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Submitted Electronically (GC-Key)

Ms. Danielle May-Cuconato
Secretary General
Canadian Radio-television and
Telecommunications Commission
Ottawa, ON K1A 0N2

RE: Telecom Notice of Consultation CRTC 2015-134 Review of basic telecommunications services — Undertakings Requested from the First Mile Connectivity Consortium (“FMCC”)

Dear Ms. May-Cuconato,

In accordance with the process established by the Telecom Notice of Consultation CRTC 2015-134 dated 9 April 2015 (as amended), the First Mile Connectivity Consortium (FMCC) files the attached responses to Undertakings requested by the Commissioners. Please note that we are also submitted several supporting documents that are relevant to providing a complete answer to the Undertakings, and that we refer to in our answers. These supplementary documents are:

- *Digital Technology Adoption in Northern and Remote Indigenous Communities*. Prepared for Innovation, Science and Economic Development Canada. First Mile Connectivity Consortium. Available at: <http://firstmile.ca/report-digital-technology-adoption-in-northern-and-remote-indigenous-communities-in-canada/>
- *A Guide to Federal Funding for Indigenous Broadband in Canada*. First Mile Connectivity Consortium. Available at: <http://firstmile.ca/guide-federal-funding-for-indigenous-broadband/>
- *After Broadband: Organizational Use of Broadband in Southwest Alaska*. Heather E. Hudson.¹
- *Shaping First Nations Broadband Policy in Canada: Indigenous Community Intermediary Organizations in the Age of Austerity*. Available at: <http://firstmile.ca/wp-content/uploads/2015/03/2013-McMahon-WSSF.pdf>

The FMCC is seeking means to ensure access to reliable and affordable broadband in northern Indigenous communities, with engagement of residents of these communities in the provision of services. Importantly, our member organizations support broadband-enabled public services such as online education and telehealth, as well as entertainment services for household consumers.

Sincerely,

Rob McMahon
First Mile Connectivity Consortium
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¹ The full report is available at: http://www.iser.uaa.alaska.edu/Publications/2015_06-AfterBroadband.pdf

General Comments

1. The First Mile Connectivity Consortium (FMCC) is an incorporated independent not-for-profit national association. Our members are First Nations Internet service providers – what we call “community intermediary organizations.” Our associate members are university and private sector researchers and others interested in Indigenous and community communications and telecommunication services for the public good. Our work focuses on innovative solutions to digital infrastructure and services with and in rural and remote communities.
2. In this submission the FMCC responds to the Undertakings requested by the Commissioners during the public hearing in April 2016.

Undertaking #1: Estimated Cost of Northern Infrastructure and Services Fund (NISF)

806 COMMISSIONER MENZIES: Okay. I understand your point there. But what I'm trying to get to is, assume that I accept your argument that all of those things are good things. **Tell me how much it costs.**

807 DR. HUDSON: I think it's a good question for which we do not at this point have a definitive answer.

808 But we did review the Affordable Access Coalition's proposal for a broadband deployment mechanism, which is slightly different but somewhat comparable. And they came up with 315 million using somewhat different criteria and kind of a way of, I think, looking at what's a reasonable pod. And we think bottom-up might be a better way to approach it, but 315 is probably a low-end estimate.

809 We'd really need to look harder to give you a definitive number, but we are happy to try to do that and to work with -- I think you'll hear from several other groups that have variations on a similar approach and perhaps we can come up with something more concrete for you.

810 COMMISSIONER MENZIES: Yeah, that would be useful. It's kind of one thing if you can try to empathize with our position for a moment; it's one thing to look at each presentation on its own and when you go through a whole week and you start trying to figure out how much it all costs it can be a little intimidating, especially when the answer is, “We don't know.”

811 So **anything you can come up with in terms of what would be infrastructure and what would be operational in your view, would be useful because it goes to the affordability of the whole system.**

ANSWER:

3. The Northern Infrastructure and Services Fund (NISF) consists of both capital (infrastructure) support and ongoing operational support. In what follows, we point to the range of activities that the NISF would support. We recognize that some infrastructure support could come from various government programs, and not just the CRTC, but we note that these programs to date have been typically short term and unpredictable, and furthermore that they tend to prioritize capital investment over ongoing operations.² In the long term, the best way to ensure the efficient use of scarce resources is to account for the need to provide ongoing support to initial investments; doing so would ensure that the dispersal of subsidies does not amount to ‘throwing good money after bad’.

² The FMCC recently produced a report on this issue, see: <http://firstmile.ca/guide-federal-funding-for-indigenous-broadband/>

4. We believe that it is crucial for the Commission to engage with the Telecommunications Service Providers (TSPs) and ISED, which are well situated to provide estimates of the cost of providing broadband to rural and remote unserved and underserved communities. However, we also note the difficulty in these estimates given the range of variables involved in determining costs, such as travel, material (fibre) and so on.
5. Despite these caveats, we think that a revised high cost subsidy that could be available to any qualified provider could address the problem of high operating costs from the providers' perspective and high prices from the users' perspective. In determining funding, we suggest that the necessary costs should be calculated using a 'bottom up' approach that first determines the requirements of providers (as expressed, for example, in project proposals and/or feasibility studies) and then generates estimated costs from there.
6. To be more specific, the FMCC suggests that the following activities should be eligible for funding support:
 - **Capital costs:** Procurement and installation of infrastructure required for deployment of broadband services in unserved and under-served remote and isolated communities.
 - **Operations and Maintenance costs:** Operating costs of these facilities that exceed revenues from affordably priced services. There is also a need to upgrade the equipment as new digital technologies are required to be supported and as infrastructure ages.
 - **Providing training in digital literacy** to enable users in remote and isolated communities to participate in and contribute to the digital economy. This includes developing local skilled employment through acquiring technical skills such as network management and operations and community-based Internet performance measurement. This can result in jobs such as cable plant technicians and videoconferencing coordinators, or as administrators and technicians of community networks.
 - **Providing strategic planning, research and business support** for community networks. This could support, for example, aggregating demand to achieve economies of scale in the purchasing of hardware, software and bandwidth (including satellite bandwidth and/or mobile spectrum),³ aggregating customers or 'anchor tenants' for community networks (such as public and community services like online education and e-health providers), and establishing partnerships between community networks and other public and private sector entities.
7. These activities are consistent with the recommended actions identified for funding in the 2001 *National Broadband Task Force*:⁴

³ See: FMCC Initial Intervention, CRTC 2015-134.

