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Review of Basic Telecommunications Services

CRTC Telecom Notice of Consultation 2015-134

Introduction

Cybera is a not-for-profit, technology-neutral agency responsible for accelerating high-tech adoption in Alberta. One of Cybera's core roles is the operation of Alberta's Research and Education Network, called CyberaNet. This is the dedicated network for unmetered, not-for-profit traffic used by Alberta's schools, post-secondary institutions and business incubators to aid innovation, enterprise and ingenuity.

Cybera receives both provincial and federal government funding to spearhead pilot projects that improve efficiencies and the competitiveness of Canadian institutions and businesses, and support international-level research. It is guided by a strategic leadership team, and is home to some of the world's top cloud and networking experts, who work together to build cloud infrastructure, data storage, and advanced networking solutions.

Drawing on this expertise and public service mandate, Cybera is pleased to provide the following response to the CRTC Telecom Notice of Consultation 2015-134 regarding the review of Canada's basic telecommunications services. It is our view that broadband Internet be considered a basic telecommunication 21st century service, and should be affordable and accessible to all Canadians - equal in importance to the touch-tone telephone service of the 20th century.

The importance of this review cannot be understated. It represents a critical turning point in Canada's digital economy. To ensure that Canada is able to take a lead in tomorrow's marketplace of ideas and services, we need the right resources and policies in place to build and support our digital infrastructure. Very soon, all Canadians will need the capability to transmit gigabits per second of data, and process terabytes of information.

A large portion of this response will focus on minimizing the digital divide to ensure economic and social viability for all Canadians. Redefining broadband as a "basic service" would obligate carriers to deliver services to geographically dispersed and sparsely populated regions. However, it is also important to recognize that rural and remote residents are not the only Canadians experiencing frustration related to connectivity. Our response will also focus on potential funding mechanisms to incentivize and support deployment of modern telecommunication services to all underserved sectors. Finally, we will demonstrate how a strong model supporting structural separation can increase efficiencies, reduce duplicate infrastructure, protect public-interest infrastructure, and create an open, accessible and service-based solution.

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<u>**Canadians' evolving needs for telecommunications services**</u>
Canadians are using telecommunications services to fulfill many social, economic, and cultural needs in today's digital economy.

1. For Canadians to meaningfully participate and contribute to the digital economy, it is imperative that sufficient digital infrastructure exists to be competitive and foster innovation. Multiple studies[1],[2] show that broadband has a positive effect on a nation's GDP and household income, as it increases personal productivity and allows for more flexible working and learning opportunities, including home-based business and education resources.

2. Unfortunately, many Canadians still do not have the broadband connections needed to access necessary telecommunication services. Minimizing the current digital divide requires better, more affordable connectivity for all Canadians, regardless of location. It is a question of both price and availability. This is especially true for Canadians living in rural and remote regions where barriers include: availability (lack of access and choice), quality (lack of high-speed coupled with capacity), and price (unaffordability due to lack of competition).

3. The 200 plus interventions by private citizens on Notice of Consultation 2015-134 reflect Canadians' frustration with their inability to meaningfully participate in the digital economy. A sampling of these complaints demonstrates the issues being faced by Canadians looking to innovate or grow their businesses:
   a. Intervenor #69, Stephanie Snow, describes an inability to work from home or perform job interviews via Skype.
   b. Intervenor #130, Diane Wood, describes poor and prohibitively expensive access to 5 Megabits-per-second (Mbps) download speeds, which constrains her ability to perform tasks urban Canadians take for granted, such as applying for jobs and accessing government services.
   c. Intervenor #22, J. Tesolin, as a web developer, complains of low upload speeds.
   d. Intervenor #25, T. Singh, a small business owner in Mississauga, describes low upload speeds limiting his business' ability to run the applications it requires.
   e. Intervenor #55, Stephen Schwartz, describes an inability to access modern high-quality (data intensive) web content.

4. Canada's rural communities face a serious challenge in maintaining their economic viability as residents migrate to urban centres to access better connectivity tools. Fast broadband is increasingly being considered a necessity by homebuyers.[3] Without careful consideration, the rural-urban divide will continue to grow. It is critical that rural and remote residents be given the same opportunities as urban Canadians with respect to the adoption of Internet services. In his 2013 article on the Status of Broadband Connectivity in Canada, Nordicity partner Stuart Jack noted that: "In general, citizens in rural areas might obtain 2 Mbps broadband Internet access service over wireline services (such as DSL and

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[1] Copenhagen Economics."The socio-economic value of digital infrastructures". *Danish Energy Association (April 16, 2010).* 7.
[2] Ericsson, Arthur D. Little, and Chalmers University of Technology. "Socioeconomic effects of Broadband Speed". September 2013. 10-20.
[3] Karissa Gail. "Would you move to the town of Olds for its Gigabit Age Internet speed?" *Calgary Herald*, May 29, 2015.

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Cable modems). Citizens in remote areas...can often only obtain 2 Mbps via satellite technology, and often at much higher costs than their urban counterparts."[4]

5. The Internet economy made up 4.1% of the G-20 nations' GDP in 2010, and is expected to reach $4.2 trillion in the G-20 economies by 2016[5]. The volume of global data created daily is 2.5 Exabytes (or 2.5 billion Gigabytes)[6], and this number is growing quickly. Global IP traffic is growing at a compound annual growth rate (CAGR) of 23%[7] from 2014-2019, thanks to the rise of technologies such as the Internet of Things (IoT) and sensor networks. Over the next ten years, the majority of digital infrastructure solutions will require significant investment in order to meet the needs of future generations and flexibly accommodate disruptive technologies.

6. Canadians require more bandwidth for activities that require high-speeds (such as telecommuting, telehealth and videoconferencing), above-the-network services (such as cloud storage of digital files) and as more devices become Internet-enabled. Infrastructure considerations should not only focus on networks, but also the data that travels over those networks, including the ability to store and manage big data, devices needed to access telecommunication services, and the compute power available in the cloud itself. Examples of important telecommunication services needed to participate in the digital economy include: telepresence robots for remote working and virtual tourism, telehealth, distance-learning, data analysis sharing and processing, e-commerce, software and video game development, photo and video sharing, contributing to global work and research projects using shared software, and open network technologies and topologies.

7. The sectors these services impact include:
   a. **Health Care:** Transmission and sharing of medical data and imagery in real-time; direct consultations between health care professionals and patients in all regions and across all income brackets.
   b. **K-12 Education:** Remote collaborations between schools and classrooms; video exploration of faraway areas; developing understandings of new computer skills for future employment.
   c. **Distance Learning:** Accessing video classrooms, virtual teaching environments and training applications; videoconferencing between urban/rural/at-home students and specialist teachers.
   d. **Energy and Environment:** Encouraging telecommuting to reduce carbon emissions from shared offices / workplace commuting; new monitoring tools for improved environmental preservation.
   e. **E-Government:** Offering more efficient access to government services through online portals; Increasing civic participation in government planning; opening up government data for the creation of new, convenient applications.
   f. **Public Safety:** Enabling safety officials to easily connect and share resources (including video and data files) during crisis situations.

8. An enabler in the education sector is a national program called the Canadian Access Federation (CAF) which oversees two identity and access management services: eduroam (education roaming) and Federated Single Sign-On (SSO). Eduroam provides open, easy access to wireless networks at most

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[4] Stuart Jack. "Status of Broadband Connectivity in Canada: The need for a National Strategy and Clear Standards of Service," *Info Telecom*, December 2013, 13.

[5] David Dean. "Connected World" The Boston Consulting Group, January 2012.

[6] Tim Paydos. "Demystifying Big Data: Decoding The Big Data Commission Report", Presented at an event highlighting Big Data, IBM's Analytics Solution Center, November 14, 2012.

