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Rethinking Universal Service for the 21st Century and an All-IP World

Prepared by:
Dwayne Winseck, Ph.D.
Professor, School of Journalism and Communication, Carleton University and Director of the Canadian Media Concentration Research Project
dwayne.winseck@carleton.ca; 613 769-7587

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Mr. John Traversy, Secretary General
Canadian Radio-television and Telecommunications Commission
Ottawa, ON K1A 0N2

Submitted by the Canadian Media Concentration Research Project.

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Dwayne Winseck, Ph.D.
Professor, School of Journalism and Communication, Carleton University and Director of the Canadian Media Concentration Research Project
dwayne.winseck@carleton.ca; 613 769-7587

The Canadian Media Concentration Research Project (CMCR Project) is pleased to participate in the Commission's *Review of basic telecommunications services* (Telecom Notice of Consultation CRTC 2015-134). CMCR Project requests to appear at the public hearing scheduled for April 11, 2016 in Gatineau, Quebec.

Executive Summary

The CRTC's review of basic service offers a valuable opportunity to revisit a conception of universal service that was forged last century when plain old telephone service (POTs) and broadcasting ruled. This proceeding offers an historic opportunity to reshape the basic service obligation (BSO) to reflect the emergence of an all-IP world, and the prominent role of the public Internet in the daily lives of Canadians. In our view, the goal of the CRTC should be to replicate the achievements of POTs-based universal service for a broadband-centric world, but with an essential difference: whereas POTs was relatively simple and mostly about voice telephony, high-speed broadband, in contrast, is a general purpose telecommunications network that supports an ever-expanding variety of activities, applications and media types that connect hundreds of millions of people around the globe, often in real time.

As such, revisiting the BSO is not just about telecoms policy but internet policy, media policy, cultural policy and socio-economic policy as well, all rolled into one. Reshaping the BSO for the digital era will require a great deal of effort and imagination applied not merely to new technical arrangements among network operators, but also to new ways of considering and promoting the welfare of individual Canadians, not just broadband adopters, but non-adopters as well.

Recommendations

I. The Commission has the power to bring in substantial BSO reform under the Telecommunications Act. It must use this power.

II. We strongly urge the Commission to move beyond its tendency to focus on availability to give greater weight to adoption, affordability, speed and how people actually use broadband.

III. We strongly encourage the Commission to expand universal basic service to include, at a miniumum, high-speed broadband of between 25 and 30 Mbps over the next five years.

IV. We strongly urge the Commission to phase out data caps, failing which to set a data cap floor of around 200 GB per month for households with multiple users to meet the projected use of the average Canadian household in 2020 (Cisco, 2015).[1] For individual subscribers, a useful target for data caps might be roughly 90-100 GB per month, again to meet projected demand. The Commission might also draw on suggestions that users be allocated 200GB caps per month for *peak* use, and *unlimited* use thereafter, as a guide.[2] As a general principle, broadband service should be differentiated on the basis of speed, price, customer service and other factors, not usage. Unlimited usage at different levels of speed and price points should be as much a part of a universal service for broadband as it was when POTS was the norm.

V. As revenues from POTS continues to decline, the Commission should expand the range of services that contribute to the National Contribution Fund to include retail Internet access revenues, with a general levy on all broadband carriers adopted that is equal to the estimated cost of meeting these new standards.

VI. The Commission needs to develop better methods to monitor the services covered by the BSO and to do so more frequently and comprehensively.

VII. Lastly, we encourage the Commission to work with Industry Canada and the federal government to develop a more coherent policy agenda so that they do not work at cross-purposes.

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[1] Cisco (2015). http://www.cisco.com/web/solutions/sp/vni/vni_forecast_highlights/index.html
[2] Sandvine (2013). *Global Internet Phenomenon Report*., p. 5. http://www.sandvine.com/downloads/documents/10-26-2011_phenomena/Sandvine%20Global%20Internet%20Phenomena%20Report%20-%20Fall%202011.pdf

Universal Service and the Broader Broadband Policy Agenda

1. Policy makers have debated for over 100 years how best to achieve universal telecommunications service. They have relied on many tools in pursuing that goal: competition, cross-subsidies, price-cap regulation, forbearance, encouraging investment, removing barriers that restrict broadband initiatives and so on. People have also agitated for such goals for twice that long, starting with the post office, then POTs, libraries, broadcasting and, of course, the Internet today.

2. The goal of the U.S. Post Office, for example, was to bring "general intelligence to every man's [sic] doorstep", while also serving as a heavily subsidized vehicle for delivering newspapers from one city to another across the country with the aim of helping the nation's journalism flourish. It largely worked. Universal postal policy, in other words, was also press, information, social and economic policy all rolled into one.[3] People in Canada and the U.S. also pushed hard to transform the telephone from a luxury good and tool of commerce and government into a social necessity, and a popular means of interpersonal communication.[4]

3. In an all-IP world, universal service might build upon this history by not only bringing general intelligence to every citizens' doorstep but by helping to make that doorstep the perch from which they can see and speak to the world. Indeed, the original arguments for universal service made for POTs (as well as for mail, libraries, radio, etc.) remain valid today, and have acquired even more significance with the expansion of high-capacity networks as well as the evolution of social needs in light of these capabilities. While establishing the appropriate level of adoption might be difficult, the OECD, for instance, points to the highpoint of wireline POTS penetration levels as a proxy for desired levels of broadband adoption.[5] As Chairman Wheeler of the FCC in the United States is fond of stating, neither the concept of broadband nor universal service is static; both must be continuously reevaluated in light of emergent "advanced telecommunications services" as well as people's needs.[6]

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[3] John, R. (2010). *Network Nation: Inventing American Telecommunications*. Cambridge, MA: Harvard University Press. *Business History*, *53*; Starr, P. (2004). *The Creation of the Media*. New York: Basic Books.

[4] MacDougall, R. (2014). *The People's Network: the Political Economy of the Telephone in the Gilded Age*. Philadelphia: University of Pennsylvania; Pike, R. & Mosco, V. (1986). Canadian Consumers and Telephone Pricing: From Luxury to Necessity and Back Again?" *Telecommunications Policy*, *10*(1), 17-32.

[5] OECD (2012). Universal Service Policies in the Context of National Broadband Plans. p. 21.

[6] Wheeler (2015). Prepared remarks of FCC Chairman Tom Wheeler http://transition.fcc.gov/Daily_Releases/Daily_Business/2015/db0626/DOC-334141A1.pdf; FCC (2015). Broadband Progress Report, paras 3, 20, 45-49

4. There are many rationales to support the adoption of universal service policies, but some concerns about the potential consequences of doing so also exist. Recent international reviews by the OECD and the Broadband Commission, for instance, identified the following rationales for universal service: (1) economic benefits for individuals and the economy in terms of greater productivity, economic growth, competitiveness, potential energy conservation, regional and rural development, and the development of new information services; (2) network effects whereby the value of a network for all who use it increases the more people and services are connected; (3) greater access to education and informational resources; (4) mitigating social exclusion; (5) enhancing people's ability to exercise their social and political rights; (6) ameliorating the impact of income inequality, location, gender differences and physical ability on people's quality of life; and (7) ensuring contact with emergency services.[7] Reza Rajabiun and Catherine Middleton make similar points in relation to Canada, while Gerard Goggin does the same in relation to Australia and mobile phones.[8]

5. There are also several potential pitfalls associated with the pursuit of universal service, including (1) the high cost of providing universal service; (2) interference with market forces that could deter network development; (3) reinforcing the dominance of incumbents by requiring others to finance their network expansion in underserved areas; and (4) the need to be "future proof" so as not to lock in developments down the road into the standards of today.[9]

6. Given the cross-cutting potential benefits and consequences, there is no one-size-fits-all approach to universal *access* or universal *service* policies (the distinction is vital, as we explain further below). However, one thing they have in common is the impressive number of national broadband plans that have been put into place in recent years, especially in response to the global financial crisis (2007-8) and its economic depressing aftershocks ever since. In fact, the number of national broadband plans adopted around the world quadrupled between 2007 and 2013, from 38 to 134.[10]

7. Three threads appear to unite these planning efforts: a stress on broadband *availability* (access), big budgets, and the concerted nature of the efforts taken by governments. The Australia broadband plan, for instance, calls for investments of

[7] OECD (2012), pp. 8-9; Broadband Commission, 2014, *State of Broadband*, p. 44.
[8] Rajabiun, R., & Middleton, C. (2013). Rural Broadband Development in Canada's Provinces: An Overview of Policy Approaches. *The Journal of Rural and Community Development*, *8*(2), 7-22; G. Goggin (2014). New ideas for digital affordability: Is a paradigm shift possible? *Australian Journal of Telecommunications and the Digital Economy*, *2*(2).
[9] OECD, 2012, pp. 17-18.
[10] Broadband Commission, 2013, *State of Broadband*, p. 41.

USD $34 billion to achieve 100% geographic coverage, with 93% at 100 Mbps and 7% at 12 Mbps, by 2020. New Zealand has a similar approach, allocating USD $1.3 billion to achieve 99% coverage, with 100 Mbps connections available to 75% of urban households, and the rest by wireless at 5 Mbps by 2019. The U.S. National Broadband Plan allocated $7.2 billion over and above its well-funded universal service fund to make 100 Mbps broadband available to 95% of American homes by 2020.

8. Some EU countries have even more aggressive targets than Australia, New Zealand, and the United States. Denmark, for instance, aims to bring 100 Mbps broadband to 100% of all households by 2020. Finland is striving to do the same by 2016. Germany's plan calls for 50 Mbps to 75% of households by 2014, while Sweden's plans call for 100 Mbps to 40% of households by 2015, and 90% by 2020.[11] The EU-wide plan calls for all citizens to have access to 30 Mbps by 2020, and for 100 Mbps broadband to be available to at least half of all households by 2020. The costs to achieve such targets are substantial but vary widely from $50- to $350-billion USD depending on the goals in question.[12]

9. By contrast, the Government of Canada's broadband plan, as outlined in *Digital Canada 150* (released in 2014), states that Canada will spend $305 million on rural broadband over the next 5 years to achieve 98% access to broadband at only 5 Mbps by 2019.[13] This initiative follows on $225 million earmarked five years earlier to achieve similarly modest goals. Such efforts pale by international comparisons. They also fall short of MTS's estimates during the CRTC's last BSO review that there were about 700,000 households without access to broadband – more than three times the Government's figure. "Closing the coverage gap over 10 years", MTS continued, "[would] cost approximately $700 million per year", or $7 billion altogether.[14] Nothing close to that has happened.

10. Whatever stance governments take generally reflects a broader policy agenda and political climate. The U.S. government, for example, is currently promoting universal broadband to advance a wide range of "healthcare, education, energy, government performance, civic engagement and public safety" objectives.[15] The policy agenda in the EU is focused on the digital economy *and* society, and

[11] Broadband Commission, 2013, p. 56; EC (2012) National Broadband Plans; OECD, 2012; Benkler, Yochai, Faris, Rob, Gasser, Urs, Miyakawa, Laura, & Schultze, Stephen. (2010). *Next generation connectivity*. Cambridge, MA: Berkman Center for Internet & Society. http://cyber.law.harvard.edu/publications/2010/NextGenerationConnectivity p. 231)
[12] EC, 2012, p. 8; OECD, 2012, p. 23.
[13] http://www.digitaleconomy.gc.ca/eic/site/028.nsf/vwapj/DC150-EN.pdf/$FILE/DC150-EN.pdf
[14] CRTC 2010-43, paras 1609, 1625.
[15] OECD, 2012, p. 73.

consists of five pillars: 1) Connectivity (wireline and mobile, speed *and* affordability); 2) human capital (basic and advanced skills development); 3) Internet use; 4) business integration of digital technology; and 5) Digital Public Services (eGovernment and eHealth).[16] The Korean government has planned universal service in relation to the broader policy of the informatization of the Korean economy and society, its macro-level approach to economic and social development.[17]

11. Certain agreed criteria are also used to determine the general scope and function of universal service. The scope of universal service in the U.S., for instance, depends on four criteria: 1) whether a service is essential in relation to education, public health or public safety; 2) whether it has been widely adopted by residential users in the market; 3) whether it is widely offered by carriers; and 4) whether including the service meets the broad public interest, convenience and necessity standard that has been a cornerstone of U.S. communications policy since the 1930s. In Korea, planning turns on the general state of communication technology development; promoting the adoption and use of telecommunications services; the public interest and security; social welfare considerations; and promoting the "informatization" of Korean economy and society.[18] The more general questions are whether broadband will be included within the scope of universal service, the role of mobile wireless within this context, and how to fund the goals once established.