⁴ *The New National Dream: Networking the Nation for Broadband Access*, Report of the National Broadband Task Force.

- Broadband infrastructure and services deployment, particularly to unserved communities and regions, through either a supply-oriented infrastructure support model or a demand-oriented community aggregator model.
 - Support for research and pilot projects that further the social and economic benefits of broadband.
 - Support for information campaigns and promotion of best practices targeted toward individual citizens.
 - Support to communities for strategic planning initiatives (e.g. Defining strategies to take advantage of broadband services in achieving their economic development objectives; developing tools to support decision-makers).
 - Support for development of necessary skills for the networked economy.
 - Innovation in applications and technology development, and in content development.
8. In providing estimates for the potential costs to support these activities, we drew on several sources. However, we stress that it is very challenging to come up with an effective estimate. This is due to several factors:
- Many variables affect the costs of construction in these regions, including delivery, labour, materials, and other costs.
 - The years that the estimates we provide below vary. Therefore, so do associated dollar values and costs for various items (transport, labour, equipment, materials, etc).
 - The projects noted below all incorporate different elements in their project cost calculations, rather than a standardized approach to determine costs. Therefore it is impossible to tell from the numbers presented below what specific aspects of a fibre build are included in the estimate.
9. Recognizing these limitations, rather than attempting to estimate a specific figures based on a 'one-size-fits-all' solution, we propose that the Commission instead focus on establishing an administrative mechanism involving government, industry and members of affected regions and communities. This group could collectively identify infrastructure (and other funding) needs in the regions, and then monitor and review funded the implementation of projects on an ongoing and transparent basis. In developing this administrative mechanism, we suggest that the Commission consider similar programs in place in other jurisdictions (such as the FCC's work in the U.S. – see paragraphs 18-25 for details) as well as historic funding in this area. Below, we provide several examples of these estimates.
10. First, the 2001 National Broadband Task Force report began the process of this costing exercise by including several broad estimates determined by the various telecom industry representatives included on the committee. The report states the following estimates (in 2001 dollars) to implement the action plan (described above in para 7):
- Transport to unserved communities: \$1.3 billion to \$1.9 billion
 - Connecting public institutions: \$500 million to \$600 million

- Connecting businesses and residences: \$900 million to \$2 billion
- Funding for community champions: \$50 million to \$70 million

11. In the intervening 15 years, the estimated \$4 billion dollar requirements for transport and connections provided by the telecom industry have probably been realized through a mix of both public and private funds. However, as has been proven in the course of these BSO Hearings, the lack of equitable and adequate connections serving remote and rural communities remain a challenge. As representatives of the telecom industry have repeatedly indicated in their presentations at these hearings, their priorities and investments are focused on the urban environments. This “last mile” approach to developing networks - that is, building from an urban core outwards to peripheral regions - has resulted in improved network capacity for urban and near-urban environments, but less favourable results for the remote and rural communities that remain under-served and unserved after all these years and investments. FMCC is proposing an alternative “first mile” development approach in these regions, which focuses on supports that enable these communities to gain voice in the development of the infrastructures and services they require and desire to connect with existing networks.

12. Second, we believe that the AAC has provided a robust estimate for its proposed low-income subsidy and broadband deployment subsidy. We focus here on the ACC’s proposal for a transport fund (the ‘Broadband Deployment Funding Mechanism’, which AAC states should be capped at \$190 million per year). AAC notes this Mechanisms should be based on a share of estimated total funds that could be allocated including both transport and low income subsidies. While we support the ACC’s proposal in principle, the NISF approach is different in two ways:

- We are talking about including costs to support ongoing operational/training activities - not just capital costs. The reason for this is to encourage sustainability and economic development among service providers in these regions. These funds would support the required upgrades to ensure the infrastructure and services are able to accommodate new digital technologies and innovations. Therefore the NISF includes added costs to support these activities.
- We noticed that ACC is proposing a cap on the transport fund. We disagree. Instead, we proposed that when determining funding for the NISF, the Commission sets policy objectives and then determines the resources required to pay for them. This ‘bottom up’ approach is more in line with the expressed needs of residents of northern communities. Above, we listed the suggested activities that could be supported through the NISF in para 6 above.

13. Third, we can draw on past infrastructure projects and feasibility studies to provide illustrative estimates. Below, we provide estimates for capital costs for transport infrastructure based on the experience of FMCC members KNET and the Western James Bay Telecommunications Network, and also projections of capital costs from KRG and NBDC. These costs are all on the public record. However, as noted above, we stress that it is very challenging to come up with an effective estimate. The table below illustrates estimated costs:

Project Name	Region	# Communities	Cost per KM	Total Cost
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NAN build by Bell	NW Ontario	22	\$30,000 to \$40,000	\$81 M
WJBTN.com	Western James Bay	3	\$70,000 ⁵	\$4.9 M
Nunavik Fibre Optic Feasibility Study (2013) ⁶	Nunavik	14	\$34,000	\$87.4 M
Nunavut Fibre Optic Feasibility Study ⁷	Nunavut	24	\$70,000 ⁸ to \$97,000	\$750 M to \$1,050 M

