Submitted electronically

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July 7, 2014

Ms. Candice Molnar
Inquiry Officer and Commissioner, Manitoba and Saskatchewan
Canadian Radio-television and Telecommunications Commission
Ottawa, ON K1A 0N2

Re: Request for information from the Northern Indigenous Community Satellite Network partnership pursuant to Telecom Notice of Consultation CRTC 2014-44, reference 8663-C12-201401041

Dear Ms. Molnar,

1. We are pleased to provide the requested information on behalf of the Northern Indigenous Community Satellite Network (NICSN) partnership. The information provided below includes satellite services provided to the partnership as a whole, or to individual partners.

2. The NICSN partnership is comprised of the Kativik Regional Government (KRG) in Nunavik, Northern Quebec; Keewaytinook Okimakanak (K-Net) in Northwestern Ontario; and the Keewatin Tribal Council which delivers services through Broadband Communications North (BCN) in Northern Manitoba. The partners each provide a range of services in their respective region that may include Internet service, mobile telephony, videoconferencing and voice over IP.

3. This document contains proprietary information. The commercial and technical specifications contained herein are filed in confidence pursuant to section 39 of the *Telecommunications Act.* The commercial information could provide a potential competitor with an unfair advantage and, with regards to the KRG, financial, commercial or scientific information provided by a third party is protected under the *Act Respecting Access to Documents Held by Public Bodies and the Protection of Personal Information (R.S.Q. A-2.1).* Information of a technical nature that could be used maliciously by a third party to breach the partners' networks is also filed in confidence.

4. The NICSN partners have answered the Commission's request for information jointly. In certain cases, answers may differ between partners. In order to identify the source of the information an identifier attributes information to Keewatinook Okimakanak "KO:", the Kativik Regional Government, "KRG:" or Broadband Communications North "BCN:". Joint responses are labelled "NICSN partners:". Where there is no attribution, the partner has no comment.

Section 1: requests for information directed at all parties

Competition

1.1 Telecom Notice of Consultation 2014-44 stated that the inquiry and report will focus, among other things, on potential changes to the competitive environment. The first step of assessing the competitive environment in any market is to define the relevant market. Comment on the following proposed definition of the market being examined in this inquiry: Fixed-satellite services (FSS) used by providers of telecommunications services in the transport section of their networks that enable the provisioning of telecommunications services, such as broadband Internet, voice, and wireless (both fixed and mobile), to end-users in Canada.[1]

[1] Note: all references to "FSS" in these requests for information are based on this definition of the market (i.e. FSS used for transport).

In your response, address whether the definition should consider:

a. customers located north of the 60th parallel north as a sub- or separate market from those located south of the 60th parallel north;

5. KO: No, this will fragment the market unnecessarily. The issue of access and cost to provide access are just as real in the far North of Ontario as in some of the areas north of 60.

6. KRG: For Nunavik such a separation would be catastrophic as this would result in the separation of Nunavik into two markets, with seven communities north of sixty and seven communities south of sixty. Any division of market should be done based on the on the socio-geographical realities of the communities and not on pure geographical elements. Examples of factors that should be considered are:
    1) Can the community be accessed via and all season road, a winter road, a railroad or no road at all?
    2) How does the community obtain electrical power, what is the cost of electricity in the community and does access to a large power grid present an opportunity for providing terrestrial telecommunications services? (e.g.: Optical ground wire on a high voltage network)?
    3) Does the community have access to skilled labour? If not, what is the travel cost of flying in labour?
    4) What is the proximity to the nearest terrestrial based network (i.e. Fibre optics or microwave towers).
    5) What is the cost (e.g. per kilogram) of shipping goods to the community?
    6) Can oversized goods such as construction materials or satellite antennas be shipped in year round or only during certain months?

7. Ultimately, the factors that affect the telecommunications industry are related to population density, accessibility and existing infrastructure and as opposed to the communities'

geographical location. The KRG agrees with use of special designation for markets where there is no cost effective solution to provide broadband or other telecommunications services. For example, markets should be designated as "standard cost, high cost, extreme cost", or "urban, rural, remote, very remote", as opposed to "north of 60" and "south of 60".

b. different frequency bands that deliver telecommunications services (i.e. C-band, Ka-band, Ku-band) as being separate product markets, and

8. NICSN Partners: while they may have different technical characteristics, they provide the same services in that they carry data and voice with some varying costs and characteristics.

c. future satellite technologies, such as high throughput satellites, as being part of a different market.

9. NICSN partners: Future satellite technologies should be part of the same market. If we define the market as being the constituents being served, then they should be able to take advantage of newer technologies without having to have it defined for their market first.

1.2 Having regard to the relevant market defined in 1.1 above,
a. What characteristics would indicate, in your view, that the market is competitive, in terms of market share, demand and supply conditions, the likelihood of competitor entry, barriers to entry, and rivalrous behavior?

10. KRG: For Nunavik, transport network costs and high operating costs create nearly insurmountable barriers to entry into the telecommunications market. It is relatively easy to determine that market failure exists when the per Mbs cost of the transport network is nearly double the price charged to users. For example using an estimated unidirectional cost of $#/Mbs/mo and an oversubscription ratio of 20:1, the cost of transport per user for the Broadband Canada stipulated plan at 1.9 Mbs (1.5Mbs down and 0.4Mbs up) is $#/mo. The price cap stipulated by the Broadband Canada program was $80/mo. Even without factoring the capital and operating costs of local distribution, it is clear that there is no market even for a single provider, let alone competition. The KRG considers that conditions of market failure exist in Nunavik and provides broadband service on a public utility basis with financial assistance from federal and provincial programs.

b. Are there any other factors that should be considered when assessing the competitiveness or other characteristics of the relevant market?

11. The NICSN partners have no comments.

1.3 Discuss how feasible it is for a provider of telecommunications services to switch from one FSS provider to another. Provide a high-level explanation of the process and costs involved when a provider of telecommunications services switches from one FSS provider to another. For those who purchase FSS, have you been approached or considered changing FSS providers, and if so, what was the end result (e.g. initial meetings only, service contract proposal, switched FSS providers, etc.)

12. KO: Switching FSS providers is not a trivial task. Months of planning, coordination of travel and an extremely detailed process is required.

13. The simplest FSS provider switch is if the earth station can simply be moved from one satellite to another. This requires a site survey at each site to ensure that there will be line of site to the new FSS provider, that the dish has the ability to be repointed. If not, a new dish would need to be constructed at the new location. This assumes that the electronics are reused.

14. However, NICSN partners have agreements in place with health organizations, hospitals, airlines and emergency measures groups that do not allow for extended outages. This means a new hub site would need to be constructed and brought online so sites could be repositioned without affecting services. A new hub site for NICSN would be in excess of $1.0 million.