[7] Cisco. "Forecast and Methodology, 2014-2016", Cisco Visual Networking Index, last modified May 27, 2015.

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post-secondary institutions across Canada and in more than 65 countries worldwide. According to CANARIE, the CAF currently supports an average of 8 million eduroam logins per month. Eduroam is only possible where there is sufficient broadband infrastructure. Federated SSO allows students, faculty and researchers from participating institutions to use their personal institution credentials to access a growing number of online services and resources across Canada and around the world[8]. Federated SSO is a foundational tool for providing post-secondary users access to shared applications and infrastructure. Researchers from different institutions who are working on joint projects are able to use shared infrastructure spaces to collaborate seamlessly. Administrators at postsecondary institutions are also able to access hosted, shared applications — rather than duplicating costs by each running separate siloed applications. Both of these digital services enable students, professors and researchers to access the Internet and other telecommunication services, regardless of location.

9. Another enabler for the digital economy is the evolution of virtual and distance learning. Laptops and handheld mobile devices that readily connect to the Internet are ubiquitous, providing users with 24/7 access to ideas, resources, people and communities. Because of this, more educational institutions are enacting bring your own device (BYOD) policies. The Alberta Ministry of Education noted in 2012: "Web-based tools and resources have changed the landscape of learning. Students now have at their fingertips unlimited access to digital content, resources, experts, databases and communities of interest. By effectively leveraging such resources, school authorities not only have the opportunity to deepen student learning, but they can also develop digital literacy, fluency and citizenship in students that will prepare them for the high tech world in which they will live, learn and work."[9] Moving towards mobile accessibility enables students to extend their learning outside of the classroom, and allows teachers to create interactive lessons to engage students. However, this participation can only happen if students and teachers have access to high-quality, affordable bandwidth.

10. Further, cloud computing-based services — both for the consumption *and* creation of online content using Internet-enabled devices — represent key tools for today's digital economy. Organizations in Canada and around the globe now realize the value of transitioning at least part of their operations into the cloud, and are making the necessary financial investments. The ability to take advantage of cloud service offerings is crucial for keeping up with competing businesses or education initiatives. Further, companies looking to leverage cloud infrastructure for their application or product development will need to be able to seamlessly interact with virtual machines via Internet-enabled devices. This participation in the digital economy can only take place if a high-quality bandwidth connection is in place.

11. For the average Canadian to meaningfully participate in the digital economy, he or she must be able to use the Internet interactively, not just as a passive consumers. As such, upload and download speed targets should be symmetric, to allow consumers to properly carry out digital activities such as videoconferencing and telecommuting. Again, the basis of this is affordable and equitable access to high-speed connectivity. Too often, residents, businesses and public sector organizations are confronted with not being able to access the connectivity required to operate effectively in today's economy.

12. We believe that broadband Internet — as a mandated basic telecommunication service — must:
    a. Be accessible and affordable. Networks need to reach all communities — urban and rural — at affordable and competitive rates.

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[8] "Federated Single Sign-On", accessed July 8, 2015. http://www.canarie.ca/identity/sso/.
[9] Alberta Government Ministry of Education. "Bring your own Device: A Guide for Schools", October 2012. 4.

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b. Have higher target speeds. Target speeds currently mandated by the CRTC (5 Mbps download and 1 Mbps upload) are outdated, too low, and must be increased.

c. Minimize latency. Latency affects the quality of the Internet connection in place. Even with excess bandwidth available, without low latency, users are unable to effectively take advantage of real-time collaboration tools or videoconferencing.

d. Be built to accommodate future needs. This means flexibility, increased capacity, and the integration of mobile. Network builds need to be well positioned for emerging demand. This will require sharing physical infrastructure that is built to support multiple network and service providers.

13. By prioritizing the deployment of fibre to rural communities, the impact of the digital divide on rural communities and businesses will be significantly minimized. To bridge this barrier, we need to revisit Canada's investment strategy. An organizational shift in the way infrastructure is planned for, built, operated, used, and maintained is required — including a shift to services-based competition from facilities-based competition especially for fibre to the premise (FTTP) technologies. Facilities-based competition is too expensive for rural Canadian communities. This is because they do not provide a positive business case for one ISP, let alone the multiple ISPs needed to promote a competitive environment and improve availability, choice, quality and prices for Canadians living in rural and remote communities .

14. The introduction of structural separation between the delivery of services and infrastructure (also known as open communications networks), and the move towards carrier-neutral network infrastructure, will ensure competitive access to next-generation computing and network technology (see Figure 1). The Alberta SuperNet is an excellent example of the positive impact that can be produced from having open-access network into rural Canadian communities. Prior to the deployment of the SuperNet, only seven service providers operated outside of Calgary and Edmonton, a number that has since increased to at least 47 service providers that utilize the SuperNet[10]. On their own, these providers would not have had viable business cases to build their own fibre networks into rural Albertan communities. However, by taking advantage of the open-access network in place, these companies were able to establish a positive business case for providing services in rural Alberta.

15. In the future, fibre that is capable of transmitting at least terabits-per-second will become the backbone on which Canada's digital economy grows and thrives. Fibre networks will need to deliver fast Internet to Canadian homes and businesses, and provide the foundation to advance our digital workforce, research and creative activities. For our country's digital economy to grow, all Canadians will require access to broadband Internet.

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[10] Axia SuperNet Ltd. "Residents". Accessed on July 13, 2015
http://www.thealbertasupernet.com/connect/providers/residents.aspx

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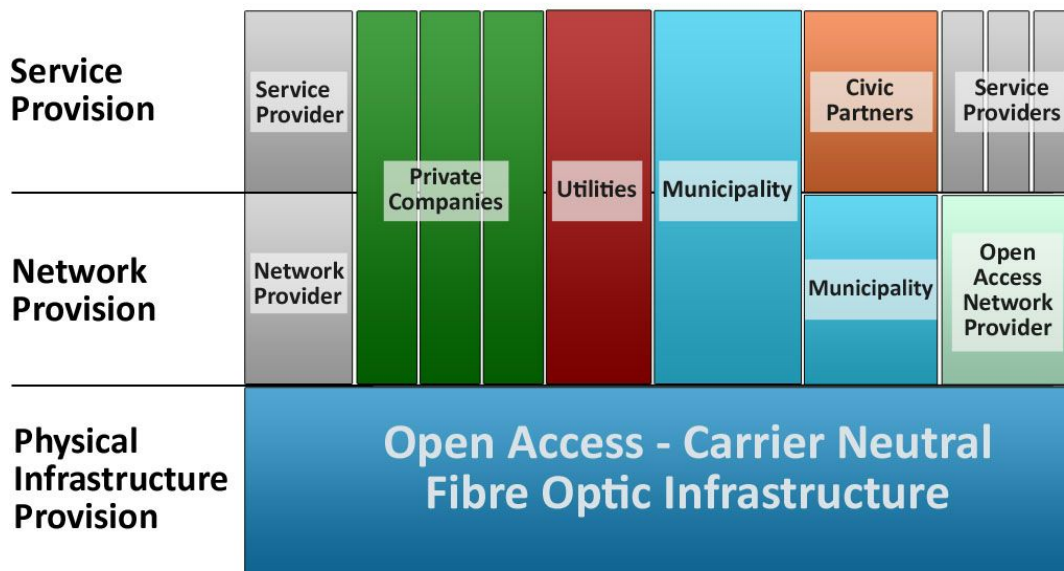@cybera   info@cybera.ca   www.cybera.ca

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Figure 1. Structural separation between the delivery of services and carrier-neutral network infrastructure

The Commission's current target speeds for broadband Internet access service are a minimum of 5 Mbps download and 1 Mbps upload, based on uses that consumers should reasonably expect to make of the Internet. Are these target speeds sufficient to meet the minimum needs of Canadians today? If not, what should the new targets be and what time frame would be reasonable to achieve these new targets?