12. Ultimately, the scope of universal service policies do not turn on policy agendas, technical criteria or economic matters alone but politics, and the normative views that decision-makers hold regarding the relationship between markets and society, and the communication rights of citizens. While economics, technology, regulation and law are crucial, discussions about universal service are also discussions about communication, fundamental rights and democracy by another name. That this is so can be seen in current debates over whether some level of universal basic broadband service should be part of fundamental legal, constitutional or human rights.[19] Some dismiss the idea of a right to affordable access to broadband Internet service as a cloud of high-minded rhetoric. One of the Internet's founding fathers and Chief Internet Evangelist at Google, Vint Cerf, for example, condemns

[16] EU, 2015, Connectivity, slide 1.
[17] OECD, 2012, p. 14.
[18] OECD, 2012, pp. 13-14.
[19] OECD, 2012, p. 8.

such ideas.[20] So, too, has Michael O'Reilly, one of the two Republican appointees to the FCC, among others.[21]

13. Popular opinion worldwide, however, supports the idea strongly that universal broadband service should be part of fundamental constitutional or human rights.[22] Several countries have also established basic broadband service as part and parcel of citizens' communication rights under their constitutions or specific laws to this effect: e.g. Brazil, Costa Rica, Estonia, Finland, France, Greece, and Spain. Finland set out a 1 Mbps broadband connection in such term in 2011, for instance, with the threshold to evolve into a 100 Mbps threshold by 2016.[23] The EU's 2009 *Regulatory Framework for Electronic Communications Networks and Services* "recognizes that the Internet is essential for education and for the practical exercise of freedom of expression and access to information".[24]

14. Telecommunications and broadband are consequently not only brought within the ambit of universal service but cast within the scope of Article 10 of the *European Convention on Human Rights* on freedom of expression:

> Everyone has the right to freedom of expression. This right shall include freedom to hold opinions and to receive and impart information and ideas without interference by public authority and *regardless of frontiers*.[25]

15. Globally, the *Report of the Special Rapporteur on the Promotion and Protection of the Right to Freedom of Opinion and Expression* by Frank La Rue for the UN Human Rights Commission made the case in 2011 for Internet access and freedom of expression on the Internet as a basic human right covered by Article XIX of the *Universal Declaration of Human Rights* which, in∂cidentally, McGill University law professor John Humphreys played a lead role in drafting in the 1940s.[26] The next year the U.S. and Sweden sponsored a resolution passed by

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[20] V. Cerf (January 4, 2012). Internet access is not a human right. *New York Times*. http://www.nytimes.com/2012/01/05/opinion/Internet-access-is-not-a-human-right.html?_r=0

[21] O'Reilly, M. Remarks Before the Internet Innovation Alliance "What is the Appropriate Role for Regulators in an Expanding Broadband Economy?" June 25, 2015. http://transition.fcc.gov/Daily_Releases/Daily_Business/2015/db0625/DOC-334113A1.pdf.

[22] BBC (2010). Four in Five Regard Internet Access as a Fundamental Right: Global Poll. http://news.bbc.co.uk/2/shared/bsp/hi/pdfs/08_03_10_BBC_Internet_poll.pdf; Internet Society (2012).*Global Internet user survey* https://www.Internetsociety.org/sites/default/files/GIUS2012-GlobalData-Table-20121120_0.pdf

[23] OECD, 2012, p. 9.

[24] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:337:0037:0069:EN:PDF

[25] *italics added*, https://ec.europa.eu/digital-agenda/sites/digital-agenda/files/Convention_ENG.pdf

[26] La Rue, F. (2011). *Report of the Special Rapporteur on the promotion and protection of the right to freedom of opinion and expression*, Human Rights Council Seventeenth session Agenda item 3,

the UN Human Rights Council reaffirming the applicability of Article XIX to the Internet and that "call[ed] upon all States to promote and facilitate access to the Internet".[27]

16. Seen in the context of these considerations, current Canadian government policy and the CRTC's existing BSO are hardly ambitious. To the extent that there is a policy, it is more by way of a universal *access* policy rather than a universal *service* policy. An access policy merely requires that all citizens have access to the service provided, whereas a service policy strives to ensure an acceptable, affordable and relatively equal level of service for all Canadians. In addition, there has thus far been no discussion in Canada of broadband as an intrinsic part of people's fundamental communication rights.

17. Some other countries take a similar stance to Canada's, such as Australia, Korea, Japan, New Zealand and the UK. However, these countries' stance tends to be backed by expansive universal *access* projects, with funding to match. Other countries have explicitly included broadband into their universal service policies, as is the case with the U.S., Israel, Finland, Malta, Spain and Switzerland. Some have rejected both options but pursued similar goals through their commitments to EU-wide telecommunications goals and/or national industrial policies. The latter are well-represented by Denmark, Germany, Ireland, Netherlands and Norway, for example. In Canada, by contrast, there is no universal broadband Internet service framework; a weak access framework (i.e. incomplete reach and low target speeds); and only very modest levels of federal funding for broadband deployment.

CRTC 2011-291: the Commission's Last Review of the BSO

18. The last time the Commission addressed the issues discussed above, it adopted a narrowly drawn conception of the BSO. The scope of universal service was restricted to POTs and some associated services, while broadband was explicitly excluded. In terms of scope, the BSO was defined as follows:

19. Individual line local Touch-Tone service; access to low-speed Internet at local rates; access to the long distance network and to operator/directory assistance services; enhanced calling features, including access to emergency services,

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A/HRC/17/27 of 17 May 2011 at
http://www2.ohchr.org/english/bodies/hrcouncil/docs/17session/A.HRC.17.27_en.pdf

[27] UN Human Rights Council (2012). *Promotion and protection of all human rights, civil, political, economic, social and cultural rights, including the right to development*, http://ap.ohchr.org/documents/E/HRC/d_res_dec/A_HRC_20_L13.doc

voice message relay service, and privacy protection features; and a copy of the current local telephone directory (para 7).[28]

20. In addition to restricting the scope of the BSO, the Commission limited its reach in that it applied only to regulated exchanges. The upshot was to limit the reach of an already narrow conception of the BSO to just 20% of telephone lines (representing roughly a quarter of local telephone revenues).[29] The concept did not apply to four-out-of-five Canadians at all. Moreover, since "the majority of [regulated exchanges] are in rural and remote areas",[30] this also meant that achieving universal service was seen mainly as a problem of geography rather than income and affordability, and as an issue that affects big cities just as much as small towns and rural areas.

21. During the 2010 public hearing, MTS, SaskTel, PIAC and some small ILECs, among others, argued that market forces alone would not be enough to achieve the BSO and that it should apply to all exchanges.[31] The Commission decided otherwise, concluding "wireline and wireless competition in forborne exchanges is sufficiently pervasive that it is no longer necessary or appropriate to retain the basic service objective in order to protect the interests of consumers."[32]

22. The Commission's decision to exclude broadband Internet from the scope of the BSO is the other most significant feature of 2011-291. Although some ILECs argued that the Commission was not empowered to include broadband,[33] the Commission rejected this argument. In other words, the Commission considered that it does have the power under the *Telecommunications Act* to include broadband within its universal service policy, whereas it chose not to do so on the grounds that "market forces and targeted government funding will continue to drive the rollout and improvement of broadband Internet access services in rural and remote areas."[34] While placing its faith in market forces, the Commission rejected the idea that universal service was limited to services where a monopoly existed (fn 33).

23. While declining to fold broadband Internet access into the basic service obligation, the Commission did set a universal target speed for broadband Internet access of a minimum of 5 Mbps download and 1Mbps upload. It also required that these

[28] CRTC 2011-291 (para 63), (fn 33).
[29] CRTC, *Communications Monitoring Report 2011*, Table 5.2.2.
[30] CRTC, 2011-291, para 41.
[31] CRTC, 2011-291, para 34.
[32] CRTC, 2011-291, para 1.
[33] M.H. Ryan, Memorandum of Opinion to Bell Canada regarding TNC 2010-43 – Obligation to Serve, April 26, 2010.
[34] CRTC 2011-291, para 63.

speeds should be available to all Canadians by 2015.[35] In order to get a better view of what the Commission had in mind with respect to broadband use at the time, it is worth quoting its decision on this point at length:

> Canadians should have access to a broadband Internet access that allows *several users* in one household to use the WWW (alpha-numeric text, images, and small video files), voice over Internet Protocol services, and other online services (such as email and banking) over a single connection at the same time.
>
> [B]roadband Internet access should allow a *single user* to stream higher quality audio and video and to participate in video conferencing at reasonable quality using online services. Distance learning and professional consultations, e.g. e-health.[36]

24. The CRTC also took a modest look at international trends to inform its decision on the speed target. Its main point of reference appears to have been the FCC's 2010 target of 4 Mbps download and 1 Mbps upload for all Americans by 2020. By this measure, the Commission's target was more aggressive than that of its U.S. counterpart insofar as the speed threshold adopted was 1 Mbps faster, and the timeframe for achieving it five years shorter. In sum, the CRTC sought a realistic target that also reflected a set of then current Internet uses. Aware that such targets could not be fixed for any length of time, however, the Commission indicated it would take an evolutionary view of the issues and revisit the targets if and when necessary.

25. It is important to step back and distill the main principles that appear to have underpinned the Commission's decision, six of which stand out:

i. It had the authority to include broadband Internet access and set target speeds within its universal service framework;
ii. It had to look at what ISPs and the market were already making available and what was just over the horizon;
iii. Broadband policy was not just telecommunications policy but media, culture, social and economic policy all rolled into one;
iv. Whatever standards of universal service and speed are adopted have to match what people are doing with broadband and evolve with them;
v. International trends are important;

[35] CRTC 2011-291, p. 2.
[36] CRTC 2011-291, paras 74-75, 80, fn 39.

vi. The scope and specific dimensions of universal service need to be revisited from time to time and changed if and when necessary.

26. Although these principles can usefully inform the current review, we have a number of concerns over changes that need to be made to the BSO framework to better align basic service with the current realities of the marketplace.

Missed Opportunity

27. The decision not to formally expand the BSO beyond the standard of POTs set in the 20th century was a missed opportunity. It established a frugal conception of universal access. It is probably most like Australia's parsimonious definition of "reasonable access" as "equitable [access] to a standard telephone service for the purpose of voice communication, payphones and prescribed carriage services".[37] The big difference between the two, however, is that the Australian standard is firmly nested within a broader policy agenda to build a "future proof", fibre-based, wholesale access network that will be available to *all* citizens.[38] In other words, not only does the BSO established by the Commission in 2011 adopt a weak standard of universal *access*, but key pieces of a larger policy agenda – and resources -- are missing.

28. Lastly, other than a single reference to the word "freedom" couched in concerns with consumer choice,[39] the discourse of communication rights, freedom of speech and democracy were missing in action. Any mention of how Canadians might think of such matters in relation to the *Charter of Rights and Freedoms*, let alone Article XIX of the *Universal Declaration of Human Rights*, was nowhere to be found. The current review offers an excellent opportunity to redress this omission by going beyond invocations of consumers to specifically refer to the fundamental communication rights of *all* Canadian citizens.

Misplaced Faith in Market Forces

29. The Commission's faith in "market forces" at the last BSO review was also arguably excessive – a concern that was raised by several interveners at the time. As MTS stated, "the hands-free approach that some parties are suggesting will bridge the access gap […] will simply not happen."[40]

30. In the time that has passed, the CRTC – and government policy in general – appears to have become less enthralled with existing markets for both wireline and mobile wireless Internet access. The Commission's wholesale wireline services

[37] OECD, 2012, p. 10.
[38] Except 10% of the population that will be served by a combination of technologies at 12 Mbps minimum speeds.
[39] CRTC, 2011-291, para 71.
[40] CRTC, 2010-43, para 1602.

decision released since the initial round of submissions for the current proceeding were due has only confirmed this point.

31. On the basis of standard measures of concentration, Canadian wireline markets are highly concentrated, both according to the CR4 measure (85%) and the HHI 3150, for instance.[41] The residential Internet access market is basically a duopoly, with 92% of residential Internet subscribers using either the incumbent cable or telecom companies for Internet access – a figure that has stayed relatively stable over the years but which may have ticked upwards slightly in recent years on the basis of our data.[42]

32. The Commission's recent Wholesale Wireline Services decision (2015-326) adds weight to these basic indicators of concentration, concluding that "incumbent carriers continu[e] to dominate the retail Internet access services market.[43] It also concluded that "there is limited rivalrous behaviour to constrain upstream market power" and, furthermore, that whatever "competition that does exist today is . . . a result of regulatory intervention".[44] It also rejected claims that wireless Internet access is an acceptable substitute for wireline facilities on the grounds of significant disparities in terms of price, speed, capacity and quality.[45]

33. Stubbornly high levels of concentration continue to define mobile wireless markets in Canada as well. Whether measured by revenue, spectrum held, spectrum in use or subscribers, whether at level of the country as a whole, specific provinces or Canada's nine biggest cities – e.g. Toronto, Montreal, Vancouver, Ottawa-Gatineau, Calgary, Edmonton, Quebec City, Winnipeg, Hamilton – mobile wireless markets in Canada are remarkably concentrated. In fact, the mobile wireless market has continued to be highly concentrated despite four new entrants having survived joining the field since 2008: Wind, Videotron (Quebecor), Eastlink and Public.

34. According to the Canadian Media Concentration Research Project's 2013 data, Rogers, Bell and Telus accounted for 94% of the market on the basis of revenue.[46] According to the CRTC, Rogers, Bell and Telus had 90% market share by subscriber share in 2013, or 91% by revenue.[47] While the 2014 data is yet to be finalized, our preliminary analysis suggests that concentration levels have ticked

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[41] CMCR Project (2014). Media and Internet Concentration in Canada. http://www.cmcrp.org/2014/11/26/media-and-Internet-concentration-1984-2013/.
[42] CRTC, CMR, p. 186. CMCR Project (2014).
43 CRTC (2015), Review of wholesale wireline services and associated policies para 125. http://www.crtc.gc.ca/eng/archive/2015/2015-326.pdf
[44] CRTC, 2015-326, para 123.
[45] CRTC, 2015-326, paras 122 & 126.
[46] CMCR Project (2014). Media and Internet Concentration in Canada. http://www.cmcrp.org/2014/11/26/media-and-Internet-concentration-1984-2013/.
[47] CRTC, CMR, pp. 213-214.

upward slightly to 95.4%. The mobile wireless market is also highly concentrated on the basis of the Herfindahl-Hirschmann Index: 2822 in 2013 and slightly up to an estimated 2916 for 2014.

35. Canada is not unusual in this regard, and indeed no matter whether we look at things from the perspective of revenues, subscribers, provincially, locally or around the world, the answer is pretty much the same: concentration in these markets is "astonishingly high everywhere".[48] The main difference between countries is whether or not regulators do anything about this state of affairs. Recent indications are that both the CRTC and the Canadian Government have begun to address such realities.