15. Additional costs would include operating on 2 FSS providers while the move from one to another takes place realizing that a work to rule attitude would exist with the exiting FSS provider.

16. NICSN did change providers at one time. This was accomplished under a very stressful environment. To do so again, NICSN would need to see long term benefits to doing so. It would be easier to operate with two FSS providers partitioning services between the two and gradually moving services from one to another if that was the most beneficial.

17. KRG: It should be noted that a move from one satellite to another (Anik F2 to Anik F3) was done without a redundant hub in 2007. This move involved two months of planning, multiple teams deployed simultaneously, tens of thousands of dollars in travel expenses and yet still resulted in over five continuous days of downtime for some smaller communities. Such a scenario would no longer be possible given current contractual obligations, as noted by KO above.

Subsidies

1.4 Describe any public subsidies or funding (in terms of the amount, purpose of the funding, and any obligations associated with the subsidy) that you currently receive in connection with the provision or purchase of FSS, and when each of those sources of funding is expected to expire.

18. KO: NISCN has a public benefit transponder (c-band) as well as two C-band transponders purchased under National Satellite Initiative round 2 (funded by the Canadian Strategic Infrastructure Fund at Infrastructure Canada). The latter two are set to expire in 2019. The funding sources for this project are listed in the table below:

Table 1 National Satellite Initiative round 2 funding

Name of Contributor	Private / NonProfit Sector	Prov Gov't	Gov't Canada	Project Total
CSIF (Infrastructure Canada)			$20,649,068	
Telesat	$2,880,000			
Village Branché (Quebec)		$2,200,000		
Northern Ontario Heritage Fund		$1,326,929		
NICSN	$3,022			
Total	**$2,883,022**	**$3,526,929**	**$20,649,068**	**$27,059,019**

19. KRG: In addition to the NICSN capacity, the KRG participated in the Broadband Canada: Connecting Rural Canadians program in 2009-2012. This capacity added two C-band transponders for use exclusively in the Nunavik communities until 2016. The funding sources for this project are listed in the table below:

Table 2 Broadband Canada project for Nunavik only.

Name of Contributor	Private / Municipal TSP	Prov Gov't	Gov't Canada	Project Total
CSIF			$7,401,557	
Telesat	$2,000,000			
Ministère des Ressources naturelles et de la Faune		$3,000,000		
Kativik Regional Government	$2,505,403			
Total	**$4,505,403**	**$3,000,000**	**7,401,557**	**$14,906,960**

1.5 Describe any sources of public subsidies or funding connected with the provision or purchase of FSS that are anticipated in the near future.

20. KRG: ###

Relevant Literature
1.6 As announced in Telecom Notice of Consultation 2014-44, the Inquiry Officer is conducting her review, in part, through a review of relevant literature. Literature that has been referred to as part of the satellite inquiry is set out in Appendix A. Identify any additional relevant literature that you are aware of that would be useful for the Inquiry Officer to consult.

21. The NICSN partners have no recommendations to make on this topic.

Communities

1.7 A list of communities that are believed to receive telecommunications services (e.g. voice, wireless (both fixed and mobile), Internet) by way of FSS is set out in Appendix B. Having regard to that list, identify:
a. Any communities that receive telecommunications services by way of FSS that are not included in the list.[2]

22. KO: The following communities in Ontario receive service by FSS: Fort Severn, Peawanuck, Neskantaga, Eabematoong, Martin Falls, Webequie. The following community in Quebec receives service by FSS: Matimekush (Schefferville).

23. KRG: The community of Whapmagoostui, adjacent to Kuujjuarapik in Quebec, receives broadband Internet services by FSS. Kuujjuaraapik/Whapmagoostui may receive voice telephone service via a microwave link. This information should be validated with the ILEC. (Bell Aliant)

b. Any communities from the list that do not, in fact, receive telecommunications services by way of FSS.

24. KO: The following communities from the list do not receive telecommunications by way of FSS.
    Bearskin Lake
    Big Grassy
    Biinjitiwaabik Zaaging Anishinaabek
    Cat Lake
    Ginoogaming Fist Nation
    Keewaywin
    Kingfisher Lake
    Kitchenuhmaykoosib Inninuwug
    Michipicoten
    Mishkeegogamang
    Muskrat Dam Lake
    Nibiniamik First Nation
    North Caribou Lake
    North Spirit lake
    Pikangikum
    Poplar Hill
    Sachigo Lake
    Sandy Lake
    Slate Falls Nation
    Wabigoon Lake Ojibway Nation
    Wapekeka
    Wawakapewin
    Wunnumin

c. Which communities receive telecommunications services by more than one satellite?

25. KO: Unknown
26. KRG: In Nunavik, all communities receive broadband services via Anik F3. Other services such as voice telephone and direct to home Ka broadband may use a different satellite. This information should be validated with the appropriate providers. (eg.: Bell Aliant, Xplornet).
27. BCN: none in Manitoba

Section 2: requests for information directed at earth station operators

An earth station (also named ground station or satellite terrestrial station) is a ground-based receiving or transmitting /receiving station in a satellite communications system. The counterpart to the earth station is the space segment, which is the satellite in orbit, which is the "space station." Earth stations use dish-shaped antennas.

Technical performance

2.1 For each earth station you operate, identify the total FSS capacity allocated to each earth station, in terms of megabits per second (Mbps). Provide the response for: (i) the highest-cost, lowest-cost, and an average-cost community, in your serving area, located north of the 60th parallel north, and (ii) the highest-cost, lowest-cost, and an average-cost community, in your serving area, located south of the 60th parallel north.

28. KO: not applicable in Ontario. The bandwidth is sold on a wholesale level to the community Broadband development corporation who then resells to their customers at a price they determine. Keewaytinook Okimakanak does not have input or insight into the costing structure.

29. KRG: The table below describes the FSS capacity allocated to each community.

Table 3 Capacity available per community in Nunavik.

Community	Downstream transponder	Downstream Committed BW	Downstream Maximum burst BW	Upstream BW
Akulivik	#	#	#	#
Aupaluk	#	#	#	#
Inukjuak	#	#	#	#
Ivujivik	#	#	#	#
Kangiqsualujjuaq	#	#	#	#
Kangiqsujuaq	#	#	#	#
Kangirsuk	#	#	#	#
Kuujjuaq	#	#	#	#
Kuujjuarapik/Whapmagoostui	#	#	#	#
Puvirnituq	#	#	#	#
Quaqtaq	#	#	#	#
Salluit	#	#	#	#
Tasiujaq	#	#	#	#
Umiujaq	#	#	#	#

30. BCN: BCN currently has 16 communities located on transponder ##. BCN's dishes are 2.4M which only permits a modulation size of #. BCNs Mhz to Mbps ratio is #. The table below describes the FSS capacity allocated to each community.