16. The Commission's current target speeds are no longer sufficient to accommodate Canadians' demands for broadband. Further, these targets do not come close to competing with international standards. In 2010, the European Community set out a target of 30 Mbps for its members by 2020, with the intention of ramping up to 100 Mbps[11]. Several of its member countries have adopted far higher bandwidth targets. For example, Sweden, with a population density between that of Canada's and the USA, has set a target of 100 Mbps for 90% of the population by 2020[12]. In the geographically comparable Australia, the National Broadband Plan, which includes the rollout of a national, government-owned wholesale fibre network in order to facilitate structural separation[13], has a near-term target of 12 Mbps down by 2016, with the ultimate target of 100 Mbps wholesale download speeds by 2019. In the USA, the Federal Communications Commission (FCC) announced in January 2015 that the minimum broadband benchmark speeds would increase to 25 Mbps download and 3 Mbps upload. This target is five times faster than Canada's current target.

17. Canada's broadband strategy comes primarily from Industry Canada's *Connecting Canadians* initiative. Canada's approach intends to partner with the private sector to deliver broadband connectivity to rural

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[11] "Digital Agenda for Europe: Broadband Strategy & Policy". European Commission, accessed July 13, 2015, https://ec.europa.eu/digital-agenda/en/broadband-strategy-policy
[12] "Broadband Strategy for Sweden". Government Offices of Sweden. 3
[13] Parliament of Australia Research Publications. "Broadband: National broadband plans." Accessed July 6, 2015, http://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/BriefingBook44p/Broadband

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and remote areas. The *Connecting Canadians* initiative has set a target of 98% of Canadians connected by 2019. However, we believe that the target speeds of 5 Mbps download and 1 Mbps upload should be re-considered. In December 2014, the FCC announced that only telecommunications service providers (TSPs) capable of providing speeds of 10Mbps download and 1 Mbps upload would be eligible for subsidies from the analogous Connect America Fund.[14]

18. We believe that the basis for setting new targets should be the ability for Canadians to use the Internet interactively, and not just as passive consumers. As such, upload speeds must be higher, and should be symmetric with download speeds. This will allow consumers to carry out digital activities such as videoconferencing and telecommuting.

19. The new definition of high speed broadband, according to a 2010 report by Simon Fraser University and the University of New Brunswick, "must recognize and support levels of broadband infrastructure and connectivity that enable community — not just residential — broadband-enabled public and community service applications, and an understanding that 'related technologies' will be required as broadband is implemented (i.e. up-to-date computers)."[15] To ensure that Canada is competitive in the global digital economy, the Commission must set ambitious, longer term goals for Canadian broadband, taking into account the increasingly data-intensive demands of Canadian Internet users.

20. At the minimum, Cybera recommends that the CRTC should aim to match the FCC's National Broadband Plan download target of 25 Mbps, which also calls for 100 million American homes to have 100 Mbps Internet access by 2020. Cybera also recommends symmetrical download and upload Internet bandwidth targets to ensure that all Canadians can actively participate in the digital economy. As the use of high-end video communications applications increase, Canadians will require more symmetric bandwidth. According to a 2015 Cisco report on IP traffic growth, the fastest-growing business service between 2014-2019 is expected to be desktop or personal videoconferencing. This is attributed to the higher quality and lower price of new videoconferencing services and products. In terms of innovation, Cisco notes that, "Generally, if service providers provide ample upstream bandwidth, applications that use upstream capacity will begin to appear."[16] The same report also states that global fixed broadband speeds will more than double by 2019 to 42.5 Mbps, up from 20.3 Mbps in 2014.[17] By setting progressive bandwidth broadband targets, the CRTC will ensure that all Canadians can access and meaningfully participate in the global digital economy.

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[14] Federal Communications Commission. "FCC Increases rural broadband speeds under Connect America Fund". December 11, 2014.
https://www.fcc.gov/document/fcc-increases-rural-broadband-speeds-under-connect-america-fund
[15] Simon Fraser University and University of New Brunswick et al.. "Putting the 'Last-Mile' First: Re-framing Broadband Development in the First Nations and Inuit Communities". December 2010. 9.
[16] Cisco. "The Zettabyte Era—Trends and Analysis." Last modified May 2015. Accessed July 13, 2015
http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/VNI_Hyperconnectivity_WP.html
[17] Ibid.

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The Commission's role regarding access to basic telecommunications services
Which services should be considered by the Commission as basic telecommunications services necessary for Canadians to be able to meaningfully participate in the digital economy? Explain why.

21. In CRTC consultation 2013-551, Cybera's submission supported open access to FTTP infrastructure. Cybera continues to maintain this position, and submit that arguments based on the underlying technology should not be a factor in determining whether or not a telecommunications service should be considered a basic service. In other words: the delivery of basic services should not be tied to the underlying technology, but should be deliverable over *any* available network that supports the provision of the service.

22. In the 20th century, it was necessary to build a single wire dedicated to each telecommunications service offering. But with today's advanced networks, a single wire has the capacity to carry *many* service offerings. If we consider high speed broadband networks as a basic telecommunication service necessary for Canadians to meaningfully participate in the digital economy, then we should include the benefits of implementing a model of structural separation that protects the underlying technology as an open access - carrier neutral public piece of infrastructure. A strong model of structural separation can increase efficiencies, reduce duplicate infrastructure, protect public-interest infrastructure, drive competition, and create an open, accessible and service-based solution. For these reasons the Australian federal government is pursuing a comprehensive national broadband plan, including the construction of a national wholesale-only broadband network.[18] Efficient infrastructure models create a marketplace for service-based competition. Networking infrastructure should be considered the modern-day equivalent of the telephone, railway, roadway, and transmission infrastructure installed by the public sectors in the 19th and 20th centuries. Fibre should follow those models, which would mean minimizing duplication of the baseline infrastructure, and protecting and managing the fibre in the public's interest.

23. If we continue with facilities-based competition, it would mean a perpetual drive for inefficient, duplicate infrastructure. This approach is cost-prohibitive, especially in areas outside of urban cores (where service providers must consider large geographic distances coupled with low population densities). Canadians simply cannot afford to subsidize duplicate infrastructure offerings.

24. Cybera believes that regulations must be put in place regarding: speed, competitive access, oversight, affordability, and latency. Without such regulations, there is no incentive for Internet carrier companies to connect all Canadians or provide the lowest-possible broadband Internet rates. The terms, conditions and service characteristics that basic telecommunications should provide include:
    a. **Speed:** Incumbent local exchange carriers (ILECs)[19] tasked with meeting the basic service objective should be obligated to provide services at or above the speeds designated as broadband by the CRTC. There is also a need to regulate how providers advertise their Internet rates, as this is often quite different from the actual data rates achieved by consumers. Consumers are often misled by these inconsistencies, and may not realize that services can be

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[18] Parliament of Australia Research Publications. "Broadband: National broadband plans." Accssed July 6, 2015 http://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/BriefingBook44p/Broadband
[19] In Canada there are 7 ILECs: Northwestel Inc., Bell Canada, Saskatchewan Telecommunications, MTS Inc., Télébec, Telus Communications Company, Bell Aliant Regional Communications.

