C-Band Public Benefit
Keewaytinook Okimakanak: A Case Study

Summative Overview

Assisting Remote Communities

Across Canada

to Access & Use C-Band Public Benefit

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The Executive Summary

Background

K-Net's primary interest in developing the C-Band satellite data solution arose from the need to provide Fort Severn First Nation, a founding member of Keewaytinook Okimakanak and a satellite-served community, with the same level of service that the terrestrially-served KO members had come to expect. The planning and fundraising for this development work began in 1998 and continued until 2000 when the earth stations were constructed in both Fort Severn and Sioux Lookout. Without the C-Band solution, Fort Severn could not have participated fully in such applications such as KiHS, KO's Internet high school and KO Telehealth that were being planned and developed.

K-Net's core values rooted deeply in the traditional First Nations values of sharing, mutual cooperation, and respect for local autonomy saw Industry Canada's C-Band Public Benefit resource as a means to work with other Aboriginal communities in Canada's near north extending connectivity and telecommunications for their broadband applications. Once the needs of Fort Severn were identified, Slate Falls became involved in this work. Industry Canada's FedNor initiative supported both these community broadband connectivity solutions as a partnership between Keewaytinook Okimakanak and Windigo First Nations Council.

However, Slate Falls' community priorities were different from Fort Severn. Prior to the C-Band satellite solution, Slate Falls did not have residential telephone service. There was only one telephone line that provided service for the band office during business hours and a pay telephone available in the evenings and weekends. Less concerned about tele-education and tele-health, Slate Falls wanted commercial and residential telephone service as a necessary step in its economic development strategy. These other broadband applications became a means to address these local priorities.

To broaden the impacts of the C-Band Benefit and to provide an equitable level of service, the K-Net team worked with the other tribal councils in Nishnawbe Aski that had member First Nations, which were satellite-served. The Windigo Tribal Council had three other satellite-served communities: Cat Lake, Sachigo Lake and Weagamow Lake. The Shibogama First Nations Council had one satellite-served community, Kasabonika. The Matawa Tribal Council had the four satellite-served communities, including Webequie, Eabametoog, Marten Falls and Neskantaga. The Independent First Nations Alliance (IFNA) had one satellite-served community, Muskrat Dam. Working in partnership with each of theses tribal councils and the individual First Nation communities, K-Net Services developed strategies, worked with community champions and assisted with proposal development that ensured that each First Nation would fully benefit from the additional bandwidth created by the C-Band Public Benefit resource.

As well, K-Net Services looked beyond its own regional partners in the Sioux Lookout region in Ontario's far north and began to work with partners in the Kativik Regional Government (KRG) in northern Quebec and the Keewatin Tribal Council (KTC) in northern Manitoba. The K-Net team utilized the C-Band Public Benefit to provide KRG in particular with the necessary support to extend connectivity to their remote communities in northern Quebec after the Department of Indian Affairs unexpectedly withdrew $500,000 in funding from their development initiative.

Ultimately, these three organizations (K-Net, KRG and KTC) worked together to form the Northern Indigenous Community Satellite Network in January, 2005 with the objective of promoting the connectivity and telecommunications needs of Aboriginal communities in Canada's near north. K-Net Services and FedNor are currently partnering with Peawanuk, Marten Falls (Ogoki) and Attawapiskat First Nations to bring these remaining satellite-served, northern Ontario First Nations on-line as partners in the utilization of the available C-Band Public Benefit resource.

Since Industry Canada's C-Band Public Benefit resource became available to K-Net in January 2002, K-Net worked with a number of different regions and groups across Canada to support their involvement in utilizing or examining the services that have been put in place due to its existence. Private corporations and companies including Telesat Canada, SSI Micro, Viasat, for example have been key partners and investors in both the development and establishment of the existing services. Industry Canada's BRAND, National Satellite Initiative and FedNor programs worked with the K-Net team throughout this project to ensure its success. Aboriginal communities, provincial and territorial governments, local and regional organizations from across Canada spent time learning about and in many cases working with the K-Net team to develop their own strategies to access similar broadband connectivity solutions for their members. This broad base of relationships and partnerships has resulted in a sustainable and growing network of individuals and groups that support the work began with Industry Canada made the C-Band Public Benefit available for remote communities.

Community Members and C-Band Benefits

These efforts are bearing fruit at the community level in Ontario's far north. During the research phase of this project, more than thirty community members were interviewed to see how the C-Band Public Benefit has been used to address some of their educational, health and wellness and economic issues. Those interviewed indicated that the C-Band Public Benefit has not only created faster and reliable connections but it has also strengthen the social fabric of the satellite-served communities. Some of those interviewed talked about how the additional bandwidth means new options for e-government and e-commerce. People are banking on-line, shopping on-line and conducting business on-line because of the additional bandwidth. Most, however, said the C-Band Public Benefit means improved access to secondary and other educational opportunities as well as better access to health care. Most echoed the words of one interviewee who said, "we now have a window on the world that swings both ways."