14. As stressed above, our proposal includes additional funding to support ongoing operations and maintenance costs, including for training (digital literacy for local network management and community-based Internet Performance Monitoring), research and strategic planning.
15. Fourth, calculating projects costs for a CRTC-administered fund should take into account the range of funding programs for capital infrastructure announced by federal and provincial government departments (e.g. ISED). The FMCC recently conducted research into federal funding programs available for broadband in Indigenous communities.⁹ This report identifies both historic and ongoing funding programs, and provides a concise description of each initiative, including focus, eligibility requirements and links to pertinent online resources. While we are aware of several active sources of federal infrastructure funding, it is difficult to track the current status of each of these programs. In addition, these programs provide capex (capital expenditure) infrastructure funds rather than the required ongoing opex (operations and maintenance) funding as described above to ensure sustainability. In our opinion the Commission can play a key role in government to coordinate these various funds. We recognize that some capital costs will be met by government funding programs, and others by the NISF.
16. Fifth, we note that the the Federal Communications Commission (FCC) on March 30, 2016 announced changes in the High Cost Fund component of the Connect America Fund that apply to some carriers (those regulated as rate-of-return). These carriers may accept specific support for a term of 10 years in exchange for meeting defined build-out obligations. They may receive subsidies of up to a total of \$200 per customer per month for customers in census areas where costs of service to end users are above \$52.50 per month. Carriers accepting support must deploy service providing 10 Mbps downloads/1 Mbps uploads to all funded locations, with faster 25/3 service required in areas of higher population density. They must provide an initial minimum usage allowance of 150 GB per month, which over time will increase based on the average usage of a majority of consumers.¹⁰

⁵ WJBTN built the fibre from Kashechewan to Attawapiskat - a distance of 70 km along the Hudson Bay coast. WJBTN built fibre in each community, including poles, electronics towers, etc. The fibre network was constructed along with the electrical grid system, resulting in additional costs.

⁶ See Appendix A - Cost Estimate, p23. Full study available at: <http://www.krg.ca/images/stories/docs/Tamaani%20Reports/Nunavik%20Pre%20Feasibility%20Telecoms%20Report%20Appendices.pdf>

⁷ See: http://www.qfile.ca/p/42424/Workspaces/web_docs/Nunavut%20Fibre%20Optic%20Feasibility%20Study%20-%20Final%20Report.pdf

⁸ Based on 10,782 km of fibre, from Nunavut 2012 Fibre Optic Feasibility Study.

⁹ This report is available at: <http://firstmile.ca/guide-federal-funding-for-indigenous-broadband/>

¹⁰ In the Matter of Connect America Fund ETC Annual Reports and Certifications Developing a Unified Inter-carrier Compensation Regime. Report and Order, Order and Order on Reconsideration, and Further Notice of Proposed Rulemaking. Released: March 30, 2016.

17. This approach has many advantages: it provides 10 years of predictable funding; it requires specific actual speeds; it caps prices for users; and it sets a relatively high user allowance or data cap. We note that the price ceiling of \$52.50 (although in US dollars) is similar to the affordability ceiling noted by K-NET and Obedjiwan, and which these two Indigenous organizations said resulted in losses to the providers that had to be covered from other community sources.
18. We cite these as examples of a promising approach; we note that in the U.S. this is also a work in progress. Chairman Wheeler states that the FCC plans to have specific recommendations for Alaska by the end of the second quarter of this year and for broadband deployment to America's Tribal areas before the end of the year.¹¹
19. The FCC's **Universal Service Funds** (USF) are all ongoing operating subsidies designed to provide affordable services to rural and low income residents, schools and libraries, and rural health facilities. The U.S. *Telecommunications Act* of 1996 expanded the traditional definition of universal service -- voice service for households -- to include schools, libraries, and rural health care facilities, and to include "advanced services," which today may be defined as broadband.
20. The universal service **Schools and Libraries Program**, commonly known as the **E-rate**, helps ensure that schools and libraries can obtain high-speed Internet access and telecommunications at affordable rates. Subsidies depend on the level of poverty and location, such as in a rural or remote area. The **Rural Health Care Support Mechanism** allows rural health care providers to pay rates for telecommunications services similar to those of their urban counterparts.
21. These programs have been highly beneficial to remote Alaska communities in providing broadband for schools and libraries, and connectivity for village clinics. However, their value extends beyond these services because the schools and clinics have become "anchor tenants" for many communities, and because the predictable annual subsidy payments helped to make the business case to upgrade connectivity for the entire community. In the fifteen years from 1998 to 2013, Alaska received a total of almost \$3 billion from these funds to subsidize services to its more than 200 villages, most of which are primarily Indigenous and without road access, similar to Canada's northern settlements. This amount is about 3 percent of the total funds allocated, although Alaska's population is only 0.23 percent of the U.S. population.¹²
22. The FCC has also introduced several infrastructure or capital subsidy funds targeted to remote and Indigenous regions. It has allocated \$100 million per year to a **Remote Areas Fund**. In addition, a special allocation under the **Connect America Mobility Fund** is scheduled to provide \$50 million capital plus up to \$100 million per year for tribal areas to support the build-out of current and next-generation mobile networks in areas where these networks are currently unavailable. In 2013, the FCC held a reverse auction for Phase I of the Tribal Mobility Fund, which distributed \$50 million in one-time support for mobile service providers serving tribal lands lacking 3G or 4G service. Phase II of the Mobility Fund

¹¹ *Statement of Chairman Tom Wheeler*. 2016. Re: Connect America Fund, WC Docket No. 10-90, ETC Annual Reports and Certifications, WC Docket No. 14-58, Developing a Unified Intercarrier Compensation Regime, CC Docket No. 01-92. March 30.