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sold based on the bandwidth that *might* be available to them (but only if no other users are on the network). The CRTC should regulate that advertised data rates reflect the minimum bandwidth available to the consumer at peak hours, and provide a means of monitoring providers, and penalties for failure to perform. This is common in other regulated industries, including power and railways.

b. **Competitive Access**: Given the country's low population density, service-based competition is preferable to facility-based competition. In rural areas, regulating access to long-haul fibre infrastructure would enable smaller service providers to offer competitive, high-speed services to remote customers at affordable rates.

c. **Oversight & Accountability:** Consider the Alberta SuperNet. The SuperNet was a $295 million strategic infrastructure investment by the Government of Alberta ($193 million) and Bell Canada ($102 million) that was completed in 2005. Final costs, including subsequent extensions, were on the order of $330 million. The SuperNet is governed by Service Alberta, with operations and management contracted to Bell Canada and Axia SuperNet Ltd, a wholly owned subsidiary of Axia NetMedia Corporation. The agreement with Axia was recently extended from its initial 10-year contract period for three more years, meaning it will run until June 30, 2018.[20] Despite the existence of the SuperNet, broadband connectivity and affordability in Alberta remains a significant barrier for many public sector organizations (post-secondaries, incubators, K-12) to participate in the digital economy. Today, the SuperNet remains underutilized as a critical component of public infrastructure and is currently not able to fully fulfill its intended purpose of connecting communities and public sector institutions across Alberta at reasonable rates. The difficulty has been related to affordable wholesale access to this middle-mile infrastructure, particularly in rural communities. These issues could have been avoided if better oversight, transparency, and accountability measures had been implemented in the initial SuperNet agreements that dictate the responsibilities and roles of the network operator. In fact, federal and provincial funds are being invested to find work-around solutions for those who remain unconnected. These inefficiencies demonstrate the need for regulatory oversight of telecommunications infrastructure.

d. **Affordability:** In the past, the CRTC set rules for making cable and dial-up Internet services more affordable to Canadians (e.g. 2010-632). In Alberta, Cybera has observed significant disparity in the Internet prices paid by Alberta public institutions. For example, one school reported paying $185 per Mbps at a time when other post-secondaries were paying $10 per Mbps and counterpart colleges in the United States were paying as little as $1 per Mbps. Some level of rate-setting should be applied by the CRTC, while still allowing for a reasonable return on investment for investors in fibre services.

e. **Latency:** The CRTC should regulate what level of latency is acceptable for broadband services delivery. Latency can greatly affect the quality of the Internet connection in place. Even with excess bandwidth available, without the right latency level, users would be unable to take advantage of applications such as videoconferencing and Voice over Internet Protocol (VoIP). Latency standards that are suitable for real-time applications and services should therefore be set. Of note, one important tool in the reduction of network latency are local Internet Exchanges, which allow networks to interconnect directly, rather than through one or more third party networks.

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[20] Cybera Inc.. State of Alberta Digital Infrastructure Report. October 2014. 14.

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25. The prices for basic telecommunications services should be as low as possible for wholesale and consumer markets. This would ideally be achieved through a partnership between public and private stakeholders to build and maintain telecommunications infrastructure, and make services available through this infrastructure at competitive rates. This requires the public sector to invest in the infrastructure to reach geographically dispersed and less populated regions, where existing financial incentives are insufficient for commercial providers to invest. The ideal rate for basic telecommunications services should be as close to $0 as possible, to give all Canadians the opportunity to innovate and compete in the digital market, without having to worry about prohibitive Internet costs, or slow connection speeds.

26. Cybera believes that the CRTC should implement an entry-level service rate floor for (retail) Internet pricing for Canadian consumers which ensures fair compensation for service providers, and does not place undue strain on the National Contribution Fund for network operators and service providers in high-cost serving areas. In Telecom Order 99-592, the CRTC chose to forbear from regulating retail end-user Internet services citing sufficient competitive market forces (except in Northwestel's operating territory[21]), however, this decision should be reviewed regularly to ensure that all Canadians continue to receive affordable access to broadband Internet. An entry-level service rate floor must also be complemented by a rate ceiling for broadband that is analogous to Broadcasting Regulatory Policy 2015-96, wherein the CRTC introduced a $25 entry-level residential service offering for television. ILECs (Telecom Decision CRTC 2007-27) and small ILECs (Telecom Regulatory Policy CRTC 2013-160) are currently subject to price cap regimes for current basic residential services. Including broadband Internet services in these regulatory frameworks is necessary to ensure all Canadians can afford basic broadband service to access e-health, e-government, and e-learning resources. Such an entry-level service rate ceiling for broadband could be determined by—or tied to—economic markers such as the minimum wage. Alternatively, this set rate range could reflect the national average (urban rate) for comparable broadband service. Whatever the formula, it is imperative that the calculation for it be transparent, and that the rate reflects an accurate picture of the cost of service balanced with the benefit to Canadians. The rate cap must not be obscured or subject to manipulation in favour of service providers. In particular, the CRTC should be cognizant of the challenges of determining stand-alone service rates, as broadband is increasingly offered as part of a bundle. Furthermore, the CRTC should be concerned about the vertical integration of services offered by TSPs — namely blending content charges with access charges — which makes it difficult for the consumer to determine the true price of bandwidth.

Can market forces and government funding be relied on to ensure that all Canadians have access to basic telecommunications services? What are the roles of the private sector and the various levels of government (federal, provincial, territorial, and municipal) in ensuring that investment in telecommunications infrastructure results in the availability of modern telecommunications services to all Canadians?

27. Federal, provincial, and municipal governments have a responsibility to ensure that investment in infrastructure results in the availability of modern telecommunications services to citizens. At the federal level, the telecommunications networks of the 21st century are akin to the railways of the 19th and 20th centuries, in terms of economic importance and ability to connect Canadians to domestic and foreign

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[21] CRTC. "Telecom Decesion CRTC 2015-79", last modifided March 4, 2015, http://www.crtc.gc.ca/eng/archive/2015/2015-79.htm#fnb2, accessed July 8, 2015.

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markets. Provincially, governments have a responsibility to administer e-health, e-learning, and e-government services that are enabled by broadband Internet connections.

28. Examples of the roles that municipal, provincial, and federal governments can play in the delivery of broadband services in Canada include:
    a. **Municipal/Regional**: Municipalities are increasingly recognizing the value of robust broadband connectivity. Municipally owned networks are cropping up where city officials recognize the importance of a robust broadband to their communities, but the market alone is not providing the service. There is a strong case to be made for a public-private partnership network model wherein network infrastructure and end-point equipment is owned by a municipality who then turns to the market to maintain and upgrade the equipment, and provide retail services over the underlying infrastructure.
    b. **O-Net:** The rural town of Olds, Alberta, provides an excellent example of a proactive approach to combating the digital divide. This community built its own fibre network (O-Net) and started its own Internet service provider as a means to attract technology companies to the town. It now offers Internet speeds of a gigabit per second at a low commercial price.
    c. **Eyou Istchee:** In 2009-2010, the Canada Economic Development for the Regions of Quebec (CED) invested $9.6 million to create a not-for-profit broadband telecommunications network for the James Bay and Eyou Itschee communities in rural Quebec. This innovative network leverages the fibre-optic trunk running from Hydro Quebec's Saint-Félicien facility to the LG-1 generating station near Radisson, in concert with substantial new construction.[22]
    d. **Provincial:** Please see paragraph 24b: Competitive Access, paragraph 24c: Oversight & Accountability and paragraph 24d: Affordability.
    e. **Federal:** Through the *Connecting Canadians* initiative, the Government of Canada committed $305 million to extend access to an additional 280,000 homes in rural and remote parts of the country. This is a good start, but the program does not go far enough. *Connecting Canadians,* which is one of the pillars of the Digital Canada 150 plan, is a one-time federal budget disbursement allowing eligible ISPs to apply for funding to build infrastructure, but it is not a comprehensive broadband plan.

