth in the years to come, with estimated worldwide IoT spending growing from US\$737 billion in 2016 to US\$1.29 trillion in 2020.
- The rising importance of the Internet of Things reinforces arguments against measures designed to prop up small players at the expense of strong facilities-based providers.

INTRODUCTION

For each of the past three years, *The State of Competition in Canada's Telecommunications Industry* has assessed how Canada measured up with other jurisdictions regarding the quality and pricing of its telecommunications services. The report has also evaluated how competition was faring in key areas of the Canadian telecommunications market, and provided a critical assessment of Canada's legislative and regulatory framework for this industry.

One of the primary motivations for the publication of the first three editions of this *Research Paper* was that many Canadians are, in our opinion, under the mistaken impression that Canada's telecommunications industry compares poorly with that of other jurisdictions.

"The government should liberalize its policies on spectrum transfer and the mandatory sharing of broadband networks, and recognize the role of innovation in assessing the level of competition that exists in a dynamic market."

Our report has attempted to dispel the notion that Canadians pay uncompetitive prices for low quality services. It has also argued that the federal government's and the CRTC's interventions in the wireless and wireline sectors aiming to increase the number of players through indirect subsidies and mandated access were not likely to have the intended effects and might jeopardize investments and innovation. Instead of these interventions, the report has argued that the government should liberalize its policies on spectrum transfer and the mandatory sharing of broadband networks, and recognize the role of innovation in assessing the level of competition that exists in a dynamic market.

This fourth edition continues to explore these themes. Chapter 1 provides updated statistics regarding the performance of the Canadian telecommunications industry compared with other jurisdictions.

Chapter 2 describes some recent developments in Canada's telecom sector, namely BCE's acquisition of Manitoba Telecom Services, the CRTC's decision to sanction Ice Wireless, and the CRTC's decision on basic telecommunications services.

Chapter 3 looks back, ten years later, at the 2006 Policy Direction which, among other things, directed the CRTC to rely on market forces as much as possible in exercising its powers and performing its duties.

Finally, Chapter 4 argues that only large, facilities-based competitors will be able to make the necessary investments in networks required by the burgeoning Internet of Things, and that only they will be able to manage those networks to answer the complex needs of this new sector.

CHAPTER 1

How Does Canada Measure Up?

The criticism most often heard regarding the telecommunications industry in Canada, and especially wireless services, is that Canadians pay a lot more than people in other countries for lower quality services. It is this criticism that was used to justify the federal government's and the CRTC's numerous interventions over the past few years aimed at promoting more competition in the wireless sector. But does this criticism stand up under scrutiny?

It is difficult to form a perfectly clear and objective picture of the situation, not only because circumstances (like geography and types of regulation) vary from one country to the next, but also because of the use of different research methodologies. The available data, however, do not support such a conclusion.

“In terms of the quality of services, the data indicate that Canadians actually benefit from some of the most advanced and efficient wireless and broadband Internet services in the world.”

The charts that follow come from the main organizations that publish international rankings related to various aspects of the telecommunications industry.

As in the three previous editions of this report, the picture that emerges from these data is first of all that Canadians are among the biggest consumers of telecommunications services in the world (Figures 1-1 and 1-2). This does not constitute a proof, but it is certainly an indication that they enjoy competitive, quality services.

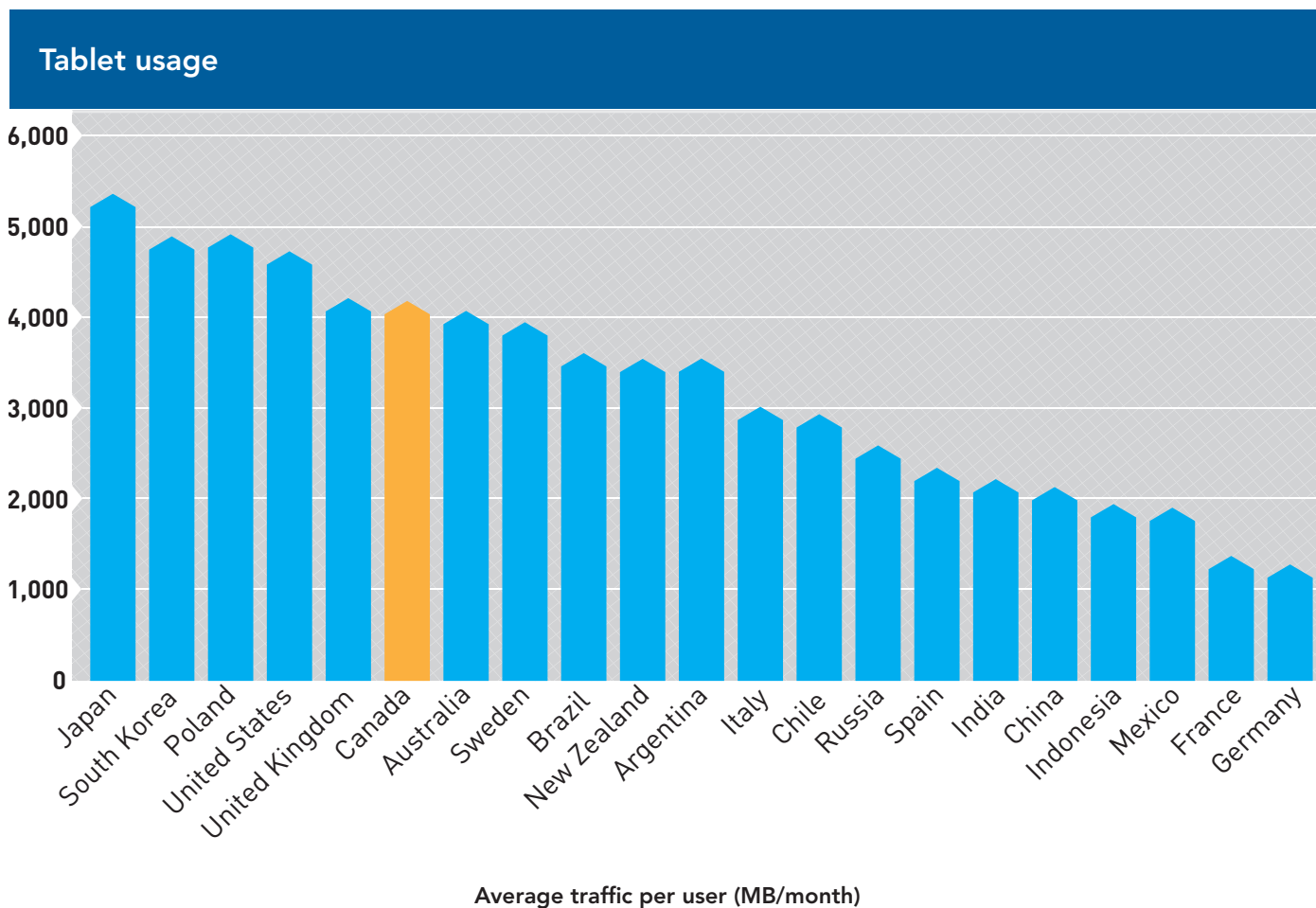
Another indication is that the penetration rate of smartphones is also among the highest for industrialized countries (Figure 1-3). The proportion of mobile users connected to the fastest, LTE network increased by nearly 10 percentage points since last year's report (Figure 1-4).

In terms of the quality of services, the data indicate that Canadians actually benefit from some of the most advanced and efficient wireless (Figures 1-5 and 1-6) and broadband Internet (Figures 1-7 and 1-8) services in the world.

As for the prices Canadians pay for wireless services, they remain generally higher than in Europe and in Australia, but comparable to or lower than in the United States and Japan (Figures 1-9 and 1-10). An international study indicates that Canada is the country with the highest total operator revenue per GB (Figure 1-11). However, Canada ranks first in terms of affordability when measured by a relative index taking into account gross national income per capita and the state of competition in the market (Figure 1-12).

Considering the additional costs associated with the Canadian market's low density of users per km² (Figure 1-13), Canada fares relatively well both in terms of prices and in terms of the quality of services offered.

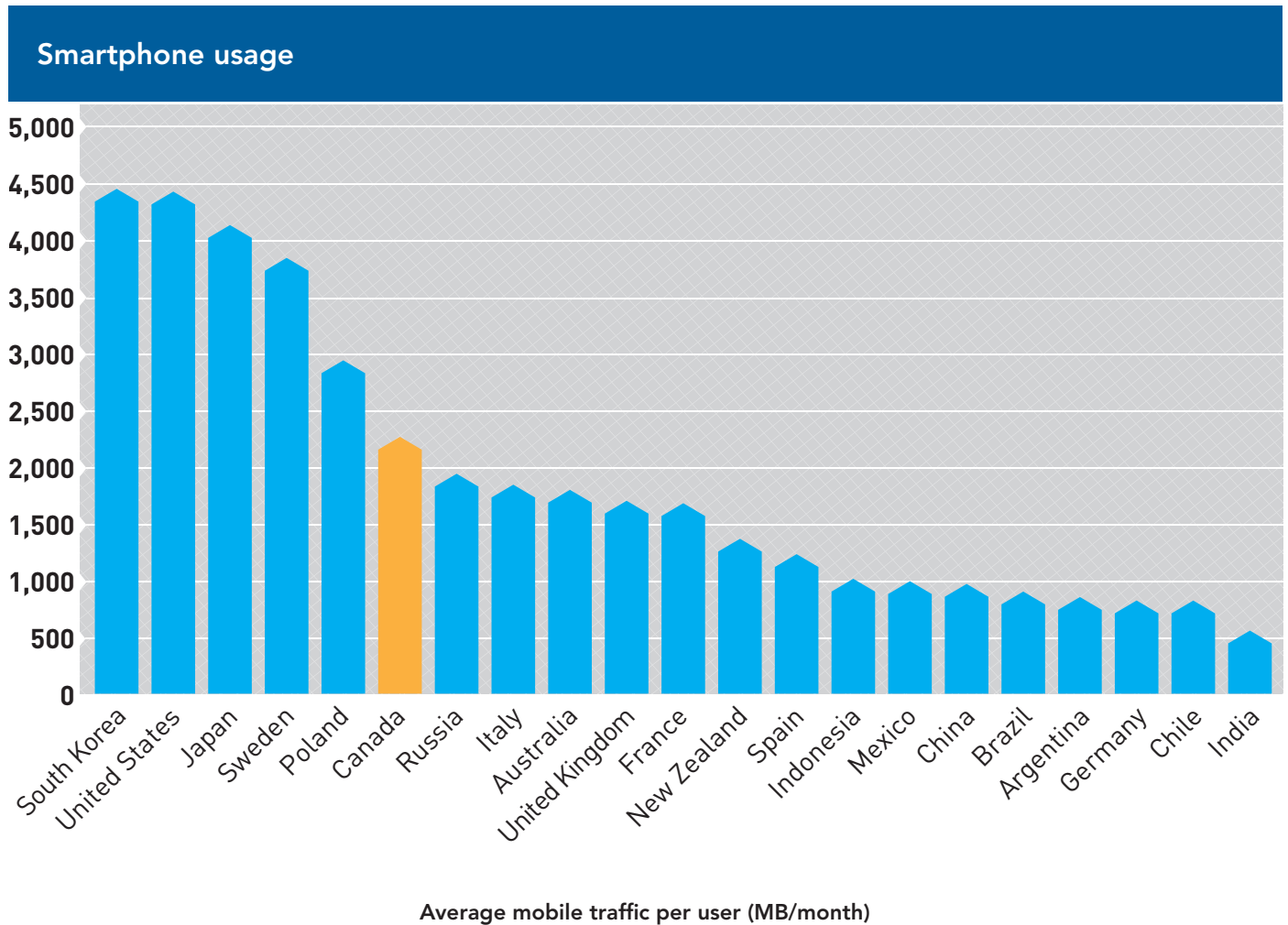
Figure 1-1



Source: Cisco, VNI Mobile Forecast Highlights 2016 – 2021, 2016.

When it comes to tablet usage, Canadians use on average 4,167 megabytes per month. Canada is ranked 6th among the countries where data was available.

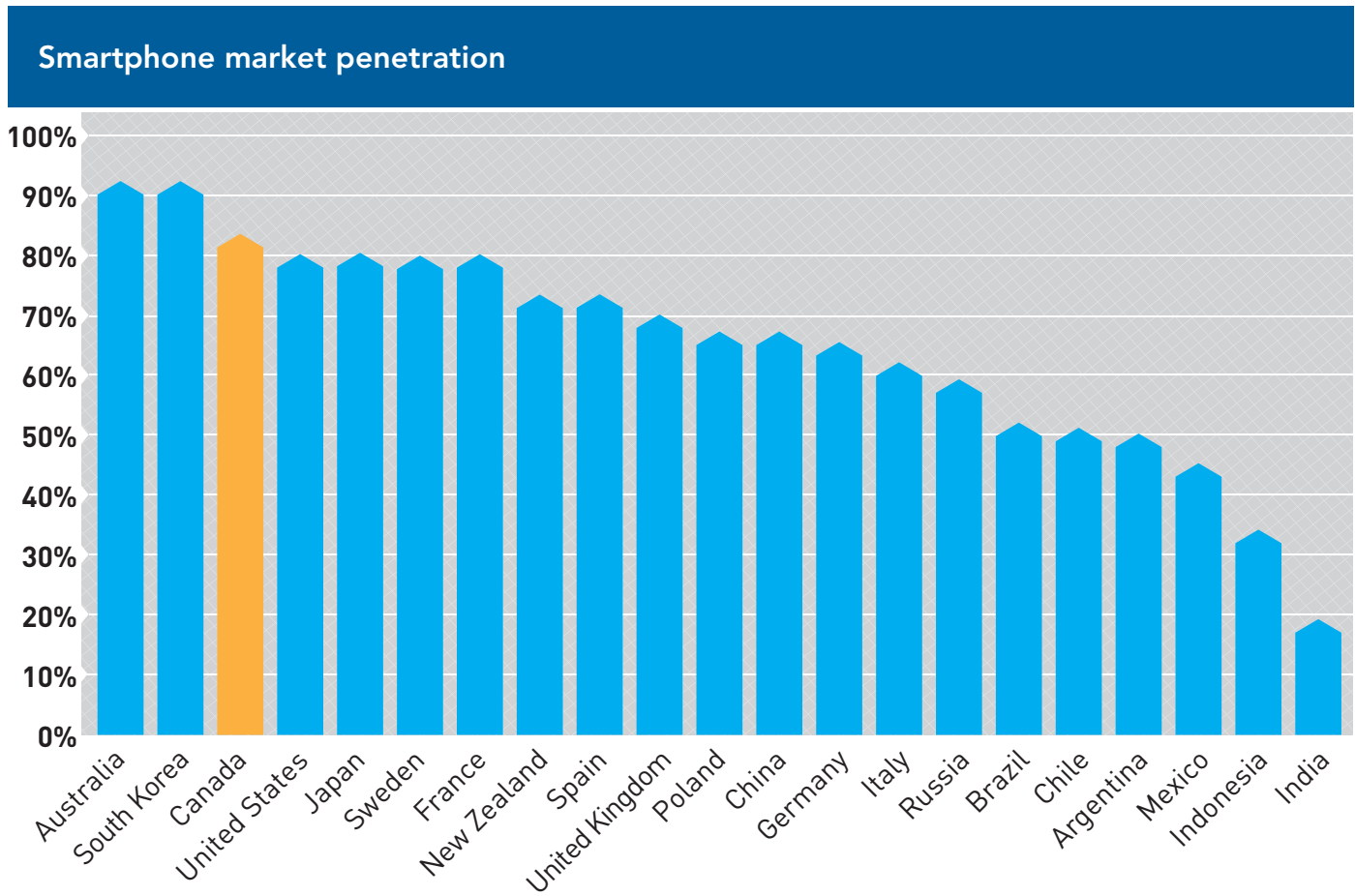
Figure 1-2



Source: Cisco, VNI Mobile Forecast Highlights 2016 – 2021, 2016.