The C-Band Public Benefit means that satellite-served communities now enjoy access to the same applications such as Keewaytinook Okimakanak Telehealth (KOTH) and Keewaytinook Internet High School (KiHS) as the terrestrially-served communities do. Neither of these heavy users of bandwidth would be available in the satellite-served communities without the C-Band Public Benefit. Youth can pursue their educational goals without having to leave home. KiHS provides youth with the opportunity to enroll in Grade Nine and Ten courses and study in a "traditional" classroom setting energized with the additional power of ICTs. Likewise, KO Telehealth offers community members unprecedented access to health care professionals without the time and expense of travel. Through telehealth, physicians can screen patients, provide diagnosis and prescribe treatment without a face-to-face consult. If one is necessary, the physician can conduct follow-up appointments while the patient is recovering at home. It allows for the opportunity to transfer savings from travel to local identified health and wellness priorities at the community level.

Like KiHS and KOTH, members of the satellite-served communities enjoy greater access to communication tools as a result of the C-Band Public Benefit. It means that people in the satellite-served communities enjoy the same access to web-based email and personal web pages that K-Net's terrestrially served partners take for granted. K-Net has provided web based email accounts and toll free dial access to the estimated 20,000 aboriginal people in over 40 Nishnawbe Aski Nation (NAN) communities for over 8 years. There were 29,000 active email addresses in January 2005. Accounts with no activity in six months are deleted. Approximately 25,000 emails, exclusive of Spam, are delivered daily at webmail.knet.ca. The ten public benefit served communities presently using the C-Band Public Benefit resource in northern Ontario represent approximately 20% of the population. An estimated 5,000 emails per day are therefore sent or received over public benefit bandwidth in communities which previously had very limited access to email.

K-Net also provides free web hosting and on line web creation tools for the communities of Nishnawbe Aski Nation. Over 14,000 personal web pages are hosted on myknet.org. These pages receive over 27,000 visits per day and over 800,000 visits per month totaling over 80 million hits by March, 2005. The majority of these pages are owned by First Nations youth. In most cases, these personal web pages are the principal form of communication for these young people. The satellite-served First Nations have a population of 4000 people or approximately 20% of the user population. These people make approximately 160,000 visits per month to personal sites on myK-Net.org.

Capacity Building

The C-Band Public Benefit means that local entrepreneurs in the satellite-served communities are taking their IT skills learned in the south and returning to their home communities where they are working as consultants and IT technicians. Like a growing number of employees who avoid daily commutes to the city a growing number of Aboriginal people are learning that they can return to their home communities and take their IT skills and jobs with them. At least one employee of the Keewaytinook Okimakanak has returned to her home community in Fort Severn but continues to work full time for the tribal council using IT. This potentially could have a major impact on the economies of satellite-served communities in the north. There are other examples of this trend. In Webequie, another satellite-served community, the C-Band dish heaves due to frost. With technical support over the phone, the community IT technician can effect alignments without the hiring of an outside consultant to make the necessary adjustments. This accounts for a significant and on-going cost saving. In contrast, when the same problem occurs with the Telesat Canada dish that feeds Bell Canada service, a technician from outside of the community is flown in to make the same adjustments. Other agencies are recognizing the advantages of supporting local community-based IT technicians. Health Canada, as part of its monthly fee for tele-health network services, receives on-site services from the community IT technicians in the twenty-four remote telehealth sites. The costs of travel alone for sending a Health Canada technician once into each community is approximately the same as the monthly fee for bandwidth and technical support from the community network.

Industry Canada's Strategic Investment

When Telesat Canada applied to Industry Canada for their new orbital space for their next generation of satellites, they included two public benefit transponders as part of their investment in their business. The cost of these transponders is worth approximately $10 million each for the life of the satellites. By making this resource available to regional satellite connected groups and remote communities across the country, Industry Canada and Telesat Canada began a development process that is unprecedented in the Americas. In the thirteen satellite served First Nations across northern Ontario, over $10 million has been invested in infrastructure development since the start of this initiative to bring broadband connectivity solutions and applications to these remote communities. In northern Quebec, another $5 million is now invested in strategic infrastructure in that is connecting fourteen remote communities with the rest of the world. In northern Manitoba, the cost of including ten satellite served communities is now costing a little more than one million dollars. Programs and services are resulting in millions of dollars being invested by other partners in utilizing these new resources. Digital highways are now being developed and utilized to carry information, services and understandings that support remote communities to take their rightful place in the Canadian mosaic.