29. Cybera believes that a comprehensive broadband strategy will require an organizational shift in the way infrastructure is planned for, built, operated, used, and maintained — including a shift to services-based competition rather than facilities-based competition. The introduction of structural separation between the delivery of services and infrastructure (also known as open communications networks), and the move towards carrier-neutral network infrastructure, will ensure competitive access to next-generation computing and network technology. Furthermore, the federal government and its regulatory bodies should endeavour to drive efficiencies and support the construction of robust fibre networks by making it a requirement for industry to install conduit for public fibre whenever the ground is trenched. Laying the underground conduit can account for 80% of the cost of fibre infrastructure[23]. In the interest of efficiency and connectivity, conduit that can carry public access fibre is best installed when public land is already being trenched, eliminating the need for multiple digs. If a conduit that could carry public access fibre was installed every time public land was trenched — for example, while laying oil and gas pipelines — the cost of entry for rural communities into the digital economy would be greatly reduced. This approach

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[22] Canada Economic Development for Quebec Regions. "Project to Implement the Eeyou Istchee Broadband Communications Network (ECN)." Accessed 8 July 2015,
http://www.dec-ced.gc.ca/eng/publications/agency/evaluation/2015/317/index.html
[23] City of Calgary. "2015-134 Response to Request for Information - The City of Calgary" June 29, 2015.

was largely used over the last 15 years by the City of Calgary to deploy its 400 km municipal fibre network at reduced costs.

30. Canada's government should take on more responsibility for making telecommunications services available to all Canadians. Currently, compared to other leading OECD nations, Canada has a limited policy framework and provides very limited funding for broadband connectivity.[24] In a 2009 OECD paper on the role governments should play in broadband, the authors argued that "most of the OECD countries that lead broadband penetration, including Denmark, the Netherlands, Norway, Korea, Sweden and Finland, have coherent broadband strategies."[25] In Canada, a 2010 report on broadband development among the First Nations and Inuit communities states that: "Partnerships between commercial, government, and First Nations and Inuit organizations are another core component of broadband infrastructure and connectivity. To function most effectively, government policy designed to support such partnerships recognizes the complex policy and funding environments that First Nations and Inuit must negotiate, and be designed in a way that enables communities to partner to share resources. This approach is necessary for communities and regions that cannot support an independent business case for private-sector broadband development. Government policies designed to harness the potential of advanced networks must be framed to support the endogenous development of community-driven broadband infrastructure and connectivity models."[26] These statements are as true for most Canadian rural residents as they are for First Nations and Inuit communities: the federal, municipal, and provincial governments need to work with commercial and community-led organizations to ensure that everyone has access to the most advanced telecommunications infrastructure.

What should be the Commission's role in ensuring the availability of basic telecommunications services to all Canadians? What action, if any, should the Commission take where Canadians do not have access to telecommunications services that are considered to be basic services?

31. As demonstrated in most parts of the world, without intervention, TSPs will only build where they can make a profit. In Canada, for example, one of the major challenges of FTTP is the lack of incentive for carriers to install fibre networks in rural communities, as long distances and low population density limits their profitability. This has resulted in a digital divide between rural and urban regions and the existence of service "donuts" - where a single TSP monopolizes (or hollows out) the profitable business centre of a town, then neglects to extend their services to less profitable (residential) areas on the edge of town. Further, by focusing on the profitable businesses centres, this disincentivizes other TSPs from entering the marketplace due to the limited number of customers in the area. The Commission's direct mandate is to take actions to ensure all Canadians have fair and equal access to telecommunications services including broadband Internet. The digital divide the commission seeks to prevent is exacerbated by TSPs neglecting to connect customers on the edge of the 'donut.'

32. Cybera asserts that the Commission should broaden the basic service objective to include broadband, and continue to provide subsidies in HCSAs. This will ensure broadband service providers can profitably

[24] Stuart Jack, "Status of Broadband Connectivity in Canada: The Need for a National Strategy and Clear Standards of Service". December 2013.
[25] Tim Kelly et al., "What role should governments play in broadband development?" Paper prepared for info Dev/OECD workshop on "Policy Coherence in ICT for Development", Paris, 10-11 September 2009 http://www.oecd.org/ict/4d/43631862.pdf
[26] Richard Smith et al., "Putting the 'Last-Mile' First: Re-framing Broadband Development in the First Nations and Inuit Communities." December 2010 report by Simon Fraser University and University of New Brunswick. http://firstmile.ca/wp-content/uploads/2015/04/2010-Putting-the-Last-Mile-First.pdf

and sustainably provide services to people in rural communities that are comparable to those available in urban centres. The commission has a responsibility to regulate where necessary, to help minimize the number of unserved communities. Capital investment will be required to build out telecommunications infrastructure into those areas. The CRTC should work with Industry Canada and funding bodies that provide grants and/or loans for capital investment to ensure that these programs work in concert with each other. This will ensure that any programs put in place are done so in collaboration, rather than in isolation, which will maximize the return on investment of public funds.

In Telecom Regulatory Policy 2011-291, the Commission stated that it would closely monitor developments in the industry regarding the achievement of its broadband Internet target speeds to determine whether regulatory intervention may be needed. What action, if any, should the Commission take in cases where its target speeds will not be achieved by the end of 2015?

33. The Commission should continue to be proactive in cases where target Internet speeds will not be achieved by the end of 2015. For example, in Telecom Regulatory Policy 2013-711 regarding the Northwestel modernization plan, the Commission ruled that "it will not be possible for Northwestel alone to deliver the telecommunications services needed by Canadians across the company's vast operating territory". This includes an inability to provide satellite-served communities with Internet at the Commission's target speed of 5 Mbps down and 1 Mbps up.[27] As a result, the Commission launched an inquiry and report on satellite transport services offered in Canada.[28] It will also launch a proceeding to investigate ways to fund infrastructure investment in transport facilities in Northwestel's operating territory. Moreover, in Telecom Decision 2015-78[29], the Commission ruled that Northwestel must reduce its Internet rates by 10-30%, to ensure consumers will receive Internet at both target speeds and affordable rates.

34. The positive steps taken by the Commission to address the Internet needs of Canadians in Northwestel's operating territory provides a framework for how the Commission can handle future cases where target speeds are not being achieved in the desired timeline. This framework review would examine: 1) available infrastructure and technologies needed to provide the desired Internet speeds to consumers in an operating territory; 2) mechanisms to fund infrastructure investment (if lacking); 3) availability and rates of wholesale services to ensure competitive access to transport facilities; and 4) tariffs for retail Internet services, including subsidies for high-cost serving areas.

35. It is also critical that frequent (quarterly or half-year) reviews of wholesale service rates, tariffs and subsidies are conducted by the Commission to ensure proper management of these rates to encourage market competition. Therefore, we believe that a sensitivity analysis be conducted in the case of a subsidy regime, to determine what actions the commission should take when target speeds will not be met.

In Telecom Regulatory Policy 2013-711, the Commission stated its intention to establish a mechanism, as required, in Northwestel's operating territory to support the provision of modern telecommunications services. Such a mechanism would fund capital infrastructure investment in

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[27] CRTC, "Telecom Regulatory Policy CRTC 2013-711." December 18, 2013. http://www.crtc.gc.ca/eng/archive/2013/2013-711.htm accessed July 8, 2015.
[28] Satellite Inquiry Report. October 2014. The Canadian Radio-television and Telecommunications Commission.
[29] CRTC, "Telecom Decision CRTC 2015-78." March 4, 2015. http://www.crtc.gc.ca/eng/archive/2015/2015-78.htm accessed July 8, 2015.

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transport facilities (e.g. fibre, microwave, and satellite), as well as the cost of maintaining and enhancing these facilities. The Commission considered that this mechanism should complement, and not replace, other investments from the private sector and governments, including public-private partnerships.