In terms of smartphone usage, Canadians use on average 2,267 megabytes per month. This level of consumption places Canada 6th among Cisco's sampled countries.

Figure 1-3

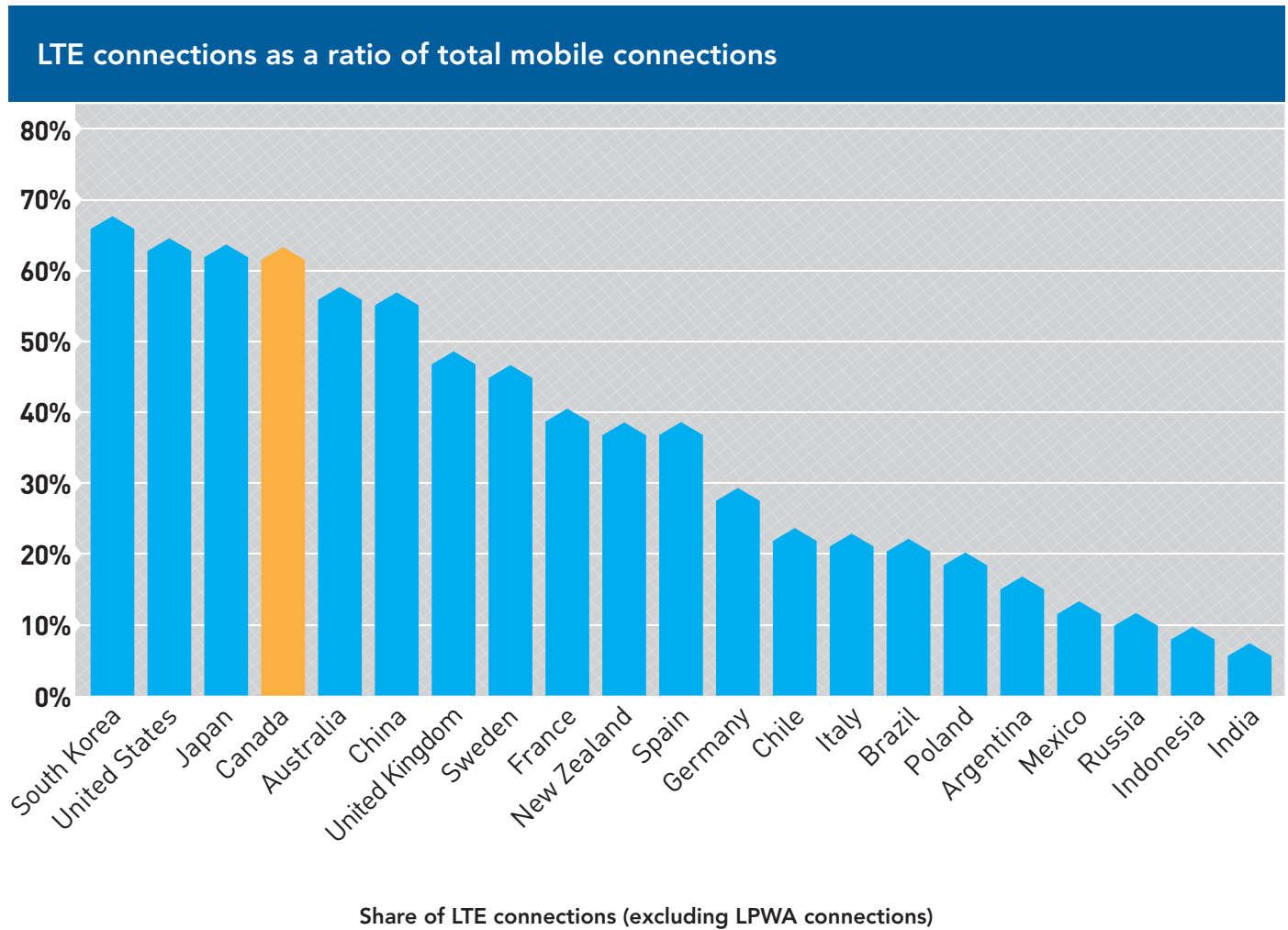


Smartphone market penetration by percent of mobile subscribers (excluding LPWA connections)

Source: Cisco, VNI Mobile Forecast Highlights 2016 – 2021, 2016.

In terms of smartphone market penetration, Canada ranks 3rd, with a total of 83% of mobile subscribers using smartphones.

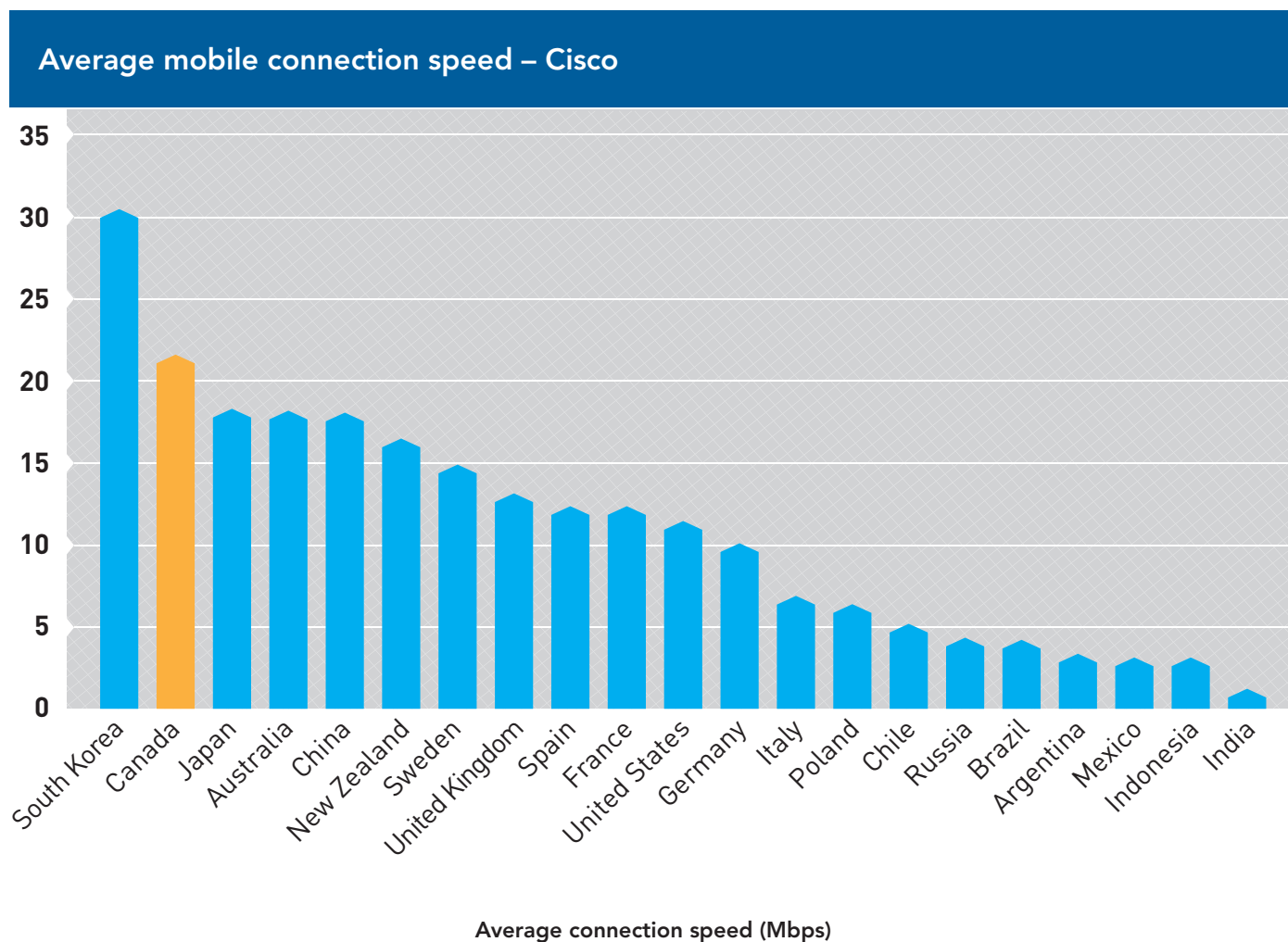
Figure 1-4



Source: Cisco, VNI Mobile Forecast Highlights 2016 – 2021, 2016.

Canada ranks 4th among the 21 selected countries in terms of the proportion of mobile users connected to the fastest network, with 63.4% of total connections being LTE (Long Term Evolution, or 4G) connections.

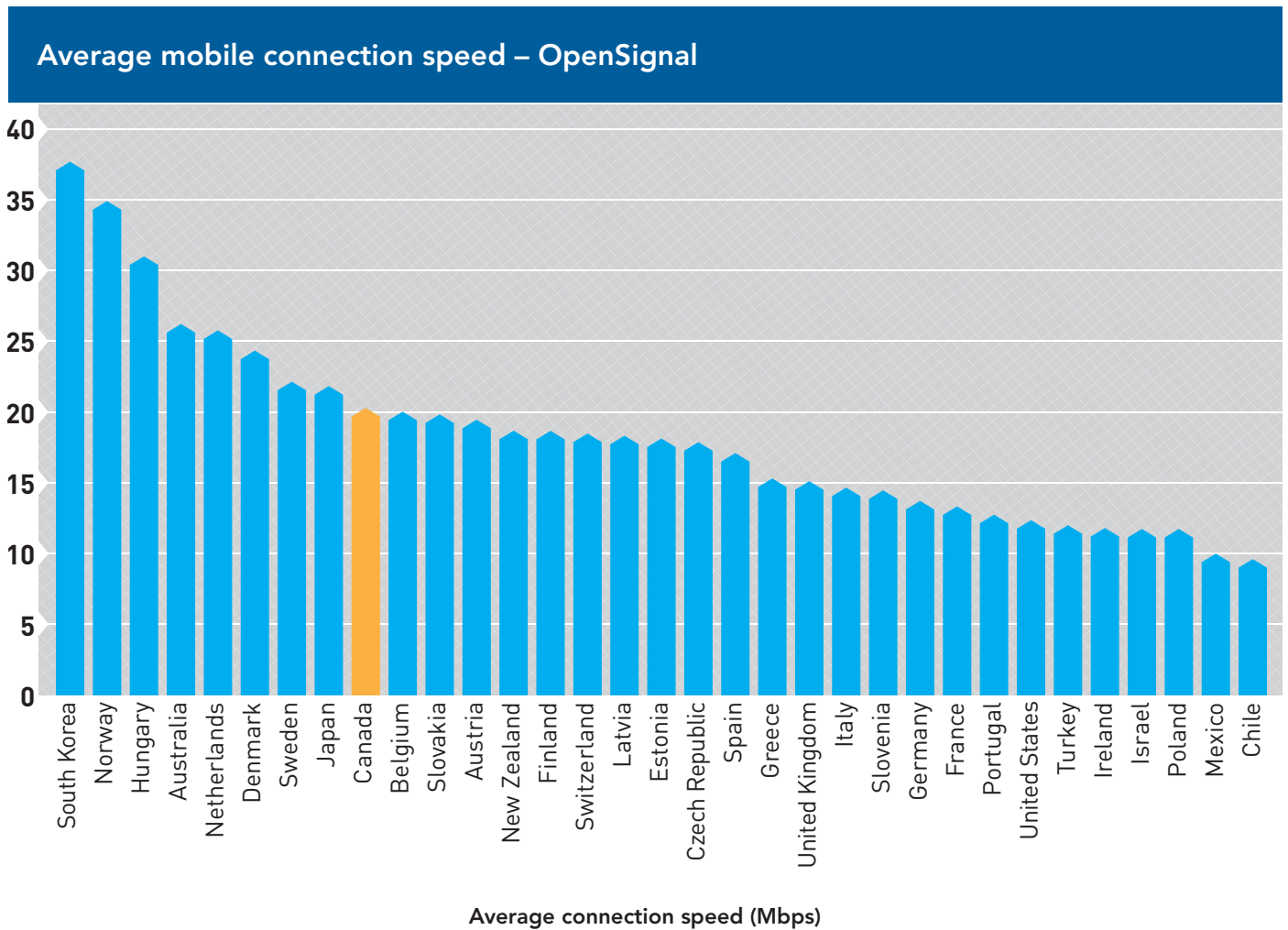
Figure 1-5



Source: Cisco, VNI Mobile Forecast Highlights 2016 – 2021, 2016.