31. Each community is assigned a dedicated amount of upload bandwidth (noted in table below). Total uplink bandwidth equals #Mbps. All communities have access to a share pool of download bandwidth equalling # Mbps (#). It is theoretically possible for one community to receive all

#Mbps however during normal operation each community normally sees between #Mbps of downlink bandwidth.

		Modulation	Dedicated Uplink (mbps)	Downlink (Mbps)
1	Little Grand Rapids	#	#	variable
2	Tadoule Lake	#	#	variable
3	Lac Brochet	#	#	variable
4	Brochet	#	#	variable
5	Bloodvein	#	#	variable
6	Shamattawa	#	#	variable
7	Berens River	#	#	variable
8	Wasagamack	#	#	variable
9	Pauingassi	#	#	variable
10	Gods Lake	#	#	variable
11	Pukatawagan	#	#	variable
12	Oxford House	#	#	variable
13	Moose Lake	#	#	variable
14	Poplar River	#	#	variable
15	Gods River	#	#	variable
16	Red Sucker Lake	#	#	variable
		Total Uplink	#	
		Total Downlink		#

a. If more than one community shares the same earth station's capacity, indicate the capacity made available to each community.

32. NICSN partners: not applicable for our communities.

2.2 Can the earth station(s) you operate technologically support the provision of retail Internet service at the target speeds established by the Commission in Telecom Regulatory Policy 2011-291 (i.e. 5 Mbps download and 1 Mbps upload)?

33. NICSN partners: under the present conditions, no.

b. If not, describe the reasons why the Commission's target speeds cannot be met. Identify whether the bottleneck is due to issues with the space segment or with ground infrastructure. Indicate what speeds you currently offer.

34. KO: Several reasons.
    1) There is not enough satellite bandwidth to allow for this.

2) The community ground equipment, while of high quality only does 10 megabits per community from community to southern hub.
3) The dish size would have to be increased to allow for larger capacity and modulation rates.

35. KRG: Currently, there is not enough space segment allocated to support the target speeds. Approximately 3.2 times more space segment would have to be purchased and implemented to meet these targets. A major issue will be encountered because there is no satellite capable of providing this capacity on the same polarity. Our current network architecture relies on all sites being on the same satellite and polarity in order to communicate directly from remote to remote with a single satellite hop to keep latency to a minimum 600ms. In order to maintain this architecture across two polarities or across multiple satellites, addition of antennas and associated RF equipment would have to be added to some or all earth stations.

36. Addition of space segment will require addition or upgrade of earth station and teleport electronics (modulators, demodulators, routers, TCP accelerators, traffic shapers and associated management hardware such as remotely accessible power distribution units, uninterruptable power supplies, etc.).

37. In addition to space segment, the wireless local distribution infrastructure, including customer premises equipment, will not scale beyond 1.5Mbs per residential customer and would therefore have to be entirely replaced. It is our intention to replace this infrastructure in the next three years regardless of whether targets will be increased or not for reasons of obsolescence and because of the risk of loss of spectrum from the upcoming 2.5GHz spectrum auction.

38. It should be noted that the buying power of users will not increase proportionally to the targets but the costs will. This would leave us to build a business case with a significant capital expenditure and triple the cost of space segment but with no significant increase in revenue.

39. BCN: Given the CRTCs new requirement of 5mbps down and 1mbps up, various pieces of network technology would need to be upgrade to accommodate the projected demand. The table below indicates the amount of bandwidth required to support the new standard. A 1:10 contention ratio has been applied.

Community	Population	# of homes	Bandwidth required to meet CRTC 5/1 standard
Berens River	2,929	130	65
Bloodvein	1,606	140	70
Brochet	1,021	60	30
Gods Lake	2,469	255	127.5
Gods River	801	85	42.5
Lac Brochet	1,005	145	72.5
Little Grand Rapids	1,486	185	92.5

Moose Lake	903	90*	45
Oxford House	2,737	441	220.5
Pauingassi	600	95	47.5
Poplar River	1,590	160	80
Pukatawagan	3,418	415	207.5
Red Sucker Lake	995	160	80
Shamattawa	1,429	165	82.5
Tadoule Lake	729	115	57.5
Wasagamack	1,838	260	130
	Total	2811	1450.5

2.3 Describe any existing technical challenges (e.g. technical limitations) related to satellite earth station technology, including particularly, the impact of those challenges on the quality and capacity of transmitted / received signals (e.g. speed, bandwidth, latency, etc.)

40. KO: due to limited capacity on satellite we need to put in bandwidth acceleration and caching technologies. Many popular websites (Facebook, Google) are now HTTPS. This does not allow caching or compression.

41. Customers using their own VPN tunnels with encryption cannot be cached.

42. Because satellite technology is simplex versus duplex in nature, two channels are required for the transmissions. This doubles the price.

43. As the communities receive more bandwidth, the amount they need to send out also increases with a causal effect of requiring larger earth stations and transmitters in the communities. As more and more communities send more bandwidth to the hub station, that will also have to be periodically resized.

44. KRG: In addition to reasons listed above by KO, some applications are sensitive to latency and cannot be corrected by accelerators. In tele-psychiatry, it has been reported that the delay is a problem for clinical use of videoconference for psychiatric examinations. Psychiatrists who work in Nunavik have reported that response time and image quality is not sufficient for clinical use of tele-psychiatry. Similar comments have been made by representatives of the Quebec Ministry of Justice with regards to judges, prosecutors and lawyers reporting frustration with their inability to read body language instantaneously and without delay during tele-justice sessions

45. TCP acceleration is an ongoing challenge. Despite the fact that a centralised TCP accelerator is provisioned in every earth station, the requirement for encrypted tunnels by many public and commercial applications necessitates deployment of multiple TCP accelerators in a single village (e.g. at the store, police station, health clinic, court house, government office, hotel, post office, bank, airport, water treatment plant, etc.). This represents a major irritant and cost for customers. Since accelerators act as proxy devices and often have support for specific applications, tuning is important and often an ongoing concern. We have seen many cases in our

network where TCP acceleration must be disabled in order for some specific applications to work, leaving the customer no choice but to abandon acceptable speed in order to obtain basic functionality.

Efficiencies

As noted in Telecom Notice of Consultation 2014-44, the satellite inquiry is exploring technical limitations on satellite services and potential changes to technology, in that technical solutions may be able to be implemented as a means of improving efficiencies. For instance, some earth stations can operate in one band (e.g. C–band), while others can operate in dual bands (e.g. C-band and Ku-band with a 7.3M Earth Station Antenna).
The following series of questions relates to the earth stations that you operate.
2.4 How many frequency bands can be operated at the same time by the same earth station?

46. NICSN partners: All earth station are currently able to operate on C-band only and on a single polarity.

a. Describe the advantages and disadvantages of utilizing more than one frequency band on the same earth station.

