

Response to Notice of Inquiry: Telecommunications Assessment of the Arctic Region

Submitted by email to arcticnoi@ntia.doc.gov

by

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Please note that I have been interviewed on several occasions by NTIA for their report, and have already submitted copies of relevant reports and papers.

Below are responses to selected sections from the NOI.

III. Request for Comments on Available and Planned Communication Services

(c) Recommendations to Foster the Deployment of Advanced Communications Networks and Services

1. Universal Service Subsidies

Universal Service Fund (USF) subsidies have been critical to provision of existing broadband services in Alaska, particularly to schools and libraries. Since the passage of the 1996 *Telecommunications Act*, Alaska has benefited significantly from federal universal service funds. In 2013, Alaska received a total of \$278.7 million in universal service funds, ranking sixth among the states in total amount received, following Texas, California, Oklahoma, Florida, and New York, states with five times to more than 50 times Alaska's population. In the fifteen years from 1998 to 2013, Alaska received a total of almost \$3 billion from these funds. Over that period, Alaska schools and libraries received more than \$295 million. Yet Alaska ranks 47th in population among the states, with only .23 percent of the total U.S. population.

Although the Rural Health Care fund is relatively small, Alaska's share is significant; between 1998 and 2013, Alaska's rural health care providers received more than \$342 million, the largest absolute amount and more than 50 percent of the total funds distributed, as well as the highest funding per capita. Telemedicine facilities link village clinics, typically staffed by local paraprofessional health aides, with regional hospitals, for voice consultations, transmission of medical records, and video consultations and training. The regional hospitals, in turn, are linked to the Alaska Native Medical Center (ANMC) in Anchorage. Electronic medical record systems are now being implemented, so that patient records may be accessed and updated for patients treated anywhere in the Native health care system. Hospitals now transmit digital x-rays to be read in Anchorage or elsewhere in the U.S. or abroad.

The largest USF subsidy to Alaska is from the High Cost fund, which provides support to rural local exchange carriers (LECs) so that prices for local voice services can remain affordable for their subscribers. In 2013, the high cost subsidy amounted to more than \$181 million for Alaska carriers, and from 1998 to 2013, the total amount Alaska carriers received was more than \$ 2.1 billion. However, the subsidy models are changing under the recently implemented Connect America Fund which is designed to help achieve the goals of the National Broadband Plan. While there will continue to be subsidies for rural telecommunications, more emphasis will be placed on broadband.

It is critical that USF subsidies be continued, as operating costs remain a significant challenge because of the small population, huge landmass plus numerous islands with population centers, rugged landscape, and extreme climate – which contribute to high operating and maintenance costs.

2. Infrastructure Funding and Subsidies

Capital funding for infrastructure has also been important for rural and Arctic communications in Alaska. For example, the Rural Utilities Service (RUS) in the U.S. Department of Agriculture has funded facilities and upgrades for the telephone cooperatives in Kotzebue and Barrow.

The ARRA (American Recovery and Reinvestment Act of 2009) stimulus program provided grants and loans to build the TERRA Southwest broadband network in southwest Alaska. The TERRA terrestrial network has recently been extended to Barrow. NTIA's Broadband Telecommunications Opportunities Program (BTOP) funded OWL (Online with Libraries) to upgrade connectivity for 65 rural libraries, most of which are in indigenous communities. Facilities include videoconferencing and web conferencing, so that the libraries can serve as public computing centers. OWL was also intended to provide training and support in digital literacy to benefit community residents without broadband at home. In villages above the Arctic Circle, the broadband access is just for libraries, and not for the rest of the community. To date, funding has not been available to extend terrestrial broadband in the regions above the Arctic Circle.