The average mobile connection speed in Canada according to Cisco is 22 Mbps. This places Canada 2nd among the 21 countries surveyed.

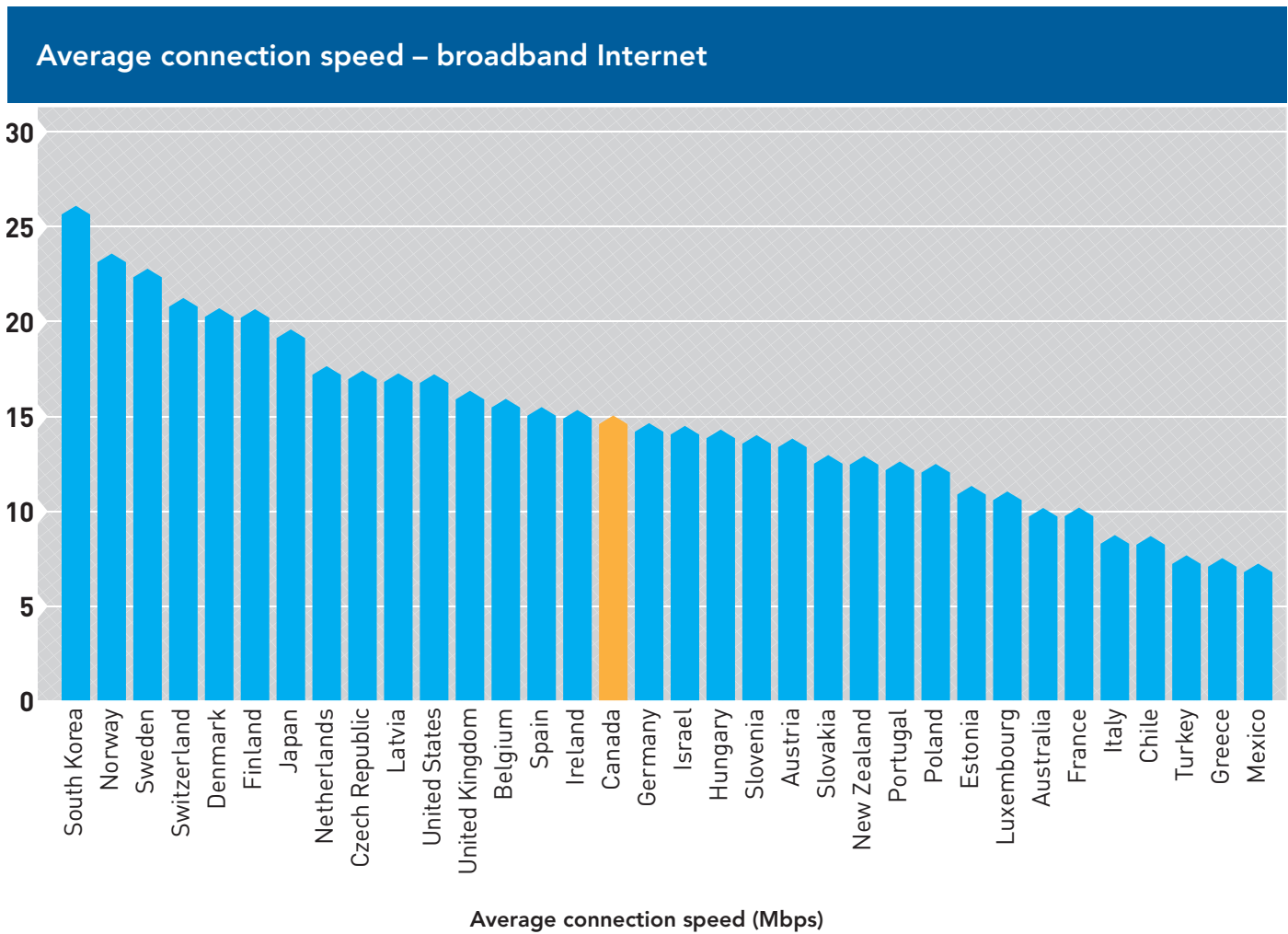
Figure 1-6



Source: OpenSignal, Global State of Mobile Networks, Overall Speed Comparison, February 2017.

The average mobile connection speed in Canada according to OpenSignal is 20 Mbps. This places Canada 9th among the 33 countries surveyed.

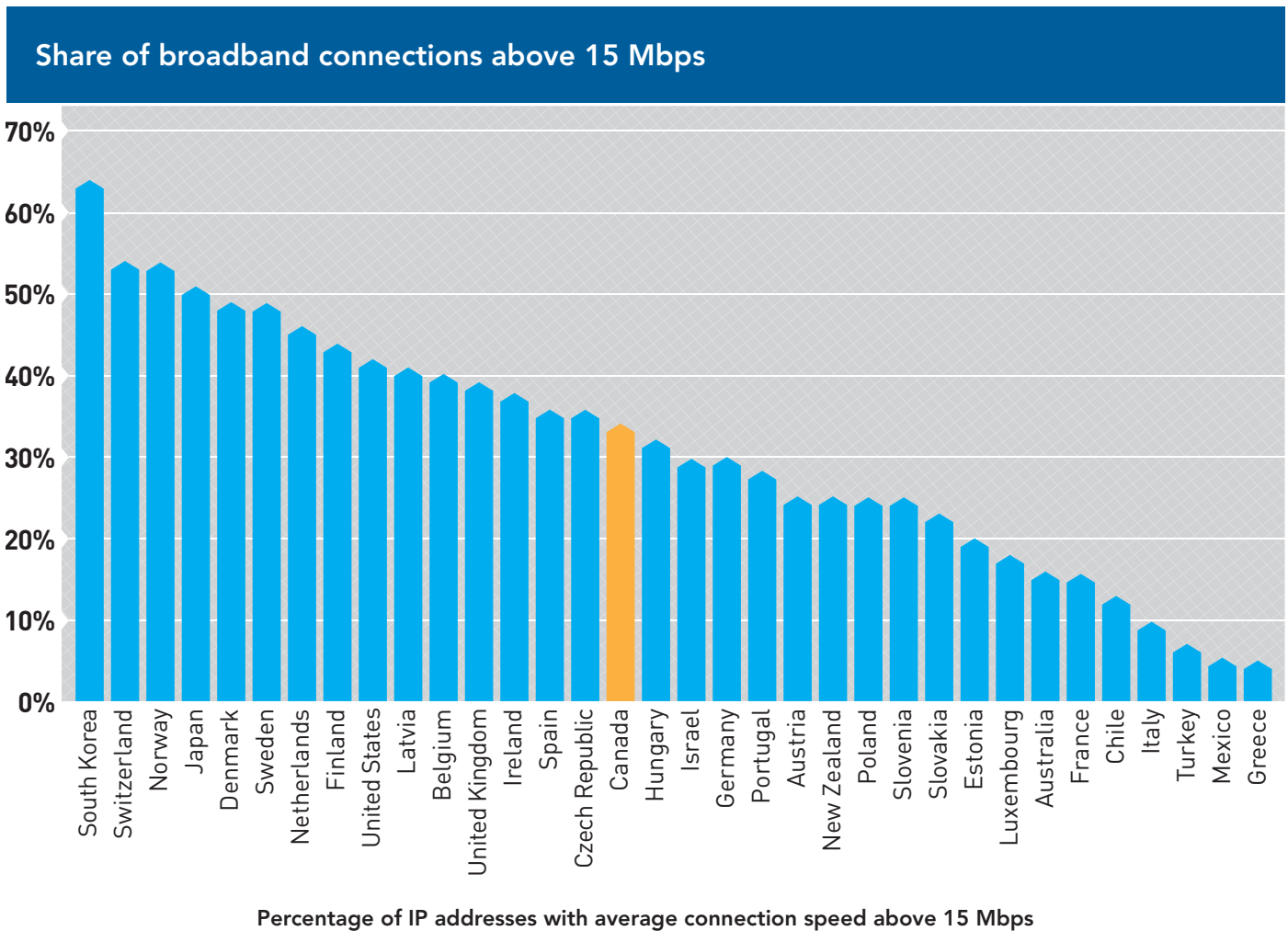
Figure 1-7



Source: Akamai, Akamai's State of the Internet: Q4 2016 Report, Vol. 9, No. 4, 2017, pp. 55-56.

In terms of average broadband connection speed (that is, connection speed for Internet users with a wireline or cable connection), the Akamai report for the last quarter of 2016 places Canada 16th among 34 OECD countries for which data was available.

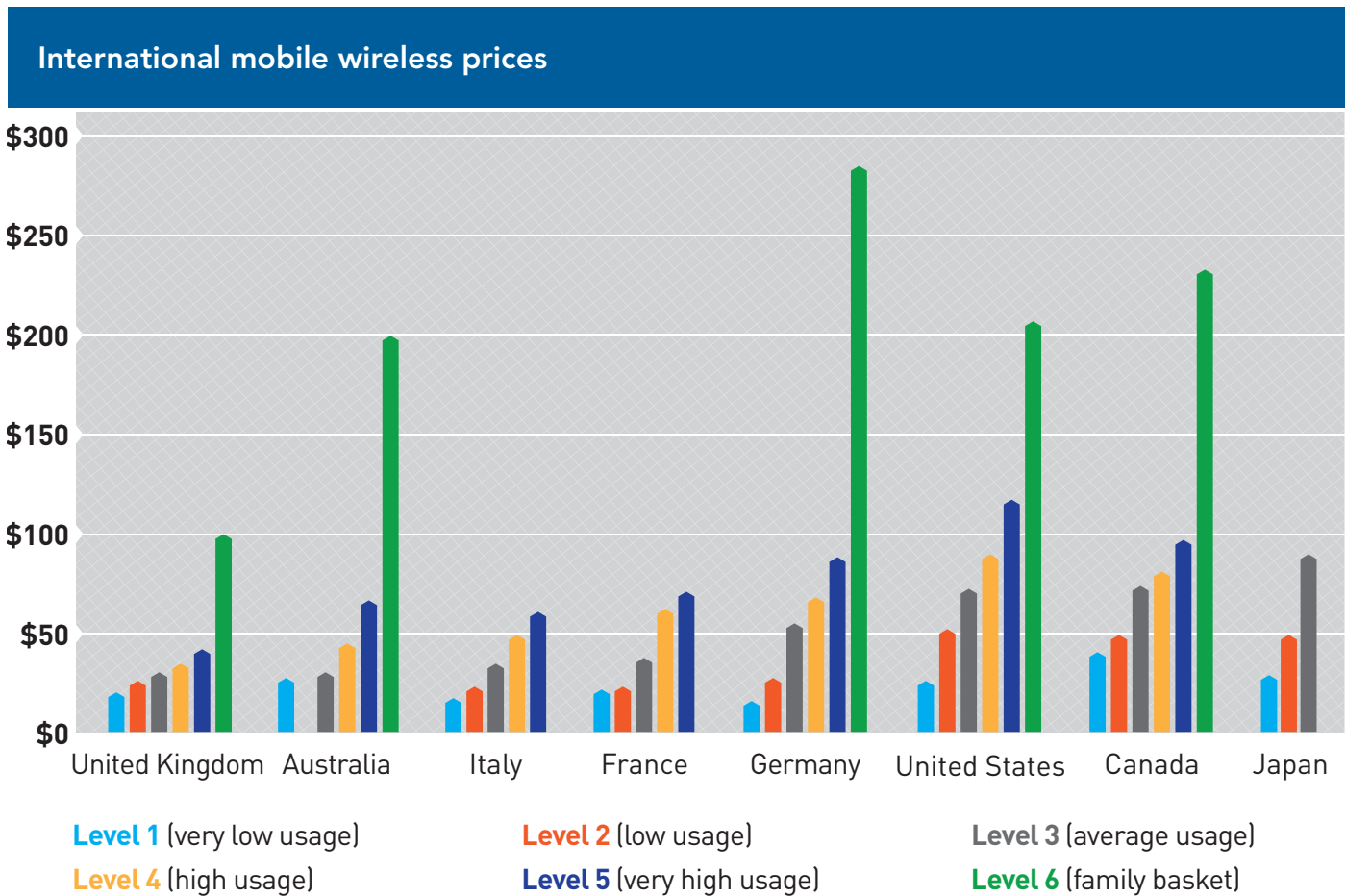
Figure 1-8



Source: Akamai, Akamai's State of the Internet: Q4 2016 Report, Vol. 9, No. 4, 2017, pp. 55-56.

For the fourth quarter of 2016, Akamai estimates that nearly 34% of IP addresses in Canada had an average broadband connection speed above 15 Mbps. With this percentage, Canada ranks 16th among the 34 OECD countries for which such data was available.