36. There is a significant need for the Commission to establish additional funding mechanisms in Northwestel's operating territory for the deployment of broadband Internet services. Under the existing Northwestel modernization plan, the goal is to provide 15 Mbps down and 1 Mbps up services to 52 communities by 2017 via terrestrial Digital Subscriber Line (DSL) technologies. However, only 7 of these 52 communities currently receive these services, while the remaining DSL and non-DSL (e.g. satellite-served) communities remain inadequately served. To provide unmetered, symmetrical broadband Internet services to all northern residents in high-cost serving areas at an affordable rate will require significant investment in infrastructure and technology, beyond what is currently planned and budgeted for in Northwestel's modernization plan. These public investments should work alongside the ~$20 million in subsidies received annually by Northwestel from the National Contribution Fund (NCF) through the per network access service (NAS) subsidy that supports residential primary exchange services (PES), and the non-access portion (NAP) subsidy that supports the service improvement plan (SIP).

37. Due to the area's vast territory and low population density, Arctic infrastructure projects do not typically lend themselves to private financing. Public contributions are therefore needed to ensure that all Canadians receive the same level of access to the Internet. In addition, competitors in the same operating territory as Northwestel are currently unable to access the NCF residential PES subsidy, since only incumbent local exchange carriers (ILECs) are eligible recipients and have an obligation to serve. By expanding the obligation to serve to include broadband Internet services, and by increasing access to NCF subsidies to non-ILECs, the Commission will encourage better investment, competition and market pricing forces in the Arctic. For example, the Ivaluk Network project proposed by Nuvitik Communication aims to lay fibre (including submarine portions) to connect 26 communities in Nunavut, and 14 communities in Nunavik, in an 8,000 km loop, at a cost of approximately $800 million[30]. This or other similar projects would benefit from support in some form of public funding.

38. Similarly, access to NCF subsidies for satellite-dependent or semi-dependent communities could help improve access and market competition. As described in the Commission's review of Satellite services (the Satellite Inquiry Report October 2014): in order to bridge the divide between satellite- and terrestrially-served communities, there needs to be both private-sector and government funding. Newer satellites that are able to provide High Throughput Satellite Services (such as broadband Internet — up to 10 Mbps download) will require significant infrastructure investment (both to launch satellites and build receiving/transmitting stations). The current practice of launching new satellites only after capacity has been fully allocated could also be sped up through public funding support. This would enable satellite-dependent communities to gain access to broadband Internet faster through subsidizing infrastructure investment costs typically incurred by the satellite operator. The CRTC should also consider reviewing the regulatory framework and funding mechanisms that govern low earth orbit (LEO)

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[30] Nuvitik Communications, "Ivaluk Network a Bridge to Canada's North." http://www.nuvitik.ca/ivaluk-network/ accessed July 9, 2015.

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satellite technologies for broadband services. A number of projects[31] that leverage recent developments in LEO satellite technology — such as improvements in network latency — and which aim to reduce launch costs (per satellite) are targeted towards underserved and unserved populations. In combination with other high-altitude wireless access technologies (e.g. Google's Project Loon), the financial and technological barriers to provide broadband services to Canada's HCSAs may be lowered through appropriate regulation and investment.

39. The impact of additional subsidy mechanisms, when combined with appropriate regulation, can encourage private sector investment in small client bases, such as in the Arctic (for example, there are only 35,600 and 11,000 inhabitants in Nunavut and Nunavik, respectively). Potential funding mechanisms could include mechanisms to increase contributions to the NCF by ILECs, and encouraging more contributions from non-telecommunications sectors. This could include contributions from foreign investment acquisitions (ownership and control) of large (>$312 million in assets for companies from World Trade Organization countries) non-cultural Canadian businesses. Such acquisitions must meet federal approval by Industry Canada and demonstrate the "net benefit" to Canada criteria set forth in the Investment Canada Act[32].

40. The "net benefit" test includes the effect of investment on technological development and competition in Canada, and the contribution to Canada's ability to compete globally. In order to satisfy these criteria, foreign investors can offer legally binding undertakings to demonstrate their "net benefit" to the country. This could include contributions to connectivity that would enable all Canadians to participate in the global digital economy from their home communities, as well as offer incentives to the private sector to invest in these traditionally unprofitable geographic regions. Without the establishment of additional subsidy mechanisms, business owners such as Madeleine Redfern (Intervenor #74) from Iqaluit will continue to face telecommunications bills of approximately $1,000 per month — despite deteriorating service quality — which directly prevents her from running a competitive business. If nothing is done to support businesses such as hers, entrepreneurs will be forced to leave the north.

What changes, if any, should be made to the *obligation to serve* and the basic service objective?

41. Cybera believes that the obligation to serve and the basic service objective should be expanded to incorporate deployment of broadband Internet access services, including in rural and remote areas, as a mandated basic telecommunication service.

Should broadband Internet service be defined as a basic telecommunications service? What other services, if any, should be defined as basic telecommunications services?

42. Broadband Internet service should be included in the definition of a basic telecommunication service. The Government of Canada's *Connecting Canadians* initiative, announced in 2014, states that: "In today's digital economy, Canadians live in an increasingly connected world where access to the Internet is essential to create jobs, realize economic opportunities and link Canadians to online services….Over 99 percent of Canadian households currently have access to basic broadband with speeds of 1.5 Mbps,

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[31] Virgin Galactic, "Virgin Galactic Signs Contract with OneWeb To Perform 29 Satellite Launches." June 25, 2015. http://www.virgingalactic.com/press/virgin-galactic-signs-contract-with-oneweb-to-perform-39-satellite-launches/ accessed July 8, 2015.
[32] Industry Canada, "An Overview of the *Investment Canada Act* (FAQs)." March 8, 2013. http://www.ic.gc.ca/eic/site/ica-lic.nsf/eng/h_lk00007.html#q8 accessed July 8, 2015.

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but newer online technologies typically require faster speeds and higher data transfer rates." Connecting Canadians called for all Canadians to have access to high-speed Internet connections through which they will be able to better use cloud computing, stream video, save and transfer files, or participate in distance education programs online. Going further, Section 7 in the Canadian Telecommunications act states that: "It is hereby affirmed that telecommunications performs an essential role in the maintenance of Canada's identity and sovereignty and that the Canadian telecommunications policy has as its objectives[: (1)] to facilitate the orderly development throughout Canada of a telecommunications system that serves to safeguard, enrich and strengthen the social and economic fabric of Canada and its regions[; (2)] to render reliable and affordable telecommunications services of high quality accessible to Canadians in both urban and rural areas in all regions of Canada."

43. Canada currently ranks 28th[33] in the world for Internet speed — meaning it offers some of the slowest Internet speeds in the developed word. Broadband Internet is an essential component for the prosperity of Canada's digital economy going forward and must be considered a basic telecommunication service — as necessary as radio and telephone connections. Symmetric connections of 100 Mbps up/down will soon be required by all Canadians to carry out the data processing, video/graphics sharing, and videoconferencing required for education and business endeavours.

44. It is clear that market forces alone cannot be relied upon to extend symmetrical broadband service to all Canadians. It is the nature of industry to seek out profitable service areas and ignore regions where it does not make business sense to operate, resulting in the existence of service "donuts." Managed effectively, designating broadband as a basic telecommunications service will solve the "donut-hole" or "timbit" problem encountered in small towns. See paragraph 31 for more detail.

What changes, if any, should be made to the existing *local service subsidy regime*? What resulting changes, if any, would be required to the existing regulatory frameworks (e.g. price cap regimes)?

45. Like residential telephone service, it will be necessary to enact, periodically review, and amend local service subsidy regimes that classify broadband telecommunications services within the current price caps for large[34] and small[35] ILECs. Modernization measures are required to update the local service subsidy regime and the NCF in order to encourage private sector investment and competition, especially in HCSAs with respect to broadband pricing. The NCF revenue contribution threshold for TSPs (currently $10 million) and HCSA residential subsidy should be reviewed in light of the different costs and revenues associated with provisioning of broadband Internet. For example, small ILECs are currently ineligible for NCF funding, but these funds could help provision broadband Internet in HCSAs. As well, the criteria used to distinguish between non-HCSA and HCSA regions should be reviewed to ensure that subsidy eligibility is appropriately administered with respect to broadband connectivity.