36. Indeed, the Commission was forthright in the *Regulatory Framework for Wholesale Mobile Wireless Services decision*, finding that:

    i. there has been very little change in retail market shares (either by revenue or by number of subscribers) in Canada in the past five years, despite entry into the market by several wireless carriers;[49]
    ii. the barriers to entry into the retail market are very high and the likelihood of new entry in the short to medium term is low;[50]
    iii. Rogers, Bell and Telus collectively possess market power in the national market for GSM-based wholesale roaming;[51]
    iv. "there is no rivalrous behaviour between the national wireless carriers in the provision of GSM-based wholesale MVNO access at a national level",[52] and Bell, Rogers and Telus "collectively possess market power in the national market for GSM-based wholesale MVNO access"[53]

37. The upshot of the recent wholesale wireline and mobile wireless decisions, respectively, is that questions of market concentration and market power are not just conjecture but legal findings of fact. Moreover, the CRTC has begun to act on these findings through the implementation of its wholesale wireline and mobile wireless services frameworks. These realities forcefully undercut the faith in

[48] Noam, E. M. (2013). Who Owns the World's Media? (2013). Columbia Business School Research Paper No. 13-22. Paper presented to the 41st Research Conference on Communication, Information and Internet Policy of the Telecommunications Policy Research Conference, George Mason University School of Law, Arlington, Virginia. http://dx.doi.org/10.2139/ssrn.2242670
[49] CRTC, 2015, Regulatory Framework for Wholesale Mobile Wireless Services decision (2015-177), para 35.
[50] CRTC, 2015-177, para 72.
[51] CRTC, 2015-177, para 74.
[52] CRTC, 2015-177, para 86.
[53] CRTC, 2015-177, para 88.

market forces that permeated the last review of the BSO and ought to be reflected in the outcomes of the current proceeding.

38. These recent steps add to many measures taken by the Commission, and the federal government, in the last several years that point in a similar direction: e.g. adoption of the National Wireless Code;[54] a review of international roaming charges;[55] the relaxation of foreign ownership rules "for companies that have less than a 10 percent share of the telecommunications market";[56] the government's rejection of Telus' bid to acquire Mobilicity in June 2013;[57] the spectrum set aside rules for new entrants in the 700 MHz spectrum auction.[58]

39. Lastly, the Commission's NorthWestel Modernization decision made several important determinations that directly link the point of market concentration to the heart of the BSO review.[59] Of particular importance in the decision is the Commission's finding that the lack of competition in Northwestel's markets for retail Internet service justified the adoption of retail Internet price regulation.[60] Second, it highlighted the broad scope of the CRTC's authority when it comes to ensuring that Canadians have access to Internet services. Third, it determined that retail satellite Internet service was not an effective competitive option to wireline Internet because the rates for these services are generally "more expensive than terrestrial retail Internet rates for comparable speeds. Moreover, speeds are much lower and latency issues have a significant negative impact on the quality and delivery of real-time services".[61]

40. The general findings regarding market concentration and the abuse of market power suggests that some kind of regulated retail Internet prices for a basic level of high-speed broadband Internet access, at whatever speed target that the Commission decides are appropriate, should be actively considered. At the least, the conclusions reached by the Commission on these questions are fundamentally at odds with the expressions of faith that underpinned its belief in "market forces"

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[54] CRTC (2013b). *National Wireless Code*. http://www.crtc.gc.ca/eng/archive/2013/2013-271.htm
[55] CRTC (2013a). *International Roaming.* http://www.crtc.gc.ca/otf/eng/2013/8620/c12-201312082.htm
[56] Canada (March 14, 2012). Harper Government Takes Action to Support Canadian Families. http://www.ic.gc.ca/eic/site/064.nsf/eng/07089.html
[57] Canada (June 4, 2013). Harper Government Protecting Consumers and Increasing Competition in Canadian Wireless Sector. http://news.gc.ca/web/article-eng.do?nid=746949
[58] Industry Canada (June 2013). Framework Relating to Transfers, Divisions and Subordinate Licensing of Spectrum Licences for Commercial Mobile Spectrum. http://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/dgso-003-13-transfer.pdf/$file/dgso-003-13-transfer.pdf
[59] CRTC 2013, *Northwestel In: Regulatory Framework, Modernization and related matters*. http://www.crtc.gc.ca/eng/archive/2013/2013-711.pdf
[60] CRTC, 2013, para 201.
[61] CRTC, 2013, paras 211-212.

in the last BSO decision. It is also crucial to underscore a point that the Commission itself has made repeatedly in recent decisions: wireless services are no substitute for wireline broadband Internet service.

Restoring the End-User Perspective in Broadband Policymaking

41. While many parties may agree on the general need to make broadband Internet access a part of basic universal service, there is still a great deal of disagreement over what kind of broadband Canadians should get and how success in achieving broadband policy aims should be measured. The research that we review below illustrates that Canada performs well on the measure of *availability*, but continues to perform poorly compared to most of the developed world on three other critical broadband variables: penetration, speed and pricing. The problem is not just that 20% or more of Canadians do not have broadband Internet access at home, or that those who do have to put up with relatively slow speeds and high prices, however. The more fundamental problem is that federal policy makers, including those at the Commission, have focused mostly on supply-side issues where Canada tends to do well (i.e. availability), while neglecting demand-side issues (i.e. adoption, affordability and use).

Availability versus Adoption

42. In our view, it makes neither policy sense nor common sense to gauge Canada's broadband Internet standing by pointing to the percentage of the overall population that *could* be on the Internet at home if they so chose. Canadians cannot make meaningful use of the Internet or any of its potential if they are not on the Internet in the first place. Adoption and use are at least as important as availability and access, and arguably much more so, but this is not reflected in either current CRTC or government policy.

43. Perhaps policy makers focus on availability versus adoption because Canada generally fairs well in terms of international rankings with respect to sheer broadband availability across a range of speeds. Canada, the US and the EU all have close to 100% coverage for basic broadband (≥1.5 to 2 Mbps), for example. Access to high-speed broadband of at least 30 Mbps in Canada (80% population coverage) and the U.S. (85%) is higher than the European Union average (68%) – although 15 out of 28 EU countries have levels of access that meet or exceed levels in Canada: i.e. Austria, Belgium, Cyprus, Denmark, Estonia, Germany,

Hungary, Iceland, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Portugal and the UK.[62]

44. For ultrafast broadband above 100 Mbps, between six- and seven out-of-ten households in Canada and the US, respectively, have access to such speeds compared to nearly half in the EU, reflecting the stronger legacy of competition between the incumbent telcos and cablecos in North America compared to most, but not all EU countries (Belgium, the Netherlands and Denmark are important exceptions).[63] These positions are reversed, however, when it comes to next generation fibre-to-the-premise (FTTP), where the EU leads by a wide margin, with FTTP available to one-in-five premises (19%) versus less than one in 30 in Canada (2.9%), and roughly one in fourteen in the U.S. (7.6%).[64]

45. In the mobile wireless sector, 4G LTE networks were available to four-out-of-five Canadians in 2013, and an estimated 86% last year.[65] Coverage had been significantly greater than the EU average in recent years, but by the end of 2014 the gap between Canada and the EU had largely vanished. Such networks were available to four-out-of-five citizens in the EU's 28 member states at the end of 2014. Higher levels were reached in Germany and Finland (92%), Ireland (87%) and the UK (84%). The U.S. (98%), Denmark and Sweden (99%), and the Netherlands (100%) top the ranks, although it is likely that the gap between all of these countries and Canada will be transitory and dissipate within the next few years.[66]

46. For all that success in access is important, however, Canada continues to do poorly in terms of wireline and mobile wireless adoption (or *penetration*). In wireline broadband, we consulted the relevant OECD data to create a time series on penetration for the years 2005, 2010, 2012 and 2014 (see Appendix, Table

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[62] CRTC (2014). *Communications Monitoring Report 2014*, Table 5.1.6; EU (2015) *Connectivity: Broadband Developments in the EU*, slide 9; NTIA & FCC (2015). *Broadband Statistics Report*, p. 4

[63] CRTC (2014). CMR 2014, Table 5.3.16; EU (2015) Connectivity, slide 9; NTIA & FCC (2015), p. 4. The US comparison uses 25 Mbps, which most closely matches the 30 Mbps threshold used in EU reporting. FCC (2015). Broadband Progress Report, p. 77, fn 455.

[64] CRTC (2014). CMR 2014, Table 5.1.6; EU (2015) *Broadband Coverage as of end of 2014*. http://ec.europa.eu/newsroom/dae/document.cfm?action=display&doc_id=11196; NTIA & FCC (2015). *Broadband Statistics Report*, p. 4. US and EU data is for 2014, while Canadian date is for 2013. Using year-over-year growth for IPTV as a proxy for FTTH growth, this would give an estimated rate of 4.2% penetration for FTTH in Canada in 2014.

[65] CRTC (2014). *Communications Monitoring Report 2014*, p. 207. Telus, Bell and Rogers claim to have 4G LTE network coverage of 89%, 86% and 84%, respectively, by the end of 2015. Bell (2015). *Annual Report*, p. 9; Telus (2015). *Annual Report*, p. 16; (2015). Rogers (2015*). Annual Report*, p. 50.

[66] EU (2015) *Connectivity: Broadband Developments in the EU*, slide 12; FCC (2015). *Broadband Progress Report*, p. 66.

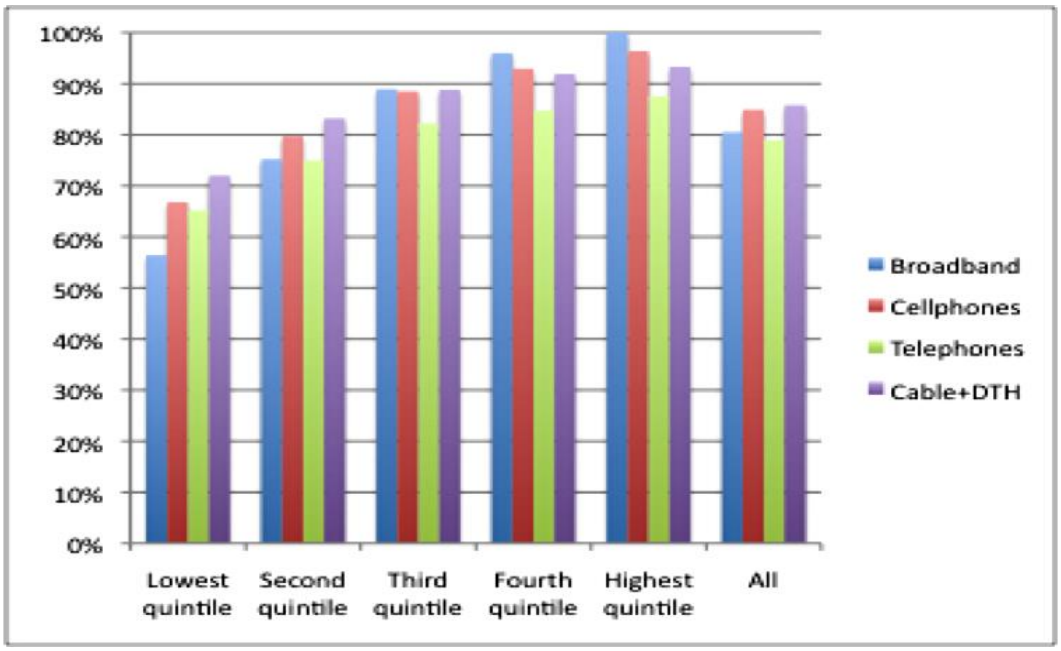
1).[67] While Canada stood seventh out of the then 30 OECD member countries in 2005, it fell to 11th place in 2010, 10th place in 2012 and 11th place in 2014.

47. Because of the more limited availability of historic data on mobile wireless, we used a time series covering 2010, 2012, 2013 and 2014. We find that here Canada ranked worse, at 26th place (out of 34 countries) in 2014, having fallen from 21 in 2010 (30 countries, 24 in 2012 (31 countries) and 25 in 2013 (34 countries) (see Appendix, Table 4). While many observers who are satisfied with the current state of affairs claim that three-quarters of Canadians have a smartphone, this is misleading. That figure refers to the percentage of wireless subscribers that have any kind of smart *device* (e.g. tablets, smartphones, etc.), whereas the reality is that just over six-out-of-ten Canadians had a smartphone on the basis of the latest data (2013).[68]

48. While availability may be reasonably high on some measures, adoption is far from universal. Overall, four-out of-five Canadians have some kind of broadband connection, while the rest do not. Adoption rates are also heavily skewed to income. Indeed, while current broadband Internet policy focuses on availability and geography over adoption and affordability, Figure 1 clearly depicts the impact of household income on broadband Internet adoption (and other ICTs). As it shows, more than two in five (44%) households in the lowest income bracket do not have broadband Internet of any kind, while roughly a third do not have a mobile phone. At the opposite end of the scale (the top quintile), mobile phone and broadband adoption are over 95%. If income was not such a strong factor, levels of access would be relatively even across the population.

[67] All data from OECD Broadband Portal: http://www.oecd.org/sti/broadband/oecdbroadbandportal.htm. **Erratum:** the rankings were off by one place for each year in the original submission.
[68] Estimate based on mobile phone penetration levels of 85% (Statistics Canada (2015). *Survey of Household Spending* in 2013) with 66% and 49% of Anglophone and Francophone Canadians, respectively, having a smartphone (CRTC, CMR 2014, Table 5.5.8).

Figure 1: Household Access to ICTS by Income Quintile, 2013



Source: Statistics Canada, 2015. *Survey of Household Spending*.

49. The table below also illustrates the gap between availability and adoption of broadband Internet at various levels of speed on the basis of the CRTC's most recent data (CMR 2014, Tables 5.3.10, 5.3.12).

Table 1: Speed, Availability and Adoption of Broadband Internet, 2013

Speed	Availability	Adoption
≥ 5 Mbps	95%	92%
≥ 10 Mbps	84%	57%
≥ 16 Mbps	82%	31%
≥ 50 Mbps	78%	5%[69]
≥ 100 Mbps	60%	NA

Source: CMR 2014, Tables 5.3.10, 5.3.12.