Figure 1-9

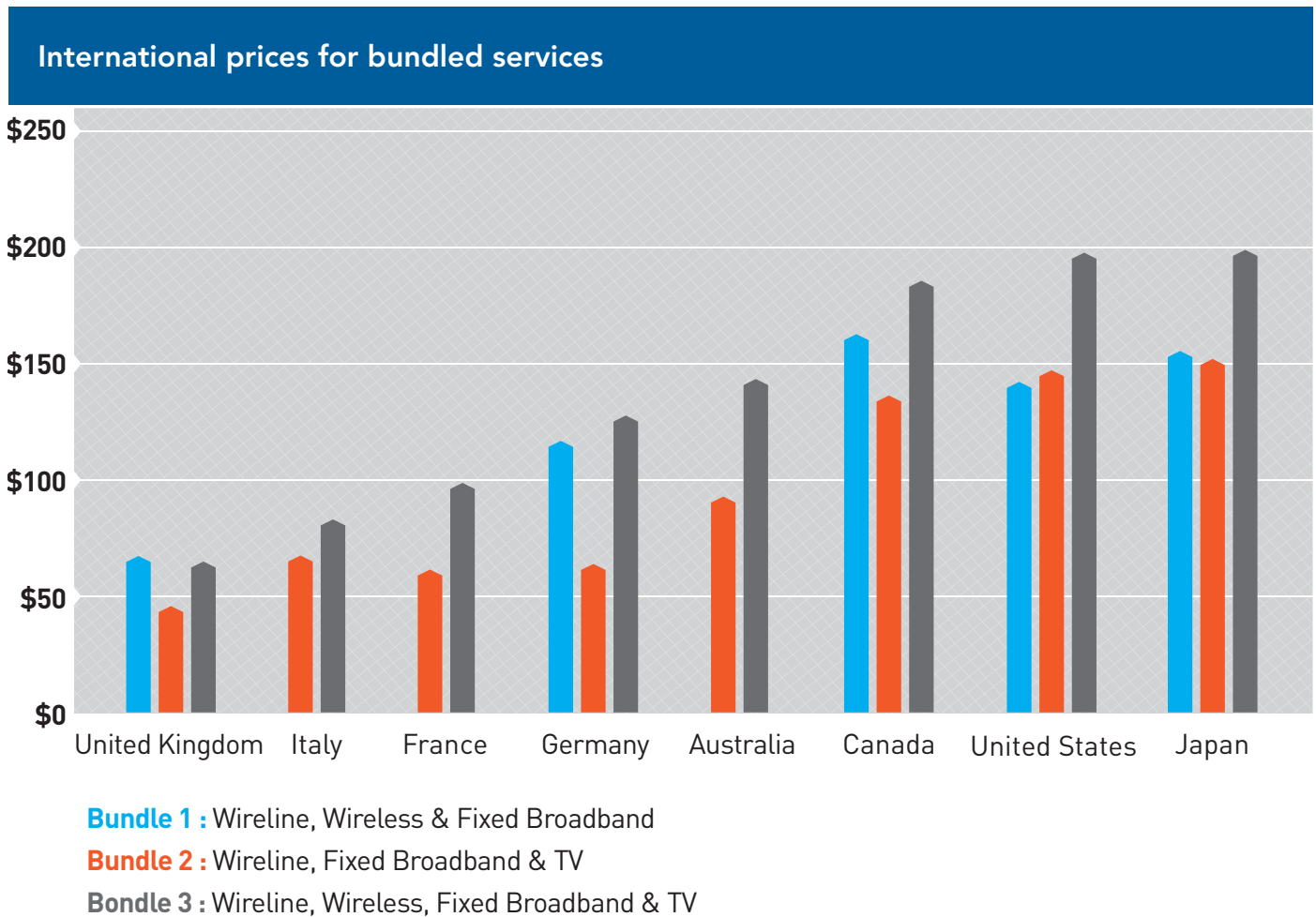


Source: NGL Nordicity Group, 2016 Price Comparison Study of Telecommunications Services in Canada and Select Foreign Jurisdictions, Prepared for the Canadian Radio-television and Telecommunications Commission (CRTC), Appendix D, Table D.2.1 to D.2.6, March 22, 2016. The indicated values are expressed in Canadian dollars, adjusted for purchasing power parity.

Nordicity Group has assembled different baskets of mobile wireless services in order to compare Canadian monthly rates with those of seven other countries. These baskets were built on the basis of volume and number of services (minutes, voice mail, call display, text messages, and data), ranging from very low to very high usage.

In terms of prices, Canada ranks 8th out of eight countries for very low usage, and 6th out of seven countries for very high usage.

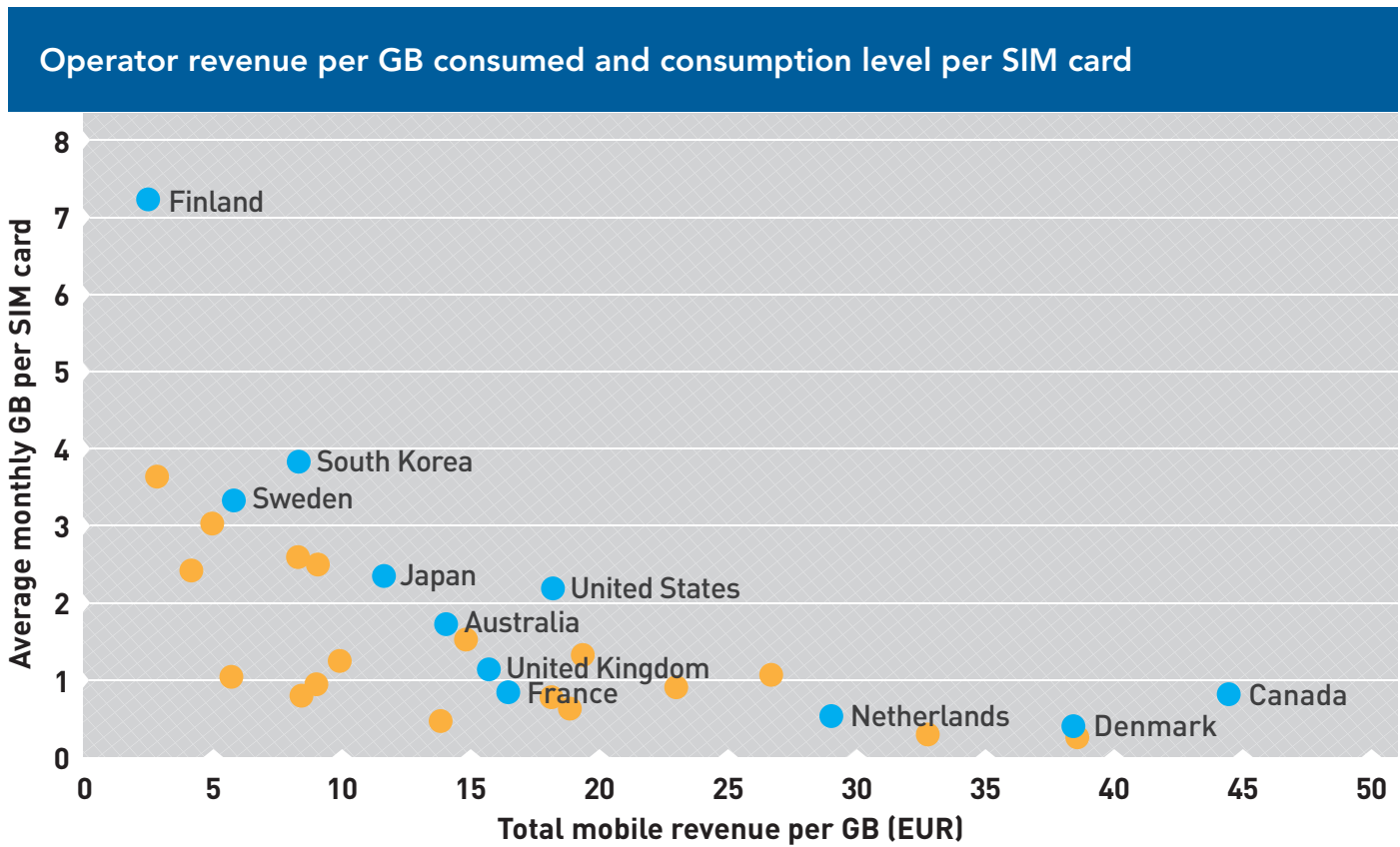
Figure 1-10



Source: NGL Nordicity Group, *2016 Price Comparison Study of Telecommunications Services in Canada and Select Foreign Jurisdictions*, Prepared for the Canadian Radio-television and Telecommunications Commission (CRTC), Appendix D, Table D.5.1 to D.5.3, March 22, 2016. The indicated values are expressed in Canadian dollars, adjusted for purchasing power parity.

Nordicity Group has assembled different bundles of services in order to compare Canadian monthly rates with those of other countries. With regard to the first bundle, Canada ranks 5th out of five countries. As for the other two bundles, it ranks 6th out of eight countries, ahead of Japan and the United States.

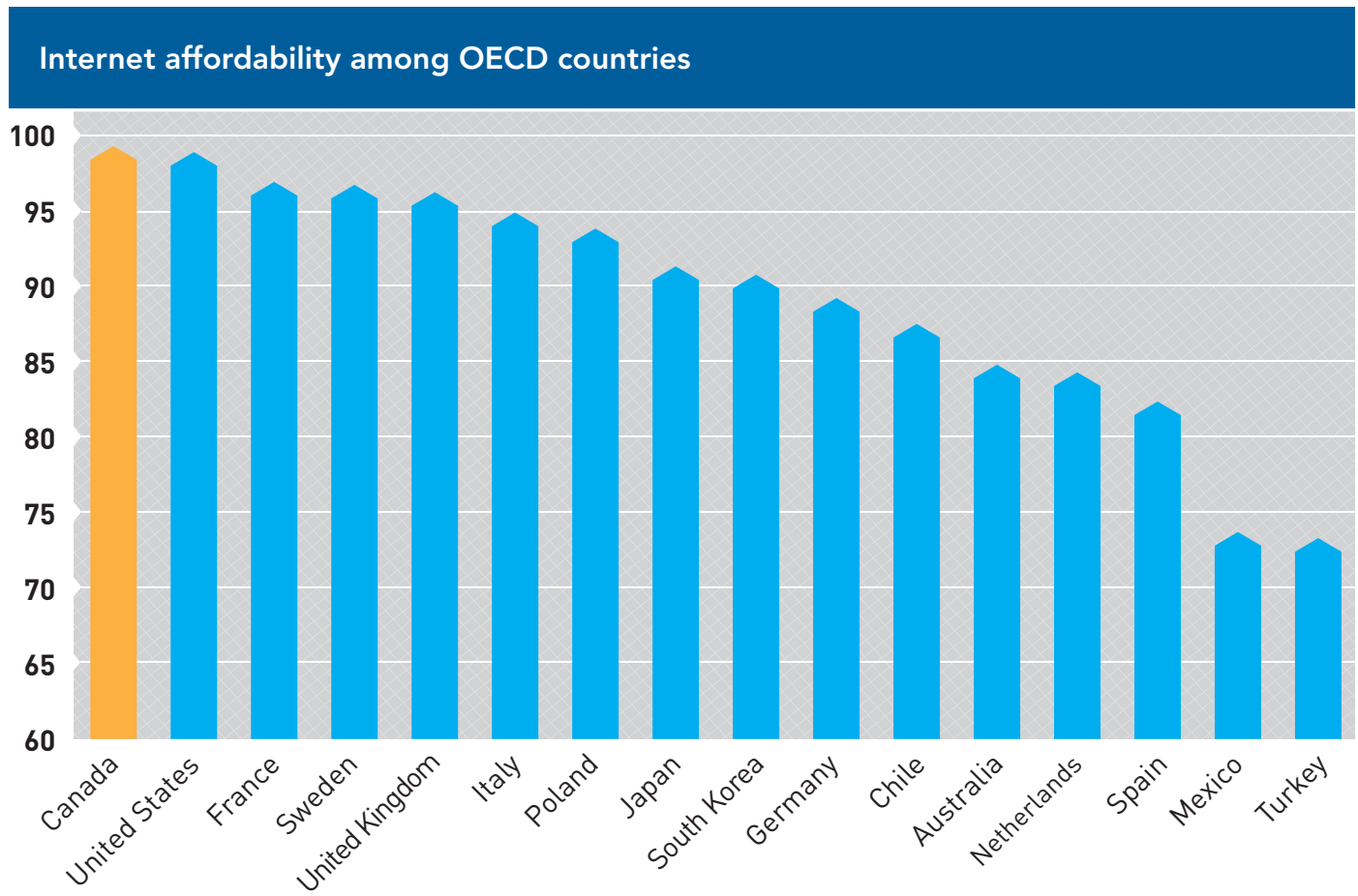
Figure 1-11



Source: Tefficient, “Mobile data 1H 2016: Unlimited pushes data usage to new heights,” Industry analysis #5 2016 — Updated version, January 5, 2017, p. 12.

Tefficient publishes an international comparison of data consumption. Out of a total of 29 countries, Canada is the country where operators have the highest total revenue per GB. Canada is also among the countries with the lowest consumption of data per SIM card. At the opposite extreme, Finland is the country with the lowest operator revenue per GB, whereas it has the highest level of data consumption per SIM card.

Figure 1-12

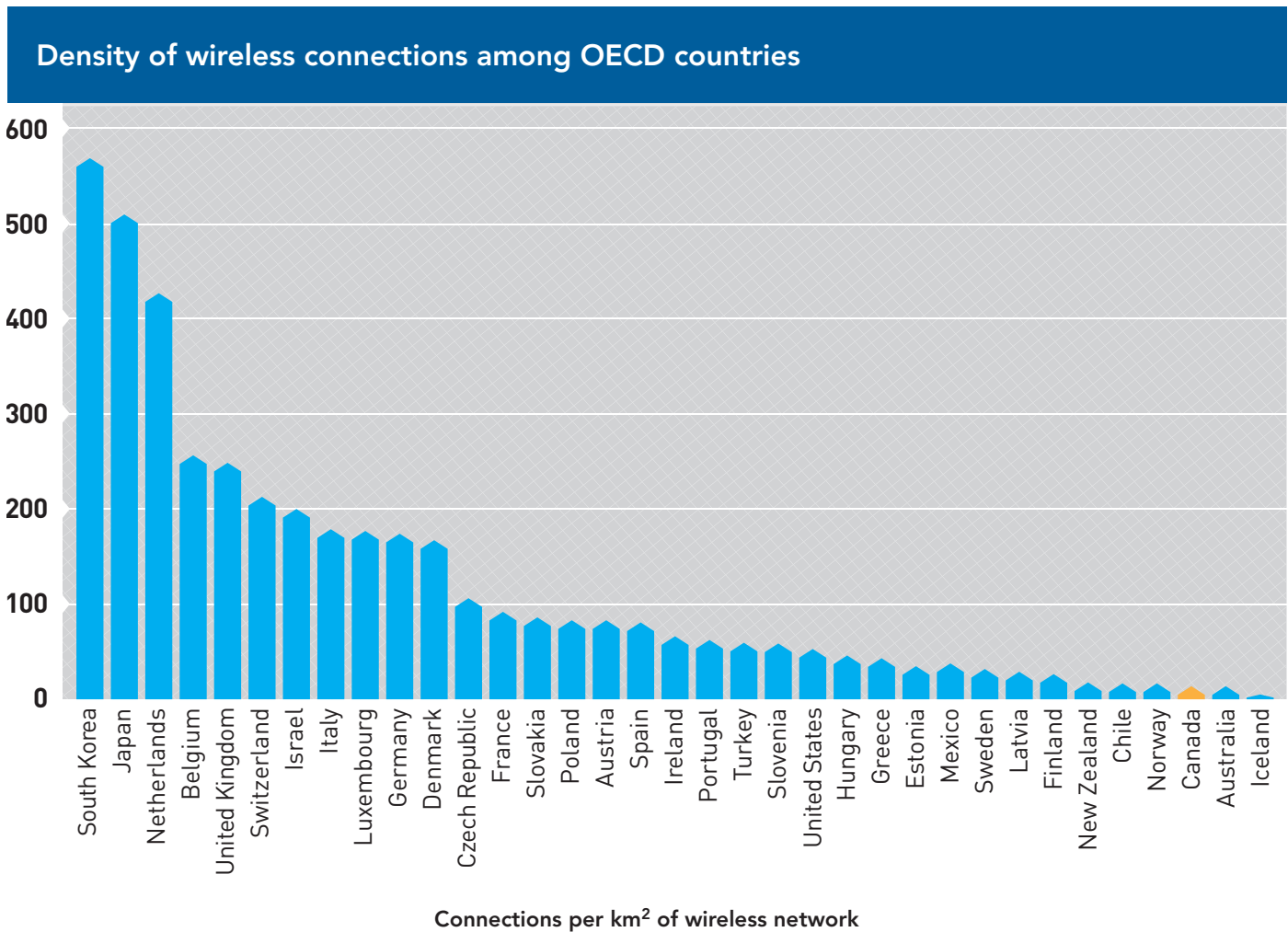


Composite index based on cost of access relative to gross national income per capita and the level of competition in the Internet marketplace.