New Opportunities Created

The C-Band Public Benefit is changing expectations in the satellite-served communities in Ontario’s far north. Parents no longer expect their children to leave their home communities and go south after they graduate from elementary school. Broadband services in the satellite-served communities mean that young people have the option of remaining at home and not sacrifice their educational goals. The Keewaytinook Internet High School means people have choices. The sick and the injured no longer expect to receive diagnosis and treatment in the south. Broadband

services mean that people can access physicians and specialists via Keewaytinook Okimakanak Telehealth. They no longer have to wait for a doctor to conduct fly-in visits or see the physician on call rather they have a wide choice of health care professionals in Winnipeg, Thunder Bay, Toronto and beyond. Dollars which had previously been allocated for travel and lodgings can now, with broadband services, be reallocated towards initiatives that will allow communities to address the challenges facing them, if the political will exists to change funding policies.

Access to such applications as videoconferencing encourages people in satellite-served communities to participate in a growing number of workshops and conferences available on-line. People in the satellite-served communities have enthusiastically embraced the new applications made available as a result of the C-Band Public Benefit that many in the terrestrially served communities had come to expect. These First Nations communities in Ontario's far north have shaped these new applications to address their own needs and challenges and most importantly, they have reached out to share their knowledge and experience with others across the Digital Divide.

C-Band Public Benefit: A tool for social change

Few federal policies have such a profound impact on First Nation communities in Ontario's far north. The additional bandwidth means members of the ten satellite-served communities in northern Ontario have new tools to address the challenges that have confronted them for decades.[1] It increases educational opportunities. It means better communications. It creates better access to physicians, specialists and other health care professionals. Industry Canada's C-Band Public Benefit means local people have unprecedented employment and entrepreneurial opportunities as ICT technicians and other IT careers. The additional bandwidth means opportunities for young people to carry their education and their jobs back home. Few federal policies have had such a dramatic impact, so quickly and so comprehensively. It will be years before the full impacts will be fully realized or understood.

[1] Satellite-served First Nations in Ontario's far north that benefited from the C-Band Public Benefit include: Fort Severn, Sachigo Lake, Eabametoog (Fort Hope), Webequie, Weagamow, Cat Lake, Slate Falls, Kasabonika and Neskantaga. The tenth community Muskrat Dam will come on-line in April 2005.

1 Introduction

The Industry Canada Broadband Office Research and Information Management team contracted the Keewaytinook Okimakanak Research Institute (KORI)[2] to assess the social and economic impacts of 40% (12.5mhz) of the first C-Band public benefit transponder which was entrusted to Keewaytinook Okimakanak (KO) for deployment to remote communities across Canada. KO is a not for profit organization serving as the tribal council for six First Nations in Ontario's far north.[3] KO's role in deploying the public benefit was particularly challenging in that, unlike the governments of Nunavut and the Northwest Territories, KO had neither the authority nor resources of a central government to apply to the launch and use of public benefit.

KORI is a member of the Canadian Research Alliance For Community Innovation And Networking (CRACIN)[4] and a partner of Researching ICTs with Aboriginal Communities (RITCA)[5]. The Chiefs of Keewaytinook Okimakanak created KORI in the spring of 2004 to promote and protect the research interests of the member communities and particularly to develop research capacity at the community level.

This study presents the C-Band Public Benefit[6] story in terms of the processes undertaken by the stakeholders, their Information and Communications Technology (ICT) activities, outputs and the ultimate outcomes from the use of this potion of the public benefit resource. The "process story" includes the selection, by Industry Canada, of K-Net, the telecommunications department of Keewaytinook Okimakanak, to manage the deployment to eligible communities across Canada and K-Net's success in accomplishing this task. Investments of human and financial resources and applications delivered will be covered in the ICT Activities section. Outputs captured include capacity made available and use by jurisdiction and geographic community. The Outcome story reports quantitative and qualitative information on ICT applications implemented using the public benefit and, where possible, the resulting social, economic and cultural impacts. There is no consensus in the academic community that measuring social impacts is possible or even desirable. This study has adopted the principals of outcome mapping as a model in an attempt to identify the ways in which 24 remote northern Ontario (10)7 and northern Quebec (14) communities have used the public benefit to shape applications to address the historic and contemporary challenges of their communities.

