Beyond Infrastructure Funding: Policies to Extend Access to Broadband in Rural and Indigenous Regions

Heather E. Hudson[1] and Rob McMahon[2]

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Abstract

Research on policies for providing broadband to isolated regions typically focuses on various infrastructure funding options. This paper postulates that CapEx funding may be necessary but is often not sufficient to install and operate sustainable broadband services in these regions. We examine the policy and regulatory challenges facing small and Indigenous providers attempting to serve remote northern Canada, even when public sector CapEx funding has been provided.

As in other remote and developing regions, communications providers serving Canada's North face high costs, relatively low revenues, and great distances, in addition to challenges of difficult terrain and extreme climate. In remote primarily Indigenous communities, broadband access is limited, with typically low speeds and quality of service, coupled with high prices for data services. Health clinics, schools, and northern businesses have also heavily relied on this limited connectivity during the COVID-19 pandemic.

Like many other countries, Canadian government agencies have established funds to extend broadband in unserved and underserved areas. We focus on recent experience with Canada's regulator, the CRTC, which established a rural broadband fund after determining in 2016 that broadband was to be considered a basic service, available to *all* Canadians

After reviewing comments from small and Indigenous providers, the CRTC opened a further proceeding on barriers to deployment of broadband. We analyze issues and barriers identified by Indigenous and community providers in these proceedings.

The paper concludes with the results of this analysis, identifying issues and possible solutions in addition to infrastructure funding that should be considered in policies designed to extend rural

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[1] Affiliate Professor and Former Director, Institute for Social and Economic Research, University of Alaska Anchorage and Professor Emerita, University of San Francisco. Contact: hehudson@alaska.edu.

[2] Associate Professor, Media and Technology Studies, Department of Political Science, University of Alberta. Contact: rob.mcmahon@ualberta.ca

broadband and to facilitate service provision by small and Indigenous providers. These lessons from the Canadian experience are also likely to be relevant for other underserved and remote regions including the Pacific islands.

1. Introduction

Research on policies for providing broadband to rural and isolated regions typically focuses on the need for infrastructure funding and various funding options. We postulate that infrastructure funding may be necessary, but is often not sufficient to install and operate sustainable broadband services in these regions. We analyze other requirements, primarily using examples raised in recent Canadian regulatory proceedings concerning broadband funding. From this analysis we identify issues in addition to funding for infrastructure that should be considered in policies designed to extend and operate reliable and affordable broadband.

We deliberately exclude from this analysis issues of sources of funding and financial sustainability. Our intent is not to minimize the significance of these issues but to focus on other elements that are often overlooked. We recognize that providing affordable and reliable broadband is critical for community development, which we have addressed in other research.[3] [4] Here, we focus on Indigenous provider issues, generally not been addressed in rural broadband research, which tends to highlight consumer and other user needs. Thus, we do not directly include affordability in this paper, but the conditions that providers, especially small and Indigenous ISPs, face in their efforts to control costs and thus minimize the prices they charge to their customers. We also recognize that economic development includes provision of local jobs, and therefore include a discussion of the need for publicly funded providers to train and hire local employees.

2. The Northern Context

Access to broadband is necessary to participate in the digital economy – for access to services such as education and training, health care, government programs and services, online banking, ecommerce, community development and small business entrepreneurship. These services are particularly important for isolated, primarily Indigenous communities across the North. In northern Canada, these settlements, ranging in population from a few hundred or fewer to a few thousand, typically have no year-round road access, and may be hundreds of kilometers

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[3] Hudson, H. E. (2015). After Broadband: An Analysis of Organizational Use of Broadband in Southwest Alaska. Retrieved from https://iseralaska.org/static/legacy_publication_links/2015_06-AfterBroadband.pdf;

[4] McMahon, R., Hudson, H.E., & Fabian, L. (2017). Canada's northern communication policies: The role of Aboriginal organizations. In N. Mulé & G. DeSantis (Eds.), *The Shifting Terrain: Public Policy Advocacy in Canada* (pp. 259–292). McGill-Queen's University Press.

from larger regional "hub" communities. Incomes are typically low or seasonal, and costs of living for housing, food and electricity are high.