47. NICSN partners: Addition of using and additional frequency band would require a major investment in upgrading or replacing antennas and RF equipment such as amplifiers and block up-converters.

A variety of forms of antennas can be used for transmitting to and receiving from satellites. The most common type of satellite antenna is the parabolic reflector (dish), however this is not the only type of antenna that can be used. The actual type of antenna will depend upon the overall application and the requirements.
Ground antennas used for receiving satellite signals and transmitting to the satellites vary considerably according to their application. Again, parabolic reflectors (dish) are the most widely used, but Yagi antennas may be used on occasion. The size of the antennas may vary considerably. The parabolic reflectors used for satellite television reception are very small. However those used for professional applications are much larger and may range up to several tens of meters in size.
2.5 Some earth stations can contain 1 or 2 antennas (dishes) and others can contain more than 2 antennas, including redundant antennas. For your earth stations, is operating an earth station with multiple antennas (dishes) more cost effective than operating an earth station with a single antenna? If so, please explain how it is more cost effective.

48. KO: It is more cost effective to operate an earth station facility with multiple earth stations. The reason is one of redundancy. If a change of FSS operator was to take place, this can be more easily done by having the hub operate on both FSS operators while changes take place.

49. Having a second dish with transmitter in a hot or cold standby will guard against dish loss or maintenance downtime. The initial costs are in capital.

50. KRG: For historical reasons, funding for multiple antennas was not available. This is a major concern and will likely be addressed going forward if funding or capital can be obtained.

2.6 Presently, do you have any existing collocation arrangements or plans for such arrangements with other providers of telecommunications services on the same earth station?
a. If so, please describe your actual collocation arrangements and/or plans.

51. KO: When the Sioux Lookout earth station was designed, the facility was large enough to accommodate other providers. A wholesale rate was calculated and approved by the funders. To date, no requests have been made to Sioux Lookout for any formal colocation.

52. KRG: The KRG has had discussions concerning collocation but has not received a formal request for collocation by another telecommunications provider.

b. If not, please explain why not and indicate if you have any future plans to collocate with other providers of telecommunications services.

53. KO: There has been no colocation with other providers at present. The Sioux Lookout earth station can accommodate third parties but that would necessitate the third party to cover costs of upgrades and capacity upgrades.

54. KRG: The KRG has held discussions with another telecommunications provider (#) concerning earth station sharing, however it has proven logistically difficult to share infrastructure for reasons of network architecture. Discussions are still ongoing.

2.7 Describe the potential changes related to new satellite technologies and to earth station technology, along with the impact(s) on earth station performance and cost.

55. KO: Since the implementation of the NICSN satellite network, NICSN has gone from TDMA technology to SCPC and DVB-S2. Additional enhancements in caching and data compression have been implemented. For future changes in technology, KO is looking at the Ka band on an ownership model.

56. The cost of launching satellite has gone down as well as the cost of the spacecraft. KO believes that the different earth station operators in the far north have a combined requirement that would allow for a condominium style approach to satellite technology. Basically, the Earth station operators would tender out for a satellite and tender out the maintenance and orbit keeping. There is enough requirement for one full satellite owned and maintained by the earth station operators coupled with leased capacity on a FSS operator craft. Initial numbers run by KO suggest that the cost per megabit would go from $980 per megabit to approximately $200 per megabit depending on what is factored in the calculations.

Section 4: requests for information directed at providers of telecommunications services (e.g. voice, wireless, Internet, data services) excluding satellite operators

Mapping data

4.1 A list of communities that are thought to receive telecommunications services through FSS transport services is set out in Appendix B. For each community identified in Appendix B, including any amendments to that list proposed as part of your response above, provide:
a. Its population, latitude, and longitude.

57.

Community	Prov.	Operator	Latitude	Longitude	Population
Matimekush*	QC	K-Net	54.800	66.816	540
Eabemetoong	ON	K-Net	51.610	87.910	800
Fort Severn	ON	K-Net	55.980	87.630	400
Neskantaga	ON	K-Net	52.210	88.020	350
Martin Falls	ON	K-Net	51.630	85.950	300
Peawanuck	ON	K-Net	54.980	86.430	237
Webequie	ON	K-Net	52.980	87.350	713
Akulivik	QC	KRG	60.800	78.200	647
Aupaluk	QC	KRG	59.300	69.600	208
Inukjuak	QC	KRG	58.500	78.100	1637
Ivujivik	QC	KRG	62.400	77.900	383
Kangiqsujuaq	QC	KRG	61.600	71.900	715
Kangiqsualujjuaq	QC	KRG	58.700	66.000	889
Kangirsuk	QC	KRG	60.000	70.000	565
Kuujjuaq	QC	KRG	58.050	68.250	2469
Kuujjuarapik + Whapmagoostui	QC	KRG	55.300	77.800	1529 (655 + 874)
Puvirnituq	QC	KRG	60.000	77.300	1756
Quaqtaq	QC	KRG	61.000	69.600	394
Salluit	QC	KRG	62.200	75.700	1362
Tasiujaq	QC	KRG	58.700	69.900	313
Umiujaq	QC	KRG	56.600	76.500	448
Brochet	MB	BCN	57.850	101.730	1021
God's Lake Narrows	MB	BCN	54.530	94.550	2469
God's River	MB	BCN	54.830	94.060	801
Lac Brochet	MB	BCN	54.600	97.770	1005
Oxford House	MB	BCN	54.570	95.160	2737
Poplar River	MB	BCN	53.000	97.270	1590
Pukatawagan	MB	BCN	55.440	101.190	3418
Shamattawa	MB	BCN	55.510	92.400	1429
Tadoule Lake	MB	BCN	58.710	98.490	729
Berens River	MB	BCN	52.180	97.230	2929
Bloodvein	MB	BCN	51.790	96.707	1606
Little Grand Rapids	MB	BCN	52.040	95.461	1486
Moose Lake	MB	BCN	53.640	100.297	903
Pauingassi	MB	BCN	52.154	95.379	600

Red Sucker Lake	MB	BCN	54.169	93.559	995
Wasagamack	MB	BCN	53.889	94.947	1838

*The adjacent community of Schefferville is not served by NICSN.

b. The number of households, businesses and government offices (e.g. schools, health clinics, government offices), as well as total population, that have access to your telecommunications services.

58. KO:

Community	**Dwellings***	**Businesses**	**Government offices****
Fort Severn	148	4	3
Peawanuck	59	1	3
Webequie	444	5	3
Neskantaga	91	2	3
Eabemetoong	174	6	3
Martin Falls	191	2	3
MAtimekush	unknown	unknown	unknown

59. KRG: Mobile wireless coverage is available in all villages up to 1.5Mbs and reaches all residences and offices. Fixed wireless service is available in all villages, subject to line of site, up to 3Mbs. Some custom service plans are installed up to 6Mbs over fixed wireless in Kuujjuaq only.