¹² Hudson, Heather E., 2015 "Broadband for Remote Regions: Overcoming the Challenges." Proceedings of the Pacific Telecommunications Conference, Honolulu, January.

provides \$500 million annually for ongoing support of mobile services, with up to \$100 million of this amount designated annually and exclusively for support to Tribal lands.¹³

23. We believe the FCC's funds and subsidy programs provide useful models for the CRTC to consider in developing infrastructure and operating subsidies for indigenous and remote regions in Canada, and may provide more information about these programs in our Final Comments.
24. Finally, we realize that several intervening organizations have proposed some form of subsidy for remote and isolated regions. Some groups note the high cost of operations as well as a need for infrastructure investment. We propose that the Commission convene a follow-up consultation or inquiry with these organizations that could examine specific requirements, costs, and funding options. We may also refer to and comment on some of these proposals in our Final Comments.

¹³ Hudson, Heather E., 2015 "Broadband for Remote Regions: Overcoming the Challenges." Proceedings of the Pacific Telecommunications Conference, Honolulu, January.

Undertaking #2: How do we define the communities/regions eligible for the NISF?

812 So just moving on. You reference how the FCC has designated funds for tribal lands. And I need to understand how you would suggest those be defined. They are defined in treaty areas, but in non-treaty areas they are less well-defined and where you've got ongoing land claims. I mean, most of the north I think fits the definition of that, if you wish. **But I need to know what sort of definition we'd be working with in terms of where there are treaties and where there aren't treaties, where there are land claims resolved, where there are unresolved land claims.**

813 MR. WHITEDUCK: Maybe we could come back with a clear definition just for the sake of being accurate on that one. But like, Kitigan Zibi is a non-treaty community. So anything to the east of Ontario is non-treaty if my memory serves me correctly. But we would have to come back with a more precise answer on the territorial ---

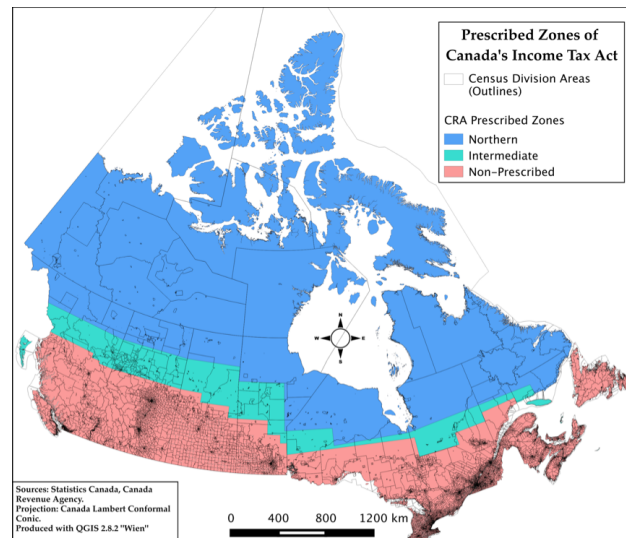
814 COMMISSIONER MENZIES: I will defer to your expertise in that area over mine, thanks. May 5th, I believe is the date.

ANSWER

25. The FMCC, composed of First Nations broadband providers working in remote and Northern regions, is proposing an inclusive definition with regards to the regions eligible for the proposed NISF fund. Our emphasis is on northern Indigenous communities¹⁴, but we realize that there are some northern non-Indigenous and mixed communities that are also isolated and could be eligible for funding through the NISF. We have heard from the Commission and several interveners, as well as from FMCC member organizations and researchers, that regions outside of the North face similar challenges with regards to access to affordable, adequate infrastructure and services.
26. Therefore, rather than focusing on distinctions between treaty and non-treaty regions, the FMCC's priorities for the NISF are the unserved and under-served communities and regions that exist across the country. This geographic focus includes communities in northern parts of provinces without year round road access as well as other isolated communities. We realize there are other locations that are distant from regional centres, such as Obedjiwan, whose IT Coordinator Marc Awashish testified at the hearing, and which is 300 km northwest of Roberval, Quebec -- more than half by gravel road.
27. As a proxy for these regions, we refer to the 2001 National Broadband Task Force report, which provides a methodology to help determine investment models for under-served and unserved regions. The Task Force combined data on unserved communities provided by telecommunications and cable companies with data from Statistics Canada on the characteristics of these communities (p.6). Statistics Canada classifies census subdivisions by their proximity to metropolitan centres (signaling whether a community is, for example, 'outlying', 'far outlying' or 'remote') (pp.62-3).
28. In our research for ISED (see Undertaking 5), we similarly used a definition of prescribed northern and intermediate zones as defined by the Canadian Revenue Agency¹⁵ and shown on the map below.

¹⁴ For more information on locations of First Nations communities, INAC supplies a map of all 680 First Nations in Canada at: <http://fnpim-cippn.aandc-aadnc.gc.ca/index-eng.html>

¹⁵ See: <http://www.cra-arc.gc.ca/tx/ndvdl/tpcs/ncm-tx/rtrn/cmpltng/ddctns/lns248-260/255/zns-eng.html>



29. Once an eligible geographic region is established, the next step is to determine the degree of service available within that region. The 2001 National Broadband Task Force defined “Unserved” communities as communities without access to DSL or cable Internet services as of December 2000. In cases where a provincial government was funding backbone transport infrastructure (e.g. Alberta SuperNet, Saskatchewan CommunityNet) communities were considered “Served”. These definitions have evolved over the years and will continue to evolve as new “basic” level of services are determined as essential. For example, many presentations at the hearings outlined the need for symmetrical 10Mb service that is required to properly accommodate high definition video for essential e-health services in remote and rural communities without local hospital and physician services. Therefore, we note the importance of ensuring that such definitions are tied to the evolving requirements of users - both household and institutional - living in these communities.
30. When considering such definitions, coverage maps issued by Telecommunications Service Providers (TSPs) are one important source of data on whether a community is served, underserved or unserved. So is data collected through initiatives such as the CRTC’s SamKnows project. However, our position is that these maps and associated data should be verified by community-based organizations and local residents. The Canadian Internet Registration Authority (CIRA) provides a tool and process for this activity (see the Intervention and Presentation made by Dr. Fenwick McKelvey). Other sources describing coverage are referenced throughout our document and are included in the ISED report (see Appendix 2 of the report that is available online at: <http://firstmile.ca/wp-content/uploads/Appendix2-Primary-Secondary-Data-Sources.pdf>).
31. With regards to the proposed NISF, our position is that the fund should be available to providers in unserved and underserved communities throughout northern Canada. To recognize and address the shifting requirements of communities, we propose that the NISF fund be administered with regards to the following criteria:
- First to unserved communities;
 - Second to underserved communities and regions requiring updated infrastructure;
 - Third to ongoing operational funds, which will be prioritized based on needs to address BSO requirements; and
 - Fourth to other qualified projects.