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[33] Ookla, "Global Broadband - Household Quality Index." http://www.netindex.com/quality/allcountries/, as of July 5, 2015.

[34] CRTC, "Telecom Decision CRTC 2007-27." April 30, 2007, http://www.crtc.gc.ca/eng/archive/2007/dt2007-27.htm, accessed July 8, 2015.

[35] CRTC, "Telecom Regulatory Policy CRTC 2013-160." March 28, 2013. http://www.crtc.gc.ca/eng/archive/2013/2013-160.htm, accessed July 8, 2015.

46. Section 7(b) of the Telecommunications Act states that the objective "to render reliable and affordable telecommunications services of high quality accessible to Canadians in both urban and rural areas in all regions of Canada" in order to secure urban and rural consumer access to reasonable, just, and symmetrical rates across Canada. Cybera supports the implementation of a price cap framework for ILECs in order to ensure both residential and business local rates do not increase any more than the lesser of 5%, or the annual rate of inflation in HCSAs where market forces are not sufficient to drive competition. In the event that broadband is reclassified as a basic service and ILECs are required to provide broadband to HCSAs, such inclusion under an updated price cap (basket) regime will provide incumbents with a subsidization incentive to drive efficiencies and innovation in these areas.

47. We also recommend that the CRTC regulate and open long backhaul infrastructure to full competition. The latter will encourage competition among incumbent and non-incumbent service providers while increasing the leverage of existing Canadian communications infrastructure. Greater competition will lead to higher availability and lower prices for high-speed broadband services in Canada, especially within underserved and unserved communities. This has been recently demonstrated in the wireless sector to help lower prices for consumers[36]. Full regulation will also enable small and non-incumbent service providers to offer services in smaller or under-served communities.

48. In Cybera's experience as an innovative vehicle for efficiency in the provision of broadband, the cost of providing broadband to its members has decreased over time. Members of Cybera's Internet Buying Group (IBG) saw their costs decrease by an average of 81% upon joining the IBG in 2012. Since then, the IBG prices have been cut by an additional 39%. This effectively means that IBG members, on average, were paying almost 9 times the amount for bandwidth three years ago that they are today. By aggregating demand, Cybera has been able to reduce Internet costs for publicly funded institutions in Alberta. More importantly, by acting as a disruptive innovator in Alberta, Cybera has been able to decrease prices for non-Cybera members as well: Shortly after introducing the IBG, for-profit service providers began reducing their prices as well in order to retain customers.

49. Additional sources of funding that would contribute to the existing local service subsidy regime could include contributions from foreign investment acquisitions (that satisfy the "net benefit" to Canada criteria set-forth in the Investment Canada Act). Please refer to paragraph 39 and 40 for more details.

What changes, if any, should be made to the contribution collection mechanism? Your response should address, with supporting rationale, which TSPs should be required to contribute to the NCF (National Contribution Fund), which revenues should be contribution-eligible and which revenues, if any, should be excluded from the calculation of contribution-eligible revenues.

50. In 2014, the CRTC determined that video relay service is a basic telecommunications service eligible for funding through the NCF. Similarly, the Commission should find that broadband is a basic telecommunications service eligible for NCF funding.

51. Currently, TSPs who have more than $10 million in telecommunications service revenue are required to pay into the NCF. Incumbent local exchange carriers tasked with providing service to HCSAs are then permitted to draw on the fund to support this activity.

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[36] CRTC, "Telecom Regulatory Policy CRTC 2015-177." May 5, 2015.
http://www.crtc.gc.ca/eng/archive/2015/2015-177.htm, accessed, July 8, 2015.

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52. Should the CRTC decide to continue to collect on a revenue-percentage basis, Cybera supports the continued $10 million revenue threshold in order to facilitate the entry of new players to the market. We also support the revenue-percent mechanism, as this ensures a reliable stream of contributions to the NCF. However, it is likely that the collection mechanism will require reevaluation in light of the higher costs and revenues associated with the provision of broadband to HCSAs, including, initially, the extension of infrastructure to areas where it does not yet exist.

53. Currently, it is difficult to assess the contribution rates on services that have been bundled into packages provided by ILECs. Cybera believes that transparency and the ability to see what customers are paying for — versus what they are actually receiving — is important. Vertical integration is being heavily pursued by ILECs, including new cloud and content offerings. In many cases, it allows for predatory pricing in captive markets and an inability to determine what is actually being offered, and what are the most beneficial services. It is imperative that TSPs are not able to inflate their costs or deflate their revenues to manipulate subsidy contributions. In the interest of transparency, we believe that the commission should regulate and require public disclosure of the cost of basic service and availability.

Should some or all services that are considered to be basic telecommunications services be subsidized? Explain, with supporting details, which services should be subsidized and under what circumstances.

54. Tim Wu, a Canadian who is now a Columbia Law School professor and expert on telecommunications, frequently speaks about the need for government involvement in network infrastructure management: "History shows that when a small group of private companies owns an essential part of the nation's infrastructure, the potential for abuse is serious…That broadband has become a utility is obvious to anyone."[37]

55. There are examples of several nations who agree with this belief, and subsidize basic telecommunications services. In July 2013, the UK Government announced a target of providing 95% of premises with access to superfast broadband by 2017, and to explore the measures needed to reach at least 99% by 2018. To achieve this, the government gave British Telecommunications (BT), a £1.2bn subsidy to upgrade the national broadband network. In a November 2013 broadband impact study impact report, consultants from the SQW Group estimated that this investment would "return approximately £20 in net economic impact for every £1 of public investment" by 2024. "This is an unusually high level of return for public funding, but we consider it to be realistic, given that broadband is a General Purpose Technology which has an increasingly critical role in the day-to-day operations of the majority of UK businesses. The Government's interventions are substantially improving the quality of this technology across a significant proportion of the UK, which, in the long term, will benefit hundreds of thousands of businesses, employing millions of people."[38] The UK broadband subsidy was also expected to create 20,000 jobs that could be directly attributed to the government's intervention.

56. In a separate 2009 paper on international governments' roles in broadband development, the authors argued that there are essentially two different roles for the public sector – making markets work more

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[37] Wall Street Journal,"Should the U.S. Regulate Broadband Internet Access as a Utility?" May 11, 2014, http://www.wsj.com/articles/SB10001424052702303939404579532054229366092
[38] SQW Group, "UK Broadband Impact Study Impact Report." November 2013. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/257006/UK_Broadband_Impact_Study_-_Impact_Report_-_Nov_2013_-_Final.pdf

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efficiently and ensuring equitable access for all. They found that market failures associated with a lack of economies of scale can be addressed through regulatory policies that: 1) liberalize licensing regimes, 2) facilitate efficient access to radio-spectrum, and 3) regulate access to dominant operators' networks. The authors also point to successful economies that have focused on providing low-cost access to existing infrastructure facilities, such as energy and transport networks: "In France, for instance, a 'ladder of investment' approach can be seen in the evolution of the broadband market. At the lowest level is resale of the incumbent's capacity, which requires interconnection at only one point in a network. Later, bitstream access was offered at a regional level, whereby the entrant would interconnect at multiple regional points and construct a backbone network between them. As full unbundling of the local loop was mandated, full-service operators have further generated growth in direct competition to the incumbent, France Télécom, while building their own networks. Some countries, such as the Republic of Korea, have gone further than this market regulation approach by providing positive financial incentives for operators to invest and compete. In the early days of broadband development, this allowed Korea to 'defy the S-curve' and to expand the market at a faster rate than might otherwise be expected."[39]