50. As the table shows, broadband availability for at least 5 Mbps service is relatively high, but even on this measure the Commission's goal to have such services available to all Canadians by 2015 has not yet been met. Internet access services of this standard are available to 95% of Canadians, but to only 72% of those who

[69] Corrected from original. Clerical error led to "adoption rates" for ≥ 16 Mbps and ≥ 50 Mbps being repeated. Latter corrected; data for ≥ 100 Mbps not available.

live in rural areas.[70] Table 1 also shows that availability falls fast with speed, as does adoption. Competition also drops off the higher one moves up the speed tiers: e.g. 52-55% of households have access to two platforms with speeds of 10 to 30 Mbps, but just one-quarter of households did for speeds of 50 Mbps or higher; only 8% had competitive ISPs offering speeds of 100 Mbps or more.[71]

51. The lessening of competition at the higher speed tiers is likely to contribute to affordability issues and, consequently, to adoption issues as well. We do not know the relationship between uptake at the various speed levels on the basis of household income, however, because the data needed to do so, to the best of our knowledge, is unavailable.[72]

Target Speeds: How Much Bandwidth is Enough?

52. According to incumbent ISPs, the problems of adoption stem from limited consumer demand for higher speeds. They also argue that they are doing a good job meeting the demand that does exist.[73] As an expert witness for one such company told the CRTC during its review of wholesale wireline services last year, the fact "that only 37 percent of Canadian broadband subscribers chose a service with a download speed of at least 10 Mbps" in 2012 illustrates the point with respect to the lack of consumer demand. At the same time, he also claimed that the fact that "the share of subscribers choosing such services rose to 57 percent in 2013 was a *remarkable increase* in just one year".[74]

53. Seen from this view, and as another representative for the same company put it, the demand for very fast broadband is low, and there is little willingness to pay for it:

> You know, there's sort of this -- I mean this is more my personal view. You know, you read in the trade press about Google Fiber -- you mentioned that -- gigabit per second downloads. This is all exciting in the theoretical but what people -- even heavier users, what they use Internet for does not require that kind of speed and people don't necessarily want to pay for it.[75]

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[70] CRTC, Communications Monitoring Report 2014, Table 5.3.12 and Figure 5.3.17.
[71] CRTC, Communications Monitoring Report 2014, Table 5.3.12.
[72] CRTC, Communications Monitoring Report 2014, Figure 5.3.14.
[73] CRTC, 2013, Review of wholesale services and associated policies (TN 2013-551); CRTC Review of wholesale service and associated policies. Transcript, Hearing 1, Volume 6, December 1, 2014. http://www.crtc.gc.ca/eng/transcripts/2014/tt1201.htm
[74] ibid, Transcript, para 7161, emphasis added; also Church, J. (2014). Review of Wholesale Sevices and Policies: CRTC Public Notice 2013-551: Expert Report, para 194 and Figure 13, Appendix 1.
[75] ibid, Transcripts, para 7539.

54. We disagree strongly and suggest that these claims are part of a larger pattern among incumbent ISPs to downplay the broadband subscriber's need for speed, at least when appearing before regulators, though not in their annual reports or marketing materials. First of all, it conveniently overlooks what Canadian consumers probably dislike most about very fast broadband plans: the high prices. In addition, the very high-speed plans being referred to in the quote above are in limited supply. When the US incumbents complained to the FCC last January about setting the threshold definition of broadband at 25 Mbps down and 3 Mbps up, Chairman Wheeler and his staff dismissed the industry's self-serving comments -- which included Verizon's claim that the old standard based on 4 Mps down and 1Mbps up was actually "popular and worth keeping."[76]

55. As a matter of fact, Canada does poorly relative to its OECD peers with respect to actual wireline download speeds, for example, with a mean actual download speed of 18.1 Mbps, ranking 23rd of 34 countries -- again with very little sign of improvement relative to its peers over the years (see Table 2 in the Appendix). To be sure, available speeds in Canada have risen over time, from 10.9 Mbps in 2011 to 13.9 Mbps in 2012, then 18.1 Mbps in 2013. That increase, however, has not kept pace with other countries that have ranked ahead of Canada over the years (see Appendix, Table 2).

Pricing and Affordability

56. The Commission promised to monitor the situation with respect to broadband speed and uptake in its last BSO decision,[77] but it has focused far more on availability and geography rather than price and adoption. The *Communications Monitoring Report*, for example, contains just one table on broadband adoption (Table 2.0.9) and two for household expenditures on a general set of communication services by income quintiles (Table 2.0.10 and 2.0.11). In sharp contrast, there are numerous tables and figures covering availability and subscriptions. This monitoring effort does not match what studies consistently identify as the most important variables affecting uptake: income, education, age and desire.[78]

57. The Commission has also given some but limited attention to the international context relative to the standards of the FCC or Ofcom, for instance. While limited

[76] FCC, 2015, Broadband Progress Report, para 52
[77] CRTC, 2011-291, para 83.
[78] FCC, 2015, *Broadband Progress Report*, para 7; PEW, 2013; Griffin, *Universal Service in an All-IP World*, 2015; OECD (2012). Universal Service Policies in the Context of National Broadband Plans, p. 73.

in scope and coverage the annual study for the Commission by Wall Communications that examines prices in Canada compared to those in the U.S, UK, France, Australia, Japan, Germany and Italy for wireline, mobile wireless, broadband Internet, as well as bundles that also include television services are instructive all the same.

58. The latest version of the Wall Report, for example, finds that wireline prices have risen steadily at rates well above the inflation rate over the past five years, and that Canada, consequently, has "slipped from being in the middle to now residing at the higher end of the [international comparison] group".[79]

59. Mid-range mobile wireless prices have declined 20-24% since 2008, although this trend holds across most countries, the study also finds. While prices in general have fallen, entry-level prices, however, have risen 14%.[80]

60. The highest end plans that include unlimited talking and texting and large data caps, and which have been tracked consistently by the report over time, dropped 11% in the last year, "in marked contrast"[81] Lastly, while the report finds that "broadband prices declined this year relative to last year", they have "generally trended upwards . . . over the last five years".[82] These findings have clear implications for affordability.

61. Across the board, Canada does not fare well in the results of the Wall study, with very few exceptions. The price of the lowest level mobile wireless plan, for instance, "is the highest of the group".[83] In terms of mid- and high-end mobile wireless offerings, Canada ranks on the high side of the group".[84] The same results hold for the two highest usage tiers.[85]

62. Canada does have the lowest price offering with respect to the lowest level broadband category but "very few . . . providers continue to offer Level 1 (sub 3 Mbps) broadband services" in only three of the seven countries surveyed: Canada, the US and Japan.[86] In terms of comparisons with the US, Australia and the UK for rural fixed wireless services (i.e. satellite), prices in Canada are comparable with

[79] "Price Comparisons of Wireline, Wireless and Internet Services in Canada and with Foreign Jurisdictions" (Wall Report), 2015, p. ii.
[80] Wall Report, 2015, pp. ii-iv.
[81] Wall Report, 2015, p. ii.
[82] Wall Report, 2015, p. iv.
[83] Wall Report, 2015, p. iii.
[84] Wall Report, 2015, p. ii.
[85] Wall Report, 2015, p. iii.
[86] Wall Report, 2015, p. iv.

the U.S, but “considerably higher than in Australia and the U.K.”, while there were no offerings in the highest category matching those in the other countries surveyed.[87]

63. Mobile Internet prices in Canada are also well-above average ($43.55 versus $32.50), and rank 6th out of the 8 countries surveyed. Only prices in the U.S. and Japan are higher. Mobile Internet prices are consistently higher across service levels in Canada than in the European countries surveyed and Australia -- “by a substantial margin in many cases”.[88]

64. The Wall Report also compares three different bundles that include television service. While noting the difficulties of such comparisons the results are not good. Regardless of the bundle, Canadian prices are “well above average” and usually rank as the sixth or seventh most expensive out of the eight countries ranked, again only ahead of the U.S. in all cases and Japan in two of the three bundles examined. For the “quad play” bundle -- basic telephone, mobile wireless, broadband Internet and television -- the report finds “that the average Canadian bundle price of roughly $187 is considerably above the average bundle price for the other surveyed countries of roughly $147” (p. 56). Finally, the Wall Report notes the prevalence of data caps in Canada and Australia relative to the finding that they are mostly non-existent for the plans in other countries surveyed (Wall Communications, 2015, p. 40).

65. In sum, the Wall Report shows that prices in Canada have generally risen over time at rates faster than inflation except for mid-range mobile wireless services, the steepest increases have been for entry level wireless plans where affordability is of the greatest concern, and prices are significantly higher across the board even by the limited range of international comparisons covered, except for the U.S. and Japan in a few cases. It also offers strong support for the case that affordability issues are linked to the relatively low levels of adoption across a wide range of broadband Internet and mobile wireless services in Canada. Such results would not be so troubling but for the fact that the study itself was commissioned by the CRTC and its findings consistent with those of other more comprehensive studies done by the OECD and FCC, for instance.

66. Table 2 below illustrates by summarizing the results the OECD’s most recent data on prices for a dozen-and-a-half fixed broadband baskets.

[87] Wall Report, 2015, p. v.
[88] Wall Report, 2015, pp. 51-52.

Table 2. Broadband Pricing in Canada vs OECD Peers Across Speed Ranges (September 2014)			
Broadband Basket	Canada's Rank	Canadian Price	OECD Avg Price
5 GB/month, ≥.250 Mb/s	29 / 34	36.97	27.73
2.5 GB/month, ≥1.5 Mb/s	30 / 34	36.97	28.01
10 GB/month, ≥10.2 Mb/s	28 / 34	44.32	31.17
15 GB/month, ≥25/30 Mb/s	26 / 34	47.13	37.73
25 GB/month, ≥102.4 Mb/s	28 / 34	73.05	76.53
100 GB/month, ≥1024 Mb/s	##	##	##
10 GB/month, ≥.250 Mb/s	29 / 34	36.97	27.81
15 GB/month, ≥1.5/2 Mb/s	28 / 34	36.97	28.17
25 GB/month, ≥10.2 Mb/s	28 / 34	44.32	31.25
50 GB/month, ≥ 25/30 Mb/s	26 / 34	47.13	37.73
100 GB/month, ≥102.4 Mb/s	28 / 34	73.05	76.53
250 GB/month, ≥1024 Mb/s	##	##	##
25 GB/month, ≥.250 Mb/s	28 / 34	36.97	27.86
50 GB/month, ≥1.5/2 Mb/s	33 / 34	44.32	28.38
100 GB/month, ≥10.2 Mb/s	27 / 34	44.79	31.66
200 GB/month, ≥25/30 Mb/s	25 / 34	48.47	38.81
400 GB/month, ≥ 102.4 Mb/s	29 / 34	79.31	77.04
1000 GB/month, ≥1024 Mb/s	##	##	##
Source: OECD Broadband Portal (2015) Fixed Broadband Basket Prices, September 2014. http://www.oecd.org/sti/broadband/oecdbroadbandportal.htm			

67. The most recent data available from the FCC (2013) also shows that in terms of the price of standalone wireline broadband service, for example, Canada ranks 27th out of 31 OECD countries for which data was available (see Appendix, Table 3). The mean cost for monthly stand-alone plans in Canada was USD $77.62 (PPP) compared to an average of $51.10, or just $31.14 if we take only the top ten countries on this measure. Canada's rank on this measure has also deteriorated over time, dropping from 26th in 2011 and 31st in 2012, respectively.

68. As for mobile wireless pricing, there are serious difficulties in finding a reasonable basis on which to make comparisons due to the relatively rapid changes in available services and pricing plans over time. In the FCC report cited above, for example, plans have been analyzed across a range of devices and, for smartphones alone, across several plans featuring different levels of voice and data availability.

69. For the purposes at hand, we were able to identify three types of smartphone plans that had data for Canada across the survey period between 2011 and 2013:

(1) small Smartphone Data Plans with Usage Limits <1 GB and Limited minutes; (2) medium Smartphone Data Plan with Usage Limits: ≥1 to <5 GB and Unlimited Minutes and (3) large Smartphone Data Plans with Usage Limits: ≥5 GB and Unlimited Minutes. We analyzed the available data for each of these plans to see where Canada ranks amongst its OECD peers in terms of average monthly charges and on price per GB basis (see Appendix and Tables 5a, 5b, 6a, 6b, 7a and 7b).

70. In terms of the small smartphone data plan, Canadian data was unavailable for 2013, and thus it could not be ranked. For the prior year, however, it ranked 23rd out of 30 countries for which data was available in terms of mean average monthly price and 27th in terms of the cost of data on a per GB basis.

71. Canada fares marginally better when it comes to mid-size Smartphone Data Plans with Usage Limits ≥1 to <5 GB and Unlimited Minutes than on the other measures reviewed so far, ranking 17th out of 26 countries in 2013. The mean cost for the mid-range monthly wireless smartphone plans in Canada in 2013 was USD $65.61 (PPP) compared to $93.08 in the U.S. and an average of $58.43 for the 26 OECD countries for which data was available. The average price in the top ten most affordable countries on this measure was $32.03 – half the amount.

72. Parsing the data further to consider the price of mobile wireless smartphone data plans on the basis of price per GB, as Table 6b does, reveals that, once again, there is little room for complacency. The cost of a GB in Canada is over USD $36 compared to half that amount in Australia (which ranks 8th out of 34 OECD countries), or USD $9.55 in France (1st) or USD $11.03 in Denmark (2nd). Overall, Canada ranks 20th out of the 26 OECD countries for which data is available on this measure -- consistent with its place in the bottom half of the rankings since 2011. The U.S. does worse, however, ranking 24th in 2013, and with a price per GB of $48.80.