Broadband availability is also limited in northern Canada. While 92 percent of all Canadian households had access to the target of 50 mbps or more, about 60 percent of Yukon and the Northwest Territories (NWT) had access to these speeds (generally in larger, more accessible communities). Conditions are similar in northern regions of the provinces. However, in Nunavut, none of the households (all of which are served by satellite and have no road access) have such speeds available.[5] As in other remote and developing regions communications, providers are challenged by high costs, relatively low revenues, great distances, and in the North, difficult terrain and extreme climate.

3.   The Policy and Regulatory Context

Regulation of telecommunications across Canada is the responsibility of the Canadian Radio-television and Telecommunications Commission (CRTC). The CRTC and several other federal and some provincial/territorial agencies provide funding for rural broadband. However, this paper focuses on the CRTC because, as the regulator, it has the task of determining how its mandate of broadband as a basic service for all Canadians is to be implemented. Also, its proceedings address issues beyond one-time infrastructure funding, as being relevant to achieving its goals. Finally, its proceedings include participation by Indigenous organizations, including Indigenous broadband providers, and their comments form part of the public record. Together these elements provide an opportunity to examine the challenges and potential solutions to extending and upgrading broadband in remote regions, and a participatory model including small and indigenous providers, for addressing them.

In April 2015, CRTC announced a proceeding "to conduct a comprehensive review of its policies regarding basic telecommunications services in Canada and of the telecommunications services that Canadians require to participate meaningfully in the digital economy." It included an examination of how these telecommunications are used by Canadians to access "essential services", what prices they should be expected to pay, and which areas are unserved or underserved. The Commission also stated that it would consider whether broadband should be considered a basic service available to all Canadians, and "what its role should be in ensuring the availability of basic telecommunications services, particularly in rural and remote regions of Canada."

The proceeding also addressed whether a funding mechanism was required in the region of the incumbent telecommunications provider serving Canada's northern territories and adjacent

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[5] CRTC (2020). *Communications Monitoring Report, 2020*, CRTC: Ottawa. Available at:
https://crtc.gc.ca/pubs/cmr2020-en.pdf

regions and "whether such a mechanism should be considered for other rural and remote areas in Canada."[6] Participants included several consumer representatives and Indigenous organizations including providers of internet services in the northern territories and in the northern regions of seven provinces, where most communities have no year-round road access. They pointed out not only the need for broadband, but the financial, technical, and other difficulties they faced in to serve their isolated communities.

In its decision after the hearing, the CRTC determined that broadband was to be considered a basic service available to all Canadians, and set targets for universal broadband at 50 mbps download and 10 mbps upload speed. Some Indigenous and consumer organizations pointed out that market forces had not resulted in extending broadband facilities in much of the North.[7] The Commission appeared to agree, stating that it would establish a new fund to extend and upgrade broadband for rural and remote regions. A total of C$750 million was to be allocated over five years.[8]

In 2018, the Commission initiated a follow-on consultation on how the fund was to be administered and on eligibility criteria for applicants.[9] Following this proceeding, the CRTC took the unusual step of publishing and requesting comments on a draft Application Guide for the fund.[10] Several Indigenous and community providers and other small ISPs filed comments in the consultation process and on the draft Application Guide. Their submissions included references to barriers to implementing rural broadband networks even when funding was made available.

In 2019, the CRTC published a call for rural broadband infrastructure proposals and has since provided two rounds of funding. After reviewing comments from small and Indigenous providers who participated in the consultation, the CRTC then issued a request for comments on barriers to deployment of broadband, although this request was not made until December 2019, *after* the funding guidelines had been finalized and the first call for proposals had been issued.[11]

After reviewing the submissions, the CRTC stated that "many interveners raised the fact that untimely and costly access to poles is one of the most significant barriers to the deployment

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[6] CRTC. *Telecom Notice of Consultation CRTC 2015-134*. (2015) Ottawa, April 9.

[7] First Mile Connectivity Consortium (FMCC) (2016) Testimony of the First Mile Connectivity Consortium (FMCC) in Telecom Consultation CRTC 2015-134. Retrieved from http://crtc.gc.ca/eng/transcripts/2016/tt0411.htm.

[8] CRTC. *Telecom Regulatory Policy CRTC 2016-496*. (2016) Ottawa, December 21.