The FCC has recognized that mobile broadband is increasingly important as a means of accessing the Internet and other services, and has therefore established a universal service support mechanism dedicated expressly to mobile services. The Connect America Mobility Fund awards licenses by reverse auction, so that the carrier requesting the lowest subsidy wins the bid. In the first auction, held in 2012, GCI received \$3.23 million to upgrade mobile coverage in some rural regions of Alaska.¹

A special allocation under the Connect America Mobility Fund is 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 2014, the FCC held a reverse auction for subsidies under Phase I of the Tribal Mobility Fund to

¹ See http://wireless.fcc.gov/auctions/901/reports/901winning_bids_by_state_county.pdf

distribute \$50 million in one-time support for mobile service providers serving tribal lands lacking 3G or 4G service. GCI received \$41.4 million to upgrade wireless service for 48 communities, while Copper Valley Wireless received \$152,000 to serve an estimated population of 127 in the Ahtna region.² There was only one bidder for each of the areas in Alaska in the two reverse auctions. Phase II of the Mobility Fund will offer \$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, which include much of Alaska.

Within the Connect America Fund, the FCC created a Remote Areas Fund with a budget of at least \$100 million annually “to ensure that even Americans living in the most remote areas of the where the cost of providing terrestrial broadband service is extremely high, can obtain service.”³ As a step toward implementation of the Remote Areas Fund, in July, 2014, the FCC announced funding of \$100 million for rural broadband experiments in high cost areas that would include most of Alaska.

These funds are likely to make significant contributions to extending and upgrading facilities for broadband in the Alaska Arctic. However, there is no overall plan or strategy at present to prioritize broadband requirements in rural Alaska.

3. Consumer/User Involvement

There is no organization representing communications consumers in Alaska, including individual residents, small businesses, nonprofit organizations, social and educational services, and larger businesses. Such an organization could bring user needs to the attention of industry, regulators, and policy makers, and could provide information in public hearings and filings at the state and federal level.

4. Native Engagement

Few Alaska Natives are engaged in representing their needs as consumers of communications content and services, and fewer still are engaged in providing communications services to their communities. Yet as the majority of residents in much of rural Alaska, access to affordable communications services and relevant content should be a particular concern.

There is no Native telecommunications provider certified as an Eligible Telecommunications Carrier (ETC), which would then be eligible to receive federal funding to provide rural broadband fixed or mobile services.

² Federal Communications Commission. “Tribal Mobility Fund Phase I Auction -- Winning Bids Sorted by State and Tribal Land.” March 2014. Available at http://wireless.fcc.gov/auctions/default.htm?job=auction_summary&id=902

³ Federal Communications Commission. “Public Notice: Wireline Competition Bureau Seeks Further Comment on Issues Regarding The Design of The Remote Areas Fund.” Wc Docket No. 10-90, January 17, 2013.

One possible step would be for Alaska Natives to establish a Native communications organization that can represent their interests and advocate for their needs at both the state and federal levels. Such an organization could help tribal organizations take advantage of the opportunity of the FCC's recent mandate that carriers receiving subsidies to serve tribal areas must engage with tribes. It could also help Alaska Natives to become providers or to partner with other providers to obtain federal funding available for extending broadband in remote and tribal areas.

(d) Adoption Barriers

1. Affordability

Affordability remains a key issue in rural Alaska; if broadband networks are not affordable to residents and organizations, they do not effectively close broadband gaps. In a study directed by the author in southwest Alaska, village residents cited price as their primary reason for not subscribing to newly available broadband.⁴ Some nonprofit organizations and businesses state that they cannot take full advantage of broadband because of high prices, which include usage caps in addition to monthly fees⁵.

There are significant differences between prices in urban areas and in rural areas where broadband is available. In the city, a subscriber can pay \$40 per month for 10 mbps down/1 mbps upload speed, with a cap of 10 GB. Packages with much faster speeds and higher caps are available. In a village in southwest Alaska with service from the same carrier, 10mbps is not available, and the lowest price for 2 mbps down with 246 kbps up is \$65 per month. After complaints about the high cost of access, the carrier did introduce a cheaper package for \$30 per month, but with only 512 kbps download speed and 128 kbps upload speed, and a 5 GB cap. See Tables 1 and 2. But these are not broadband speeds, and the disparity between urban and rural broadband speeds and prices does not meet the requirements of the 1996 *Telecommunications Act*, which stipulates that rural service quality and pricing should be "reasonably comparable" to urban service and pricing.