Source: The Economist Intelligence Unit, Inclusive Internet Index, Database, February 2017.

According to the affordability index calculated by The Economist Intelligence Unit, Canada is ranked first among the 16 OECD countries for which data are available. This ranking indicates that the price paid by Internet service users is low relative to their income and that the level of competition among providers is relatively high.

Figure 1-13



Note: Given that a substantial portion of their territory is uninhabited, total land area was adjusted based on the coverage of the network in Canada (20%), Australia (31%), and the United States (80.7%). We assume 100% coverage for the other countries.
Sources: OECD, OECD Broadband Portal, Total fixed and wireless broadband subscriptions by country, June 2016; World Bank, Land area (sq. km), March 23, 2017; CRTC, *Communications Monitoring Report 2016*, October 2016, p. 280; Federal Communications Commission, *Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless*, Chart III.A.1: Estimated Wireless Coverage by Census Block Including Federal Land Form 477, September 23, 2016, p. 29; OzTowers, Mobile Bands (frequencies) By Provider, Information.

Canada is ranked 33rd out of 35 OECD countries with just 13 wireless connections per km². This indicates that compared to countries like South Korea, Japan, and the Netherlands, where the density is over 400, it is much more expensive to develop and maintain a wireless network in Canada.

CHAPTER 2

Recent Developments in Canada's Telecom Sector

This chapter provides an analysis of the highlights of the past twelve months in Canada's telecom sector. The headline-grabber of the year was undoubtedly the announcement of BCE's acquisition of MTS in May 2016, and its subsequent blessing by the Competition Bureau this past February, with conditions that are in line with the "fourth-player" policy pursued by the previous, Conservative government. Other notable highlights include the CRTC's decision on basic telecommunications services, as well as its recent *Sugar Mobile* decision, which reaffirmed a past decision denying mobile virtual network operators regulated access to the networks of Bell, Rogers, and TELUS.

BCE's Acquisition of MTS: The Fourth-Player Policy Lives On

A few days before the publication of last year's edition of this *Research Paper*, BCE Inc., Bell Canada's parent company, announced that it had reached an agreement to acquire Manitoba Telecom Services Inc. (MTS), the former provincial monopoly and dominant player in Manitoba. Concerns were immediately voiced by some Manitobans regarding the potentially higher prices they might face once Bell acquired MTS, as Manitoba wireless bills were then among the lowest in the country.¹

At the time, we wrote that this situation was likely unsustainable. MTS was in a precarious financial situation and was therefore a prime target for acquisition. The transaction, we argued, would allow Manitobans to access better networks, improved data speeds, and more innovative media platforms.²

More importantly, we noted that the proposed transaction could mark the end of the federal government's long-pursued fourth-player strategy. Over the better part of the past decade, the federal government has doggedly pursued a policy agenda aimed at having a fourth wireless player in every region of the country.

It is true that the Bell-MTS transaction would have reduced the number of wireless players from four to three, which went against the fourth-player policy. That being said, the transaction would allow Manitoba to have three, rather than two, large wireless competitors. As a result, it would enhance—rather than lessen—competition in the province.

Indeed, prior to the transaction, the Manitoba market had two dominant players, MTS and Rogers, with a combined wireless market share of approximately 85% (see Table 2-1).³ The two other competitors, Bell and TELUS, had a limited presence in the province and outdated infrastructure. As the transaction included the sale of about one-third of MTS's Manitoba customer base to TELUS, it would allow both Bell and TELUS to become important wireless players in Manitoba.⁴ This could lead to more real competition in Manitoba, not less.

"The transaction would allow Manitoba to have three, rather than two, large wireless competitors. As a result, it would enhance—rather than lessen—competition in the province."

Some market observers had predicted that the transaction would receive regulatory clearance, but expected the Competition Bureau to require additional undertakings from Bell, including the transfer of spectrum to another market player to ensure the continued presence of four players in Manitoba.⁵ It was also expected that the beneficiary of such a divestiture would be Shaw Communications, which had recently acquired WIND Mobile and was establishing its presence as Ontario's, Alberta's, and British Columbia's fourth wireless player.

In February 2017, the Competition Bureau announced that it had cleared the transaction. As many had predicted, regulatory clearance was conditional on Bell's divestiture of spectrum, stores, and subscribers to a fourth player. However, the beneficiary of these divestitures was not Shaw, but Xplornet, a rural Internet provider

1. NGL Nordicity Group, *2016 Price Comparison Study of Telecommunications Services in Canada and Select Foreign Jurisdictions*, Prepared for the Canadian Radio-television and Telecommunications Commission (CRTC), March 22, 2016, Appendix C, Table C.2.1 to C.2.6.

2. Martin Masse and Paul Beaudry, "BCE – MTS deal could be the welcome end of the telecom fourth-player policy," *The Globe and Mail*, May 11, 2016.

3. CRTC, *Communications Monitoring Report 2016*, October 2016, Table 5.5.8, p. 289.

4. BCE, "BCE to sell a portion of MTS wireless subscribers and assign certain dealer locations to TELUS," News release, May 2, 2016.

5. Greg O'Brien, "Is the Bell-MTS deal on the rocks? Will Shaw save it?" *mobilesymp*, November 20, 2016.

Table 2-1

Wireless service subscriber market share, by province and territory, 2015 (%)				
PROVINCE/TERRITORY	BELL GROUP	TELUS	ROGERS	OTHER
British Columbia	20	42	37	0
Alberta	25	53	23	0
Saskatchewan	15	13	5	66
Manitoba	8	7	36	49
Ontario	30	22	47	1
Quebec	31	28	28	13
New Brunswick	57	26	17	0
Nova Scotia	54	33	12	0
Prince Edward Island	57	31	12	0
Newfoundland and Labrador	71	27	1	0
The North	99	0	0	1

Source: CRTC, *Communications Monitoring Report 2016*, October 2016, Table 5.5.8, p. 289.

with activities across Canada, including in Manitoba, yet with no previous involvement in the wireless market.⁶

In previous editions of this *Research Paper*, we criticized the federal government's fourth-player policy. In short, we pointed out that the policy encouraged the emergence of several small, poorly-capitalized wireless players (Public Mobile, Mobilicity, and WIND) which were unable to adequately compete and which failed and ended up being bought by bigger players. It took a decade to sort out that mess, during which time billions of dollars of investments were wasted and valuable spectrum went unused or was inefficiently allocated. There is no indication that sustained, or sustainable,

"This could very well be just another in a series of government decisions on this file that deny the reality of the market and lead to the costly misallocation of resources."

competition was measurably increased by this policy, as opposed to letting market forces decide the outcome.⁷

The arrival of Xplornet on the Manitoba wireless landscape underscores the persistent belief of the federal government and regulator in the effectiveness of the fourth-player policy. It remains to be seen, however, whether Xplornet will have the necessary resources to

6. Competition Bureau, "Statement regarding Bell's acquisition of MTS," Press release, February 15, 2017.

7. See in particular Chapter 2 of the 2014 edition of this *Research Paper*, "The Elusive Search for a Fourth Wireless Player."

become a credible competitor, even given the regulatory privileges conferred by consent agreement between Bell and the Competition Bureau.

Unlike Shaw, which has the financial ability to become a serious wireless competitor in Ontario, Alberta, and British Columbia, it is far from certain at this point that Xplornet will be able to carve out a niche for itself and become a sustainable fourth player. This could very well be just another in a series of government decisions on this file that deny the reality of the market and lead to the costly misallocation of resources.

The CRTC Takes a Welcome Stance against Sugar Mobile

On March 1st, 2017, the CRTC issued its decision ending a year-long dispute between Rogers and Ice Wireless, a carrier with activities in Northern Canada.⁸ The dispute was over the use of the Rogers network by Sugar Mobile, a discount wireless provider and affiliate of Ice Wireless, but it has wider implications for the telecommunications sector in general.

Ice Wireless has operations in the Northwest Territories, Yukon, and Nunavut. It owns a wireless network in these territories, but has a roaming agreement that allows its customers to use the Rogers network when travelling in other parts of the country. Conversely, the agreement allows Rogers customers travelling to Northern Canada to access the Ice Wireless network.

In 2016, Ice Wireless launched Sugar Mobile, a mobile virtual network operator, which is telecom jargon for a reseller that owns no infrastructure and provides wireless services through third party networks. By virtue of the roaming agreement between Ice Wireless and Rogers, Sugar Mobile customers could use the Rogers network when travelling outside of the territories.

Instead of only targeting customers in Ice Wireless's home territory, however, Sugar Mobile marketed its services to customers across Canada. Such customers would never use the Ice Wireless home network, and would permanently rely on the Rogers network for roaming purposes. This, according to Rogers, amounted to a breach of its roaming agreement with Ice Wireless, which was meant to cover "incidental," rather than "permanent" roaming on the Rogers network.

The CRTC agreed with Rogers, and found that Ice Wireless had "improperly allowed the end-users of [Sugar Mobile] to obtain permanent, rather than incidental, access to [the Rogers] cellular network." The regulator's decision is welcome news, and reaffirms its commitment to promoting, at least to some extent, facilities-based competition in Canada's wireless sector.

Sugar Mobile CEO Samer Bishay compared the decision to being given "a death sentence without seeing the judge,"⁹ while consumer advocacy group OpenMedia claimed that the decision would "harm innovation, reduce choice, and keep low-income Canadians offline."¹⁰ Yet such hyperbolic reactions are off the mark.

"The regulator's decision is welcome news, and reaffirms its commitment to promoting, at least to some extent, facilities-based competition in Canada's wireless sector."

The CRTC's decision to sanction Ice Wireless is in line with its 2015 decision regarding the right of smaller competitors to access the Bell, TELUS, and Rogers networks.¹¹ While the CRTC decided to regulate the roaming rates the Big Three could charge smaller carriers with less extensive infrastructure, it refused to extend this regulatory privilege to resellers. Indeed, the CRTC felt that extending network sharing obligations to resellers would discourage wireless carriers from investing in their own network infrastructure.

On this issue, the CRTC's reasoning is in line with the economic reality: In order to satisfy customers' insatiable appetite for bandwidth, network operators are investing billions of dollars every year in new infrastructure.¹² Allowing product imitators to offer quasi-identical services by piggybacking on these networks at a below-market rate would not only be fundamentally unfair, but it would also constitute a strong disincentive for future investment in network infrastructure.

In analyzing this decision, one should not confuse the forest for the trees: The vibrancy of Canada's wireless

8. CRTC, *Ice Wireless Inc. – Application regarding roaming on Rogers Communications Canada Inc.'s network by customers of Ice Wireless Inc. and Sugar Mobile Inc.*, Telecom Decision 2017-57, March 1, 2017.

9. Christine Dobby, "Small wireless players can't let users 'permanently roam' on big networks: CRTC," *The Globe and Mail*, March 1, 2017.

10. Katy Anderson, "Disappointing CRTC ruling threatens to lock Canadians into a future of high wireless prices," OpenMedia, March 1, 2017.

11. CRTC, *Regulatory framework for wholesale mobile wireless services*, Telecom Regulatory Policy 2015-177, May 5, 2015.

12. CRTC, *op. cit.*, footnote 3, Table 5.0.5, p. 12

market is not contingent on the existence of small reseller like Sugar Mobile, whose total market share is negligible,¹³ but rather on carriers that own and invest in their own infrastructure. Although it may be tempting to root for the little guy, it is important to realize that the little guy contributes very little to Canada's wireless market.

And contrary to opinions expressed in certain quarters, Canada's wireless market is faring well. A recent study conducted for Facebook by the Economist Intelligence Unit found that Canada ranked first out of 75 countries with respect to Internet affordability. Canada stood out, "given its strong competitive environment for both wireless and broadband."¹⁴

The CRTC deserves credit for sanctioning Ice Wireless for its breach of contract and for refraining from imposing mandatory access obligations on the Big Three when it comes to resellers. If anything, it should be encouraged to extend this reasoning to broadband Internet services.

The CRTC Declares Broadband Internet an Essential Service

The CRTC chose to release its much-awaited decision on basic telecommunications services a few days before Christmas 2016.¹⁵ And for good reason: The decision came with a \$750-million industry-sponsored "gift" to Canadians over a five-year period.

Recognizing that access to broadband services was "vital to Canada's economic, social, democratic, and cultural fabric," the CRTC set a goal of giving all Canadians access to download speeds of at least 50 megabits per second (Mbps) and upload speeds of at least 10 Mbps.

To achieve this goal, the CRTC announced that it would establish a fund of \$750 million over five years which would be used to finance high-speed Internet infrastructure in rural and remote areas of the country where such services are not yet available. This fund will be paid for by Internet service providers, but the cost will ultimately be passed on to consumers.