73. The available data is most incomplete for high-end plans, likely on account of the fact that it is still early days in the roll-out of 4G LTE networks. Data was available for only 15 countries in 2013 (the latest for which data is available), for instance, and just eight the year before that. While the data may be limited, the results are again consistent with the observed trends so far: Canada ranked 12th out of 15 countries for Smartphone Data Plans with Usage Limits ≥5 GB and Unlimited Minutes in 2013, and the same with respect to the price of data on a per GB basis. The cost of a GB in Canada for such plans was $11.47 (USD PPP) versus, for

example, $3 in Denmark, and roughly $6.50 to $7 in Australia and the United Kingdom, respectively. The OECD average was $8.80.

74. The overall picture that emerges is one where respectable levels of wireline adoption (12th out of 34 countries) in Canada but low levels of mobile wireless adoption (26th out of 34 countries) are matched by prices that consistently fall on the high end of the scale. This is especially so for wireline broadband, while monthly smartphone data plan prices and prices per GB basis are firmly in the bottom half of the scale. While based on the FCC's more comprehensive data sets, these results match up well with the Wall Report commissioned by the CRTC. They consistently tell us one thing: the price of broadband internet in Canada is expensive relative to global standards.

How People Actually Use Broadband Internet Access

75. We believe that the relatively high prices offer a better explanation of the limited adoption of higher-tier broadband Internet speeds in Canada, rather than a lack of consumer demand and willingness to pay. If this is in fact the case, it appears to us to be bad policy to leave available bandwidth capacity under-utlilized, especially when Canadians, historically and today, use not just broadband but any-and-all-media at their disposal heavily – a point we will return to further below. Yet, just as the incumbent ISPs have tended to downplay user needs for bandwidth, the speed targets set in 2011 by the Commission also under-estimated how individuals use broadband as well as the extent to which multiple users in a single dwelling use the same broadband connection simultaneously.

76. One simple change that we urge the Commission to make is to measure broadband needs in terms of households with multiple devices running. As a point of reference, the FCC estimates that "the average household has more than 2.5 people, and for family households, the average household size is as high as 4.3. We [the FCC] take the needs of multiple users into account when considering what level of service is necessary to be considered advanced telecommunications capability."[89] The FCC also estimates that the average number of connected devices per household is 7.[90] Many U.S. stakeholders - such as DISH, Public Knowledge and Netflix - told the FCC over the last year to keep targets high enough for future expansion of networks and end-user consumption. Similar thinking needs to inform the CRTC's review of the BSO.

[89] FCC, 2015, *Broadband Progress Report*, para 3.
[90] FCC, 2015, *Broadband Progress Report*, para 29.

77. Evidence-based policymaking in this area requires close attention to the actual habits of Canadian Internet users, as well as to the standard industry forecasts on traffic and consumer usage. To do otherwise threatens to undermine any effort to bring broadband internet access into the BSO in a way that best serves the public interest. Indeed, a thorough understanding of how Internet users use their connectivity is also crucial to determining targets for broadband that are adequate for the present day and a robust hedge against the growth of IP traffic, end-user devices and bandwidth-intensive applications down the road.

78. The preamble to CRTC 2015-134 in which the Commission promises to "*examine which telecommunications services Canadians require to participate meaningfully in the digital economy*" raises concerns that the CRTC might be set to lowball broadband Internet uses again. To be sure, enhancing people's ability to participate in the digital economy is an important goal, but it is not one the CRTC should pursue at the expense of "non-economic" activity. As a matter of principle, policymakers should have no role in promoting any particular online "killer applications," be they associated with e-commerce or not, especially since most Internet activities are social or personal in nature.

79. Such indulgences have a long history in which what people actually do with the media at their disposal have been cast by others as being second in line to more "important" uses, and often frowned upon and discouraged. In the early 20th century, for example, the US Supreme Court denied First Amendment protection to movies because they were seen as crassly commercial, aimed at entertaining the masses rather than drawing them into the political life of the nation.[91] So, too, was women's use of the telephone discouraged, even though men were just as prone to idle chit-chat on the phone as women.[92]

80. Understanding end-user behaviours and attitudes is especially important in the formulation of Internet-related policy. For one, the Internet has become a vital part of everyday life for the great majority of North Americans. By contrast with conventional media, moreover, Internet use is intensely personal, social and interactive. Reliance on the Internet is increasing dramatically, measured in terms of volume of household and individual IP traffic, reflecting the unusually heavy use that Canadians make of media in general.

[91] Hwang, J. (2014). From Spectacle to Speech: The First Amendment and Film Censorship from 1915–1952, *Hastings Law Review*, *41*(2), p. 382.
[92] MacDougal, 2013. *The People's Telephone*.

81. The Internet is not merely a conduit for professionally produced programming, but an intensely individual medium that encourages personal expression, social intercourse, user-generated content and a host of other active functions. Ever since the early days of Internet use in the 1990s, the most common activities have always included personal messaging, especially email, along with search. This trend continues among Canadian users: as of the fall of 2014, 95% of anglophone Canadians used email on a monthly basis and 89% conducted Web searches, slightly more than those who watched online video in the same month.[93] Taking advantage of the capabilities of the Internet, media audiences have become both consumers *and* producers of content, as exemplified by the stunning volume of photos and videos that cross the Internet on a daily basis. As Pew Research found in 2013, more than 3 in 5 Internet users (62%) had either posted their own photo and video files, or had engaged in "curating" activities – i.e. finding 3rd-party image files and posting them to sharing sites. Some 40% of users were both creators *and* curators.[94] In addition to these activities, another trend that marks the unusual nature of the Internet medium is personal messaging.

82. As we note elsewhere in this paper, the IP traffic generated by Canadian Internet households is increasing at an average CAGR of 24%. It is expected to rise from 56.2 gigabytes per month in 2014 to 166.8 gigabytes in 2019. The average Internet user in Canada is also projected to generate 74.0 gigabytes of Internet traffic per month in 2019, up 196% from 25.0 gigabytes per month in 2014, a CAGR of 24%. In Canada, as in most regions of the world, video is also consuming the highest proportion of network resources (compared to other applications such as Web browsing, IM, email, gaming and filesharing). Canadian consumer Internet video traffic is projected to account for four-fifths of consumer Internet traffic in 2019, up from just over two-thirds last year.[95] Traffic on mobile wireless platforms in Canada is expected to grow even faster than wireline traffic: mobile data traffic is anticipated to grow 7-fold from 2014 to 2019, a compound annual growth rate of 46%.[96]

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[93] MTM (March 2015). Internet Activities: Analysis of the English-Language Market.
[94] Pew Research at http://www.pewInternet.org/2013/10/28/photo-and-video-sharing-grow-online/
[95] In this paper, we use the IP traffic distinctions standardized by Cisco in its annual VNI reports. Traffic data refers generally to the consumer Internet, excluding both business and non-Internet IP traffic. "Internet video" here means short-form Internet video (for example, YouTube); long-form Internet video (for example, Hulu); live Internet video; Internet-video-to-TV (for example, Netflix through Roku); online video purchases and rentals; webcam viewing, and web-based video monitoring (excludes P2P video file downloads). Internet video for this purpose does not include IPTV or VOD.
[96] All traffic estimates are Cisco: see "Cisco Visual Networking Index: Forecast and Methodology, 2014–2019," May 27, 2015: pdf at http://www.cisco.com/c/en/us/solutions/collateral/service-provider/ip-ngn-ip-next-generation-network/white_paper_c11-481360.html>; and VNI Forecast Highlights by country, at <http://www.cisco.com/web/solutions/sp/vni/vni_forecast_highlights/index.html>.

83. The prodigious growth of consumer Internet traffic is paralleled by attitudinal changes among end-users pointing to increasing levels of enthusiasm for and attachment to Internet resources. In a study conducted in 2014 to celebrate the 25th anniversary of the World Wide Web, the Pew Research group made a number of noteworthy findings about the positive attitudes of US Internet users. In terms of overall impact, the vast majority of respondents were positive about the role of the Internet:

    a. 90% of users said the Internet had been a good thing for them personally while only 6% said it had been a bad thing, while 3% volunteered it had been some of both;

    b. 76% of users said the Internet had been a good thing for society, while 15% said it had been a bad thing and 8% said it had been equally good and bad.

84. Another Pew survey question probed for the degree to which respondents felt they were attached to several different communication and media technologies, including the Internet, cellphones, TV and landline telephones. Pew found that the Internet scored highest, with 53% of Internet users saying the Internet would be, at minimum, “very hard” to give up. While cellphones were fairly close to this level, with 49% of cellphone owners saying the same thing about their cellphone, both TV and landlines were far behind, at 35% and 28% respectively. It is also worth noting that the “very hard to give up” figures for Internet and TV have been moving in opposite directions over the last several years. At the same time, however, we can also observe that, based on the data introduced earlier with respect to the composition of internet traffic and broadband uses, that relationships between different media are seldom mutually exclusive; old media typically become the content of ‘new media’, as Marshall McLuhan famously quipped. In fact, the internet is increasingly becoming the pivot around which the rest of the media universe, including television, swings, to say nothing of its ever deeper entanglement with people’s everyday lives as well as the economy and society in general.[97] This is why it is so important to get it right this time when revisiting the question of whether or not broadband internet should be formally folded into the universal service obligation. Our answer is an unequivocal yes.

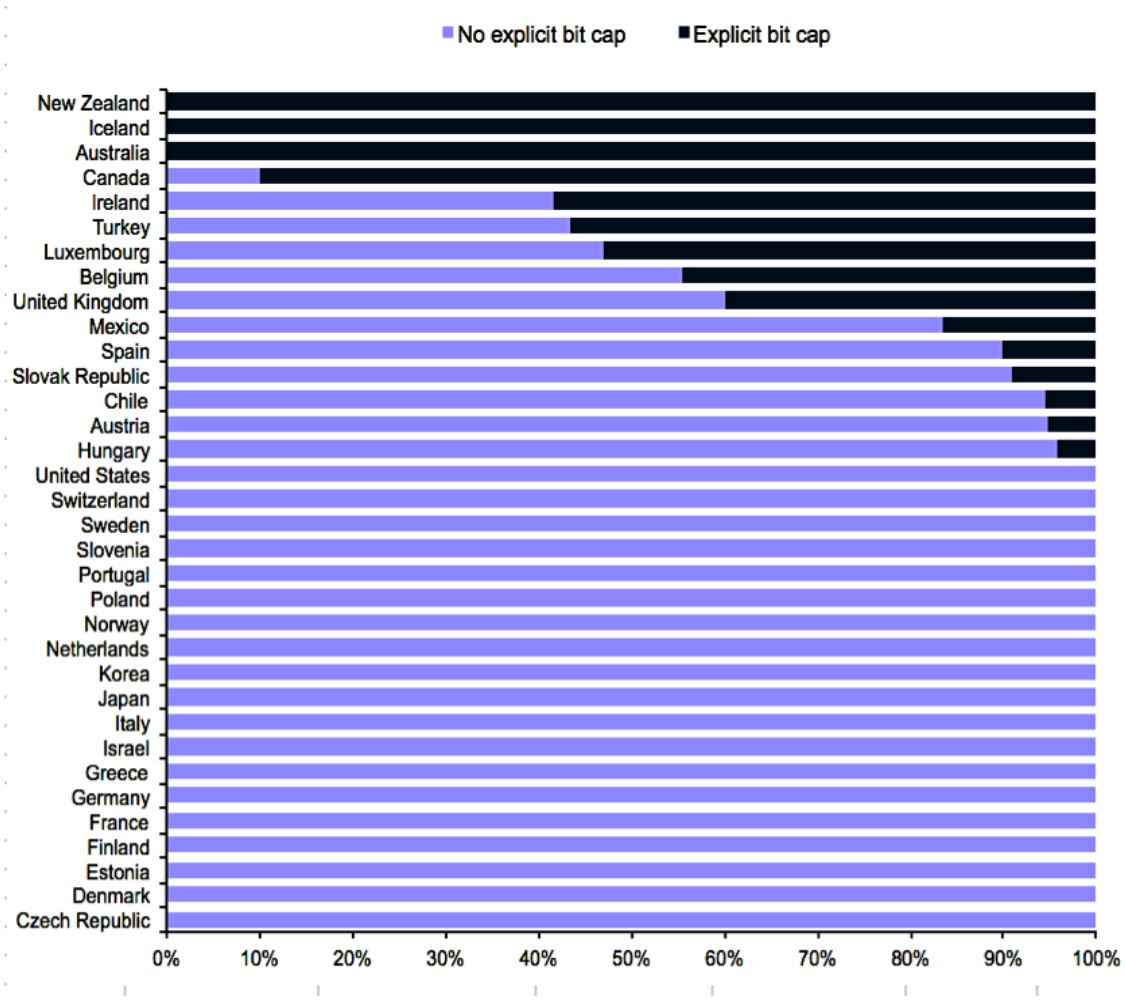
Data Caps and Harm to the Broadband Internet Ecosystem

[97] For Pew data see “The Web at 25 in the U.S.,” at <http://www.pewInternet.org/2014/02/27/the-web-at-25-in-the-u-s/>.

85. In Canada, the policy issues related to broadband adoption, affordability and use stem not only from high monthly fees, but also from the widespread use by ISPs of data caps (sometimes also called “bit” or “bandwidth” caps). As we will explain below, the harms caused by caps to the broadband Internet ecosystem extend well beyond the purely financial. Consider first the prevalence of caps across the OECD member countries. In Canada, caps are well entrenched as a routine and seemingly necessary part of the Internet access business.

86. As we can see from Figure 2 below, however, the majority of OECD countries shun caps in whole or in part (the light purple area). Canada, contrast, ranks fourth behind New Zealand, Iceland and Australia in the prevalence of explicit caps (dark blue area). In short, Canada’s caps are very much the exception not the rule.

Figure 2: Prevalence of Explicit Data Caps in OECD countries, 2013



Source: OECD, 2013, *Communications Outlook*, Figure 4.19.