Community	**Dwellings***	**Businesses**	**Government offices****
Akulivik	148	not available	8
Aupaluk	59	not available	8
Inukjuak	444	not available	15
Ivujivik	91	not available	8
Kangiqsujuaq	174	not available	10
Kangiqsualujjuaq	191	not available	10
Kangirsuk	163	not available	9
Kuujjuaq	925	not available	25
Kuujjuarapik + Whapmagoostui	425 (204+221)	not available	18
Puvirnituq	489	not available	16
Quaqtaq	91	not available	9
Salluit	315	not available	12
Tasiujaq	72	not available	9
Umiujaq	104	not available	10

* Note: statistics on number of households are not available but note that multiple households per dwelling are common in aboriginal communities. Data taken from 2011 census.

** Estimated (includes schools, daycare, employment office, airport, health, landholding corp., post offices, municipal offices, police stations, etc.)

60. BCN:

Community	(a) Population	(b) # of homes and business served*	(c) Service type	(e) # of users (wireless only)	(h) Meets CRTC 5/1mbps target
Berens River	2,929	All	Fixed wireless	<10	no
Bloodvein	1,606	All	Fixed wireless	<50	no
Brochet	1,021	All	Fixed wireless	<50	no
Gods Lake	2,469	All	Fixed wireless	<10	no
Gods River	801	All	Fixed wireless	<50	no
Lac Brochet	1,005	All	Fixed wireless	<50	no
Little Grand Rapids	1,486	All	Fixed wireless	<10	no
Moose Lake	903	All	Fixed wireless	<10	no
Oxford House	2,737	All	Fixed wireless	<100	no
Pauingassi	600	All	Fixed wireless	<10	no
Poplar River	1,590	All	Fixed wireless	<100	no
Pukatawagan	3,418	All	Fixed wireless	<100	no
Red Sucker Lake	995	All	Fixed wireless	<50	no
Shamattawa	1,429	All	Fixed wireless	<50	no
Tadoule Lake	729	All	Fixed wireless	<100	no
Wasagamack	1,838	All	Fixed wireless	<10	no

*must have line of site to local BCN broadband tower.

c. The telecommunications services that you deliver.

61. KO: KO provides wholesale data.

62. KRG: The KRG provides broadband Internet, IP based videoconference and private broadband IP based network services.

63. BCN: BCN offers fixed wireless IP based services.

d. Details on plans offered in communities for residential and business consumers, including price, speeds, data caps and overage charges for broadband Internet access and rates for retail voice services.

64. KO: Customer information are the property of the communities. Keewaytinook Okimakanak sells to the community wholesale data. That is redistributed by the community. Keewaytinook Okimakanak does not have insight into the community plans or breakdown of services.

65. KRG:

Tamaani Residential Plans

Plan	**Basic**	**Intermediate**	**Power**	**Power +**	**HomePro**
Monthly price	60$	70$	80$	$100	$150
Download	512kbs	768kbs	1.5Mbs	1.5Mbs	1.5Mbs
Upload	128kbs	192kbs	384kbs	384kbs	384kbs
Monthly data cap	10GB	20GB	30GB	45GB	75GB

Subscribers	1274	136	1114	138	52

Tamaani Corporate Plans

Plan	Corporate Basic	Corporate Mobile	Corporate Elite
Monthly price	250$	90$	500$
Download Throughput	1.5Mbs	768kbs	3Mbs
Upload Throughput	384kbs	192kbs	768kbs
Monthly Data limit	125GB	20GB	Unlimited
Subscribers	106	205	55

66. In addition to the above, the KRG provides unsubsidised wholesale bandwidth at $# per unidirectional Mbs to the *Centre des Service Partagés du Québec* for use in health, justice and other provincial establishments. The price includes rental and maintenance of local distribution equipment as well as a service level agreement that could be considered aggressive by northern standards and round-the-clock incident response. It should be noted that for reasons of cost, some provincial establishments have opted to purchase subsidised plans that use best effort bandwidth rather than dedicated wholesale bandwidth.

67. BCN: BCN Internet Plans:

Package Name	DL Speed (burstable)	UL speed (burstable)	Data caps/monthly transfer	Monthly Price
Northern Lite	Up to 1.5 Mbps	Up to 128 Kbps	None	$ 59.99
Northern Biz	Up to 2.5 Mbps	Up to 286 Kbps	none	$ 174.99

e. The number of end-users you have, by telecommunications service (e.g. voice, wireless (separately for fixed and mobile), Internet, data).

68. KRG: See Tamaani Internet Plans table above.

f. The ratio (%) of traffic for business versus residential and across telecommunications services (voice, wireless (separately for fixed and mobile), data, Internet).

69. KRG: These statistics are not gathered for technical reasons.

g. The FSS capacity used to serve each community in terms of: (i) transponders, (ii) bandwidth in MHz, and (iii) Megabits per second (Mbps). If transponders are shared amongst multiple communities, then provide the capacity required to serve a group of communities and provide a list of communities in each group.

70. KO:

Community	MHz	Mbs
Fort Severn	#	#
Peawanuck	#	#
Webequie	#	#
Neskantaga	#	#
Eabemetoong	#	#
Martin Falls	#	#
Matimekush	#	#

71. KRG: See question 2.1 above.

h. Whether you provide broadband Internet access services at the Commission's target speeds of 5 Mbps download and 1 Mbps upload.

72. The NICSN partners do not currently provide broadband services at the Commission's target speeds.

i. If so, indicate the total number of Internet subscribers that receive Internet services at or above the Commission's target speeds.
i. If you do not provide an Internet service plan that meets the Commission's target speeds of 5 Mbps download and 1 Mbps upload as a result of technical limitations of satellite technology, identify the FSS capacity that would be required to offer such a plan, in terms of: (i) transponders, (ii) bandwidth in MHz, and (iii) Mbps.

73. KO: Based on 850 homes today, we would require the following to provide 5 megabits download to the homo and 1 megabit upload from the home.
    Megabits download 4,250
    Megabits upload 850
    Total megabits 5,100
    Megahertz download 1545
    Megahertz upload 309
    Total Megahertz 1843

    Total C-Band Transponders needed 51

74. KRG: The KRG estimates that 13 full 36MHz C-band transponders (468MHz) would be required to provide Internet at the Commission's targeted speed in Nunavik. Ten transponders would be used for downstream, for a total of 950Mbs, and three transponders for upstream for a total of 194Mbs. These estimates are based on the extrapolation of current capacity used for Broadband Canada speed targets.