This study will demonstrate that K-Net not only met the target of allocating bandwidth to 23 remote communities by May 2004, it was instrumental in facilitating the construction and/or financing of ten Ontario sites (plus three more about to be funded). K-Net also deployed sophisticated tele-health, distance education and other Information and Communications Technology (ICT) applications in the northern Ontario First Nation sites. When the Kativik Regional Government (KRG)[8] had difficulty raising funds to cover construction of its southern hub, K-Net provided its Sioux Lookout hub, at cost, and trained KRG technicians to share management of the hub. This partnership expanded to include the Keewatin Tribal Council

[2] To learn more about KORI, click here http://research.knet.ca/
[3] For more information about KO's six members and broadband services, see http://smart.knet.ca/
[4] To learn more about CRACIN, click here http://www.fis.utoronto.ca/research/iprp/cracin/
[5] To learn more about RICTA, click here http://www.ricta.ca/
[6] For additional information about the C-Band Public Benefit, see http://smart.knet.ca/satellite/backgrounder.html
[7] Satellite-served First Nations in Ontario's far north that benefited from the C-Band Public Benefit include: Fort Severn, Sachigo Lake, Eabametoog (Fort Hope), Webequie, Weagamow, Cat Lake, Slate Falls, Kasabonika and Neskantaga. The tenth community Muskrat Dam will come on-line in April 2005.
[8] To see the KRG website, see http://www.krg.ca/

(KTC)[9], which is constructing 10 C-Band sites in northern Manitoba with K-Net assistance in the spring of 2005. KTC, KRG and K-Net formed the Northern Indigenous Satellite Community Network (NISCN)[10] in January 2005 to coordinate and solidify their commitment to continue to jointly deliver and promote C-Band services to their approximately 40 remote communities. NISCN is now preparing a single application to Round 1 of Canada Strategic Infrastructure Fund's National Satellite Initiative (NSI).

2 Pre-Deployment Activities

K-Net was an early adopter of Information and Communications Technology (ICT) having introduced Internet to over 15 remote northern Ontario First Nations in the mid 1990s with resources from Industry Canada's Community Access and First Nations SchoolNet (FNS) programs. Subsequent funding from Industry Canada/FedNor enabled K-Net to extend Internet services to band offices and other community services in these First Nations.

The vision of the Kuh-Ke-Nah Network [11](an Oji-Cree word meaning 'everyone') as a broadband network provider became a reality by the year 20012. K-Net was then providing a hybrid national network consisting of1.5mbps broadband service via leased land lines (cost approx $2,700/month) to community owned local networks in four KO member remote First Nations, shared 400kbps down and 9.6kbps up Internet via DirecPC and MSAT phone to approximately 10 First Nations (cost borne by First Nations SchoolNet and FedNor), and128kbps C-Band service to Fort Severn, Slate Falls and Anaheim Lake, British Columbia using Telesat Canada Research and Development (R&D) bandwidth ($2,000/month each) delivered through K-Net's earth station in Sioux Lookout. Industry Canada/FedNor had invested in the establishment of all the facilities above with the exception of Anaheim Lake, which had been established with Health Canada support. This cooperative ICT effort by three tribal councils, 15 First Nations and a number of aboriginal services agencies prepared K-Net and its neighbours for the opportunities created by Industry Canada's C-Band Public Benefit.

It is interesting to note that KO sought such a large role in the deployment of the public benefit despite Fort Severn, on the Hudson Bay coast, being the only KO community requiring satellite delivery of broadband services. KO understands that the only sustainable model for development and delivery of a satellite network service is a cooperative effort involving all interested partners. KO pursued both land and satellite based (public benefit and NSI) broadband services since 2000 primarily for its neighbors in the 'everyone' network. By early 2005, K-Net had facilitated broadband infrastructure development and was providing broadband services over leased landlines to over 40 First Nations in Ontario plus 23 remote public benefit sites. Fourteen additional public benefit sites are scheduled for completion by summer 2005. K-Net also supports broadband connections and videoconference applications in five FNS regional delivery organizations (RMOs) from Vancouver to Sidney Mines Nova Scotia with each RMO building their own regional broadband network with their partner First Nations.

Paul Bush, a Vice President of Telesat Canada, met with Brian Beaton, coordinator of K-Net Services and Carl Seibel, Telecommunications Officer, FedNor, in Thunder Bay in September 2001. Mr. Bush informed K-Net that a full C-Band transponder was available for public benefit on Anik 2 as a result of Telesat being awarded a satellite orbital position license for Anik F3 (118.7 West). He made it clear that Industry Canada had control over allocation of this resource. He provided advice on how K-Net might replace their existing Telesat R&D bandwidth, with the much more affordable public benefit.

[9] To see the KTC website, see http://smart.knet.ca/satellite/keewaytin.html
[10] To see the Northern Indigenous Satellite Community Network http://smart.knet.ca/satellite/
[11] To learn more about the Kuh-Ke-Nah Network see http://smart.knet.ca/
[12] See Appendix A, K-Net, an Early Adopter of ICT for the development of K-Net from 1994 to the present.

K-Net wrote to Information Highway Advisory Branch management on October 10, 2001 proposing the use of public benefit capacity to further Smart Communities and First Nations SchoolNet program objectives. Both the Labrador and Saskatchewan Smart Communities projects supported the proposition. K-Net was informed that the policies for the allocation and use of the bandwidth had not yet been developed.