87. It is unfortunate, moreover, that data caps have been legitimized in Canada as policy tools and not simply as pricing mechanisms. We believe that the Commission's original policy rationale for institutionalizing the use of caps as a form of economic ITMP (within the framework developed in CRTC 2009-657) was based on assumptions that have proven to be unsound. First, the need for caps in traffic management has since been debunked. Network congestion is a problem stemming from peak traffic loads, not from the individual use patterns of so-called bandwidth hogs. Data Caps are an excessively blunt and artificial constraint that discourages communication and broadband internet use when the goal of policy should be to encourage it.[98] Insofar that data caps can be justified, Sandvine

[98] St. Arnaud, 2011, p. 3.

imagines a scenario where users are allocated 200GB caps per month for use during *peak periods*, and unlimited use thereafter.[99]

88. A second assumption made about caps was that they were a good policy tool because they "*match[ed] consumer usage with willingness to pay, thus putting users in control and allowing market forces to work*" (2009-657, preamble). Recent research has now shown that, far from being willing to pay or feeling in control, consumers are confused by caps and, because they fear the financial consequences of being online "too much," are discouraged from using the Internet as they otherwise might.

89. A recent study by the Open Technology Institute (2015), for example, offers extensive, well-documented evidence of how caps discourage use of the Internet, as well as how the behavioral effects of caps have troubling implications for innovation and security.[100] The authors enumerate four different behavioral harms arising from caps:

    a. caps cause consumer confusion and uncertainty;
    b. they decrease the adoption of new services, thereby harming innovation;
    c. they undermine online security, as they discourage end-users from updating software, the major cause of Internet security issues; and
    d. they are disproportionately hurtful to low-income and minority populations.[101]

90. While some Canadian ISPs attempt to explain to their customers how much data they can transfer under a given cap, this guidance is often misleading, confusing or both. For example, Bell provides usage estimates for its Bell Fibe Internet 25 plan as follows:

> Approximately with 125 GB, you can download 182 Movies or, 26,730 Songs or, 434,600 digital pictures or, visit 3,125,000 web pages or send 11,500,000 emails.[102]

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[99] Sandvine (2013). *Global Internet Phenomenon Report*., p. 5. http://www.sandvine.com/downloads/documents/10-26-2011_phenomena/Sandvine%20Global%20Internet%20Phenomena%20Report%20-%20Fall%202011.pdf

[101] OTI, 2015, "Artificial Scarcity: How Data Caps Harm Consumers and Innovation" https://www.newamerica.org/oti/artificial-scarcity/. While the data cited is American, there is no reason to believe that the assertions made by the OTI do not apply to Canada, where caps are even more prevalent.

[102] See Bell website at http://www.bell.ca/Bell_Internet/Products/Fibe-Internet-15-FTTN.

91. It is difficult to see how this kind of information could be helpful to a customer with no technical background, especially since several of these claims are erroneous or misleading. Bell's claim that 125 GB can accommodate 3,125,000 pages, for example, means that each megabyte of the 125 GB cap would have to accommodate 25 Web pages (125 GB is 125,000 MB, and 3,125,000/125,000 = 25). According to the latest data from the HTTP Archive, however, this figure is off by a factor of 50 when contrasted with actual HTTP traffic. The Archive record shows that as of July 15, 2015, the average transfer size of a Web page from the top 1,000 sites was almost 2 MB (1961 KB) – meaning that a cap of 125 GB would accommodate 62,500 Web pages rather than 3,125,000.[103] Yet even if Bell was using accurate numbers, it is doubtful that its guidelines would be of much use. No mainstream user counts Web pages as they come and go, which is to say nothing of the awkward fact that people download different mixes of file types on different protocol platforms, so that any target for Web pages would have to accommodate any or all of the other kinds of data Bell mentions, such as movies and pictures.

92. A third assumption made by the Commission about caps is that they would be used by incumbent ISPs as intended under the ITMP policy framework: i.e. to discourage heavy users from "hogging" network resources. That goal has not been realized, an inevitable consequence of putting an unregulated pricing tool in the hands of ISPs with market power. From an economic point of view, there is no link between charges and costs, with so-called excess usage charges per GB vastly outstripping the cost to produce a GB of about $0.08.[104]

93. For example, Bell's entry level DSL service of 15 Mbps, which costs $55.95/month, is capped at 50 GB and carries a penalty of $3/GB to a maximum of $100. The maximum potential cost for this plan is $156 a month -- three times the basic fee.[105] In line with the outcomes described in the OTI research, such an excessively high penalty is bound to discourage people from trying out new or even established services, while compounding confusion over, for example, the rate at which certain Web pages load as a proxy for the volume of data in a given transfer. As Cisco reports, the average Internet household in Canada had already

[103] HTTP Archive, at http://httparchive.org/trends.php?s=Top1000&minlabel=Jul+15+2013&maxlabel=Jul+15+2015
[104] St. Arnaud, B. (2011). Myths and Facts about Usage-Based Billing, pp. 7-8 http://dwmw.files.wordpress.com/2011/04/st-arnaud-myths-and-facts-re-ubb.pdf
[105] See Bell website at http://www.bell.ca/Bell_Internet/Products/Fibe-Internet-15-FTTN.

surpassed the 50 GB threshold in 2014 (56.2 gigabytes per month, growing at a CAGR of 24%).[106]

94. Fourth and finally, current prices are a function of market dynamics, i.e. concentration, and serve primarily as a new line of revenue while helping to defer investment instead of increasing capacity to meet unmet demand.[107] Industry trends also suggest that the vertically-integrated ISPs are seeing their legacy TV business stall or contract, while the broadband side of the market has been showing gradual but steady growth. As the OTI study points out, this major shift in core business will likely have ramifications for how ISPs set retail prices:

> On the wireline side, it is increasingly clear that ISPs — particularly the largest cable providers, which have more broadband customers than subscription TV customers — need new ways to monetize broadband service as their legacy TV business shrinks (p.3).

95. The FCC reached similar conclusions in its March 2015 Open Internet Order,[108] where it outlined the many abuses -- real and potential -- associated with the use of data caps:

> Data caps or allowances, which limit the amount and type of content users access online, can have a role in providing consumers options and differentiating services in the marketplace, but they also can negatively influence customer behavior and the development of new applications. […] When bandwidth is limited during peak hours, its scarcity can cause reliability and quality concerns, which increases broadband providers' ability to charge for prioritization. Such practices could result in so-called 'tolls' for edge providers seeking to reach a broadband provider's subscribers, leading to reduced innovation at the edge, as well as increased rates for end users, reducing consumer demand, and further disrupting the virtuous cycle.[109]

96. Although the trends and issues noted in the OTI study and the FCC's *Open Internet order* are based on U.S. experience, there is no reason to believe that their lessons do not apply to Canada. In fact, the effects of data caps may be even more pronounced in Canada given that BDUs are both more vertically-integrated than their U.S. counterparts and now in the process of having to adjust to the

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[106] See Cisco VNI website at http://www.cisco.com/web/solutions/sp/vni/vni_forecast_highlights/index.html
[107] St. Arnaud, 2011, p. 4
[108] FCC, *Report and Order on Remand, Declaratory Ruling, and Order*
[109] FCC, *Report and Order on Remand, Declaratory Ruling, and Order*, para 82.

CRTC's new regulations on the basic tier and subscriber pick-and-pay options. They are doing so at a time when a rising number of Canadians have left the regulated TV system as well. As of 2012, 12% of Canadians were not paying for a traditional cable TV service, a figure that had increased to 16% by early 2015.[110]

97. We believe that all these changes taken together could encourage Canada's incumbent ISPs to make up for potential future declines in TV revenues and ARPU by raising the monthly advertised price for Internet access while lowering the size but increasing the cost of data caps. An inkling of just such a strategy was already visible when Bell, for example, announced drops in the rate for several plans while simultaneously lowering the size of the caps on those services and raising the maximum overage penalty by 25%, from $80 to $100.[111] The prospect of having data caps undermine a new vision for the BSO is especially worrisome given that a renewed and extended basic service ideal would be aimed primarily at Canadians in low-income households who may also not be as digitally literate as some - precisely those Canadians who are already most likely to be suffering the greatest harm from the use of data caps by their ISP.

98. We therefore urge the Commission to consider carefully what the long-term impact of data caps could be on the growth of the Canadian Internet, and more importantly, on the evolution of how Canadians use their online resources, at a time when it will be considering major changes to how broadband is deployed and supported in this country. This proceeding provides the Commission an excellent opportunity to undo some of the damage data caps have already done to Canada's broadband ecosystem.

Excessive Faith in "Targeted Government Funding" Misplaced

99. The last point that we wish to make is that CRTC's faith in "targeted government funding" expressed during the last review of the BSO also appears to have been misplaced.

100. As we have already seen, MTS, PIAC, and others expressed concerns that the funding levels the Commission anticipated from the government were far from sufficient to meet the task at hand. That has proven to be the case ever since with the estimated number of under-served or unserved households relied upon by the federal government far shy of what MTS, for instance, observed (i.e. roughly

[110] MTM (May 7, 2015). Cord Cutting: Analysis of the Canadian Market.
[111] DSLreports: http://www.dslreports.com/shownews/Bell-Lowers-Caps-117669

250,000 versus 700,000), and short of full universal coverage. The speed targets have also been exceedingly low and funding correspondingly the same. While there were and continue to be provincial, municipal and regional programs, they have never been thought likely to fill the void, and recent assessments suggest that, while helpful in many regards, they have not.[112]

101. The federal government has used spectrum policy over the past decade to address some of the issues of market concentration, affordability and access, with some positive results. However, its primary thrust has been on trying to foster sustained competition, investment and availability in *rural areas*. Roll-out targets have been rather weak and directed at access versus adoption, and the time frame for achieving them drawn out. There also appears to be an excessive reliance on satellite to bring broadband internet access to rural and remote communities, when even the CRTC's own recent decisions indicate that wireless technologies are poor substitutes for wireline connections due to high prices, limited capacity and other technical constraints. Even if such connections were a necessary evil, prices in Canada for rural fixed wireless services (i.e. satellite), as the most recent Wall Report observes, are comparable to the U.S, but "considerably higher than those in Australia and the U.K.", and there were no offerings at the highest end of the scale to match those in the other countries surveyed.[113]

102. The use of spectrum policy to raise money for the treasury rather than to promote universal access or universal service is also a concern. One of the earliest aims of telecoms policy reform worldwide from the 1980s onwards was to tackle the misuse of monopoly PTT services to fund the general treasury versus developing service.[114] This practice was derided as undermining access and affordability and was one of the first steps taken to roll back the PTT monopoly regime in contexts where government ownership reigned, but spectrum auctions are now being used in a very similar way, including by the Government of Canada. In our view, this practice should stop, with revenues raised from spectrum auctions earmarked specifically for the purpose of advancing universal broadband internet service policy aims.

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[112] CRTC, 2010-43, paras 1611-1612; Rajabiun & Middleton, 2013; Evaniew, J., Stobbs, R., Rathi, D. & McNally, M. (2015). Increasingly unambitious: A thematic analysis of Canadian Broadband Policy. Paper Presented at the Canadian Communication Association, Ottawa, May.
[113] Wall Report, 2015, p. v.
[114] Melody, W. (ed.)(1997). *Telecoms Reform. Principles, Policies and Regulatory Practices*. Lyngby, Denmark: Technical University of Denmark.

103. Finally, there is a strong need for a more integrated and coherent universal service policy.[115]The divided jurisdiction over spectrum policy in this regard is not helpful. The funding issue and incoherence of the federal government's specific broadband projects are only compounded by the fact that such matters have too often put the CRTC and Industry Canada at cross-purposes with one another on broadband *access* specifically and broadband *policy* generally.

104. Overall, each of these factors undermine the faith the Commission put in the ability of "*targeted government funding*" in the last BSO review. The current review offers a historical opportunity to change course in light of the lessons learned since then.[116]

Recommendations

105. On the basis of the evidence, analysis and arguments that we have developed above, we now provide the Commission the following set of seven recommendations for its consideration.

I. The Commission has the power to bring in substantial BSO reform under the *Telecommunications Act*. It must use this power.

II. We strongly urge the Commission to move beyond its tendency to focus on availability to give greater weight to adoption (penetration), affordability (price), speed (bandwidth) and how people actually use broadband. We also encourage it to adopt a more expansive view of the needs of Canadians and to adopt changes that meet those needs. To do so, it will need to expand the policy discourse to include a more Internet-centric vision of universal broadband service, in which communication rights, freedom of expression and the role of broadband Internet in our whole way of life are given as much attention as the undeniably important goal of improving people's ability to participate in the digital economy.

III. We strongly encourage the Commission to expand universal basic service to include high-speed broadband Internet access of between 25 and 30 Mbps at a minimum over the next five years. Such a standard meshes well with how people

[115] Policy and Technical Framework: Mobile Broadband Services (MBS) — 700 MHz Band, Broadband Radio Service (BRS) — 2500 MHz Band. http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10121.html para 33; Industry Canada (2013). Licensing Framework for Mobile Broadband Services (MBS) — 700 MHz Band. https://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/Licensing_Framework_MBS_700_MHz_Band.pdf/$file/Licensing_Framework_MBS_700_MHz_Band.pdf

[116] CRTC, 2011, para 63.

use broadband and the fact that multiple people regularly use a single broadband connection simultaneously for bandwidth-intensive activities in the same dwelling. The 25-30 Mbps standard is also consistent with benchmarks set by the United States and the EU.

IV. We strongly urge the Commission to phase out data caps, failing which to set a data cap floor of around 200 GB per month for households with multiple users to meet the projected use of the average Canadian household in 2020 (Cisco, 2015).[117] For individual subscribers, a useful target for data caps might be roughly 90-100 GB per month, again to meet projected demand set out by Cisco or other relevant sources on this point. The Commission might also draw on Sandvine's suggestion that users be allocated 200GB caps per month for *peak* use, and *unlimited* use thereafter, as a guide.[118] This framework also reflects the principle that data caps should be restricted to peak hours where demonstrable congestion exists that cannot be reasonably managed in the short-term by other less intrusive means. As a general principle, broadband service should be differentiated on the basis of speed, price, customer service and other factors, not usage. Unlimited usage at different levels of speed and price points should be as much a part of a universal service for broadband as it was when POTS was the norm.