Undertaking #3: What do you mean by the term ‘community intermediary organizations’

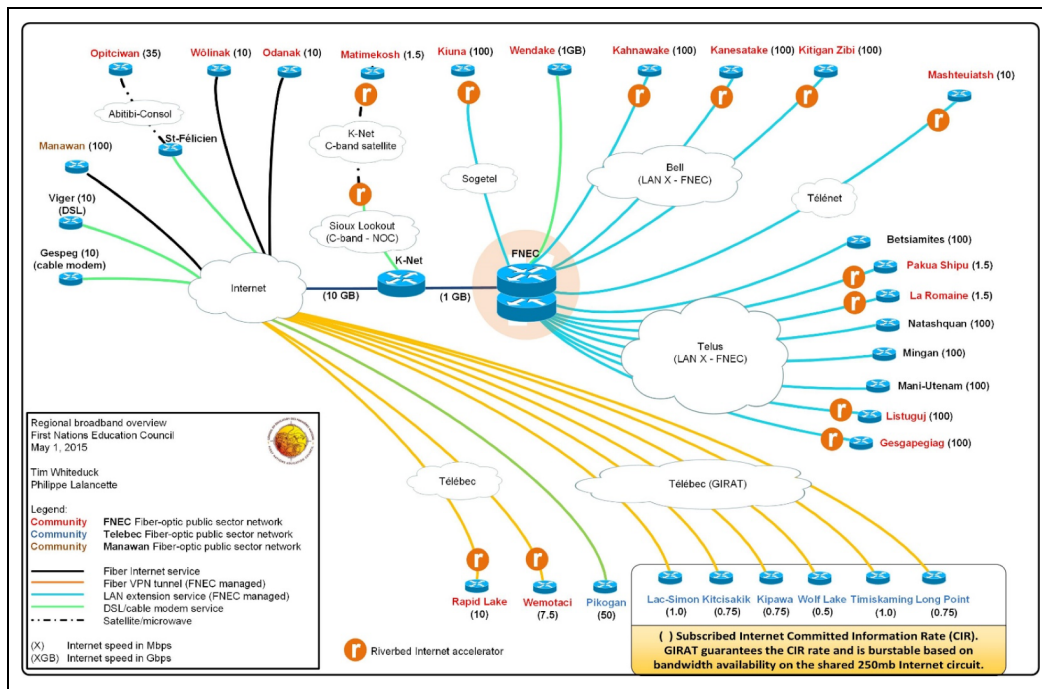
962 MR. WHITEDUCK: I think **since we’re giving information back to the Commission about territorial information, we could add the regional entities that exist in Canada for First Nations. That would clear it up.**

963 COMMISSIONER VENNARD: Thank you. I think that would be helpful.

ANSWER

32. We stress that the term ‘community intermediary organization’ is not a concept but rather a definition used to describe various existing organizations that are currently operating across Canada. These technology-focused organizations have been doing this work for decades. For example, K-NET was founded in 1994, during the early years of the Internet.
33. The FMCC was established by several of these First Nations community intermediary organizations (see: <http://firstmile.ca/fmcc-2/founding-directors/>). The eight current members of the FMCC (listed from West to East) are:
- First Nations Technology Council (B.C.)
 - First Nations Technical Services Advisory Group Inc. (Alberta)
 - Assembly of Manitoba Chiefs
 - First Nations Health and Social Secretariat of Manitoba
 - Keewatinook Okimakanak K-Net Services (Ontario)
 - Western James Bay Telecom Network (Northeastern Ontario)
 - First Nations Education Council (Quebec)
 - Atlantic Canada’s First Nations Help Desk (Atlantic region)
34. Over the years these community intermediary organizations have played prominent roles in both advocating for and administering ICT infrastructures and services on behalf of their Indigenous member communities. These organizations represent and are governed by groups of local communities, allowing residents to access services and benefit from economies of scale otherwise unavailable. They use ICTs to deliver public services and economic development opportunities to the residents of these communities. Acting as mediators between local, place-based communities and external entities like government funders or corporations, community intermediary organizations engage in both social and technical activities associated with the effective use of digital technologies: operating complex networks and applications while asserting self-determined development goals. Their activities also include attempts to reform the policy and regulatory frameworks to address persistent digital divides in the Canadian north.
35. Community intermediary organizations are somewhat analogous to the ‘Community Champions’ described in the 2001 report of the National Broadband Task Force, which outlines the rationale for and importance of these organizations in developing and delivering broadband:
- “Demand Aggregators may have to group communities together to achieve the economies required to be sustainable, and as a result, actual implementation is expected to be on a more regional basis, as opposed to community-by-community. Such clustering may not be feasible by some of Canada’s more rural and remote communities, but would still be encouraged where possible” (p.102).