Brian Beaton, K-Net Services Coordinator, wrote Michael Binder, Assistant Deputy Minister, Spectrum Information and Telecommunications Technology (SITT) on November 5, 2001 requesting that he authorize use of portions of the idle public benefit bandwidth by the K-Net, Labrador and Northern Saskatchewan Smart Communities projects until such time as SITT had designed and completed a competitive process for allocating bandwidth to a third party.

Numerous discussions led to K-Net submitting a business plan proposal on December 11, 2001, to mange the deployment of the public benefit transponder to communities across Canada, which could acquire broadband services only by satellite. It proposed to consult Telesat Canada, the Communications Research Centre (CRC), Education Network of Ontario (ENO) and others in the conduct of this work. SITT allocated half the transponder, subject to receiving a sound business plan, to the Government of Nunavut, which made a good case for managing its bandwidth directly rather than through an intermediary such as K-Net. K-Net's proposal was assessed and accepted for deployment of the remaining 18Mhz of public benefit bandwidth.[13]

3 Inputs

3.1 Bandwidth Allocated

Michael Binder notified K-Net in a letter dated February 6, 2002 of Industry Canada's decision to entrust K-Net with half of the first public benefit transponder, to be shared among remote communities across Canada. Industry Canada/FedNor agreed to monitor K-Net's performance on behalf of SITT. Key features of the plan included; targets of 9 communities to be served by May 2002 and 23 communities to be served by May 2004, the sale of bandwidth to communities at prices equivalent to land based prices in keeping with the spirit of National Broadband Task Force principles of equitable access, and, use by K-Net, of accumulated revenues to further the public benefit.

K-Net had assisted six remote First Nations in the area surrounding its tribal territory to prepare funding proposals for C-Band infrastructure and computer networking application to take advantage of the expected public benefit. Within three weeks of SITT allocation of public benefit to K-Net, FedNor had approved $2.6 million in capital and first year operating support that would enable all six communities to build infrastructure and launch applications with the public benefit.

On March 15, 2002, K-Net and FedNor executed an agreement outlining the terms of K-Net's deployment of 18Mhz of public benefit to August 31, 2004[14].

3.2 Marketing the Benefit and Developing Stakeholders

3.2.1 An Open Invitation to Collaborate

K-Net facilitated a meeting in Winnipeg on April 22, 2002, of interested public sector parties, to discuss opportunities to collaborate in the exploitation of the public benefit resource.[15] K-Net's

[13] To learn more about K-Net's consultation process, click on K-Net News article, "Public Benefit C-Band Satellite resource discussed" or go to http://www.knet.on.ca and click on Archives and type "Public Benefit C-Band Satellite resource discussed" in the search engine.
[14] See Appendix B: FedNor Contract
[15] For more information about the Winnipeg meeting, click here http://smart.knet.ca/satellite/meeting.html or Appendix C: C-Band Transponder (April 22, 2002)

brought its principles of sharing freely and openly its knowledge and experience with others outside of KO's tribal area, its respect for local control and management, and grassroots capacity building through training of community members in the operation and maintenance of network and other telecommunications applications to this meeting. Several parties which attended the meeting later pursued the public benefit resource with K-Net. The Kativik Regional Government (KRG) consisting of 14 communities in northern Quebec accessible only by air, worked closely with K-Net from that time and was granted access to the public benefit entrusted to K-Net in June 2002. KRG had been planning a satellite network since 1999 and was well placed to put the bandwidth to use within months. K-Net collaborated with KRG to deliver public benefit bandwidth to its 14 member remote communities. K-Net assisted KRG and the Keewaytin Tribal Council (KTC) of Manitoba to submit, in January 2004, successful applications for Round 1 NSI bandwidth. While KRG was awarded bandwidth in NSI Round 1, it established service with public benefit from the original K-Net allocation. Statistics in this report relate to KRG inputs, activities, outputs and outcomes specific to the K-Net public benefit, which is the focus of this report.

Smart Labrador decided to continue with services provided to its project under contract with Telesat Canada rather than attempt to switch to public benefit. One principle of the public benefit was that it was not to be used to displace existing commercial services. Smart Labrador had funds available in the project budget for Telesat services. Smart Saskatchewan did not have capital funds to construct the earth stations necessary to use public benefit and was developing opportunities for land based service from SaskTel. It did not pursue public benefit. A number of communities with good possibilities for land based service were advised to work on those options which would result in better and more cost effective long term service than utilizing the limited resources available via the public benefit C-Band satellite resource.