In a show of restraint, however, the regulator steered clear of imposing the kind of retail-rate regulations on

Internet broadband providers that it imposed on TV providers in 2015 in the form of a mandatory \$25 per month "skinny basic" package.

While the CRTC should be commended for not falling victim to the siren song of price controls, which would have undermined investment in networks, its decision to create a new funding mechanism for the development of broadband in rural and remote areas is yet another example of its central-planning mindset. Canada's market is already very healthy and competitive, and does not require additional interventions on the part of the regulator.¹⁶

"The vibrancy of Canada's wireless market is not contingent on the existence of small resellers like Sugar Mobile, whose total market share is negligible, but rather on carriers who own and invest in their own infrastructure."

The CRTC itself admits that Canada has a robust broadband market. About 96% of Canadian households have access to download speeds of at least 5 Mbps, which the CRTC had considered sufficient to participate in the digital economy since its last review of essential services in 2011.¹⁷ Furthermore, 82% of Canadians already have access to the CRTC's new aspirational target speed of 50 Mbps.¹⁸

In terms of average broadband download speed, a survey recently carried out by Akamai ranked Canada 16th among 34 OECD countries in 2016. These results are impressive—particularly for a country where the costs of network deployment are so high due to low population density.¹⁹

It is true that certain regions of the country remain underserved or do not have access to the same network speeds as are available in big urban centres. It is also true that broadband costs tend to be higher in remote

13. As a percentage of revenues and subscribers, resellers account for about 1% of the market. See CRTC, *op. cit.*, footnote 3, Figure 5.5.7, p. 288.

14. The Economist Intelligence Unit, *The Inclusive Internet: Mapping Progress 2017, Affordability, Canada*. See Figure 1-12 of this *Research Paper*, p. 21.

15. CRTC, *Modern telecommunications services – The path forward for Canada's digital economy*, Telecom Regulatory Policy 2016-496, December 21, 2016.

16. For a more extended discussion of this issue, see Chapter 3 of the 2016 edition of this *Research Paper*, "Should Broadband Internet Be Regulated and Subsidized as an Essential Service?" available on the website of the MEI.

17. CRTC, *Obligation to serve and other matters*, Telecom Regulatory Policy CRTC 2011-291, May 3, 2011.

18. CRTC, "CRTC establishes fund to attain new high-speed Internet targets," News release, December 21, 2016.

19. See Figures 1-7 and 1-13 of this *Research Paper*, pp. 16 and 22.

areas than in urban areas. But does this mean that the creation of a new CRTC funding mechanism is necessary to bridge the digital divide?

Billions of dollars are already being invested in next-generation broadband networks by Canadian providers every year, including in satellite technologies able to cover every underserved region of the country. One market player, Xplornet, launched a new satellite in December 2016 and anticipates that it will offer 25 Mbps broadband service everywhere in Canada by the end of 2017.²⁰

“While the CRTC should be commended for not falling victim to the siren song of price controls, its decision to create a new funding mechanism for the development of broadband in rural and remote areas is yet another example of its central-planning mindset.”

Furthermore, there already exist a plethora of government programs aimed at funding the deployment of high-speed infrastructure in underserved areas. In December 2016, the federal government launched Connect to Innovate, a \$500-million rural-broadband program that will run until 2021.²¹ This follows two earlier programs launched by the previous government, which represented \$530 million in broadband investments.²² The Quebec government announced a similar \$100-million program, also in December.²³

It is highly doubtful that the CRTC's involvement in the broadband financing business is necessary when market players are already investing billions in new networks, and targeted government programs are already helping out at the margins. This decision is more about justifying the CRTC's existence in a world of increased competition than it is about boosting broadband adoption or helping Canadian consumers.

20. Emily Jackson, “Xplornet says new satellite means faster Internet for rural Canadians,” *National Post*, December 19, 2016.

21. Christine Dobby, “Ottawa to target ‘backbone’ Internet connections with \$500-million rural broadband program,” *The Globe and Mail*, December 15, 2016.

22. Government of Canada, *Digital Canada 150*, 2014, pp. 8 and 10.

23. Nicolas Vigneault, “Québec investit 100 millions pour améliorer l'accès à Internet en région,” *Radio-Canada*, December 18, 2016.

CHAPTER 3

Assessing the 2006 Policy Direction: The Good, the Bad, and the Ugly

In 2006, the Harper government took office just prior to the release of the Telecommunications Policy Review Panel's *Final Report*. The Panel had been created by the previous Martin government, which recognized that the regulatory framework governing Canada's telecommunications sector was in need of modernization.

The Panel found that the "Canadian telecommunications industry has evolved to the point where market forces can largely be relied on to achieve economic and social benefits for Canadians, and where detailed, prescriptive regulation is no longer needed in many areas."²⁴ In order to reflect this shift, the Panel recommended that a policy direction be issued to the CRTC to advance the implementation of some of the Report's key recommendations, which advocated for a greater reliance on market forces.

The Harper government embraced this recommendation and, following the release of the Report, issued an *Order Issuing a Direction to the CRTC on Implementing the Canadian Telecommunications Policy Objectives*²⁵ (the Policy Direction), which, among other things, directed the regulator to rely on market forces as much as possible (see Box 3-1).

The Policy Direction was described by a policy expert as a "fundamental re-ordering"²⁶ of the *Telecommunications Act's* various policy objectives. And indeed it was: The government's power to issue policy directions had not been used even once since the Act's introduction in 1993. By directing the CRTC to adopt a less interventionist approach to telecom regulation, the federal government was sending a rare message to the regulator indicating that it was not the only agenda-setter for the telecom sector.

To further reinforce its commitment to reform, the government also used its power to vary CRTC decisions twice—in 2006 and 2007—which had the effect of accel-

erating the deregulation of VoIP service and local telephone markets.²⁷

Konrad von Finckenstein, then Chair of the CRTC, acknowledged that the regulator understood the government's new approach by declaring that "the message is clear: the government wants to move quickly toward more reliance on market forces in telecom services, less regulation and smarter regulation."²⁸

"By directing the CRTC to adopt a less interventionist approach to telecom regulation, the federal government was sending a rare message to the regulator indicating that it was not the only agenda-setter for the telecom sector."

Fast forward to 2017. After more than 10 years on the books, has the Policy Direction had a significant impact on the CRTC's telecom policy decisions? As much as the authors of this *Research Paper*, both advisors of Minister of Industry²⁹ Maxime Bernier at the time of the issuance of the Policy Direction, wish the answer were unequivocally positive, the reality is not nearly as clear-cut as that.

The Good

First, the good news. The Policy Direction sent a strong message to the regulator that it should adopt a less interventionist approach to telecom regulation. And for a while, it seemed like the message stuck. The CRTC took the principles of the Policy Direction seriously, and launched a comprehensive review of over 80 telecommunications regulations shortly after it came into force. At the end of its review, the CRTC had removed or streamlined 60% of those regulations.³⁰

Furthermore, the CRTC accelerated the deregulation of retail telecom services when such services faced sufficient

24. Telecommunications Policy Review Panel, *Final Report 2006*, pp. 1-22.

25. Government of Canada, *Order Issuing a Direction to the CRTC on Implementing the Canadian Telecommunications Policy Objectives*, SOR 2006-355, December 14, 2006.

26. Richard Schultz, "Telecommunications Policy: What a Difference a Minister Can Make," in Allan M. Maslove (ed.), *How Ottawa Spends, 2008-2009: A More Orderly Federalism?* McGill-Queen's University Press, 2008, p. 135.

27. See Government of Canada, *Order Varying Telecom Decision 2005-28*, SOR/2006-288, November 9, 2006; and *Order Varying Telecom Decision CRTC 2006-15*, SOR/2007-71, April 4, 2007.

28. Richard Schultz, *op. cit.*, footnote 26, p. 157.

29. Since the 2015 elections, Industry Canada is called Innovation, Science and Economic Development.

30. CRTC, "CRTC completes review of telecommunications regulations: Requires large telephone companies to provide free diagnostic services," Press release, February 9, 2012.

Box 3-1

Excerpts from the *Order Issuing a Direction to the CRTC on Implementing the Canadian Telecommunications Policy Objectives*

Statutory Orders and Regulations/2006-355 Registration 2006-12-14

Direction

1 In exercising its powers and performing its duties under the *Telecommunications Act*, the Canadian Radio-television and Telecommunications Commission (the "Commission") shall implement the Canadian telecommunications policy objectives set out in section 7 of that Act, in accordance with the following:

(a) the Commission should

(i) rely on market forces to the maximum extent feasible as the means of achieving the telecommunications policy objectives, and

(ii) when relying on regulation, use measures that are efficient and proportionate to their purpose and that interfere with the operation of competitive market forces to the minimum extent necessary to meet the policy objectives;

(b) the Commission, when relying on regulation, should use measures that satisfy the following criteria, namely, those that

(i) specify the telecommunications policy objective that is advanced by those measures and demonstrate their compliance with this Order,

(ii) if they are of an economic nature, neither deter economically efficient competitive entry into the market nor promote economically inefficient entry,

(iii) if they are not of an economic nature, to the greatest extent possible, are implemented in a symmetrical and competitively neutral manner, and

(iv) if they relate to network interconnection arrangements or regimes for access to networks, buildings, in-building wiring or support structures, ensure the technological and competitive neutrality of those arrangements or regimes, to the greatest extent possible, to enable competition from new technologies and not to artificially favour either Canadian carriers or resellers.

[...]

competition or when doing so was consistent with the Canadian telecommunications policy objectives. In 2015, approximately 95% of telecommunications revenues were from services that the CRTC had determined were sufficiently competitive that tariff filings were no longer required.³¹

More generally, the Policy Direction imposed on the CRTC the duty to assess whether the regulatory path it chooses to adopt relies on market forces to the maximum extent feasible, and whether any regulatory measure imposed is minimally intrusive. Commissioners were forced to explicitly justify each and every one of their decisions in a transparent manner within a clear policy framework.

The Bad

Unfortunately, the requirement to follow the Policy Direction's instructions became more theoretical as the years went by. Today, the CRTC too often merely pays lip service to the principles of the Policy Direction, and has largely gone back to its old interventionist ways.

The Policy Direction is couched in general terms, and as evidenced by several CRTC decisions, it is rather easy for the regulator to claim adherence to its principles while intervening in the market. One example nicely illustrates this trend: the CRTC's 2015 decision on wholesale access to high-speed fibre networks.³²

As explained in past editions of this *Research Paper*,³³ since new technologies facilitated the provision of high-speed Internet by cable and telephone providers in the late 1990s, the CRTC decided that regulation was necessary to ensure competitors could access these networks and offer broadband services. Accordingly, the CRTC imposed on cable companies and telephone providers the obligation to share parts of their high-speed networks with smaller Internet service providers (ISPs) at regulated prices.

This regulatory regime has allowed for the emergence of a large number of small competitors, so called independent ISPs, whose survival depends entirely on the CRTC. Indeed, these entities—which essentially resell services offered by larger providers—would not be

viable without mandated access to third party infrastructure at below-market rates.

In July 2015, the CRTC expanded its mandatory wholesale regime by requiring telephone providers to allow independent ISPs to access their highest-speed fibre networks, also known as fibre-to-the-premises (FTTP) facilities. This decision was particularly surprising, as FTTP facilities are still in the process of being built, and mandating their sharing could significantly reduce the amount of capital invested in their deployment.³⁴

Moreover, the CRTC's decision was entirely inconsistent with the Policy Direction. By mandating the sharing of next-generation networks with market players who made little if any infrastructure investments, the CRTC embraced a resale competition model instead of a facilities-based competition model. In doing so, it favoured a path that two of the world's most dynamic and innovative jurisdictions—the United States and South Korea—have refused to take.

“For a while, it seemed like the message stuck. The CRTC took the principles of the Policy Direction seriously, and launched a comprehensive review of over 80 telecommunications regulations shortly after it came into force.”

FTTP networks, unlike older broadband networks, do not rely on telephone providers' legacy copper networks, which were built during the years when they were monopolies benefiting from guaranteed rate-of-return regulation. Although there may have been a case for mandating access to monopoly networks in order to correct the errors of the past, there is no convincing case for mandating access to new fibre networks. After all, incumbents do not have any inherent competitive advantage vis-à-vis other market participants in deploying new networks based on recent technology.

It is difficult to argue that this decision relied “on market forces to the maximum extent feasible.” It also contradicts another Policy Direction instruction, which is to “neither deter economically efficient competitive entry into the market nor promote economically inefficient entry.” In mandating competitor access to incumbents' high-speed fibre networks, the CRTC only paid lip service

31. CRTC, *op. cit.*, footnote 3, p. 206.

32. CRTC, *Review of wholesale wireline services and associated policies*, Telecom Regulatory Policy 2015-326, July 22, 2015.

33. See Chapter 3 of the 2014, 2015, and 2016 editions of this *Research Paper*, available on the website of the MEI.

34. See Chapter 3 of the 2014 edition of this *Research Paper*, “Mandatory Network Sharing in the Wireline Sector: A Policy Whose Time Has Passed.”

to the Policy Direction, but failed to make a compelling argument that such access was necessary to prevent market failure or to ensure the robustness of the retail broadband market.

Although the CRTC's decision on wholesale access to high-speed fibre networks may have been one of its most egregious from a Policy Direction-enforcement perspective, many other CRTC decisions and policies have also undermined the Policy Direction.

Another noteworthy example—this time at the retail level—is the Wireless Code's ban on wireless contracts featuring a device subsidy spread over a period of more than 24 months.³⁵ Such a ban limits consumer choices, and can have a particularly negative effect on consumers of modest means, for whom the prospect of higher prices upfront can be very daunting.

Even more recently, the CRTC's regulatory policy on essential services discussed in Chapter 2 of this *Research Paper*, while mostly benign, set up yet another broadband funding program, and failed to reduce regulation.³⁶

The Ugly

The blame for the lax enforcement of the principles enshrined in the Policy Direction does not lie only with the CRTC. It also lies with the Harper government, which embraced a more interventionist telecom policy agenda after issuing the Policy Direction, and sent mixed messages to the regulator.

Perhaps the most blatant example of the federal government renegeing on the principles of the Policy Direction is its reaction to the CRTC's 2011 decision on usage-based billing (UBB).³⁷ UBB is the practice of billing customers on the basis of how much data they consume, as opposed to having unlimited usage plans.