[9] CRTC. (2018) *Telecom Regulatory Policy CRTC 2018-377*. Ottawa: September 27.

[10] CRTC (2019) *Telecom Notice of Consultation CRTC 2019-45: Call for comments – Application Guide for the Broadband Fund*, March 18, 2019.

[11] CRTC (2019). *Telecom Notice of Consultation CRTC 2019-406: Call for comments regarding potential barriers to the deployment of broadband-capable networks in underserved areas in Canada*, December 10, 2019.

of broadband-capable networks in rural and remote regions of Canada."[12] It then issued a call for comments regarding potential regulatory measures to make access to poles owned by Canadian carriers more efficient.

The analysis below is based on the CRTC's notices and requests for comments, submissions by Indigenous organizations, and CRTC decisions to date. We include recommendations developed in collaboration with Indigenous providers and discuss how these suggestions may be relevant for other rural, remote, and Indigenous regions.

4. Wholesale Access to Transport Services

Community and Indigenous service providers generally need access to fiber transport networks provided incumbents where the cost of installing their own networks is prohibitively expensive. Facilities-based duplication is generally not feasible or very expensive in the Canadian North.

However, lease charges are generally very high, as regulation of wholesale fiber transport services has generally been forborne since 2011. This forbearance is based on the assumption that all wholesale fiber facilities are potentially competitive. However, an ILEC transport network is installed to connect an otherwise unserved community is a defacto monopoly – and an essential service. Regulatory forbearance has not resulted in facilities-based competition in most rural and remote regions but perpetuated difficulties in access to these wholesale transport monopolies.[13]

As a large competitive provider states "…where a service provider is attempting to negotiate access to wholesale transport services in a monopolistic wholesale market, negotiations may result in access being granted to the competing service provider, but only at monopolistic rates …." [14] For example, an Indigenous provider serving isolated James Bay communities stated that

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[12] CRTC (2020). Telecom Notice of Consultation CRTC 2020-366: Call for comments regarding potential regulatory measures to make access to poles owned by Canadian carriers more efficient, October 30, 2020, para 3.

[13]See:

> Gauthier, N. (2014). Bolder aspirations needed to improve broadband connectivity in Canada's North. *Northern Public Affairs*, 2(3), 62-64.

> Hudson, H. E. (2017). *When Regulation fills a Policy Gap: Toward Universal Broadband in the Remote North*. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2944295

> Jevne, H. (2018). Policy Approaches to Internet Access in Northern and Rural Canada. (Unpublished master's thesis), University of Calgary, Calgary, AB, Canada. Retrieved from https://prism.ucalgary.ca/bitstream/handle/1880/109332/capstone_Jevne_2018.pdf?sequence=1

> McMahon, R., Gurstein, M., Beaton, B., O'Donnell, S., & Whiteduck, T. (2014). Making information technologies work at the end of the road. *Journal of Information Policy*, 4, 250-269.

[14] CRTC 2019-406 – Shaw Cablesystems G.P. Intervention, para 48.

it paid almost 50 percent more per MB to the ILEC in 2020 than it had ten years ago, whereas the price of wholesale bandwidth has decreased dramatically elsewhere in the past decade.

Some incumbents claimed that there is little demand for wholesale access for rural and remote communities. For example: "There is also no evidence that any demand for wholesale access exists in unserved or underserved communities to date or that there will be in the foreseeable future"[15] Yet, these providers were participants in the CRTC's hearings in 2015, when Indigenous providers and others that utilized wholesale transport access from ILECs stated that they needed additional capacity to provide retail services in those regions.[16] More recently, these providers have witnessed demand for much more bandwidth for broadband services throughout their territories, exacerbated by increased use of online services during the pandemic. For example, the Indigenous provider serving James Bay now needs 10 GB circuits. Another provider has started to deploy an 800-kilometre fibre-optic network to remote communities, but until construction is complete, communities are dependent on heavily oversubscribed satellite links, and residents cannot access real-time applications that support telemedicine, distance learning and telework.