36. We recognize that the term “community” can have several meanings. Here we use a broad definition that encompasses place-based communities at both local and regional scales, as is highlighted in the above description of Demand Aggregators.
37. Community intermediary organizations include a range of institutions, including First Nation Councils such as Keewatinook Okimakanak (which established K-NET), Regional Governments such as the Kativik Regional Government, and Non-Profit Advocacy Groups set up by residents of northern and remote regions of Canada, such as the Nunavut Broadband Development Corporation.¹⁶ These organizations perform a range of functions to their constituency of First Nations communities across Canada, including broadband deployment, operations and maintenance, purchasing, IT support and training, legal and advocacy support, and so on.
38. For more information on community intermediary organizations, we have included in this Undertaking a research paper on this topic.¹⁷ As a concrete example illustrating the relationships established by one community intermediary organization, the First Nations Education Council in Quebec, see the diagram below.



39. This diagram illustrates the relationships between First Nations communities, telecommunications companies (including Telebec, TELUS and Bell), and another community intermediary organization, K-Net. FNEC - located in the centre of the diagram, manages various initiatives on behalf of its member First Nations. The networks in the diagram illustrate the public service network connections managed by FNEC - the lines represent infrastructure (fibre, LAN, DSL and satellite) connecting the communities.

¹⁶ Note that NBDC is not, has not been and will not be a service provider.

¹⁷ McMahon, R., Whiteduck, T., Beaton, B. (2013). *Shaping First Nations broadband policy in Canada: Indigenous community intermediary organizations in the age of austerity*. World Social Science Forum, Montreal, QC, Canada. October. Available at: <http://firstmile.ca/wp-content/uploads/2015/03/2013-McMahon-WSSF.pdf>

40. FNEC aggregates member First Nations communities into a common market and manages a contract on their behalf, brokering partnerships between government funders such as INAC or Health Canada and service providers (such as TELUS, Bell or K-Net). In those cases where individual First Nations choose to manage connectivity contracts themselves, FNEC supports them by connecting them with funding resources from government departments. FNEC also provides a number of other services to member communities, including data management, training, help desk support, access to a videoconferencing bridge and network, and strategic planning, advocacy and research support.
41. The First Nations communities in red illustrate a fibre optic connection exists to connect public service buildings. The number in brackets represents the speed of this connection - which ranges from 0.75 MB to 1GB. FNEC is currently working with Health Canada to establish a 100 MB link as a standard throughout its member communities.
42. While a few locally-owned and operated networks exist in this arrangement, those initiatives are separate from (though supported by) FNEC. However, this diagram clearly illustrates the broadband partnerships and capacity already in place, and the potential for member First Nations communities to establish local Internet Service Providers in collaboration with FNEC.

Undertaking #4 – Provide details on funding and expenditures

988 So my next question you'll probably want to answer by an undertaking because you'll see I'm looking for detailed numbers. And it was very useful for you to identify which of the First Nation community intermediary you're representing. So that will be helpful.

989 But for those that you do represent, would it be possible for you to **provide us the amount of contribution or funding that each one of them have received from the federal, provincial, or territorial governments for offsetting satellite transport costs, okay?**

990 **And if you could break it down by program, by the ISPs benefitting from the program, and by year, that would be useful.**

991 **And by the same token, so that's the supply side -- as to what you actually have spent in those various organizations, what were the annual costs and what satellite capacity was obtained?**

992 **And then if you could do the same thing now this time with respect to broadband internet infrastructure. The first question was satellite relating to capital costs this time, and breaking it down in a similar way. Could you do that?**

993 DR. HUDSON: We could try. I think there's certainly some of our organizations, such as the one sitting in front of you, who have -- who could break out that information. Not all of them use satellites, but they should -- we can try and get you as much as we can.

994 THE CHAIRPERSON: Sure. So for the 5th of May, and **whatever caveats you need to add you can add to your -- the response to that undertaking, if that's okay, all right? Okay, thank you very much.**

ANSWER

43. Below, we provide information on terrestrial transport costs and expenditures from two FMCC member organizations: KNET in Ontario and FNEC in Quebec. This data was drawn from the past 5 years (2011/12 to 2015/16), from the annual financial statements presented in the publicly available annual reports for these two organizations.¹⁸
44. We note that it is challenging to present this information in the required format, due to the complexity of the arrangements in place. These organizations each operate in a multi-faceted and unique environment. They have established a diverse array of relationships, including with regards to their responsibilities and the services they provide to their community partners. For example, FNEC delivers many different educational support services for schools in their partner First Nations, and the administration and programs managed by the organization all use digital technologies and networks to support their operations. All the numbers presented are project-based and require annual funding applications and administration. As detailed in the FMCC's report on federal funding for broadband, these government funding programs change as governments change; they are subject to elimination or reduction based on current fiscal planning, as each of these organizations have experienced over the years.

FNEC Terrestrial Transport Funding¹⁹

¹⁸ Please note, year 2015/16 is unaudited and based on year-end estimates.

¹⁹ Since FNEC only works with one satellite-served community, and does so in partnership with K-Net, we do not include information here.

45. The amounts included in the table below include funding for capital costs, ongoing operations and maintenance, and training. Because there is a lack of program support for infrastructure upgrades and staffing, these requirements are integrated into the operations as efficiently and effectively as is possible, given available resources. These include funds to support bandwidth; IT Help Desk; staffing; research, strategic planning, business development and advocacy support; and managing a range of applications including:

- Bluejeans (Unified Conferencing System)
- IP Telephony
- IP Security Video
- Centralized Server systems
- iPad carts
- SMART Boards