In January 2011, the CRTC issued a decision allowing large telecom and cable companies to impose UBB on small Internet service providers (ISPs) with whom they had the obligation to share their network at regulated rates. The CRTC's decision provided that UBB rates to be charged to small ISPs should be established at a 15% discount from the retail rates charged by large telecom and cable providers for Internet service.

Despite the seemingly favourable terms established by the CRTC, small ISPs reacted negatively to the decision. Many small ISPs were offering unlimited usage plans to their customers, and the CRTC decision would have prevented them from offering such plans going forward. Moreover, considering that none of the large telecom and cable companies offered unlimited usage plans, the decision would have deprived the small ISPs of a powerful marketing tool.

The small ISPs and a few consumer advocates launched a well-organized lobbying campaign aimed at having the federal government overturn the CRTC's decision. And they succeeded. On February 2, 2011, Industry Minister Tony Clement announced that the government expected the CRTC to reverse its decision, or else the government would overturn it.³⁸ Shortly after, the CRTC announced that it would reconsider it, and eventually handed down a compromise on the issue.³⁹

“Unfortunately, the requirement to follow the Policy Direction’s instructions became more theoretical as the years went by. Today, the CRTC too often merely pays lip service to the principles of the Policy Direction, and has largely gone back to its old interventionist ways.”

UBB is not a particularly controversial practice. Most of the time, people pay for goods and services based on usage. Whether it is electricity use, gas consumption, grocery shopping, or any number of other areas, suppliers typically do not offer “all-you-can-eat” plans to their customers. Furthermore, in the words of telecom economist Len Waverman, such plans can constrain telecom investment because of “the inability of suppliers [...] to charge adequately the 20 per cent of Internet customers who use up 80 per cent of total bandwidth capacity. And the 80 per cent of us who seldom download movies will subsidize the 20 per cent who have the heaviest use of Internet traffic.”⁴⁰

35. CRTC, *The Wireless Code*, simplified.

36. CRTC, *Modern telecommunications services – The path forward for Canada's digital economy*, Telecom Regulatory Policy 2016-496, December 21, 2016.

37. CRTC, *Usage-based billing for Gateway Access Services and third-party Internet access services*, Telecom Decision 2011-44, January 25, 2011.

38. CBC News, “CRTC must reverse internet usage ruling: Clement,” February 3, 2011.

39. Iain Marlow, “CRTC unveils compromise for usage-based billing,” *The Globe and Mail*, November 15, 2011.

40. Leonard Waverman, “Make the heaviest online users pay their fair share,” *The Globe and Mail*, February 7, 2011.

More importantly, UBB respected both the spirit and the letter of the Policy Direction. Allowing small ISPs to purchase unlimited amounts of data at a regulated fixed price is unsustainable and interferes excessively with market forces. The government's denunciation of the CRTC ruling was a surprising reversal of its deregulatory mantra. Furthermore, it sent a contradictory message to the regulator: that the principles enunciated in the Policy Direction ought to be followed, except when the government, almost on a whim, chooses to ignore them.

Conclusion

Notwithstanding these criticisms, the 2006 Policy Direction has had a positive impact on Canada's telecommunications sector overall. Indeed, by echoing the Telecommunications Policy Review Panel's finding that heavy-handed regulation was no longer needed to oversee a sector that had transitioned from monopoly to competition, the government forced the CRTC to re-think its role and its approach to regulating the sector.

"The blame for the lax enforcement of the principles enshrined in the Policy Direction does not lie only with the CRTC. It also lies with the Harper government, which embraced a more interventionist telecom policy agenda after issuing the Policy Direction, and sent mixed messages to the regulator."

However, the impact could have been much greater if, over the past decade, the CRTC had not strayed from the principles enunciated in the Policy Direction and once again embraced a more interventionist approach to telecom regulation. Decisions on UBB and competitor access to incumbents' high-speed fibre networks show that the Policy Direction does not sufficiently constrain the CRTC. Furthermore, the federal government itself has at times sent confusing messages to the regulator and condemned decisions that respected the Policy Direction, in order to appear "pro-consumer." In too many cases, lip service has been paid to the Policy Direction while the CRTC chose to intervene in the market.

More could be done to ensure that the principles of the Policy Direction are respected. Part of the solution may lie with the judiciary branch.

The *Telecommunications Act* provides that CRTC decisions can be brought before the Federal Court of Appeal on questions of law or jurisdiction.⁴¹ However, this recourse has not been very effective until now because, as former Commissioner of Competition and Bell Canada executive Lawson Hunter has pointed out, courts in Canada tend to defer to specialized regulatory agencies when reviewing their activities. Affected parties therefore have little meaningful recourse to challenge their regulatory functions.⁴²

A change of attitude on the part of judges could help put more pressure on the CRTC to take the Policy Direction more seriously in its decision-making process. As Hunter notes, it is a formidable tool that makes it "easier for the courts to determine whether the Commission's decision is the minimally intrusive way to achieve its objectives."⁴³

Another, bolder approach is to recognize that the Policy Direction was a good initial compromise between regulatory discretion and direct government involvement in the policy-making process, but that more is needed to counter the regulator's documented tendency to undermine its principles. A government willing to go further in deregulating the telecommunications sector and relying on free-market principles would have no choice but to amend the *Telecommunications Act*, revisit Canada's telecommunications policy objectives, and perhaps question the role of the CRTC itself as the guardian of the sector.

41. Government of Canada, *Telecommunications Act*, SC 1993, c 38, s. 64(1).

42. Lawson Hunter, "Let's reset the regulatory agenda," Canada2020, February 24, 2012.

43. Lawson A. W. Hunter, Philippe Gauvin, and David Krause, "Changing the Presumption of When to Regulate: The Rationale of Canadian Telecommunications Reform," *Journal of Competition Law and Economics*, Vol. 4, 2008, p. 788, cited in David Krause and Mirko Bibic, "Regulatory Commitment and the Policy Direction: Has There Been a Breach of Contract?" 16th Biennial National Conference of the Law Society of Upper Canada – New Developments in Communications Law and Policy, 2012, p. 6.

CHAPTER 4

The Internet of Things and the New Competitive Environment

The policy debates of the past decade in Canada's telecommunications sector have all been centred on the desire to bring faster and better services at lower prices to individual customers in every region of the country, including rural and remote areas.

How individual customers access telecommunications services has, of course, changed quite a bit during this period. For example, increasingly large numbers of Canadians are "cutting the cord," cancelling their land-line telephone or their cable subscription. We also tend to access the Internet more and more through wireless devices.⁴⁴

Telecommunications providers have had to adapt to these market changes. But their focus—and that of the federal government and regulator as they crafted policies—has always been the individual customer.

That situation may be about to change with the rise of the Internet of Things (IoT), which is now at a stage of development similar to that of the Internet itself in the early 1990s. Few people among the general public have heard of it, but the IoT is growing fast and is set to revolutionize every aspect of our economy and our lives within a few years. It could soon become as ubiquitous as the Internet itself.

The number of objects connected to the Internet in the world has already overtaken the number of electronic devices used by human customers, according to some estimates, and is projected to explode in the coming years (see Figure 4-1). As a result, the debates of the past decade over telecommunications services, prices, and levels of competition are likely to become gradually less relevant as this new technological paradigm comes to dominate the sector.

What Is the Internet of Things?

Before discussing the policy implications of this new reality, let us look briefly at what the Internet of Things is and how it is expected to change our lives.

Described as the "fourth industrial revolution,"⁴⁵ the Internet of Things is the latest stage in the automation of various processes aimed at increasing efficiency. Instead of involving mechanical machines, however, it revolves around the integration of the different parts of a process through IP connectivity.

In part, the Internet of Things will affect individual customers in their everyday lives. For example, the home of the future will have appliances, heating units, lights, security systems, etc., connected to a network that home owners will be able to access and control remotely from their smartphones. Patients will have body sensors that will monitor their blood pressure, heart rate, or sugar level in real time so that their physician can be alerted if their health deteriorates.

"The debates of the past decade over telecommunications services, prices, and levels of competition are likely to become gradually less relevant as this new technological paradigm comes to dominate the sector."

Every industrial sector, as well as government services, will be revolutionized by connected processes.

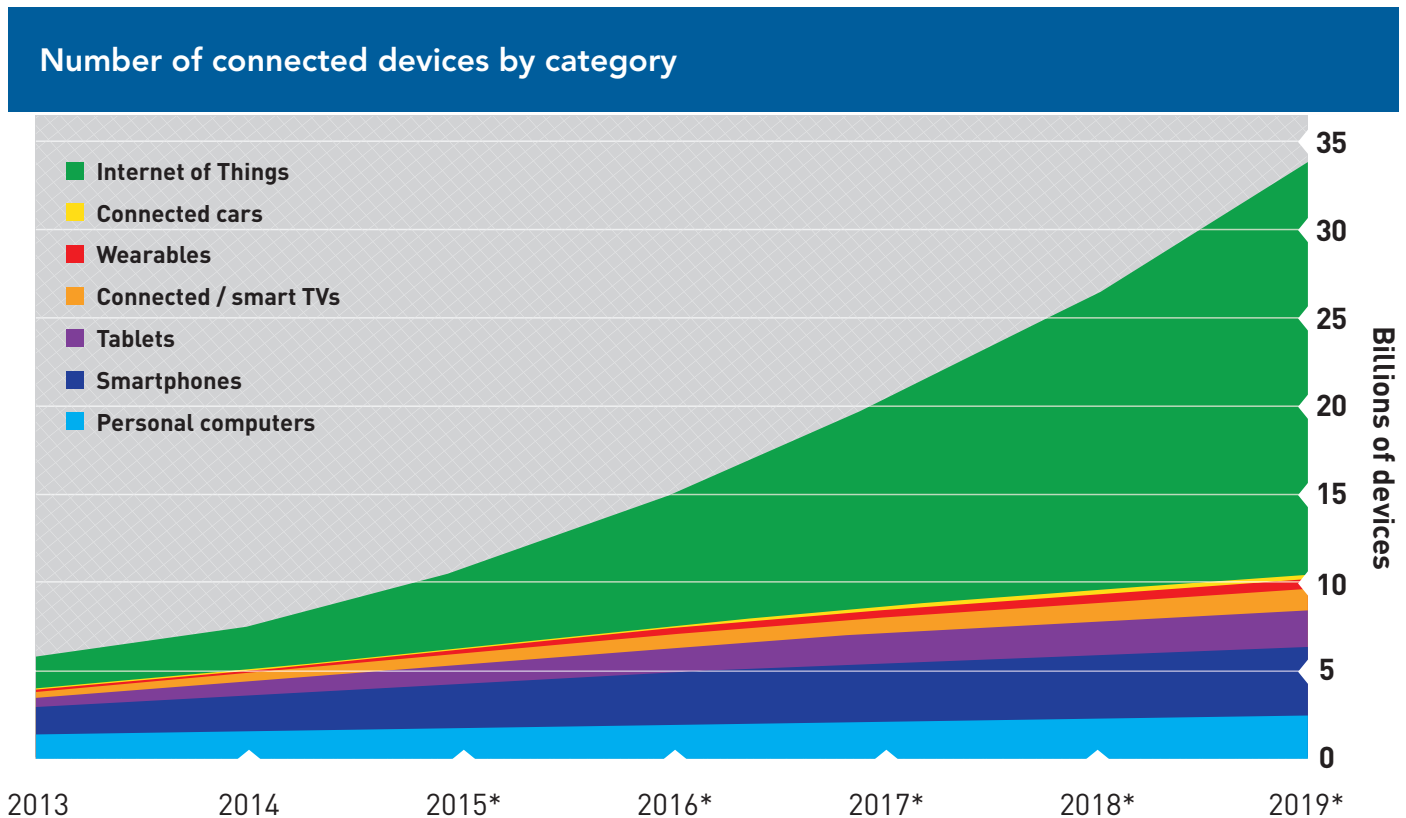
In agriculture, for instance, sensors will detect the environmental conditions of plants, send the information to a program hosted locally at the farm or in the cloud, and this program will in turn analyze the data and determine if the irrigation system should be turned on or off. The number of processes that could be automated in the manufacturing sector, especially in conjunction with robotics and artificial intelligence, is limitless.

Transportation is another sector that will be transformed by the Internet of Things. Sensors will be installed along roads so that traffic can be better managed by cities, and security improved, especially when self-driving cars appear on the roads. Whole fleets of autonomous trucks distributing products will be managed remotely, with their content checked in real time. Already, insurance companies are gathering information about driving patterns

44. Emily Jackson, "Cord cutting escalates for Canada TV subscribers in first three quarters of 2016," *National Post*, December 30, 2016; CRTC, *op. cit.*, footnote 3, Table 2.0.5, p. 59.

45. Following the mechanization of the textile industry in the late 18th century, the assembly line and mass production in the early 20th, and the digital revolution that is underway.

Figure 4-1



* Estimate

Source: John Greenough, "The Internet of Everything: 2015," *Business Insider Intelligence*, April 8, 2015.

through onboard diagnostic ports and adapting insurance premiums accordingly.⁴⁶

Studies about the development of the Internet of Things forecast extremely rapid growth in the years to come. International Data Corporation estimated worldwide IoT spending at US\$737 billion in 2016 and predicted that it would grow at a compound annual growth rate of 15.6% to reach US\$1.29 trillion in 2020. The four market segments with the largest IoT investments in 2016 were manufacturing, transportation, utilities, and consumer items.⁴⁷ IDC Canada for its part predicted that the mar-

"As IoT solutions proliferate in every sector, connected objects will become a part of almost everything, just as the Internet has now seeped into all aspects of our economy and our lives."

ket for products and services related to the Internet of Things will total \$21 billion in this country by 2018.⁴⁸

As IoT solutions proliferate in every sector, connected objects will become a part of almost everything, just as the Internet has now seeped into all aspects of our economy and our lives. And all of these IoT systems will be able to gather information, analyze it, detect and control anomalies, predict behaviour, order actions, optimize production, etc., thanks to existing and

46. For more examples of how various sectors are being and will be impacted by the Internet of Things, see "Network Effects: The Promise and Pitfalls of the Internet of Things," Public Policy Forum, December 2016; IDC, *TELUS/IDC Internet of Things Study 2014: The Connected Canadian Business*, June 2014; OECD, Working Party on Communication Infrastructures and Services Policy, *The Internet of Things: Seizing the Benefits and Addressing the Challenges*, May 24, 2016.