High prices for connectivity make it difficult for small ISPs to meet the connectivity targets set by the CRTC at affordable prices. An Indigenous provider serving northern Ontario communities states: "It is not possible to meet 50/10 [MB] service obligations with the current transport costs. The transport costs consume such a large disproportional share of the total costs to provide the service."[17]

In some cases, high rates charged by the incumbent to access facilities may result in a community seeking another solution. For example, in an Indigenous community in Quebec, the Band (local Indigenous government) signed a 20-year contract with the incumbent to connect several community service buildings to fiber optic networks. When the community requested adding two additional buildings to the network, it was quoted C$15,000 per building. An Indigenous provider subsequently conducted its own engineering study and determined the cost to build a parallel fiber optic network connecting eleven buildings in the community would cost a total of C$32,000.[18] It then decided to install its own network.

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[15] CRTC 2017-112 – TELUS Intervention, para 33.

[16] CRTC (2016). *Telecom Regulatory Policy CRTC 2016-496: Modern telecommunications services – The path forward for Canada's digital economy*, December 21, 2016.

[17] CRTC 2019-406 – FMCC Final Reply Comments, para 9.

[18] CRTC 2017-112 – FMCC Intervention, para 121.

Incumbents can also take an excessive amount of time to connect Indigenous providers to their transport networks. For example, in Ontario, a large ILEC took more than two years to provide access to various circuits requested by an Indigenous provider.[19]

5. Access to Support Structures

Access to existing support structures can be critical for extending and upgrading rural broadband. Among the issues noted by competitive providers (both major cable companies and small ISPs) are delays in getting necessary permits, high and/or changing pricing for access, and delays and costs in completing make-ready work such as repairing, anchoring or replacing poles.

As discussed above, there is an imbalance of bargaining power between the access seekers and controllers of support structures, which exert monopoly control over access to existing infrastructure. "Gatekeepers" of support structures also lack incentives to expedite permits and make-ready work, particularly when carriers are accommodating potential competitors, or when utilities have legitimate concerns regarding safety and internal approval processes.

Incumbents may state that they cannot afford to let third parties gain access to their poles or ducts in rural areas because the loss of user revenue would make the provision of services unsustainable. Alternatively, incumbents may charge rates for access to these facilities that make the costs to third parties too high for them to offer affordable rates to their customers. Yet there are more subtle ways to create barriers. An incumbent may delay approvals for access to poles or ducts to the point where the project is significantly behind schedule, and, in some cases, noncompliant with funding deadlines. Or the price charged for access may be increased from what was expected or shown in previous quotes, so that the project is significantly over budget. And if the poles need to be repaired or replaced to carry the additional strands, such as aerial fiber, who is responsible? Who bears the cost? Are there any deadlines to complete the work? Are the deadlines enforceable?

5.1. Delays in gaining access to support structures

Delays in providing information about support structure access charges and in approving access can result in small providers significantly underestimating costs in funding proposals, and can make it impossible to meet project deadlines. Impacts on projects due to such delays can be enormous, particularly in regions of Canada with short construction seasons due to cold weather and limited periods for shipping equipment over ice roads on frozen lakes and rivers. In several cases Indigenous providers have been forced to wait from 12 to 24 months to get a permit before construction work could begin.[20]

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[19] CRTC 2019-406 – FMCC Intervention, para 45.

[20] CRTC 2020-366 – FMCC Intervention, para 21.

5.2. Pricing of access to support structures

Pricing of access to support structures owned by incumbents can affect both the viability of small and Indigenous providers and the retail prices they can charge to their customers. At the construction phase of a project, these charges may consist of authorization fees, engineering charges, payment for repair, and maintenance. They may also include the cost to make any modifications to support structures so that they comply with regulations that the incumbent may have either neglected or ignored.

Attachment rates may be higher for utility poles than ILEC poles; in Ontario, prices for utility pole per annum almost doubled (an increase of 95 percent) from 2018 to 2020.[21] (These utility pole rates are regulated by provincial entities; we discuss these jurisdictional issues below.) An Indigenous provider stated that the high costs it had to absorb affected its ability to provide affordable services to remote communities: "The issue isn't whether we can access the poles… it's whether we can afford the 100 percent increase in attachment fees."[22]

An organization of independent providers stated that the utility pole rental rate had "quickly and perversely doubled" in the past few years, resulting in a material blow to the operating expenses of all carriers that use the poles, with the notable exception of the incumbent ILEC.[23] A major cable competitor stated that the rate to attach to a pole owned by the electric utility was almost four times as much as to access an ILEC-owned pole.[24]

The same rate is typically charged regardless of the condition of the support structures. An Indigenous provider in Quebec stated that whenever the staff go into communities, they discover poles are often old and poorly maintained. According to Indigenous providers in Quebec and Ontario, it appeared that in some cases the ILECs do not even know the condition of the poles in the communities.[25] As one Indigenous provider asked: "If a pole is 50 years old, should rent still be charged and collected?"