In the village example below, the median household income is only 58 percent of the statewide average. Income levels are similar in other southwest Alaska villages, where employment is seasonal, and most families depend partially on subsistence hunting and fishing. Broadband is likely not to be affordable for many of these village residents.

⁴ Hudson, Heather E., et al. *Toward Universal Broadband in Rural Alaska: Part 1: An Analysis of Internet Use in Southwest Alaska; Part 2: Literature Review*. Institute of Social and Economic Research, University of Alaska Anchorage, November 2012. Available at http://www.iser.uaa.alaska.edu/Publications/2012_11-TERRA.pdf

⁵ Hudson, Heather E. et al. "After Broadband" study in Southwest Alaska. Institute of Social and Economic Research (ISER), University of Alaska Anchorage. In progress.

Table 1: Broadband Pricing: Village

Village: Chefornak				
DOWNLOAD SPEED ¹	UPLOAD SPEED ¹	USAGE (GB)	OVERAGE RATE (PER MB)	COST PER MONTH ²
512 Kbps	128 Kbps	5	N/A	\$29.99
2 Mbps	256 Kbps	10	\$ 0.0100	\$64.99
3 Mbps	512 Kbps	15	\$ 0.0075	\$74.99
4 Mbps	1 Mbps	25	\$ 0.0075	\$114.99
6 Mbps	2 Mbps	40	\$ 0.0075	\$164.99
6 Mbps	2 Mbps	60	\$ 0.0075	\$214.99
6 Mbps	2 Mbps	100	\$ 0.0075	\$314.99

Table 2: Broadband Pricing: City

City: Anchorage				
DOWNLOAD SPEED ¹	UPLOAD SPEED ¹	USAGE (GB)	OVERAGE RATE (PER MB) ²	COST PER MONTH ²
10 Mbps	1 Mbps	10	\$ 0.010	\$39.99
12 Mbps	1 Mbps	60	\$ 0.008	\$59.99
15 Mbps	1 Mbps	100	\$ 0.006	\$69.99
18 Mbps	1.5 Mbps	150	\$ 0.004	\$89.99
22 Mbps	2 Mbps	200	\$ 0.002	\$119.99
22 Mbps	2 Mbps	250	\$ 0.002	\$144.99
22 Mbps	2 Mbps	300	\$ 0.002	\$169.99
200 Mbps	5 Mbps	500	\$ 0.001	\$184.99

2. Competition and Consolidation

The telecommunications industry was long considered to be a natural monopoly; it appeared that its services could be provided most cost-effectively by one integrated provider. Technological innovations beginning in the 1960s gradually eroded this paradigm, resulting in competition ranging from customer premises equipment (such as telephones) to satellite systems. In Alaska, the rationale for monopoly was based primarily on the high capital and operating costs of reaching customers scattered over a vast land area, and the limited revenues from a small population. However, entrepreneurs who introduced innovations in satellite technology, and later

in digital and mobile communications, demonstrated that competition could succeed even in rural Alaska.

Much of this competition has been facilities-based, with separate satellite earth stations and cellular antenna towers installed by each carrier. Yet there appears to be a new era of consolidation, as a high capacity backbone network consisting of optical fiber and microwave extends broadband to some regions of rural Alaska. Resale would provide a means of offering competitive services over this network, whereby the facilities owner would lease wholesale capacity on its network to retail service providers. However, potential competitors claim that wholesale rates are too high for them to compete with the facilities owner, which itself offers retail services.

IV. Existing and Potential Networks

1. Satellite Communication Services

Satellite services remain critical for Alaska communications. Most of the Alaska locations listed in the NOI remain dependent on satellites for voice, television, and Internet services. In general, Fixed Satellite Services (FSS) are used to provide connectivity to the community, from which the signal is redistributed to subscribers over wireline, cable, or local wireless networks. Some residents have individual VSATs for Internet connectivity, primarily with HughesNet. Starband was also popular, but discontinued service in September 2014.