V. As revenues from POTS decline, so too does the ability to support a broadened range of capabilities supported by the BSO. The Commission should change the contribution base accordingly by expanding the range of services that contribute to the NCF to include retail Internet access revenues, with a general levy on all broadband carriers adopted that is equal to the estimated cost of meeting these new standards. Funds should not be given to carriers of last resort alone (incumbents); instead companies should be required to compete for funds to offer fast broadband to underserved or unserved subscribers in rural *and* urban areas alike. The Commission should also urge the government to use the proceeds of spectrum auctions to support an expanded NCF. The current practice of using billions of dollars in proceeds from spectrum auctions to support the general budget as opposed to earmarking them to develop Canada's broadband infrastructure is an unacceptable tax on communication services and inconsistent with well-known principles of telecommunications policy reforms that

[117] Cisco (2015). http://www.cisco.com/web/solutions/sp/vni/vni_forecast_highlights/index.html
[118] Sandvine (2013). *Global Internet Phenomenon Report*., p. 5. http://www.sandvine.com/downloads/documents/10-26-2011_phenomena/Sandvine%20Global%20Internet%20Phenomena%20Report%20-%20Fall%202011.pdf

have done away with the legacy practice of using revenue from POTS to fund the state treasury.

VI. The Commission needs to develop better methods to monitor the services covered by the BSO and to do so more frequently and comprehensively. Rather than the current focus on availability, its monitoring efforts should give at least as much emphasis to adoption, affordability and usage (particularly in terms of meeting the needs of people with disabilities) at the target speed adopted, and preferably across a standard set of speed tiers so as to make meaningful comparisons with the US, Europe and other OECD countries possible and practical. Whatever efforts are adopted should match the FCC's International Broadband Data Report and Ofcom's International Communication Market Report in terms of coverage, frequency, quality, and public accessibility and usability.

VII. Lastly, we encourage the Commission to work with Industry Canada and the federal government to develop a more coherent policy agenda so that they do not work at cross-purposes with one another. We recognize that the Commission's abilities in this regard are constrained, but it is essential to the future of our broadband policy that both agencies be rowing in the same direction at the same time.

APPENDIX: Broadband Data Tables: Pentration, Price and Performance (Speed)

Table 1. Broadband Wireline Penetration: Subscribers/100 Inhabitants - 2014, 2012, 2010, 2005 (OECD)

Country	Subs/100 Inhabs 2014	Rank 2014	Subs/100 Inhabs 2012	Rank 2012	Subs/100 Inhabs 2010	Rank 2010	Subs/100 Inhabs 2005	Rank 2005
Switzerland	48.9	1	42.3	1	37.8	3	23.9	3
Denmark	41.3	2	39.0	3	38.1	1	25.9	1
Netherlands	40.6	3	39.7	2	38.1	2	22.5	4
France	39.2	4	36.6	5	32.7	8	15.0	14
Norway	38.7	5	37.0	4	35.3	4	18.2	9
Korea	38.0	6	36.5	6	34.8	5	25.5	2
Iceland	36.8	7	35.7	7	34.3	6	21.7	6
UK	36.8	8	34.3	8	31.3	12	16.3	13
Belgium	36.0	9	33.4	11	31.0	13	18.2	10
Germany	35.9	10	34.1	9	32.0	9	13.0	17
Canada	35.4	11	33.6	10	31.8	11	20.8	7
Sweden	33.8	12	32.3	13	32.0	10	20.8	8
Luxembourg	33.7	13	32.1	14	30.7	14	11.8	18
Finland	32.2	14	33.0	12	33.6	7	22.4	5
New Zealand	31.6	15	29.6	15	25.9	18	6.9	22
United States	31.4	16	29.4	16	27.3	15	16.4	11
Greece	28.7	17	24.3	25	20.2	28	1.4	29
Japan	28.5	18	27.7	17	26.6	16	16.4	12
Czech Repub.	28.3	19	25.3	20	21.5	26	6.5	23
Estonia	28.2	20	26.4	18	26.1	17	N/A	—
Australia	27.7	21	25.7	19	24.9	19	13.6	16
Spain	27.6	22	24.5	24	23.2	21	11.5	19
Austria	27.6	23	25.2	21	23.2	22	14.4	15

Table 1. Broadband Wireline Penetration: Subscribers/100 Inhabitants - 2014, 2012, 2010, 2005 (OECD)								
Ireland	27.3	24	24.2	26	22.4	24	4.3	25
Portugal	27.2	25	22.7	28	20.1	29	9.9	21
Slovenia	26.7	26	24.8	22	23.0	23	N/A	—
Hungary	26.2	27	23.0	27	20.6	27	4.6	24
Israel	25.3	28	24.7	23	23.9	20	N/A	—
Italy	23.6	29	22.7	29	21.8	25	10.0	20
Slovak Repub.	22.0	30	19.3	30	16.2	30	1.6	28
Poland	18.0	31	18.3	31	16.0	31	3.3	26
Chile	14.0	32	12.4	32	10.5	32	N/A	—
Turkey	11.6	33	10.5	34	9.7	33	2.2	27
Mexico	10.7	34	10.9	33	9.6	34	1.0	30
OECD mean	28.2	—	26.6	—	24.8	—	12.8	—

Source notes: All data in this table are from the OECD Broadband Portal <http://www.oecd.org/Internet/broadband/oecdbroadbandportal.htm>. The data for 2014 were updated by the OECD on July 23 to reflect survey collection ending Q4/December 2014, rather than Q2/June 2014 (the basis for our CRTC submission of July 14, 2015). We changed the collection end-dates for each of the other years in this series (2005, 2010, 2012) from Q2 to Q4 to make them consistent with 2014. The data are provided on the OECD's broadband portal spreadsheet #1.5 ("Historical time series, fixed and wireless broadband penetration"), which provides a more detailed time series (beginning Q4/2003) than the selection in this table.
** The ranking for 2005 includes only 30 countries, as at that time Chile, Estonia, Israel and Slovenia had not yet acceded to OECD membership (hence "N/A").

Table 2. Wireline Speed Rank: Mean Actual Download Speeds, Mbps, FCC/Ookla2011-2013						
Country	**Mean Actual DL Speed (Mbps: 2013)**	**Rank (2013)**	**Mean Actual DL Speed (Mbps: 2012)**	**Rank (2012)**	**Mean Actual DL Speed (Mbps: 2011)**	**Rank (2011)**
Luxembourg	43	1	27.6	2	16.4	12
Sweden	39.9	2	27.6	3	27.4	2
Korea	39.3	3	33.6	1	32	1
Japan	37.4	4	24.3	5	19	6
Netherlands	37	5	27.3	4	24.3	3
Switzerland	36	6	21.8	8	21.2	4
Iceland	34	7	23.9	6	19.7	5
Finland	30.6	8	18.4	13	15.5	16
Denmark	30.5	9	20.5	9	17	8
Belgium	26	10	19.4	10	17	9
Portugal	25.9	11	22.4	7	17	10
Norway	24.1	12	18.8	11	14	18
France	23.7	13	15.7	19	16.6	11
Estonia	23.4	14	17.6	15	16	13
UK	23.3	15	16.9	18	8.7	24
Czech Republic	23.2	16	18.8	12	14.9	17
Slovakia	23.1	17	17.9	14	15.6	15
Hungary	22.3	18	17.4	17	15.8	14
Austria	22.2	19	15.2	20	12.6	19
Germany	21.7	20	17.5	16	18	7
Ireland	19.3	21	11.9	24	8.3	27
United States	18.7	22	14.5	21	11.6	20
Canada	**18.1**	**23**	**13.9**	**22**	**10.9**	**22**
Spain	17.4	24	13	23	11	21
Israel	17.2	25	10.2	28	6.3	30
Poland	15.6	26	11.8	25	9.4	23
Slovenia	15	27	11.6	26	8.6	25
New Zealand	14.5	28	10.1	29	8	28
Australia	13.5	29	11.4	27	8.5	26
Mexico	10.2	30	6	33	4.5	34
Chile	10.1	31	8.6	30	6.5	29
Turkey	8.3	32	6.4	31	6	31
Greece	7.5	33	6.1	32	6	32
Italy	5.6	34	5.6	34	5	33

Source notes: The data in this table, originally compiled as part of the Ookla Net Index, are from the FCC's international broadband reports of 2012 and 2015. The data for 2011 were published in the FCC's Third International Broadband Data Report, August 2012, available at <http:// www.fcc.gov/reports/international-broadband-data-report-third>. See Appendix Table 1, p.1. The data for 2012 and 2013 were published in the FCC's Fourth International Broadband Data Report, February 2015, available at <https://www.fcc.gov/document/fourth-international-broadband-data-report-2015>. See Appendix F Table 1a, p.25. The FCC weights and stratifies the city-level data collected by Ookla to improve their reliability. These datasets cover the 34 OECD countries, as well as four additional countries: Bulgaria, Hong Kong, Lithuania and Singapore. In order to keep the FCC data consistent with the OECD data used elsewhere in this report, the four additional countries have been removed and the ranks recomputed accordingly.

Table 3. Wireline Price Rank, FCC 2011-2013						
Country	**Mean cost, monthly standalone plans (USD-PPP: 2013)**	**Rank (2013)**	**Mean cost, monthly standalone plans (USD-PPP: 2012)**	**Rank (2012)**	**Mean cost, monthly standalone plans (USD-PPP: 2011)**	**Rank (2011)**
New Zealand	22.71	1	54.46	23	61.04	29
Austria	25.87	2	25.49	3	45.07	13
Germany	28.66	3	18.85	1	32.63	1
Poland	31.60	4	36.04	10	54.16	21
Denmark	31.86	5	47.28	16	43.09	10
Korea	32.41	6	37.99	12	32.96	2
Israel	33.10	7	58.87	25	44.31	12
Slovakia	34.08	8	35.12	8	46.68	15
Estonia	34.93	9	35.15	9	33.25	3
Italy	35.92	10	28.10	5	36.09	6
Greece	39.24	11	42.51	15	49.83	19
Hungary	40.09	12	29.97	6	50.06	20
Switzerland	42.55	13	147.75	38	119.38	34
Japan	43.12	14	40.44	14	41.85	9
France	43.78	15	22.98	2	35.78	5
United Kingdom	44.44	16	#	#	45.98	14
Sweden	45.61	17	36.96	11	34.92	4
Finland	45.82	18	40.28	13	38.07	7
Czech Republic	48.05	19	47.73	18	43.62	11
Australia	54.40	20	50.18	19	60.85	28
Belgium	54.45	21	50.28	20	48.24	18
Iceland	64.49	22	63.02	28	39.12	8

Table 3. Wireline Price Rank, FCC 2011-2013						
Chile	65.86	23	60.79	26	78.83	32
Netherlands	68.48	24	33.96	7	46.93	16
Norway	69.07	25	90.27	34	55.19	23
United States	75.47	26	60.86	27	69.75	30
Canada	77.62	27	76.27	31	59.36	26
Ireland	77.91	28	47.62	17	57.34	25
Mexico	82.47	29	52.06	22	78.93	33
Turkey	86.53	30	63.90	29	47.05	17
Slovenia	103.52	31	124.16	37	71.8	31
Portugal	#	#	80.25	32	56.68	24
Luxembourg	#	#	50.60	21	54.73	22
Spain	#	#	#	#	59.41	27
OECD Avg	51.10		52.82		52.15	

Source notes: The data for 2012 and 2013 were published in the FCC's (2015) International *Broadband Data Report*, available at <https://www.fcc.gov/document/fourth-international-broadband-data-report-2015>. See Appendix C, Table 1b, pp. 31-2. Data for 2011 from the FCC's (2012) *International Broadband Data Report* available at <http:// www.fcc.gov/reports/international-broadband-data-report-third>. See Appendix Table 1b.These datasets cover the 34 OECD countries, as well as four additional countries: Bulgaria, Hong Kong, Lithuania and Singapore. In order to keep the FCC data consistent with the OECD data used elsewhere in this report, the four additional countries have been removed and the ranks recomputed accordingly. The FCC data in this table reflect average monthly prices for broadband service converted to USD, then adjusted using the PPP formula. "#" - no data available.