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[21] *Report of the Ontario Energy Board: Wireline Pole Attachment Charges*.[21]

[22] CRTC 2020-366 – FMCC Intervention, para 54.

[23] Independent Telecommunications Providers Association: *Submission to Call for comments regarding potential barriers to the deployment of broadband-capable networks in underserved areas in Canada – Telecom Notice of Consultation CRTC 2019-406 – Public Record 1011-NOC2019-0406* (7 May 2020).

[24] Telecom Notice of Consultation CRTC 2019-406 – Call for comments regarding potential barriers to the deployment of broadband-capable networks in underserved areas of Canada – Rogers' Intervention (7 May 2020).

[25] CRTC 2020-366 – FMCC Intervention, para 34.

5.3. Make-ready issues

Applicants for access to support structures may find that they have not been adequately maintained, or are otherwise not ready for attachments of the providers' equipment. The need to complete make-ready work may result in delays as well as disputes over which entity should pay for repairs and upgrades. For example, in one case a permit was not granted sooner by the support structure owner because it was the only authorized entity to conduct repairs. Despite repeated requests, the owner took a year to complete the work, and the leasing organization paid for it to be done.[26] Typically, there is no incentive for the incumbent to expedite this work.

In the U.S., the FCC has adopted an innovative "One Touch Make Ready" (OTMR) principle to help expedite extension of broadband "whereby the attacher, who has the incentive to move quickly, is able to perform simple make-ready work in the telecommunications space on a pole, subject to notice requirements and other safeguards needed to ensure the quality of the make-ready work." The FCC states:

> ". . . new attachers are not responsible for the costs associated with bringing poles or third-party equipment into compliance with current safety and pole owner construction standards to the extent such poles or third-party equipment were out of compliance prior to the new attachment. Although [pole owners] have sometimes held new attachers responsible for the costs of correcting preexisting violations, this practice is inconsistent with our long-standing principle that a new attacher is responsible only for actual costs incurred to accommodate its attachment."[27]

5.4. Reserving space for future use

While incumbents often conclude that there will be little future demand in remote and northern regions, they may also decide to reserve pole or conduit space for future upgrades or replacements. An independent provider stated "We have … experienced situations where an ILEC claims no spare capacity due to future use requirements, only to discover later that the capacity had never been used. There are currently no requirements that outline when a support structure owner can claim future use, nor are there any enforcement or recourse mechanisms that can be used for when capacity reservations go unused… Allowing ILECs to reserve capacity for future use gives them priority access over the support structure, providing them a competitive advantage and the ability to slow down the expansion plans of their direct competitors.

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[26] CRTC 2019-406 – FMCC Intervention, para 101.

[27] Removing Barriers to Infrastructure Investment: Third Report and Order and Declaratory Ruling" FCC 18-111, WC Docket No. 17-84, WT Docket No. 17-79, August 3, 2018, para. 121

Furthermore, the ability to reserve unlimited future use eliminates the incentive for ILECs to ensure they are managing their support structures efficiently."[28]

The result may be greatly increased costs for third party providers who may have to install additional (and redundant) support structures.