However, satellite choices for Alaska are limited. Few U.S. satellites include Alaska coverage. Some Canadian Anik satellites do provide coverage.⁶ Only two satellites in the Galaxy series (which are now in use by Alaska carriers) offer full C-band coverage of Alaska regions that lack terrestrial alternatives, including the Aleutian chain. See Figures 1 and 2.

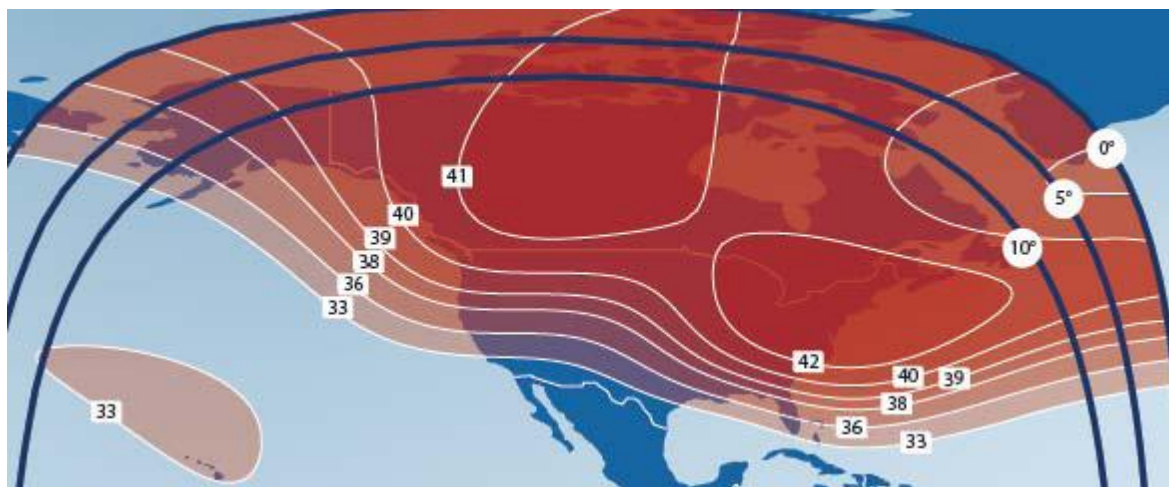


Figure 1: Telesat's Anik F2 @ 111.1 West: C band

⁶ Telesat. "Satellites with Northern Canada Coverage." CRTC Telecom Notice of Consultation 2014-44. 21 August, 2014.

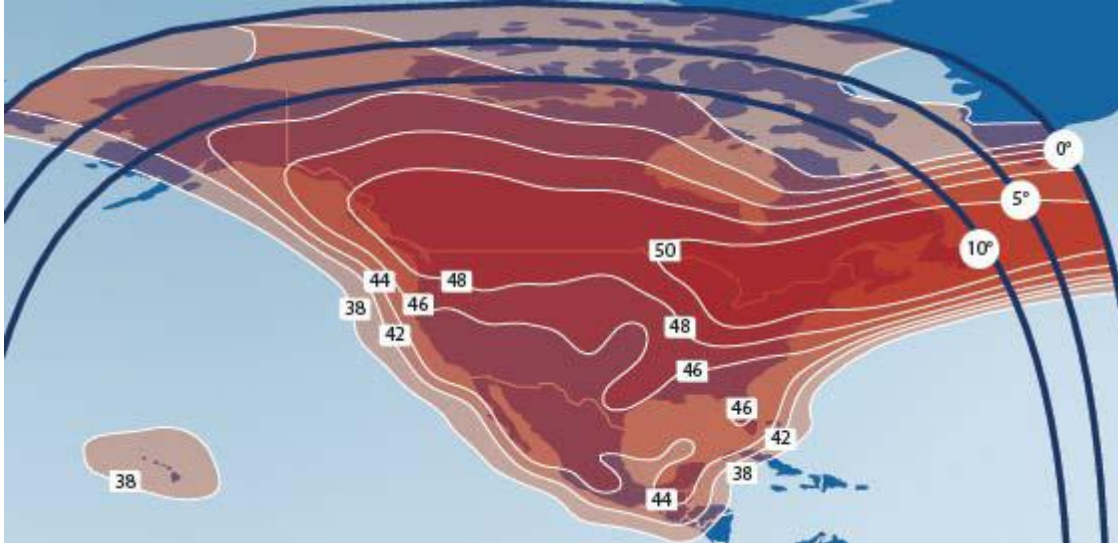


Figure 2: Telesat's Anik F2 @ 111.1 West: Ku band

C band:

There are numerous domestic satellites using C band. However, many have weak signals over much of Alaska, and few cover the Aleutians.

Current C band:

- AMC 18 @ 105 W
- SES 3 @ 103 W
- SES 2 @ 87 W (partial coverage)
- AMC 9 @ 83 W (partial coverage)

- AMC 8 @ 139 W
- AMC 7 @ 137 W
- AMC 10 @ 135 W
- AMC 11 @ 131 W
- SES 1 @ 101 W

- Galaxy 19 at 97 W
- Galaxy 3C at 95 W
- Galaxy 25 at 93.1 W
- Galaxy 17 at 91 W

- Galaxy 15 @ 133 W
- Galaxy 14 @ 125 W
- Galaxy 18 @ 123 W
- Galaxy 23 @ 121 W

- Galaxy 16 @ 99 W
- Galaxy28 @ 89 W (partial)

New C band:

Intelsat 30 and 31: Both are planned to launch to 95 West, 2014 (IS-30) and 2015 (IS-31)

KU band:

Current Ku band:

- Echostar 9 at 121 W
- Gal 19 @ 97 West

New Ku-band:

Eutelsat 115W B (Satmex 7) appears to be the only new satellite that will offer complete coverage of the North, including Alaska. Commercial service is planned for late 2015. See Figure 3.

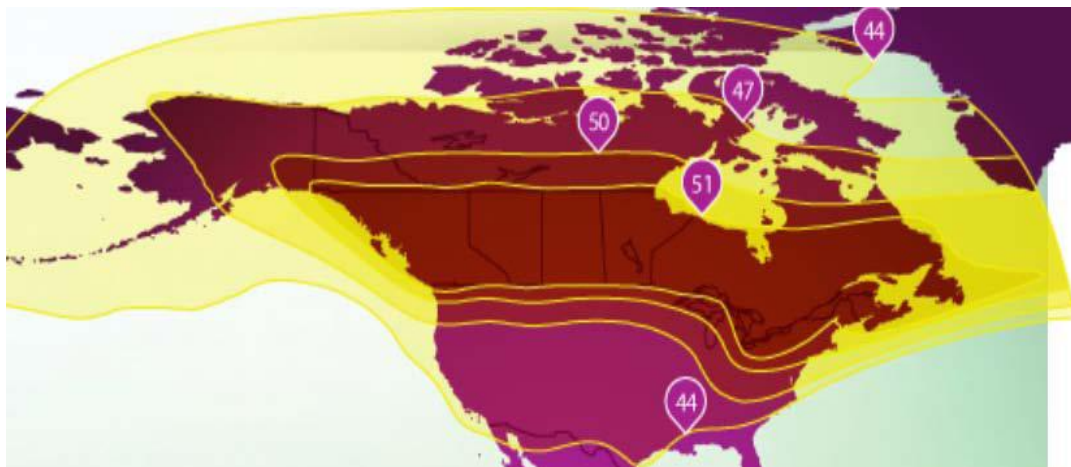


Figure 3: Eutelsat 115W B (Satmex 7): Ku band coverage

High Throughput Satellites (HTS):

No HTS satellites designed for interactive broadband are currently planned to cover Alaska. For example, see the footprint for the HTS ViaSat 2 (Figure 4).

The HTS satellite Jupiter 2/Echostar 19 to be launched in 2016 to 97 W *may* provide Alaska coverage (footprints are not available).