The Government of Northwest Territories (GNWT), which had been discussing access to public benefit through K-Net, decided to deal directly with Industry Canada due in part to their existing contractual agreement with Northwestel. With K-Net's support, GNWT applied to SITT in the summer of 2002 for its own bandwidth after the first public benefit transponder had been fully allocated to Nunavut and K-Net. K-Net believed that the public benefit would be more effective being shared dynamically using the TDMA protocol as each community had need for bandwidth rather than when divided up into smaller portions using SCPC protocols and which was the existing model used by GNWT and Nunavut. In discussions with Industry Canada and the governments of NWT and Nunavut over the summer of 2002, K-Net agreed to transfer 3Mhz of its portion of the public benefit allocation to the GNWT initiative. Nunavut also gave up 3mhz for GNWT use. GNWT and K-Net did collaborate on a three month Direct Video Broadcast (DVB) demonstration using SSI Micro DVB facilities and K-Net bandwidth. Other parties continued to share information and cooperate on various initiatives after the April meeting that supported the sharing of information through the creation of the information web site found at http://smart.knet.ca/satellite. KO was supporting much of this development work within Industry Canada's Aboriginal Smart Communities initiatives to support the development of broadband applications and infrastructure in Fort Severn First Nation.

3.2.2 Continued Marketing and Stakeholder Development

K-Net held discussions with SSI Micro and the Dogrib Rae bands of the Northwest Territories regarding access to the public benefit. Dan Pellerin, K-Net, traveled to Quebec to present public benefit opportunities to Society of Communications Atikamekw-Montagnais (SOCAM), which provides cultural communications services to 21,000 aboriginal people in Haute-Maurice, Lac-St-Jean, Cote Nord, Basse de Cote Nord, Nouveau Quebec and Labrador.[16] Neither group had the capital funds to construct the C-Band infrastructure necessary to use public benefit bandwidth. K-Net and Keewatin Tribal Council (KTC) of northern Manitoba exchanged visits and expertise resulting in successful KTC BRAND and NSI Round 1 applications.

[16] To learn more about this meeting, click on http://knews.knet.ca/modules.php?op=modload&name=News&file=article&sid=178

K-Net also assisted with community planning, design, proposal development, earth station construction and operational training and support for six remote Ontario First Nations that would gain access to the public benefit in late 2004 and early 2005.

John Webb of the Government of British Columbia consulted K-Net on several occasions as the province developed its proposal for NSI Round 1 bandwidth. John had responsibility for community consultation regarding proposed public benefit deployment.

Staff of the Nunavut health department attended the KO Tele-health training session in Sioux Lookout in the fall of 2004. They noted that K-Net communities received their tele-health services from NORTH Network, arguably the largest Tele-health network in the world, and that Nunavut had a memorandum of understanding with NORTH Network for mutual cooperation. Nunavut, however, had no affordable broadband link to NORTH Network through which medical consultations and education could be delivered. K-Net took the Nunavut representatives to its C-Band hub electronics building and showed them how the addition of a single satellite modem ($15,000) in the equipment rack could interconnect the Nunavut health system to NORTH Network. K-Net offered to provide this service with negligible monthly operating cost. Nunavut has not followed up with K-Net on this offer and may have found an alternate connection to NORTH Network.

3.2.3 Coordination with Telesat Canada and Industry Canada

Once the transponder had been allocated among GNWT, K-Net and Nunavut, all parties were very surprised to learn from Telesat Canada that the transponder provided 30Mhz – not 36Mhz – of bandwidth. 6mhz was to be left unused to prevent interference with a neighboring transponder. This 6Mhz of 'guard band reduced usable allocations to;

Nunavut	12.5 MHz
NWT	5 MHz
K-Net	12.5 MHz – 70% of the initial award of 18Mhz

There was some angst when Telesat Canada proposed a significant annual charge to the three parties for 'transponder maintenance'. Industry Canada determined that this charge was not allowed under the terms of the orbital position license for Anik F3 (118.7 West), which governed the public benefit resource. Telesat agreed to charge only for services, such as link budgets, channel changes, etc, ordered by the public benefit recipients.

Telesat Canada subsequently negotiated in good faith with the parties to allocate space on a variety of transponders that could be used most efficiently by the parties. Technically, Telesat was obligated to provide a single transponder. K-Net needed its bandwidth in a solid 12.5mhz block for efficient carrier placement. GNWT and Nunavut, required public benefit from transponders that fit efficiently within the existing C-Band network of Ardicom, which was to deliver their shares of the public benefit. Telesat's timely agreement to these requests contributed greatly to efficient use of the public benefit.

Telesat decided to transfer the various segments of the public benefit and other traffic, from Anik E2, which was reaching the end of its useful life, to ER2. While this transfer affected K-Net, Telesat Canada dealt professionally with this unexpected challenge and minimized its effects on K-Net and the communities receiving public benefit.