5.5. Dig once

Support structures for broadband include not only poles and towers, but also conduit. Some interveners stated that infrastructure projects such as road construction or upgrades should be required to install conduit for fiber and other infrastructure, with access ducts for additional providers. They pointed out that this approach would result in overall cost-savings of public funds.[29]

6. Spare Capacity and Scalability

While Indigenous populations in Canada's North are a small percentage of the total Canadian population, they are also the fastest growing. Households are often large, resulting in demand for more bandwidth. Networks must be built so that they can scale to accommodate more users and/or more bandwidth-intensive uses. Northern ISPs have already found that some incumbent fiber and microwave backbone (or middle mile) networks have no additional capacity available. For example, in northern Ontario, one ILEC's design of a fiber backbone did not anticipate residential and anchor institution demand. Accordingly, five years after the backbone was completed, its electronics had reached end-of-life. [30]

A participant in the CRTC consultation suggested that optical fiber networks built using public funds should include additional capacity in the form of "dark fiber" that may be leased and activated in the future. An incumbent challenged this proposal which it characterized as "carriers who build dark fiber be required to build for unknown future capacity," adding "It would be unprecedented for the Commission to order construction of excess capacity."[31] However, where fiber is concerned, installing extra dark fiber during construction is much cheaper that adding fiber in later upgrades and overbuilds. It would be in public interest as well as good business sense to install extra dark fiber initially, rather than returning to government agencies to request more funding for expensive upgrades.

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[28] CRTC 2020-366 – Eastlink Intervention, para 3.

[29] CRTC 2020-366 – FMCC Intervention, paras E33-35.

[30] CRTC 2019-406 – FMCC Final Comments, paras 17-18.

[31] Quoted in Final Comments FMCC 2019-406 March 8 2021.

7. Jurisdictional Confusion

Jurisdictional barriers hinder some of the steps required to install rural broadband. For example, the CRTC has jurisdiction over telecom carriers' poles, but not those owned by electric utilities, which are regulated by the provinces.

An example of a provincial response to access to poles owned by utilities is a recent Ontario law, *The Supporting Broadband and Infrastructure Expansion Act, 2021* (also known as *The Building Broadband Faster Act of 2021).* This new law applies to electric utilities and municipalities, rather than telecom providers (which are federally regulated). It requires that "A[n electric] distributor or transmitter shall compensate the proponent for a loss or expense incurred because the distributor or transmitter failed to comply with a notice…"[32] This model may also be relevant for telecom providers, but its enforcement for compliance appears vague.

Some utilities also own fiber networks that could be used to extend broadband. For example, the province of Manitoba, through Manitoba Hydro, owns unused fiber-optic cable installed to communicate with northern hydroelectric facilities. The province recently used a competitive process to make this surplus capacity available to a commercial telecommunications provider to upgrade services for northern communities.[33]

8. Indigenous Rights and Jurisdiction

In many cases, telecommunications facilities cross Indigenous lands, but the people living on those lands cannot access them. For example, the Economic Development Officer of a First Nation in Northern Ontario stated: "These poles are on our land, in our community. We have the authority to use them. Why do we have to ask Hydro for permission to string a cable on them?" (p.59).[34] Furthermore, members of Indigenous communities do not receive any compensation from providers for using rights-of-way traversing their territories.

Negotiating access to rights of way is another barrier to broadband installation that may involve jurisdictions including cities, municipalities, Indigenous reserves, and other Indigenous territory. Section 43/(3) of the *Telecommunications Act* states: "No Canadian carrier or distribution undertaking shall construct a transmission line on, over, under or along a highway or other public place without the consent of the municipality or other public authority having

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[32] Bill 257: An Act to enact the *Building Broadband Faster Act, 2021* and to make other amendments in respect of infrastructure and land use planning matters Legislative Assembly of Ontario, enacted April 12, 2021.

[33] https://news.gov.mb.ca/news/index.html?item=51277&posted=2021-05-13

[34] Cited in CRTC 2019-406 – FMCC Intervention, para 63. (Rowlandson, John. (2020) "Getting up to Speed in 19 Sioux Lookout Area First Nations." Unpublished report, p. 59. March.) Note that three jurisdictions are involved here: federal (telecom), provincial (electric utility), and First Nation.

jurisdiction over the highway or other public place." Indigenous organizations have argued that Indigenous communities and First Nations governments are considered "public authorities."

In the US, the Navajo Nation Telecommunications Regulatory Commission (NNTRC) has developed its own *Application for Certificate of Convenience and Necessity*, which includes guidelines for provision of telecommunications infrastructure and services on Navajo lands.[35] Their requirements could serve as an example for Canadian Indigenous agreements concerning infrastructure on Indigenous lands.