57. Most global governments have taken a proactive approach to ensure equitable access for all, including residents in rural and other underserved areas. This has been done through internal cross-subsidization by the state-owned monopoly operator, as well as by subsidy mechanisms. "Broadband is seen as providing a quick win in these stimulus plans because, on the supply side, it stimulates investment and employment while, on the demand side, it creates opportunities for entrepreneurship and spillover effects that benefit the general economy."[40]

If there is a need to establish a new funding mechanism to support the provision of modern telecommunications services, describe how this mechanism would operate. Your response should address the mechanism described in Telecom Regulatory Policy 2013-711 for transport services and/or any other mechanism necessary to support modern telecommunications services across Canada. Your response should also address, but not necessarily be limited to, the following questions:

58. Cybera supports designating broadband as a basic service, which will require additional funds for the NCF to help subsidize broadband deployment for all Canadians. New funding mechanisms should therefore be made available for the delivery of rural broadband solutions, and more money must be invested to ensure all Canadians have access to broadband Internet. For example, in Australia, the government is subsidizing the deployment of a national broadband solution in order to connect rural communities. In the USA, the Universal Service Administrative Company invested $4.17 billion in 2013 through the Connect America Fund[41]. Much like how the Connect America Fund shifts the focus from telephone-only services towards multi-purpose networks capable of also offering broadband Internet access[42], the NCF must be expanded to include support for broadband solutions. Supporting broadband delivery to HCSAs through the NCF will likely increase costs significantly, which means the fund's replenishing structure will have to be modified.

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[39] Tim Kelly et al., "What role should governments play in broadband development?" Paper prepared for info Dev/OECD workshop on "Policy Coherence in ICT for Development", Paris, 10-11 September 2009 http://www.oecd.org/ict/4d/43631862.pdf

[40] Op. cit., SQW Group.

[41] Universal Service Administrative Company, "2013 Annual Report." 2013. http://www.usac.org/_res/documents/about/pdf/annual-reports/usac-annual-report-Interactive-Layout-2013.pdf

[42] Op. cit., Universal Service Administrative Company.

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59. Alternative and/or additional funding options include:
    a. Taxing operators/subscribers wherein operators collect "universal access fees" through subscriber bills. The E-Rate program (or schools and libraries program), which provides discounts to eligible institutions in the USA, is one of four programs financed through the Universal Service Fund (USF). USF fees are commonly listed as a separate line item on consumer bills for service. The operator contribution factor is currently set at 17.1% and is reviewed and increased/decreased on a quarterly basis.
    b. Federal government contributions to the NCF to support basic service objectives. This form of financing currently exists in Chile, South Africa, and Finland.

60. Significant capital investment will also be needed in some cases to introduce broadband solutions that are capable of meeting the basic service objectives. While subsidies to ongoing operations will help justify capital investment for infrastructure deployment, further incentives should also be provided to help fund actual build-outs. The NCF should help fund this deployment, as it did with Northwestel's SIP program through the NAP of the funding. Another example of how infrastructure deployment may be funded is seen in the USA, where the Rural Utilities Service created the Rural Broadband Access Loan and Loan Guarantee Program, as well as the Community Connect Grant Programs in 2001. These provide loans and grants for the development of rural broadband.[43] Funding is available to incorporated organizations, state or local units of government, cooperatives, and private corporations. Issuing loans through these programs provides the advantage of making the capital investment recoverable — provided that a suitable and sustainable business model is available.

61. In Alberta, the Rural Utilities Act provided loan guarantees for associations to establish utilities primarily serving the rural marketplace for electricity, natural gas, and water services. However, it did not include broadband. If this Act were expanded to include broadband, it would provide the necessary capital investment for associations to deploy broadband infrastructure to serve rural communities. While the Rural Utilities Act is not universal in Canada, it — along with the programs offered by the Rural Utilities Service in the USA — should serve as a precedent for what can be done to help promote rural broadband deployment. In any such programs, funding should prioritize the construction of open-access infrastructure that promotes services based competition, rather than infrastructure based competition. Of note, the US Rural Utilities Service provides funding not just to private corporations, but also to municipalities and cooperatives, which, as is seen in many European examples, are often well-positioned to own neutral and shared infrastructure. Where community not-for-profit broadband is built with open access to all, including a base layer for private network operators and/or service providers, they should receive more subsidies and be treated preferentially to any single private provider solution. This is a basic method of building out the public infrastructure that should be strongly encouraged and supported.

62. Funding mechanisms should focus on rural communities and take care to ensure the funds are allocated to maximize their impact. Factors such as the definition of urban, rural, and HCSA, and whether or not existing service providers are in place in the community, should be carefully considered to ensure that funding is targeted towards the intended communities. In addition, the economic viability/business model

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[43] Lennard Kruger, "Broadband Loan and Grant Programs in the USDA's Rural Utilities Service." Congressional Research Service, July 12, 2013.
http://www.tellusventure.com/downloads/federal/crs/broadband_loan_and_grant_programs_in_rus_crs_12jul2013.pdf

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of the service provider needs to be taken into account in order to forecast any potential further subsidies required.

63. Expanded funding for broadband solutions available to municipalities and cooperatives should be accompanied by support for communities looking to take advantage of these resources. The Calgary based Van Horne Institute's 'Digital Futures Symposium' identified the need for a "community of communities", which would provide resources for best practices, and options for setting up rural broadband service providers.[44]

64. Broadband networks that are subsidized should be mandated to be available on a wholesale basis. That is, the network should be made available at set rates for any service provider that wants to provide services on top of the network, thereby stimulating services-based, rather than facilities-based, competition. Cybera believes the CRTC should implement an entry-level service rate floor in order to avoid undue strain on the NCF, and set a rate ceiling for broadband analogous to Broadcasting Regulatory Policy 2015-96, as outlined in paragraph 26.

65. An example of rate-setting for subsidized services is seen in the case of small rural telcos in the US that receive subsidies from the Connect America Fund and are therefore regulated under the FCC's Title II as public utilities. Telcos that receive subsidies are subject to rate setting rules and are limited as to what they are able to charge. They are also guaranteed a designated rate of return on capital.[45] This is similar to the primary exchange service portion of the NCF residential subsidy to Northwestel for HCSAs, which calculates subsidies based on the cost to provide the service adjusted annually for inflation, and a 15% markup for fixed and common costs less a residential local rate and fixed implicit contribution target[46].

66. The amount of funding should be determined through a competitive bidding process. This would ensure that solutions will be delivered at the lowest cost possible. Without one, it would be difficult to establish the true cost to provide a service. To help maximize the chances of having a successful competition, it is crucial that the process be open, objective, and transparent. This is also the model that was chosen by the Connect America Fund and utilized with a forward-looking broadband cost model.[47]

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[44] Mark Wolfe and Linda Vennard, "Final Report - Alberta Digital Futures Symposium." The Van Horne Institute, February 18, 2014. http://www.digitalfutures.ca/wp-content/uploads/2013/10/AB-Digital-Futures-Report.pdf
[45] FCC, "Public Notice - Wireline Competition Bureau Releases Alternative Connect America Cost Model Version 1.01.1 and Illustrative Results for Potential Use in Rate-of-Return areas. WC Docket No. 10-90," March 6, 2015, 1.
[46] CRTC, "Telecom Regulatory Policy CRTC 2013-711 - Northwestel Inc. – Regulatory Framework, Modernization Plan, and related matters," December 18, 2013. http://www.crtc.gc.ca/eng/archive/2013/2013-711.htm
[47] FCC, Report and Order and Further Notice of Proposed Rulemaking. November 18, 2011, 1123.