75. In its Pre-feasibility Study for a High Capacity Network in Nunavik, the KRG proposes using either submarine fibre optic cables or high throughput satellites to provide broadband services in Nunavik, at a per Mbs cost that would be far more reasonable than what will be needed with C-band.

4.2 Provide a list of communities included in planned service expansions where FSS would be used in the delivery of telecommunication services. For each of these communities, provide:

76. KRG: The KRG is a supra-municipal law body whose jurisdiction is the territory of the province of Quebec north of the 55th parallel. The KRG does not have service expansions planned outside of its jurisdiction.

77. BCN: At present, BCN does not have any planned expansions using FSS.

4.3 If you do not provide broadband Internet access services at the Commission's target speeds established in Telecom Regulatory Policy CRTC 2011-291 (5 Mbps download and 1 Mbps upload) or can only provide such access to a limited number of subscribers, explain what role FSS play in limiting deployment of Internet access at the Commission's target speeds.

78. KO: FSS costs and physical capacity are the primary limiting role in deploying broadband to the home. The costs are extremely high and would therefore there would be no way to be able to recoup the costs via subscriber revenues.

79. KRG: Given that there is no high throughput satellite coverage in Nunavik, FSS is currently limited to C-band or Ku-band. The main impediments are cost and limited throughput as described in sections 4.1j above. Latency is problematic, increasingly so as targets become faster, but is probably not an insurmountable obstacle.

80. BCN: In most cases, FSS is the only means of connecting the BCN communities. The main hurdle is the high cost of bandwidth over the space segment. No subsidies beyond NICSN initial funding are available to BCN to reduce the cost of delivering service. Each community serviced is remote and the cost of maintaining sites is significant. Additionally, each community has a small population base which prevents certain economies of scale from taking place to offset operating costs. The high cost of new c-band bandwidth has been the main deterrent for adding FSS capacity.

4.4 Evolution of satellite technology has led to broadband Internet access delivered directly to the end user (direct-to-home) using Ka-band spot beam technology or Ka-band high-throughput satellite spot beam technology. In order to better understand the substitutability of direct-to-home service delivery for the delivery of telecommunications services using FSS transport services, please respond to the following:
a. Are all communities served by FSS satellite transport (Appendix B) covered by satellites that have spot beam technology? If not which communities, presently served by FSS satellite transport, are not covered.

81. NICSN partners: To the best of our knowledge, all communities are covered by first generation Ka-band spot beams on Anik F2. The newer generation high throughput satellites do not cover any northern communities. This information should be validated with the direct-to-home satellite broadband Internet provider.

b. What telecommunications services are delivered using direct-to-home satellite technology? For Internet access services, specify whether the Commission's target speeds of 5 Mbps download and 1 Mbps upload can be met with direct-to-home technology. What are those services that cannot be delivered using direct-to-home satellite technology?

82. NICSN partners: To the best of our knowledge, the first generation Ka-spot beams that cover northern communities cannot meet the Commission's target speeds. This information should be validated with the direct-to-home service provider.

83. KO: The limitations of Ka are that there is no ability to provide quality of service, the upstream is unable to provide for telemedicine applications with guaranteed bandwidth or throughput. The fair access policy goes across a large spectrum of users thereby not allowing continued service in mission critical areas. This does not work for government, medical and school users as well as justice, policing and aviation.

84. BCN: Network service offered by Xplornet does not allow for dedicated bandwidth, data prioritization, and unlimited monthly data transfer. These network services are required by government, health and education.

c. Is the use of direct-to-home technology more efficient in delivering telecommunications services, including broadband Internet access, than FSS satellite transport technology? Explain.

85. KO: for the model that Keewaytinook Okimakanak uses which creates local ISP Businesses that are more in tune to community needs the direct to home market from a retail perspective only does not work nor is it more efficient than a wholesale model.

86. KRG: There are several limitations to direct to home that make FSS satellite more suitable for our region.
    - Installation of a direct-to-home service requires a certified installer. Many remote communities do not have a local certified installer. It should be noted that the travel costs and expense of flying and lodging a certified installer from Montreal to Nunavik can exceed $3000 and will take at least two days.
    - Efficiencies can be achieved by having a central earth station per community especially with regards to web caching. It should be noted, however, that these efficiencies have significantly diminished since fall 2013 when Google and Facebook changed to use encryption by default.
    - The current C-band FSS is resilient to rain fade, contrary to Ka-band.

- A portion of network traffic is either local to the community or regional (i.e. from one Nunavik community to another.) This is particularly true for the regional organisations that typically have a central office in a large center such as Kuujjuaq or Puvirnituq and branch offices in other communities. (See figure below) DTH to DTH communication is double hop, which doubles the latency. Our network architecture permits single hop communications between Kuujjuaq or Puvirnituq and other Nunavik communities. This traffic tends to be of high importance, such as communications between police headquarters and community police stations, or between the hospitals and nursing stations.
- To the best of our knowledge, current DTH services cannot use data prioritisation for high priority traffic such as telemedicine, telejustice and other video and voice applications.

87. BCN: No, direct-to-home technology is not suitable for government, education and health care applications.

Efficiencies
4.5 Describe any steps undertaken by your company in recent years to reduce the costs or maximize the efficiency of providing telecommunications services by way of FSS, including any steps taken to share facilities with other providers of telecommunications services.

88. KO: Keewaytinook Okimaknak partners with KRG and KTC (BCN) in accessing government funding, sharing hub and having common technology platforms. Keewaytinook Okimkanak does offer wholesale rates at present for other vendors.

89. KRG: In Nunavik, a major source of technical efficiency was achieved by merging the government private network with public Internet at the physical and satellite layers. The two networks remain segregated at the IP level, for reasons for security, but this segregation is done with a combination of IP tunneling, virtual router frameworks and traffic shaping. This allows the two networks to have access to unused capacity from the other network without breaking the security aspect of running segregated networks and permits for prioritisation of video traffic.

90. As noted above by KO, the economies of scale achieved by partnering with the other NICSN partners have been invaluable both on the technological front and with regard to accessing government funding.

91. BCN: Investment in WAN optimization technology.

4.6 Discuss how your company intends to reduce the costs or maximize the efficiency of providing telecommunications services by way of FSS in the future. If applicable, discuss cost savings or efficiencies that could arise from the sharing of ground infrastructure, improved provisioning of voice services by way of FSS, or the use of more efficient electronic equipment and ground station technology. For each efficiency identified, explain:
a. If and when the efficiency will be implemented by the company.

b. The effect of this efficiency, in terms of costs and capacity, on the telecommunications services you provide by way of FSS. If there are effective limitations on the implementation of an efficiency (e.g., maximum latitude or minimum community size), then identify and explain the limitations.

92. NICSN partners: Given the current conditions, our efforts are focussed on finding viable long term solutions to the transport infrastructure challenge that will allow us to provide affordable services. There is little value in trying to squeeze out a bit more efficiency from the current model when it is clear that a different model is needed.