Table 4. Wireless Penetration: Subs per 100 Inhabitants, OECD 2010, 2012, 2013, 2014

Country	Subs/ 100 2014	Rank 2014	Subs/ 100 2013	Rank 2013	Subs/ 100 2012	Rank 2012	Subs/ 100 2010	Rank 2010
Finland	138.0	1	123.3	1	108.3	1	89.3	2
Japan	124.1	2	111.8	3	85.4	7	76.3	4
Sweden	115.6	3	109.8	4	104.8	2	83.8	3
Denmark	115.5	4	102.5	6	97.5	5	64.8	6
Australia	114.4	5	114.4	2	101.7	4	56.0	8
Estonia	114.2	6	90.8	8	74.1	10	20.1	28
Korea	106.5	7	103.8	5	103.0	3	95.8	1
United States	104.0	8	100.7	7	90.7	6	61.9	7
New Zealand	98.8	9	85.9	11	71.3	12	39.4	16
Norway	88.0	10	90.4	9	84.4	8	75.1	5
Iceland	87.3	11	76.5	13	72.1	11	46.3	13
United Kingdom	84.8	12	77.2	12	68.2	13	47.3	12
Luxembourg	84.4	13	86.1	10	79.4	9	50.0	10
Switzerland	83.1	14	63.9	19	55.4	18	44.2	15
Ireland	82.1	15	69.2	14	65.7	14	46.2	14
Spain	73.3	16	68.5	15	54.3	19	27.84	22
Italy	70.9	17	65.3	16	53.0	21	37.8	18
Netherlands	69.0	18	64.2	18	61.2	16	38.0	17
Austria	67.1	19	64.7	17	58.8	17	33.3	20
Czech Republic	65.1	20	62.5	20	53.6	20	12.1	29
France	64.7	21	55.9	22	50.4	23	35.7	19
Germany	63.8	22	53.9	24	41.1	26	26.0	23
Slovak Republic	59.9	23	55.3	23	40.0	27	24.2	27
Belgium	57.7	24	51.6	26	33.0	29	9.7	31
Poland	55.3	25	61.3	21	62.9	15	50.2	9
Canada	54.2	26	53.3	25	46.4	24	30.4	21
Israel	49.9	27	50.5	27	51.2	22	48.6	11

Table 4. Wireless Penetration: Subs per 100 Inhabitants, OECD 2010, 2012, 2013, 2014								
Chile	49.8	28	35.8	31	28.4	31	8.5	33
Slovenia	47.0	29	40.6	28	35.7	28	24.4	25
Portugal	45.8	30	37.5	29	32.9	30	24.3	26
Mexico	42.5	31	33.6	32	23.6	34	7.6	34
Turkey	42.2	32	32.3	33	26.3	32	9.9	30
Greece	41.5	33	36.2	30	45.8	25	25.0	24
Hungary	34.3	34	27.7	34	24.3	33	8.8	32
OECD mean	81.3	—	74.8	—	64.5	—	44.9	—

Source notes: All data in this table are from the OECD Broadband Portal <http://www.oecd.org/Internet/broadband/oecdbroadbandportal.htm>. The data for 2014 were updated by the OECD on July 23 to reflect survey collection ending Q4/December 2014, rather than Q2/June 2014 (the basis for our CRTC submission of July 14, 2015). We changed the collection end-dates for each of the other years in this series (2010, 2012, 2013) from Q2 to Q4 to make them consistent with 2014. The data are provided on the OECD's broadband portal spreadsheet #1.5 ("Historical time series, fixed and wireless broadband penetration"), which provides a more detailed time series (beginning Q4/2003) than the selection in this table.

Table 5a. Wireless Price Rank: Mean monthly plan charge for Smartphone Data Plans with Usage Limits: <1 GB and Limited Minutes				
Country	Mean monthly charge (USD-PPP: 2013)	Rank 2013	Mean monthly charge (USD-PPP: 2012)	Rank 2012
Italy	5.79	1	21.42	11
Denmark	6.75	2	-	-
Japan	10.26	3	20.68	9
Poland	10.74	4	5.86	2
France	13.46	5	27.17	18
Switzerland	15.13	6	20.68	9
Finland	17.37	7	16.17	5
Belgium	18.25	8	17.74	6
Iceland	20.03	9	21.45	12
Austria	20.46	10	24.49	15
Sweden	21.21	11	-	-
Australia	23.23	12	22.11	14
New Zealand	23.75	13	35.5	21
Slovenia	24.21	14	19.07	8
Portugal	25.55	15	22.5	13
Luxembourg	25.7	16	7.1	3
Mexico	26.81	17	45.1	25
Hungary	31.72	18	26.03	17
Netherlands	33.14	19	29.03	19
Czech Rep	33.44	20	42.4	24
Korea	36.46	21	34.06	20
Ireland	37.26	22	46.27	26
Germany	38.31	23	24.63	16
Slovakia	40.14	24	-	-
Spain	40.67	25	47.04	27
United Kingdom	53.84	26	38.86	22
Greece	86.96	27	66.57	30
Turkey	103.58	28	7.41	4
Canada	-	-	41.61	23
United States	-	-	60.74	29
Estonia	-	-	4.08	1
Chile	-	-	54.28	28
Norway		-	18.65	7
OECD Avg	31.05		29.21	

Sources: FCC (2015) International Broadband Data Report. 4th. ed., Appendix C, Table 7a. available at: https://apps.fcc.gov/edocs_public/attachmatch/DA-15-132A1.pdf; FCC (2012) International Broadband Data Report. 3rd ed., August 2012, available at <http://www.fcc.gov/reports/international-broadband-data-report-third>.

Table 5b. Composite Wireless Price Rank: Price per GB of Data Smartphone Data Plans with Usage Limits: < 1 GB and Limited Minutes				
Country	Price per GB of data (USD-PPP/GB: 2013	Rank 2013	Price per GB of data (USD-PPP/GB: 2012	Rank 2012
Denmark	22.49	1	-	-
Italy	23.15	2	55.3	4
Poland	38.64	3	18.45	1
New Zealand	39.55	4	169.34	24
Switzerland	58.51	5	65.49	6
Iceland	59.49	6	108.86	15
Slovakia	80.27	7	-	-
Australia	81.29	8	78.99	9
Netherlands	92.77	9	86.48	11
Mexico	100.89	10	118.73	16
Sweden	102.89	11	-	-
Ireland	107.2	12	96.59	12
Portugal	108.27	13	37.51	2
Hungary	110.38	14	82.64	10
Greece	115.94	15	134.02	18
Belgium	123.59	16	119.73	17
Spain	126.06	17	97.47	13
Slovenia	128.04	18	387.08	29
Germany	133.89	19	140.15	21
United Kingdom	141.38	20	137.21	19
Korea	158.91	21	2074.17	30
France	187.49	22	65.58	7
Czech Republic	217.48	23	138.53	20
Finland	218.98	24	207.1	26
Austria	256.99	25	244.94	28
Luxembourg	941.33	26	97.94	14
Turkey	2941.31	27	70.1	8
Japan	8793.42	28	57.36	5
Estonia			40.77	3
Chile			143.09	22
Norway			152.94	23
United States			202.47	25
Canada			226.19	27

Sources: FCC (2015) International Broadband Data Report. 4th. ed., Appendix C, Table 7a; FCC (2012). International Broadband Data Report, available at <http:// www.fcc.gov/reports/international-broadband-data-report-third>.

Table 6a. Wireless Price Rank: Mean monthly plan charge for Smartphone Data Plans with Usage Limits: ≥1 to <5 GB and Unlimited Minutes

Country	Mean monthly charge (USD-PPP: 2013)	Rank 2013	Mean monthly charge (USD-PPP: 2012)	Rank 2012	Mean monthly charge (USD- PPP: 2011)	Rank 2011
Denmark	21.80	1	34.21	4	28.17	12
Estonia	23.66	2	8.85	2	23.75	9
Norway	24.56	3	—	—	32.33	16
Israel	24.95	4	66.66	3	66.47	30
Switzerland	29.09	5	25.64	10	29.32	13
France	32.88	6	60.8	11	32.01	15
Spain	40.92	7	68.34	13	46.24	21
Austria	41.05	8	17.92	5	30.4	14
Slovenia	42.39	9	—	—	17.81	4
Italy	48.96	10	57.63	7	49.54	22
UK	51.05	11	73.26	14	39.15	19
Australia	57.51	12	53.75	6	18.02	5
Belgium	57.54	13	83.15	16	-	-
Ireland	59.43	14	92.37	17	56.76	29
Czech Rep	62.30	15	48.1	18	18.65	6
Slovakia	62.65	16	18.45	1	15.49	3
Canada	65.61	17	60.19	10	56.49	28
Iceland	65.84	18	—	—	11.86	2
Poland	71.84	19	58.96	9	35.79	17
Germany	78.05	20	76.9	15	43.03	20
Korea	78.86	21	57.87	8	51.3	24
Portugal	80.74	22	155.91	18	52.61	26
New Zealand	83.78	23	—	—	50.08	23
Netherlands	91.40	24	24.89	9	73.04	31
United States	93.08	25	66.66	12	54.82	27
Hungary	129.26	26	—	—	52.44	25
Luxembourg	—	—	3.92	1	20.59	7
Japan	—	—	34.21	5	10.02	1
Greece	—	—	165.29	19	93.14	33
Turkey	—	—	—	—	20.86	8
Sweden	—	—	—	—	37.72	18
Finland	—	—	—	—	25.03	11
Chile	—	—	—	—	23.89	10
Mexico	—	—	—	—	76.67	32

Sources: FCC (2015) International Broadband Data Report. 4th. ed., Appendix C, Table 7d. available at: https://apps.fcc.gov/edocs_public/attachmatch/DA-15-132A1.pdf; FCC (2012) International Broadband Data Report. 3rd ed., August 2012, available at <http://www.fcc.gov/reports/international-broadband-data-report-third>. After the ranks were calculated for the FCC's original set of 37 countries, the ranking was recomputed with the four non-OECD countries excluded (Bulgaria, Hong Kong, Lithuania, and Singapore), giving the set of 33 countries for this table.

Table 6b. Composite Wireless Price Rank: Price per GB of Data Smartphone Data Plans with Usage Limits: ≥1 to <5 GB and Unlimited Minutes

Country	Price per GB of data (USD-PPP/ GB: 2013)	Rank 2013	Price per GB of data (USD-PPP/ GB: 2012)	Rank 2012	Price per GB of data (USD-PPP/ GB: 2011)	Rank 2011
France	9.55	1	21.14	8	29.64	23
Denmark	11.03	2	8.85	2	5.37	3
Estonia	11.83	3	—	—	35.84	24
Switzerland	12.65	4	—	—	51.31	25
Israel	13.07	5	25.64	10	61.35	28
Norway	14.76	6	—	—	28.05	20
Belgium	16.93	7	16.63	4	—	-
Australia	16.97	8	17.92	5	18.02	13
Austria	17.03	9	—	—	8.52	7
Ireland	17.19	10	18.47	7	20.56	14
Korea	17.21	11	40.92	15	27.72	19
Slovakia	21.34	12	18.45	6	11.92	11
Slovenia	21.36	13	—	—	7.6	4
Italy	26.15	14	42.11	16	21.72	15
UK	27.15	15	48.1	17	60.36	27
Iceland	28.89	16	—	—	4.29	1
Spain	32.76	17	31.6	13	28.96	21
Poland	33.27	18	29.48	11	11.87	10
New Zealand	36.19	19	—	—	58.91	26
Canada	36.36	20	32.1	14	29.16	22
Czech Rep	38.08	21	—	—	22.96	16
Germany	39.13	22	30.36	12	5.29	2
Netherlands	47.31	23	—	—	65.41	29
United States	48.80	24	24.89	9	10.4	8
Hungary	53.29	25	—	—	16.31	12
Portugal	60.18	26	77.95	18	71.74	30
Luxembourg	—	—	3.92	1	8.45	6
Japan	—	—	15.83	3	606.92	33
Greece	—	—	110.19	19	91.76	31
Turkey	—	—	—	—	10.72	9
Sweden	—	—	—	—	7.64	5
Finland	—	—	—	—	23.07	17
Chile	—	—	—	—	23.89	18
Mexico	—	—	—	—	94.73	32

Sources: FCC (2015) International Broadband Data Report. 4th. ed., Appendix C, Table 7d; FCC (2012). International Broadband Data Report, available at <http:// www.fcc.gov/reports/international-broadband-data-report-third>. After the ranks were calculated for the FCC's original set of 37 countries, the ranking was recomputed with the four non-OECD countries excluded (Bulgaria, Hong Kong, Lithuania, and Singapore), giving the set of 33 countries for this table.

Table 7a. Wireless Price Rank: Mean monthly plan charge for Smartphone Data Plans with Usage Limits: ≥5 GB and Unlimited Minutes (FCC: 2013, 2012)

Country	Mean monthly charge (USD-PPP: 2013)	Rank 2013	Mean monthly charge (USD-PPP: 2012)	Rank 2012
Luxembourg			51.42	1
Denmark	30.36	1	52.63	2
Austria	39.60	2	73.57	4
Switzerland	43.12	3		
Norway	44.21	4		
United Kingdom	59.40	5		
Australia	64.52	6		
Belgium	65.05	7		
Ireland	69.29	8		
Netherlands	84.05	9		
Czech Replublic	89.85	10		
France	101.89	11	98.46	5
Canada	103.26	12		
Korea	104.84	13	155.01	8
Germany	115.19	14	120.96	7
United States	225.84	15	114.99	6
Japan			60.13	3

Sources: FCC (2015) International Broadband Data Report. 4th. ed., Appendix C, Table 7f. available at: https://apps.fcc.gov/edocs_public/attachmatch/DA-15-132A1.pdf; FCC (2012) International Broadband Data Report. 3rd ed., August 2012, available at <http:// www.fcc.gov/reports/international-broadband-data-report-third>.

Table 7b. Composite Wireless Price Rank: Price per GB of Data Smartphone Data Plans with Usage Limits ≥5GB and Unlimited Minutes (FCC: 2013, 2012)

Country	Mean monthly charge (USD-PPP: 2013)	Rank 2013	Mean monthly charge (USD-PPP: 2012)	Rank 2012
Luxembourg	-	-	1.57	1
Denmark	2.99	1	3.73	2
Switzerland	4.31	2	-	-
Norway	5.95	3	-	-
Austria	6.14	4	7.36	4
Australia	6.45	5	-	-
United Kingdom	6.99	6	-	-
Czech Replublic	8.99	7	-	-
France	10.05	8	16.41	8
Ireland	10.13	9	-	-
Korea	10.15	10	6.2	3
Belgium	10.84	11	-	-
Canada	11.47	12	-	-
Germany	11.52	13	12.1	7
United States	12.00	14	11.5	6
Netherlands	14.01	15	-	-
Japan	-	-	8.59	5

Sources: FCC (2015) International Broadband Data Report. 4th. ed., Appendix C, Table 7f. available at: https://apps.fcc.gov/edocs_public/attachmatch/DA-15-132A1.pdf; FCC (2012) International Broadband Data Report. 3rd ed., August 2012, available at <http:// www.fcc.gov/reports/international-broadband-data-report-third>.