9. Consultation and Engagement

Consultation with communities is necessary to ensure that Indigenous and other communities in rural and remote regions are aware of the potential impacts and opportunities of publicly-funded broadband infrastructure projects affecting them.[36] Original CRTC Broadband Fund guidelines stated that applicants should show that they "attempted to consult" with communities. Such a requirement could be fulfilled by a letter never received or a telephone call never answered. Further, an example of acceptable consultation was a "market study" that could be done using available information (e.g. population, average income, public institutions, local businesses, etc.) without any interaction with the community.[37]

In the U.S., the FCC must "send any public notice seeking comment on any petition for designation as an eligible telecommunications carrier on Tribal lands, at the time it is released, to the affected tribal government and tribal regulatory authority, as applicable, by the most expeditious means available."[38] Also the FCC requires a *Tribal Government Engagement Obligation* from carriers receiving subsidies to provide services on Tribal lands. These carriers must demonstrate that they have coordinated with the Tribal government and provide a report documenting their compliance.[39] The FCC determined that, at a minimum, the annual Tribal engagement obligation for Eligible Telecommunications Carriers (ETCs) must include: (1) needs assessment and deployment planning; (2) feasibility and sustainability planning; (3) marketing services in a culturally sensitive manner; (4) rights-of-way processes, land-use permitting,

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[35] See:
http://nntrc.org/uploads/FileLinks/f25715e8b19a450c85cdea027b8b9679/2014_12_10_NNTRC_11_001_Second_Report_and_Order__CCN_1_1__1___1_.pdf

[36] CRTC 2019-406 – FMCC Reply Comments, para 66.

[37] CRTC 2019-45 – FMCC Intervention, para E11.

[38] Ibid.

[39] Form available at: https://www.usac.org/wp-content/uploads/high-cost/documents/Forms/FCC-Form-481-Template.pdf

facilities siting, environmental and cultural preservation and review processes; and (5) compliance with Tribal business and licensing requirements.[40]

In addition, the articles in the *United Nations Declaration on the Rights of Indigenous People* (UNDRIP) specify the right to consultation, as does Canada's Truth and Reconciliation Commission (TRC) in its Call to Action #92, on "Business and Reconciliation".[41]

Thus, a specific definition of "duty to consult" could also be developed in this context. By engaging with Indigenous groups, commercial providers also gain several benefits. They can reduce costs through training and employing local residents, and contribute to local and regional economies, which in turn create additional demand for their services. They also demonstrate their corporate social responsibility through tangible benefits to affected communities.[42]

10. Training and Hiring of Local Residents

Barriers to installing rural broadband can include lack of skilled local people to build and maintain the facilities. Public sector funders seek to ensure that the facilities get built, but rarely include requirements for training and hiring of local residents. For example, an Indigenous entrepreneur noted that an incumbent with public sector funding relied entirely on a contractor brought in from a southern province rather than training or hiring any local people to install a fiber network in a northern community[43]. The result is typically higher installation and maintenance costs (including travel and lodging as well as wages for outside crews) and no transfer of skills or income to the community. Also, the COVID pandemic highlighted the need for immediate responses to local network and infrastructure problems in remote and rural communities when telecom providers were unable to dispatch repair people due to lockdowns.

We are unaware of any such requirements in recent funding initiatives in North America or in rural regions elsewhere, although some may exist. One such initiative, known as the Northern Pilot Project, funded by the former Canadian Department of Communications, required that participating communities provide a location for communications equipment, and at least two community members to be trained to operate and maintain the equipment. Eventually, an Indigenous communications society was formed to implement this model across the region.[44]

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[41] See: http://www.trc.ca/websites/trcinstitution/File/2015/Findings/Calls_to_Action_English2.pdf, p.9.

[42] CRTC 2019-406 – FMCC Intervention, para 59.

[43] Personal communication, 2021.

[44] Hudson, Heather E. and Edwin B. Parker. (1975) "Telecommunication Planning for Rural Development." *IEEE Transactions on Communications*, Fall.

11. **Procurement**

Organizations based in rural, remote, northern and Indigenous communities face limited choice of contractors who can install and/or maintain support structures in remote communities and are familiar with the infrastructure, climate, people and resources. Waivers may be appropriate to allow for non-competitive procurement to hire local contractors rather than those certified by the infrastructure owners that would have to make multiple fly-in trips. OTMR procedures (see above) may also be a solution in some cases to enable the providers to hire their own contractors to complete the work.