Figure 4: ViaSat-2 Ka-band HTS to Launch Mid-2016 to 70 West

Mobile Satellite:

The Inmarsat Global Xpress with a four satellite global Ka-band constellation, is to be fully operational in 2015. It will have extensive coverage of Alaska and the Arctic. Each GX satellite is designed with 89 Ka-band spot beams. See Figure 5.

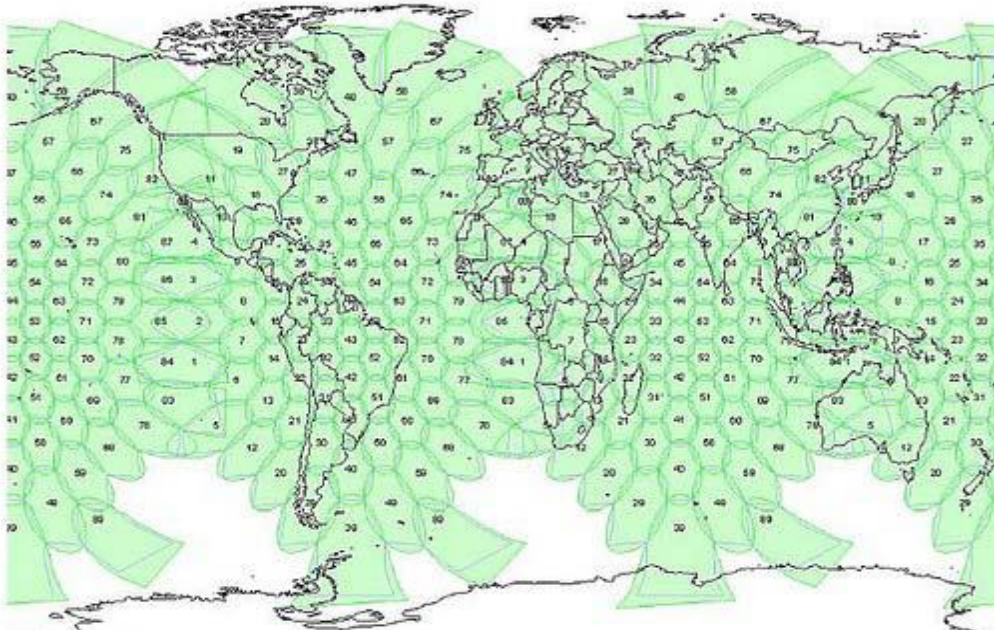


Figure 5: Inmarsat 5 F2 (55W) and F

16. Existing and Potential Networks and Services across the Pan-Arctic Region:

In Canada, the Yukon, with the exception of Old Crow, is served by terrestrial networks, primarily microwave, with optical fiber now connecting many communities on the highway system. The western part of the Northwest Territories is served primarily by microwave. Other parts of the NWT and all of Nunavut and Nunavik (Arctic Quebec) and northern Labrador are served only by satellite. See the maps below.



Figure 6: Arctic Canada networks. Source: <http://www.nwtel.ca/about-northwestel/operating-map>



Figure 7: Nunavik (Northern Quebec)

17. Fostering the Deployment of Advanced Communications Networks and Services in Arctic Alaskan Communities

Please see the response to Section III (c) above.

18. Fostering the Deployment of Advanced Communications Networks and Services in the Pan-Arctic Region

1. Canadian Funding of Rural Broadband

The Canadian government has launched a program called Connecting Canadians to provide an estimated 280,000 Canadians in rural and remote regions with high-speed, broadband Internet access. The government plans to invest up to CAD305 million, of which CAD50 million is targeting remote, satellite-dependent communities in Nunavut and the Nunavik region of northern Quebec. An estimated 12,000 households in Nunavut and the Nunavik region are to receive broadband service. Projects for the northern component must deliver speeds of at least 3 Mbps, while funded projects in other regions must deliver 5 Mbps. ISPs receiving funding to serve Nunavut and Nunavik must guarantee that monthly subscriber rates will not exceed CAD80.