47. "Internet of Things spending to reach US\$1.29 trillion by 2020, insurance industry to see fast spending growth: report," *Canadian Underwriter*, January 5, 2017.

48. Shane Schick, "IDC's Canadian IoT forecast makes the smartphone market look small," *IT World Canada*, May 15, 2014.

soon-to-be-deployed telecommunications networks, both wireline and wireless. Our whole economy will depend on telecommunications networks that support the Internet of Things.

Looking ahead, we can predict that there will be a gradual shift of focus in the telecommunications sector. At present, the focus is on the needs of customers, both individual and corporate, who want to buy telephony and Internet services. In the future, the focus will increasingly be on providing IoT platforms and integrated solutions to firms and governments. How will this new situation impact telecommunications policy?

Bad Policies Will Become Even Worse

In the first three annual editions of this *Research Paper*, we made the case that the best policies to bring about an optimal level of competition in the telecommunications sector were policies that let markets decide how many players, and which ones, should offer services.

“The rising importance of the Internet of Things reinforces our arguments against measures to prop up small players at the expense of strong facilities-based providers.”

More specifically, we argued against policies artificially encouraging the entry of new players, such as the government has pursued in the wireless sector with spectrum auction rules like set-asides for new entrants, and also against policies forcing former monopolies to share their wireline networks with competitors at regulated rates.

The justification for such policies, put forward by the federal government and the CRTC, was that more players in a market would improve the quality of services and bring about lower prices. That, however, is only the case when markets remain unfettered by government intervention, not when artificial competition is created by regulatory fiat.

The perverse effects of these policies in the wireless sector are that billions of dollars of investments were wasted and valuable spectrum went unused or was inefficiently allocated, as small companies propped up by government policies ended up being unable to effect-

ively compete and failed.⁴⁹ In the wireline sector, mandated sharing of networks props up small Internet service resellers that operate without making any significant infrastructure investments of their own (see Figure 4-2).⁵⁰

In the end, as we have argued, only competition between strong providers that use their own networks (“facilities-based competition,” in the telecom jargon) will bring about the necessary network investments, as well as the quality and lower prices that consumers want.

The rising importance of the Internet of Things shines a new light on all of these debates. Essentially, it reinforces our arguments against measures to prop up small players at the expense of strong facilities-based providers.

-The necessary investments in networks

There will be an enormous variety of IoT solutions and platforms, depending on the nature of the service involved. Some of these platforms, such as one operating within a home or a manufacturing plant, will rely on devices and sensors using unlicensed spectrum to communicate wirelessly over short distances, without necessarily connecting to the Internet. But as soon as data is sent outside of the local network, it will run on the networks of telecommunications providers. And many other objects, especially those that are moving, will connect directly to the Internet through a wireless or wireline connection.⁵¹

Although they currently account for a relatively small portion of global IP traffic (going from 2.18 % in 2016 to 4.5% by 2021),⁵² machine-to-machine connections are bound to take up an increasingly large share as their numbers explode in the years to come. The amount of traffic will also be growing faster than the number of connections “because of the increase of deployment of video applications on M2M connections and the increased use of applications, such as telemedicine and smart car navigation systems, which require greater bandwidth and lower latency.”⁵³

49. See in particular Chapter 2 of the 2014 edition of this *Research Paper*, “The Elusive Search for a Fourth Wireless Player.”

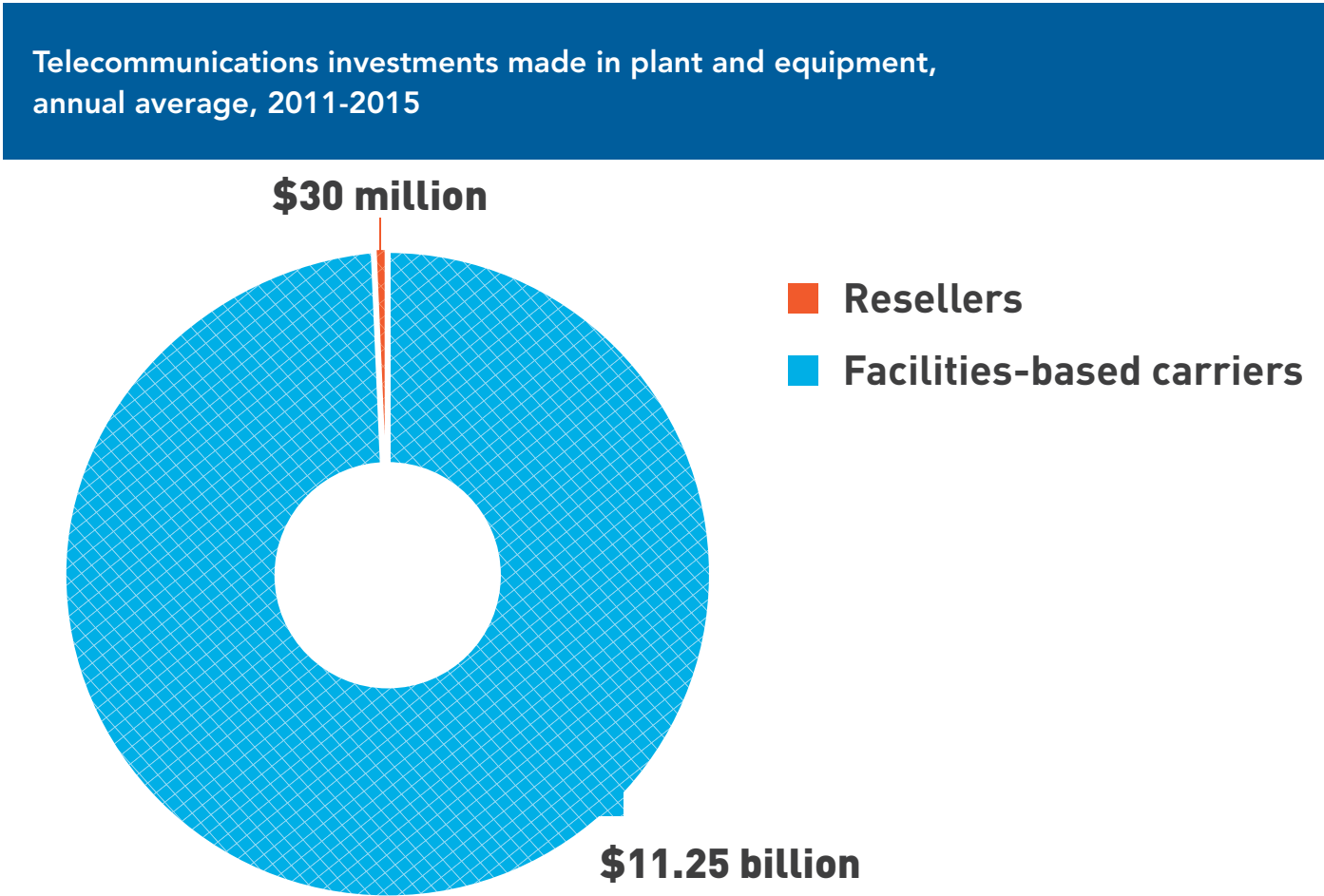
50. See in particular Chapter 4 of the 2016 edition of this *Research Paper*, “Facilities-Based Competition as a Spur to Innovation.”

51. Ericsson, “Cellular networks for massive IoT,” Ericsson White Paper, January 2016, pp. 3-4.

52. Cisco, VNI Mobile Forecast Highlights, 2016-2021, Global - Potential M2M Connections.

53. Cisco, *The Zettabyte Era — Trends and Analysis*, June 2, 2016, p. 12.

Figure 4-2



Source: CRTC, *Communications Monitoring Report 2016*, October 2016, Table 5.0.5: Telecommunications investments made in plant and equipment, by type of provider of telecommunications service, p. 212.

The next generation of wireless networks, 5G, is expected to make all kinds of IoT solutions easier to implement because of much faster speeds, reduced latency, and more flexible protocols for connections.⁵⁴ The previous generation, 4G or LTE, has been in use for less than a decade. The deployment of this new technology in Canada over the coming years will once again require billions of dollars in investments.

It is worth noting that the three new pure-play wireless players that benefitted from spectrum set-asides in the 2008 auction (Mobilicity, Public Mobile, and WIND) would be in an even more precarious competitive situation had they survived until now. They did not have the revenue stream to invest in and deploy 4G networks.

“Only these large national and regional providers have the means to invest in the wireline and wireless infrastructure that will be required to keep up with IoT developments.”

Their business model prevented them from offering triple- or quadruple-play offerings, including home telephony, Internet, and television services. Today, they would be unable to offer IoT solutions for the same reasons. Unfortunately, the federal government doesn't seem to have learned that lesson and is still attempting to

54. Jean-François Codère, “Le 5G : Vite, très très vite,” *La Presse*, April 1, 2017; Reinhardt Krause, “Why the race to wireless 5G? The Internet of Things,” *Investor’s Business Daily*, December 2, 2016.

promote the emergence of a new wireless player in Manitoba.⁵⁵

As shown in Figure 4-2, facilities-based telecommunications providers have been investing more than \$11 billion a year on average over the past five years in plant and equipment to upgrade their networks. Only these large national (Bell, TELUS, Rogers) and regional (Videotron, Shaw, Eastlink, SaskTel) providers have the means to invest in the wireline and wireless infrastructure that will be required to keep up with IoT developments.

-The management of networks

There has been a lot of talk in recent years about telecommunications networks turning into “dumb pipes.” Netflix, Facebook, Google, YouTube, and other applications and services offer content that users and advertisers are willing to pay for, while telecom providers simply provide the conduit. Net neutrality rules, which mandate that all bits of information be treated the same way, have reinforced this trend. In this kind of environment, a reseller of Internet services is more or less offering the same product as a carrier that owns a network.

The development of the Internet of Things will reverse this trend to some extent. Basic net neutrality rules stating that a carrier should not block or unduly slow down services are widely accepted. But how should a data packet sending crucial information about the position of a self-driving car be treated, compared with another one sending a cat video? What about an eHealth platform on which the survival of millions of patients depends? Or a platform monitoring a complex system of machines in a manufacturing plant?

The variety of cases will necessitate a variety of approaches regarding the treatment of packets of data circulating on the network.⁵⁶ Some prioritizing will have to happen in order to ensure the robustness and security of certain connections.

55. One of the conditions imposed by the government to approve the acquisition of MTS by Bell was the transfer of spectrum to Xplornet, a satellite and fixed wireless Internet provider with no involvement in the wireless telephony market. See the discussion of the Bell-MTS transaction in Chapter 2 of this *Research Paper*.

56. “IoT can be segmented into critical and massive applications. Critical IoT applications have stringent requirements on availability, delay and reliability; examples include traffic safety, automated vehicles, industrial applications and remote surgery in healthcare. Massive IoT, on the other hand, is characterized by a very large number of connections, small data volumes, low-cost devices and stringent requirements on energy consumption; examples include smart buildings, smart metering, transport logistics, fleet management, industrial monitoring and agriculture.” Ericsson, *Ericsson Mobility Report: On the Pulse of the Networked Society*, November 2016, p. 30.

At present, the CRTC recognizes that Internet service providers can legitimately use traffic management practices “to address temporary network capacity constraints and changing network conditions, as well as for service innovation.”⁵⁷ The development of the Internet of Things will bring to the fore a whole new set of situations in which it may be necessary to treat customers, devices, applications, or platforms differently. TELUS already has a dedicated enterprise network for M2M connections segregated from its consumer network for security reasons.⁵⁸

“The development of the Internet of Things will bring to the fore a whole new set of situations in which it may be necessary to treat customers, devices, applications, or platforms differently.”

These IoT policy issues are slowly emerging, but stakeholders and market players are already recognizing the need to adapt. Ericsson Canada president Mark Henderson noted that, “Traditional networks and their one-size-fits-all approach need to be adapted to the thousands of use cases and the many different subscriber types.”⁵⁹ The Information Technology Association of Canada expressed a similar view:

At present the view that “a bit is a bit is a bit” is pervasive and foundational to net-neutrality approaches to governance. On a network where a bit may carry a lifesaving drug dosage or the means to avert a terrorist attack as well as twitter feeds and video downloads, our governance protocol may require rethinking in exceptional cases where bottlenecks in the networks exist, typically rural and remote areas. This flies in the face of concerns around network neutrality, but we believe it is at least worthy of discussion.⁶⁰

Once again, only the carriers that own the infrastructure will be able to manage their networks so as to meet these complex needs. Resellers will have no role to play in this evolving market.

57. CRTC, *Review of the Internet traffic management practices of Internet service providers*, Telecom Regulatory Policy 2009-657, October 21, 2009, par. 36.

58. Peter Henderson, “Can carriers make the switch to become M2M service providers?” *The Wire Report*, March 25, 2014.

59. Christina Pellegrini, “Connectivity crunch looms as ‘Internet of Things’ rises, Ericsson Canada president says,” *National Post*, June 1, 2015.

60. Information Technology Association of Canada, *The Internet of Things: Time for a National Discourse*, August 2015, p. 6.

Conclusion

The Internet of Things is launching a fourth industrial revolution, and will help the Canadian economy become more efficient and competitive. But in order to fully reap the benefits of the IoT, Canadians need access to world-class networks.

"Ottawa should adapt its policies to the new IoT reality, so as not to hamper the tremendous positive impact it will have on Canada's economy."

Policies embraced by Industry Canada and the CRTC over the past decade aimed at propping up undercapitalized wireless players and broadband resellers not only failed to achieve their intended goals of increasing competition and improving quality of service; if pursued going forward, they may well slow down the development of the IoT and harm the Canadian economy.

A key component of the federal government's priorities is the so-called "Innovation Agenda." If it wants to "walk the walk" when it comes to innovation, it should stop fighting yesterday's regulatory battles. Instead, Ottawa should adapt its policies to the new IoT reality, so as not to hamper the tremendous positive impact it will have on Canada's economy.

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