Procurement guidelines can also positively contribute to Indigenous skills and jobs. An Indigenous ISP pointed out that a necessary component of any broadband development funding mechanism "is supporting opportunities for development and growth of First Nations and Aboriginal businesses." An Indigenous procurement mechanism could be included as a requirement for providers seeking government funding to serve Indigenous regions. [45]

12. The Need for Accurate and Accessible Data

New providers need to be able to identify, find and access existing infrastructure. Timely and meaningful methods for updating data are required as current information is often inaccurate or out of date. [46] One Indigenous organization stated that "the ISED map contains inaccuracies with regard to First Nation communities' access to broadband, both transport and last mile".[47] Several other interveners noted that the 25 square km hexagons utilized by ISED in many cases are not detailed enough to identify clusters of populations such as small communities, or availability of broadband in all locations within the hexagon.

An open access, publicly available database could include location of dark fiber; location and condition of support structures; location of towers; and age, condition and capacity of electronics. These maps and information should be reviewed and updated annually

13. Conclusions

This paper has presented barriers to extension of broadband into remote and Indigenous regions in addition to funding requirements that should be addressed by regulators and policy makers.

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[45] Procurement Strategy for Aboriginal Business. See http://www.aadnc-aandc.gc.ca/eng/1100100032802/1100100032803

[46] Hambly, H., & Rajabiun, R. (2021). Rural broadband: Gaps, maps and challenges. Telematics and Informatics, 60.

[47] CRTC 2017-112, All Nations Trust Intervention, para 8.

Conclusions from this analysis include the following:

- **Opportunities for Small and Indigenous Providers:** While new funding sources to extend broadband and other services can help to bridge connectivity gaps, it is important to ensure that the terms of eligibility do not exclude potential competitors including small, Indigenous, and community providers, and that requirements for participation are appropriate for smaller providers.
- **Funding may be necessary but not sufficient:** To accomplish goals of extending affordable and reliable broadband to remote and Indigenous regions, funding is not likely to be the only factor that policy makers and regulators need to consider.
- **Access to existing networks:** Conditions for access to transport networks and to existing infrastructure such as poles and conduit should be reviewed to minimize delays and paperwork for permits.
- **Pricing:** Affordability for users may depend on construction and operating costs of rural broadband networks. Charges that small and competitive ISPs pay to lease capacity and connect to existing infrastructure will be passed on to subscribers.
- **Incentives:** Incumbent facilities owners have little incentive to expedite access to their networks for potential competitors. Strategies to support the efforts of the new providers can expedite broadband build-outs. An example is OTMR (One Touch Make Ready).
- **Consultation:** Meaningful consultation requires significant efforts to inform communities and engage with them about projects intended to serve them. This consultation can also benefit providers by contributing relevant information about existing facilities and local conditions and sensitivities.
- **Training and Hiring Local Residents:** Rural broadband projects are intended not only to provide connectivity to communities but to contribute to their development. Training and hiring local people not only creates jobs but is likely to reduce costs incurred by depending on outside employees and contractors.
- **Enforcement:** License conditions such as local consultation, rollout deadlines, and quality of service metrics must include explicit means of enforcement.
- **Rural Data:** Government and/or operator data on rural coverage, transmission speeds, and service quality may be inaccurate or incomplete. Government data should be regularly updated and checked for accuracy. Additional sources should be made available to contribute more accurate or granular data for broadband planning and funding.
- **Participation:** Small and Indigenous providers should be encouraged to participate in hearings and other proceedings by regulators and policy makers. They can provide first hand testimony and examples that would not otherwise be available to decision makers.

While conditions vary, the experience in extending broadband in northern Canada offers lessons relevant for other countries, especially those with rural or isolated populations. Some may think that these details are beyond the scope of regulators and policy makers. Yet

"the devil is in the details." From the perspective of a provider that has received funds to upgrade or extend broadband infrastructure, these issues are critical. Unless they are recognized as crucial to the implementation of funded projects, these projects may be significantly delayed or funds may be squandered.

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NOTE: References to statements made by participants in CRTC Proceedings are shown in the footnotes.