FedNor provided sound advice and oversight of K-Net's activities on behalf of Industry Canada. FedNor invested approximately $5.5 million in the Sioux Lookout hub, 10 community earth stations and tele-health and other ICT equipment, which enabled these remote communities to use the public benefit effectively.

K-Net is pleased with the conduct of both Industry Canada and Telesat Canada in the deployment of the public benefit to date.[17] Both parties provided the flexibility and trust which were required for K-Net to assist remote communities to achieve efficient and effective use of this valuable resource in serving their citizens.

3.2.4 Residential Internet and Public Benefit Discussions

K-Net's financial projections for Fort Severn's community network were presented to Industry Canada late in 2001. Residential Internet services to be provided by the band owned cable TV operation were a key component of the business case for a public benefit supplied community ICT network. Approximately a year later, Telesat Canada clarified its view of acceptable public benefit uses and residential Internet service was not an acceptable use in Telesat's view. K-Net reminded Telesat and Industry Canada that its proposal clearly included residential Internet service provided by not for profit community networks. K-Net was allowed to continue to provide public benefit to community networks, which serves both public institutions and residents in these small remote communities. As time went on, residential Internet service was more clearly identified as an unacceptable use of public benefit bandwidth.

The Nunavut Broadband Development Corporation completed its BRAND funded C-Band build in January 2005. The infrastructure would bring high speed Internet service to institutions, businesses and residents of all Nunavut communities; however, the corporation could not afford to deliver this service with commercial bandwidth and had not yet been approved for NSI bandwidth. K-Net, offered, through Industry Canada's NSI office, to share public benefit with the Nunavut group for fours to six months until NSI Round 2 bandwidth could be secured by the corporation. K-Net and its partners in the NISCN, which manage a full public benefit transponder, were not yet making full use of the public benefit awarded in NSI Round 1 to KRG and KTC, as KTC's 10 sites were not scheduled to go on line until summer 2005. Industry Canada declined this offer, most likely because public benefit for residential and business Internet was not an allowed use.

A satellite bandwidth reseller made representations to Industry Canada that use of public benefit for commercial and residential Internet was detrimental to it business. Industry Canada/FedNor encouraged the company, K-Net and the community seeking public benefit to supply a community wide broadband network to meet in February 2005. Frank discussions took place at the Wendake Quebec office of First Nations Education Council which had planned to contribute to the C-Band infrastructure which would deliver public benefit. The community, a current shared 512kbps Ku Band customer of the company, proposed to upgrade to broadband service, which would support videoconference, based applications such as telehealth. While the company could provide broadband service over Ku Band with links to the K-Net videoconference network, all parties agreed that the monthly operating cost of this commercial broadband service was well beyond the reach of the community.

The negotiated solution included dual satellite feeds to the community. Public benefit bandwidth, delivered through new C-Band infrastructure, would support broadband applications of public institutions such as the school, band office and clinic. Commercial Ku bandwidth would continue to be purchased by the community to supply Internet to commercial and residential customers. The company came to more clearly understand how to participate in NSI Round 2, which would make commercial bandwidth available to remote communities across Canada. The company now recognized that NSI Round 2 would in fact provide this community, and other public benefit recipients, with commercial bandwidth that would supply Internet to commercial and residential customers. The discussions led to a much clearer understanding by the company of NSI and

[17] For more information, click here or go to http://www.knet.on.ca/ and click on K-Net news, then archives and type "Industry Canada officials visit Keewaytinook Okimakanak" into the search engine.

satellite Internet market in Canada. The company therefore agreed, that the community had the right to switch from the company's commercial Ku Band service to bandwidth it was likely to receive through the NISCN Round 2 application. FedNor, K-Net and the company discussed a similar situation with a community on the James Bay coast in Ontario, which FedNor proposed to fund. It was agreed that both C-Band and Ku Band ($7,000) infrastructure would be built. The Ku Band service would continue until fibre optic service (possibly 2006) or Round 2 bandwidth would be available. In both these cases, Industry Canada's ability to assist the community with the extra cost of Ku band service facilitated an agreement.

3.3 MHz Allocated per Recipient

K-Net chose not to rigidly divide the public benefit bandwidth among communities as no community would then have had the 880kbps required to support videoconference based applications such as tele-health. Time Division Multiplexing (TDMA) technology, which is commonly used in land based systems, was used to pool the public benefit resource and supply sufficient bandwidth for applications at the time required. While Internet and email might slow down in order that one community had the necessary bandwidth to do video conferencing or a tele-health consult, no individual community was ever completely off the 'Net. This approach ensured that even the smallest community could mount sophisticated applications.