Year	Funder	Program Description	Amount
2015/16	INAC - New Paths in Education	Supports connectivity costs for 30 First Nations schools in QC; school enrollment of 10,000. Costs are: - 50% connectivity - 40% coordination and Help Desk - 4% travel - 6% administration	\$880,000
	Health Canada	O&M recurring fees (connectivity costs) and capital costs (improvements and equipment). For local health centres only.	\$500,000
	INAC - FNIF	Capital costs (connectivity improvements and equipment, engineering)	\$315,000
2014/15	INAC - New Paths in Education	(see above)	\$881,300
	Health Canada	Reimburse the FNEC for health centre broadband costs; help the communities maintain their broadband infrastructures; and cover their connectivity fees.	\$762,659
	INAC - FNIF	Fibre optic engineering study for the Opitciwan telecommunications project.	\$19,000
	INAC - Skills Link Program	IT training programs for youth interns - short-term, project-based.	\$272,000
2013/14	INAC - New Paths in Education	(see above)	\$850,000
	Health Canada	Construction of Pakua Shipi and La Romaine fibre optic networks and other capital projects	\$551,910
	INAC - Skills Link Program	IT training programs	\$272,000
2012/13	INAC - New Paths in Education	(see above)	\$800,000
	INAC	Funding to support equipment and training activities in schools	\$240,000

	INAC - Skills Link Program	IT training programs	\$271,000
2011/12	INAC - New Paths in Education	(see above)	\$800,000
	INAC - FNIF	Phase 2 of fibre project (Kahnawake & Mashteuiatsch)	\$4.4M (\$5.7M total project)
	INAC - FNIF	Videoconferencing and networking equipment upgrades	\$750,000
	INAC - Skills Link Program (formerly SchoolNet)	IT training programs	\$272,500

K-Net Satellite Transport Funding

46. K-Net (with originally 14 satellite-served communities) is a partner in the Northern Indigenous Community Satellite Network (NICSN) joint venture with Kativik Regional Government (KRG - with 14 communities) in Quebec and Keewatinook Tribal Council (KTC) / Broadband Communications North (BCN - with 17 communities) in Manitoba. By 2004, the NICSN partnership had jointly gained access to one full transponder of the public benefit bandwidth that Telesat made available to Industry Canada (NSI Round 1) for the life of the Anik F2 satellite (approximately to 2022). In 2007, this joint venture applied for funding under the National Satellite Initiative Round 2 funding to purchase C-Band satellite bandwidth for 2 transponders for an 11-year period. The bandwidth was pre-paid to Telesat Canada for an 11-year period starting September 16, 2008 and will expire on September 16, 2019. This bandwidth was structured to meet 2007 bandwidth requirements of 1.5MB per household.
47. Although funding applications were submitted, K-Net was unsuccessful in accessing the funding required to purchase any additional satellite bandwidth over the past 5 years. The K-Net partner satellite-served First Nations remain at the 2007 1.5 MB connectivity level as a result. The KRG NICSN partner has successfully been able to raise the level of connectivity to the 5/1 MB level with two successful funding applications. The funding shown in the following table highlights the high costs involved in maintaining this inadequate satellite service. The result of this funding is that the First Nations communities on this network are under-served. What is missing in this table are costs required to bring these connections to an equitable connectivity level of 5/1. The two KRG funding projects cost a total of \$60 million for 5 years of operational costs.

Year	Funder	Program Description	Amount
2015/16	Infrastructure Canada (1 transponder on Anik F3)	National Satellite Initiative 2	\$1.2 million
2014/15	"	"	"
2013/14	"	"	"
2012/13	"	"	"

2011/12	"	"	"
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K-Net Satellite Operational Transport Expenditures

48. The following table **excludes** the annual cost of the transponder which is about 1 transponder per regional partner which works out to approximately \$1.2M per year per transponder shown above).

49. These costs support a number of Operations and Maintenance (O&M) activities, including: shared costs for Bell circuits to 151 Front St in Toronto; interconnect fees; bulk Internet purchase; network, service desk, admin, and management staffing; hydro to K-Net operations and remote earth stations; backup generator expenses; satellite network replacement equipment; travel for required repairs; and shared overhead and administration costs.

Year	Description	# of communities	Cost per year
2015/16	Cost to manage bandwidth from earth station in Sioux Lookout for the participating communities.	35	\$535,500
2014/15		35	\$535,500
2013/14		37	\$566,100
2012/13		40	\$612,000
2011/12		42	\$642,600

50. Note: In the NISCN Joint Venture, each K-Net member community served by satellite bandwidth pays the organization \$1,275 per month. The amounts listed in the above table are the annual totals billed to these communities by K-Net to manage the satellite bandwidth from its earth station in Sioux Lookout, Ontario.

Funding for Terrestrial Transport Project Development

51. Note: the Northern Ontario Heritage Fund Corporation (NOHFC) was a 4-year project to build broadband connections to 5 Ontario First Nations. There were some barriers to these builds that extended the original timeline of the project.

52. K-Net has not received any other funding for terrestrial transport builds subsequent to this project.

Year	Funder	Program Description	Amount
2015/16			
2014/15	NOHFC	See note above	\$134,642
2013/14	NOHFC		\$119,272

2012/13	NOHFC		\$99,043
2011/12	NOHFC		\$97,093

Terrestrial Transport Expenditures

53. K-Net is a managed broadband network. K-Net purchases bandwidth to connect First Nations. K-Net's circuits meet at 151 Front St in Toronto, where K-Net purchases bulk internet. K-Net also manages the circuits to provide various application services such as video-conferencing, cellular, IP Telephony and telemedicine.
54. K-Net has worked with First Nation communities over the years to identify community IT needs and worked towards addressing these needs by setting up and managing these services, which also provide spinoff-benefits to residents in the forms of local employment. As noted in Penny Carpenter's oral presentation to the Commission, excess revenues are reinvested to improve K-Net's infrastructure, services or applications, and used to keep prices to users low. Community ISPs operating in partnership with K-Net charge approximately charge \$35-50 per month for service.
55. The column "Total K-Net Operations" provides the total costs to operate the K-Net network. These costs include: bandwidth; network; service desk; admin and management staffing; overhead for operations and earth station; network training; cellular operation expenses; network equipment refresh; and new service/product re-investment development. Since K-Net operated as a not-for-profit organization during these periods, all these funds were re-invested in network development. At present, local community cable networks, along with the core network components, are aging and require upgrades to deliver required services.