For most projects, Connecting Canadians may fund up to 50 percent of eligible project costs, whereas projects serving very remote or indigenous communities could receive up to 75 percent of eligible costs.⁷

The investment in broadband is part of the Government of Canada's strategy to promote social and economic development in the North, as outlined in Canada's Northern Strategy.⁸

The Connecting Canadians subsidies are for capital expenses only. There is a small high cost fund for carriers serving remote areas in Canada, but no equivalent of Lifeline or the E-rate and Rural Health Care universal service subsidies in the U.S.

2. Canadian Regulatory Issues

In February 2014, the Canadian Radio-Television and Telecommunications Commission (CRTC) launched an inquiry into the Canadian marketplace for fixed satellite services (FSS), noting that much of the North is dependent on satellite communications. The CRTC's report is to be released before the end of 2014.⁹

A submission to the Satellite Inquiry estimated that more than 50 FSS C-band transponders would be required to provide the CRTC's mandated 5 mbps receive/1 mbps transmit speeds to

⁷ See www.ic.gc.ca/eic/site/028.nsf/eng/h_00587.html.

⁸ See www.northernstrategy.gc.ca/index-eng.asp.

⁹ *Appointment of an Inquiry Officer to review matters related to transport services provided by satellite*, Telecom Notice of Consultation CRTC 2014-44, 6 February 2014 .

all Canadians by the end of 2015.¹⁰ While higher powered satellite coverage could become available in some remote regions, issues of reliability for critical services remain, such as during snowstorms and torrential rain at Ka band.

In 2015, the CRTC will consider a Basic Service Objective, to determine whether broadband (which they currently define as 4 mbps downstream and 1 mbps upstream) should be part of basic telecommunications service available to all Canadians. It is not clear at this point how the CRTC objective of 4 mbps and the Connecting Canadians target of 3 mbps for Nunavut and Nunavik will be resolved.

19. Adoption Barriers

Adoption barriers in the Canadian North are similar to those in Alaska. Satellite bandwidth is limited and expensive. Quality of service is often inadequate for broadband applications.

In 2013, prices for the lowest-cost package in the Yukon and NWT were 16 percent to 18 percent higher than those in the provinces. The striking difference was in Nunavut, which relies exclusively on satellite connectivity, where speeds were much lower and the price was 45 percent higher.¹¹ See Table 3.

Table 3: Canada: Lowest Cost High Speed Internet Packages

Location	Data transfer rate	Monthly Price
Pan-Provincial Average	2800/590 Kbps	\$55 (average)
Yukon Average	2600/384 Kbps	\$65 (average)
Northwest Territories Average	2900/560 Kbps	\$64 (average)
Nunavut Average	1500/384 Kbps	\$80 (average)

¹⁰ Northern Indigenous Community Satellite Network partnership (NICSN). Request for information from the Northern Indigenous Community Satellite Network partnership pursuant to Telecom Notice of Consultation CRTC 2014-44, reference 8663-C12-201401041, July 7, 2014.

¹¹ Data derived from the Conference Board of Canada, quoted in Hudson, Heather E. “Undertaking on Affordability submitted on behalf of the First Mile Connectivity Consortium.” *CRTC Consultation CRTC 2012-669-1: Review of Northwestel Inc.’s Regulatory Framework, Modernization Plan, and related matters*, June 2013.

A comparison of Alaska (U.S.) and Canadian strategies for funding broadband in the North can be found in testimony by Heather E. Hudson on behalf of the First Mile Connectivity Consortium at the CRTC hearing in Whitehorse in June 2013.¹²

Current U.S. USF programs provide broadband subsidies for schools, libraries, and rural health centers, but not for individuals or households. One approach that might improve affordability in the Alaska Arctic would be adoption of Lifeline support for broadband. The FCC's Lifeline program subsidizes the price of voice services for low income residents, including those living on tribal lands. Extending Lifeline support to broadband could reduce prices for many rural Alaskans.

¹² Hudson, Heather E. "Testimony submitted on behalf of the First Mile Community Consortium." *CRTC Consultation CRTC 2012-669-1: Review of Northwestel Inc.'s Regulatory Framework, Modernization Plan, and related matters*, June 2013.