4.7 Discuss how providers of FSS could, in the future, reduce the costs or maximize the efficiency of FSS. For each improvement identified, explain the likely effect on the telecommunication services offered to your subscribers. In addition and if applicable, comment on the feasibility and expected effects of peering and caching.

93. KO: Any cost reduction on the part of the FSS is passed on to our customers.

94. KRG: As noted above, caching efficiency has greatly reduced as major providers such as Google and Facebook began encrypting traffic by default as of 2013. The KRG anticipates that caching benefits will continue to diminish with the increasing reliance on encryption by content providers.

4.8 Does current satellite technology limit the speeds and reliability of telecommunications services that you provide by way of FSS? If so, provide a list of the telecommunications services you offer that are limited by satellite technology, and describe how satellite technology limits these services.

95. KO: Current technology limitations are mainly defined by costs. The cost of satellite capacity is extremely high. Moving communities from satellite to terrestrial solutions is the preferred way to go.

96. KRG: Current C-band technology imposes limits to our ability to scale the service. This is especially true as it relates to the per Mbs cost. Broadband service providers can expect a cost increase in C-band FSS that is proportional to the speed of the service offering. However, consumers expect that the speed will rise to meet the minimum level of service set by the Commission without an increase in price. This places the burden of cost squarely on the shoulders of the providers and the government programs that support them.

97. The KRG estimates that meeting the Commission's target of 5Mbs in Nunavik will require approximately 13 full C-band transponders. Extrapolating from the 2011 target of 1.5Mbs and the 2015 target of 5Mbs, it is reasonable to expect a future target of 15Mbs in the not so distant future, especially given the pace of fibre-to-the-home deployment currently happening in urban Canada and the United States which will drive up the minimum acceptable broadband speed. Meeting this hypothetical future target in Nunavik would require approximately 39 C-band transponders, or a C-band payload exceeding one and a half the full capacity of Anik F3. The cost would be staggering.

4.9 If applicable, explain how you have segregated your use of satellite transponders between voice and broadband Internet services. Comment on whether or not separate voice and broadband/data networks are an efficient method of providing telecommunications services to end-users by way of FSS.

98. NICSN Partners: The partners only provide broadband Internet services or services that use IP for transport at this point in time. There are no segregated networks at the FSS level.

4.10 If you operate more than one network in a single service area, indicate whether or not the FSS capacity for these networks is pooled. If the FSS capacity for these networks is not pooled, explain why and discuss what additional efficiencies could be realized if all capacity in a given service area were pooled.

99. KO: Capacity is pooled.

100. KRG: The KRG operates a public Internet network and a private IP based network for use by government of Quebec institutions, primarily health and justice establishment. The efficiencies gained by doing the segregation at the IP layer as opposed to the satellite layer are described above in question 4.5.

4.11 If you operate more than one network in a single service area, and do not pool FSS capacity for these networks, identify:

a. Each separate network that you operate in the single service area.

b. The total FSS capacity that is allocated to each network.

c. The traffic volume (in Kbps, Mbps, or Gbps) during the peak hour for each network.

d. The time(s) of day that the network reaches its peak traffic.

101. NICSN partners: This does not apply in our networks.

TSP's average costs of delivering 1 Mbps of capacity by way of FSS

4.12 Provide a high-level description of the network configuration you use to provide telecommunications services by way of FSS, from the gateway earth stations up to, but not including, the distribution network in the community.

102. KO: A 7.4m earth station with a 1000 watt amplifier feeds the remote sites. The sites in Ontario are 3.8 Meter dishes. The downlink is a DVB-S2 stream and the uplink is a SCPC link to the main hub. This is the most efficient system we have found to date. Aggressive caching, bandwidth management and fair access policies are in place.

103. KRG: A diagram is provided below as an example. The other partners use very similar network architecture.

####

Figure 1 High level diagram of KRG's network at the FSS layer.

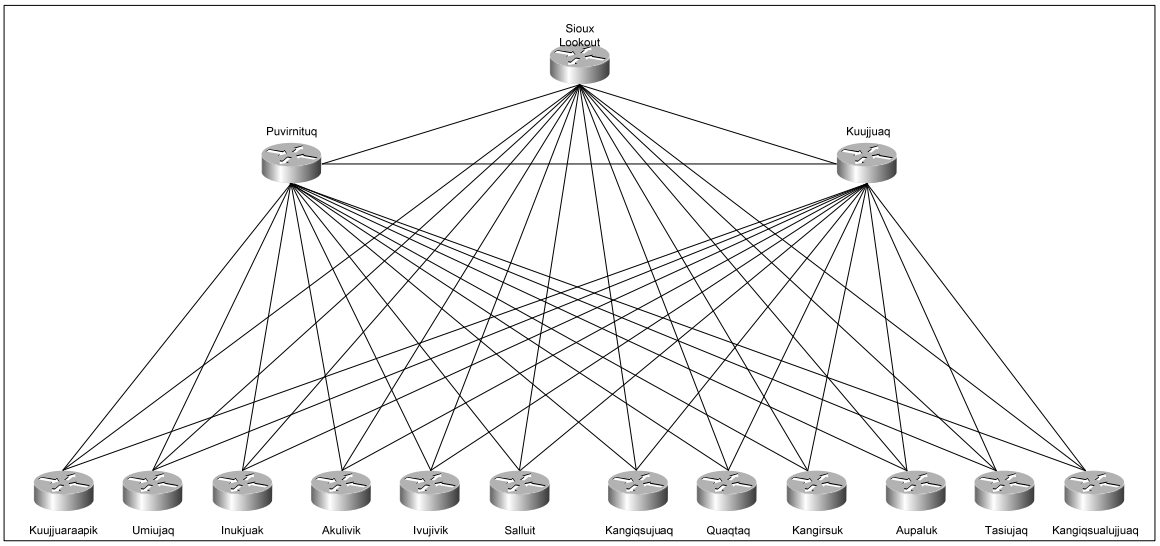

Figure 2 High level diagram of KRG's network at the IP layer.

a. Describe the extent to which you rely on FSS to provide telecommunications services.

104. KO: We rely 100 percent on satellite capacity. Keewaytinook Okimakanak manages its own satellite carriers.

105. KRG: The KRG currently relies entirely on C-band based FSS to provide all telecommunications services. However, a prefeasibility study produced by the KRG in

September 2013 (available on the KRG website at www.krg.ca -> publications -> releases -> 2013 and listed in Appendix A) demonstrates that serving the region with either high throughput FSS or undersea fibre optics is both technically feasible and more cost effective on a per Mbs basis.