Year	Cost for bandwidth ²⁰	Total K-Net Operational costs	Notes
2015/16	\$2,600,000	\$5,700,000	
2014/15	\$2,649,112	\$5,746,243	
2013/14	\$2,699,830	\$5,619,224	Increased expenses for cellular operations and equipment
2012/13	\$2,878,500	\$4,573,680	Some one-time charges incurred
2011/12	\$2,440,666	\$4,311,350	

56. Note: In the last couple of years, K-Net has delivered 2G cellular service in 20 remote First Nations. Cellular is a growing service and expenses increase each year. K-Net maintains an industry standard network and refreshes end of life equipment on a regular basis. There has been an increase on the cost of the annual service contracts for network equipment. Although this venture generates revenue, it is not adequate for needed upgrades (for example, 2G to 3G to LTE service).

²⁰ These costs are the direct costs paid for bandwidth that K-Net purchases from telcos.

57. With regards to Satellite Transport Costs, we also refer to the Satellite Inquiry, where several organizations filed information on satellite pricing and leases including the Kativik Regional Government (KRG) and the Nunavut Broadband Development Corporation.
58. As well, the KRG provided testimony at these Hearings concerning this issue. They are providing this information directly to the CRTC in a separate Undertaking requested by the Commission; see paras 576-581 of the transcript for April 11, 2016. We therefore request the Commission to take KRG's responses into consideration in reviewing the material submitted for this undertaking.

Undertaking 5: Organizational and Business Usage (requested by staff)

997 MS. HANLEY: *Professor Hudson, you referred in your opening remarks to a study that looks at these as a small -- by small businesses and government of Internet services. Is that something you can file on the record of (inaudible)?*

998 DR. HUDSON: *We believe so. We had some funding from what was Industry Canada, now ISED, and to do a pilot study on methodology for trying to understand adoption in the north and as soon as we've submitted the draft final report and as soon as they give us the clearance, we would be happy to file that.*

999 *I can also give you some additional research that I've done that addresses some similar issues, if that's helpful.*

1000 *But in terms of that particular study, as soon as they tell us it's okay, we're happy to share it with you.*

1001 MS. HANLEY: *Do you think you could just update us by May 5th as to the status of that?*

1002 DR. HUDSON: *Sure, we'll go back and ask them and I would think it will -- they'll clear it. They wanted it done by the end of the fiscal year, which was a couple of weeks ago, so they just have to look it over.*

RESPONSE:

59. As requested, we have attached the summary of the report *Digital Technology Adoption in Northern and Remote Indigenous Communities in Canada* prepared for Innovation, Science and Economic Development Canada (ISED). The entire report with its six appendices is available online at: <http://firstmile.ca/report-digital-technology-adoption-in-northern-and-remote-indigenous-communities-in-canada>. The first appendix is a comprehensive literature review providing links to many publications describing digital adoption by organizations located in numerous Indigenous communities across Canada. Appendices 4 and 5 provide case studies including information about organizational and business use in Iskut First Nation in northern BC and Timiskaming First Nation in northwestern Quebec.
60. As presented in appendices 4 and 5, those interviewed in the two First Nation communities stated that they need higher speed and more affordable Internet connectivity for a variety of applications for band council administration, continuing education and professional development for teachers and health care providers, and marketing and operation of tourism businesses. Iskut staff interviewed said that local ADSL service provided by Northwestel was not sufficient for training webinars or video conferences, so that telehealth conferencing facilities that had been installed had not been used, and teachers would have to take a week away from school to travel to Vancouver for a one or two day meeting, and thus could not participate (the nearest airport as well as hospital, banking and other commercial and government services are in Terrace, 500 km away). Timiskaming participants said they had to travel 108 km to Rouyn to obtain provincial government services that were not accessible online. They also referred to the limitations on household use because of multiple users in households and data caps that result in expensive overage charges.

61. We support the CRTC's efforts to look beyond household usage -- and this approach to community-based applications is further highlighted in the literature review we submit for consideration. We note that most models used to understand digital technology adoption focus on individual and household adoption and ignore wider social and community processes. The Community Informatics field of research and practice stresses that technology in itself will not support community development if the collective capacity is not available to use it effectively.
62. Many authors included in the literature review prepared for ISED highlighted the vital role of the "community" in Indigenous communities in Canada, in particular in small remote and northern communities. The literature suggests that there is a link between the use of digital technologies in Indigenous communities, social capital, and community economic development. Therefore, in the report we propose a "whole-community" analytical approach with three levels of factors that shape digital technology adoption:
- Community members / household factors (top level)
 - Community and community organization-level factors (middle level)
 - Local and transport infrastructure supporting individual and community adoption (base level)
63. All three of these factors need to be considered when considering broadband policy. Adoption by Indigenous community members and their households is the top level. Many factors are involved in a decision by community members and household to adopt a digital technology. Adoption within and by communities is the middle level. The community level includes how digital technologies are adopted by both community organizations and the regional organizations that support community adoption. The base level is the infrastructure supporting digital technology adoption. Infrastructure issues such as availability, price, quality of service and/or experience, interoperability, ownership and accessibility are factors in digital technology adoption. Infrastructure also includes the middle mile and backhaul layer that affects bandwidth, price and quality of service.
64. Finally, we also attach a recent study on broadband usage by organizations and businesses in rural southwest Alaska directed by Dr. Hudson, entitled *After Broadband: A Study of Organizational Use of Broadband in Southwest Alaska*. It is available at http://www.iser.uaa.alaska.edu/Publications/2015_06-AfterBroadband.pdf. The Indigenous population is primarily Yup'ik (related to Indigenous peoples of Siberia and Arctic Canada). Commercial fishing is the major industry in coastal areas, while subsistence fishing and hunting are mainstays of the local economy in most villages. The study provides examples of use of broadband by local governments and nonprofit organizations as well as businesses including retail, fisheries, and tourism.

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