4.13 Refer to the tab titled "Expense Information" on the attached spreadsheet.

a. In terms of delivering 1 Mbps of capacity to a community by way of FSS, identify the highest-cost, lowest-cost, and an average-cost community located north of the 60th parallel north that you deliver telecommunications services to by way of FSS. Further, identify the highest-cost, lowest-cost, and an average-cost community located south of the 60th parallel north that you deliver telecommunications services to by way of FSS.

b. Complete the table by providing the average cost of delivering 1 Mbps of capacity by way of FSS to each of the six communities identified in a) above. You may also provide the average cost of delivering 1 Mbps of capacity by way of FSS for any other community of your choosing. For each expense identified, provide the following:
i. A description of the items included in the expense line.

ii. The methodology and assumptions used to determine the expense.

iii. If applicable, explain the factors that cause differences in expenses between satellite dependent communities located north of the 60th parallel north and those communities located south of the 60th parallel north.

106. KRG: There is no difference in cost between communities north or south of the 60th parallel. As described in section 1 above, north-of-60 and south-of-60 designations are nonsensical when applied to Nunavik. The KRG does not track costing information on a per community basis, nor does it segregate costs based on transport or local distribution. The costing estimate is therefore an average for our communities. Cost calculations assume that 50% of maintenance costs are incurred in the maintenance of the transport infrastructure and that the remaining costs are spent on local distribution. The costs below do not include local distribution costs and are for transport only.

	Average cost of delivering 1 Mbps of capacity to:	
	Total	**Per community**
	monthly	**monthly**
Expenses related to payments to third-parties		
Payments for FSS C-band 36Mhz paid monthly	#	#
Industry Canada Spectrum License - Space	#	#
Industry Canada Spectrum License - Ground	#	#
Teleport operations NICSN partnership	#	#
CRTC levy	#	#
Support contract Traffic Shapers	#	#
Support contract TCP Accelerators	#	#

Electricity	#	#
Total expenses related to payments to third-parties	#	#
Expenses related to capital (i.e. depreciation)		
Ground station*	#	#
Telesat 11MHz C-band 18 years (Public benefit transponder)***	#	#
Telesat C-band 25Mhz 11 years paid in advance - NSI round 2*	#	#
Telesat C-band 72Mhz 5 years paid in advance - Broadband Canada*	#	#
Ground station upgrades 2011-2012*	#	#
Total expenses related to capital	#	#
Other expenses related to delivering 1 Mbps of capacity by way of FSS		
Maintenance (incl. salaries, travel, parts, contracts, etc.)	#	#
Interest on debt financing for Broadband Canada contribution	#	#
Total other expenses	#	#
Total Costs	#	#
Total Average cost of delivering 1 Mbps** of capacity by way of FSS	#	
* This cost was subsidised (see section 1.4) ** **#**Mbs Unidirectional *** Estimated value.		

107. BCN: BCN does not track costing information based on each community. Costs are not tracked separately for transport or local distribution. BCN's network comprises of a terrestrial segment and a FSS segment and costs are not tracked by individually by each segment. An estimated costing for BCN's satellite segment has been presented in the table below.

Estimated Costing per 1 Mbps	**Average cost of delivering 1 Mbps of capacity to:**	
	Total	**Per community**
	monthly	**monthly**
Industry Canada Spectrum License	#	#
Teleport operations NICSN partnership	#	#
Electricity	#	#
Total expenses related to payments to third-parties	#	#
Other expenses related to delivering 1 Mbps of capacity by way of FSS		
Maintenance (incl. salaries, travel, parts, contracts, etc.)	#	#
Total other expenses	#	#

Total Costs	#	#
Total Average cost of delivering 1 Mbps of capacity by way of FSS	#	

Section 5: requests for information directed at government organizations

5.1 A list of communities that are thought to receive telecommunications services through FSS is set out in Appendix B. For each community identified in Appendix B, including any proposed amendments to that list, provide:
a. Its population and number of households, number of businesses and government users for these communities.

108. Section 5 does not apply to BCN as it is not a government entity.

109. KO:

Community Ontario	Population	# of Households	# of Businesses	# of government users
Fort Severn	400	94	4	3
Peawanuck	237	70	1	3
Webequie	713	206	5	3
Neskantaga	414	85	2	3
Eabemetoong	1300	275	6	3
Marten Falls	328	103	2	3
Matimekush	540	unknown	unknown	unknown

5.2 Provide the names of the TSPs serving each satellite served community.

110. KO: Service in Northern Ontario communities is provided by K-Net Services

111. KRG: In Nunavik, the KRG provides broadband Internet and private broadband network services. Xplornet provides direct to home broadband Internet. Nunavik Communications provides cable Internet service in Kuujjuaq but use the KRG's network for transport. To the best of our knowledge, Bell Aliant (the ILEC) provides analogue-only land-line voice services. A very few local organisations have their own FSS obtained from unknown providers.

5.3 What capacity is used by government users (e.g. schools, health clinics, government offices)?

a. As a whole?

b. Per community?

112. KO: KO is unable to answer with accuracy as the bandwidth is shared. There is a guaranteed bandwidth for shared video conferencing and telemedicine but this is only on an as needed basis.

113. KRG: Each government office is equipped with a broadband Internet service or either 1.5Mbs or 3Mbs, depending on the size of the institution. This service is offered on a best effort basis on the same network as is used by homes and businesses.

114. The exception to the above is the government of Quebec network which serves the health establishment, justice and social solidarity offices. This is a private broadband network that operates on the same physical infrastructure as the public Internet network. Guaranteed throughput is provided at the IP layer using traffic shaping and QoS. This network has a combined forward capacity of 7 Mbs dedicated plus 5Mbs burstable into public capacity for all Nunavik villages combined (i.e.: 7Mbs total, not 7Mbs per community). The returns range from 1.5Mbs for the smallest community to 4.5Mbs for the largest.

5.4 Identify whether government users in these communities have a dedicated FSS link to a government-operated earth station, or whether they rely on a provider of telecommunications services for the provisioning of telecommunications services.

115. KO: Government users rely on K-Net Services for their data services. Wireline services are provided by Bell Alliant.

116. KRG: In Nunavik, no government office has a dedicated network. The government of Quebec has a quasi-dedicated network with traffic segregation and guaranteed bandwidth commitments. However, this network uses the same physical infrastructure as the public Internet network and unused capacity from one network can be used by the other without breaking the security constraints of the government network. Local government organisations such as the KRG, Kativik School Board and municipal governments use broadband Internet services on a best effort network that serves all homes and businesses.

Conclusion

117. The NICSN partners would be happy to provide clarification if required.

Sincerely,

(jointly)
Jean-François Dumoulin
Dan Pellerin
Stephen Ramchandar

Cc : Andrew Falcone, CRTC
Jean-François Bouchard, KRG
The TNC 2014-44-1 parties