Fort Severn, Slate Falls, Fort Hope, Webequie, Kasabonika Lake First Nations and Kuujjuaq, Quebec were sharing the 12.5mhz service by November 2002. Each community nominally received 2Mhz of public benefit service through identical earth station electronics that supported up to 2mbps combined two-way traffic. Anaheim Lake was no longer on the C-Band network as it had decided to concentrate its resources in local health staff and an Internet only service rather than upgrade to TDMA technology ($15,000) which would support tele-health and other videoconference based applications.

By May 2004, the northern Ontario First Nations of Cat Lake, Weagamow and Sachigo Lake had joined the network. Eight Ontario and one Quebec sites were now sharing 12.5mhz – nominally 1.4mhz each. Shortly after, K-Net installed a DVB carrier which increased the output of the public benefit. Two 3.25mhz TDMA carriers delivered up to 2mbps each of two way traffic. The 5.9mhz DVB carrier delivered between 6 and 7mbps. The nine communities therefore shared approximately 11mbps of bandwidth within this configuration.

Neskantaga First Nation joined the public benefit network in August 2004. Several more First Nations will soon be served from K-Net's original 12.5mhz allocation. Muskrat Dam, Ontario and Obedjiwan Quebec will be on line in spring 2005. $590,000 has been secured from FedNor and Health Canada to construct C-Band facilities in Martin Falls, Peawanuk and Attawapiskat by summer 2005.

KTC secured over $1 million from Health Canada and Indian and Northern Affairs Canada to construct 10 C-Band installations in northern Manitoba in December 2004. BRAND is now contributing to construction of six of the 10 C-Band served sites which the Minister approved for BRAND funds. KTC received NSI Round 1 allocation in May 2004. These 10 additional sites is scheduled to be completed over the summer of 2005. The KTC initiative is therefore not included in statistics relating to K-Net's 12.5mhz public benefit allocation.

3.4 Financial Investments by Stakeholders

Telesat Canada - value of 12.5mhz over 15 years -	$8 million
Fort Severn portion of Smart Communities project	$1.8 million
Industry Canada/FedNor	
Satellite Network Management & DVB & and electronics	$500,000
7.3m Sioux Lookout hub, diesel backup, electronics	$500,000
Slate Falls TDMA upgrade, ICT & IP telephony to institutions	$500,000
Weagamow, Cat Lake & Sachigo dishes	$500,000
Weagamow, Cat Lake & Sachigo ICT to institutions	$500,000
Kasabonika Lake dish, ICT to institutions	$300,000
Webequie dish, ICT to institutions & community cable	$400,000
Fort Hope dish, ICT to institutions & community cable	$400,000
Neskantaga (Mar 04) dish, ICT & community cable	$500,000
Muskrat Dam (Mar 04) dish, ICT & community cable	$300,000
Slate Falls (Mar 04) community cable, IP phones to homes	$200,000
IP telephony KiHS, Tele-health sites & all Fort Severn offices	$200,000
Fibre linking 28 Sioux Lookout aboriginal agencies to dish	$300,000
BRAND contribution to Muskrat Dam & Slate Falls above	$380,000
Tele-health - 10 satellite sites of 24 remote FN Sioux Lookout Zone build	
Health Canada	$1.6 million
Ontario	$500,000
FedNor	$200,000
KiHS - 6 C-Band served of 13 remote First Nation classrooms	
FedNor contribution to ICT technology	$200,000
KRG – 14 remote sites, local loop & ICT equipment	
KRG	$1 million
Canada Economic Development (Quebec)	$1.8 million
Province of Quebec	$1.8 million
Sanarrutik Agreement	$1 million

The figures above document known capital investments of over $13 million and $2 million in operating funds. It was not possible to capture many smaller ICT investments made by schools, police and health services, various agencies, businesses and residents to harness this new access to the Internet and ICT applications. We have also not included all operating costs as these should be offset by efficiencies gained by using the technology wisely.

3.5 Organizational Development: Training and Staffing

3.5.1 Service Providers

Telesat

- 12.5Mhz raw C-Band public Benefit
- link budget, carrier set up services

K-Net

- 3.4m dish at Sioux Lookout hub
- DVB, TDMA Network Management System (NMS), redundancy, diesel backup
- spectrum analyzer for troubleshooting
- amplifier, modem, router, videoconference unit, etc spares on hand

- leased circuits connect the Sioux lookout hub to wholesale Internet, video bridge and the land based network via the K-Net land hub in Toronto

- five K-Net and KRG staff trained by ViaSat to operate satellite NMS
- ongoing training of community technician in 10 Ontario sites
- ongoing training of 2 Sioux Lookout network technicians

Kativik Regional Government
- shares satellite network management with K-Net in exchange for use of the Sioux Lookout hub
- constructed wireless local loop to deliver service within its 14 communities
- ongoing training of community network technicians in each site

3.5.2 User Organizations, Northern Ontario

Ten First Nations in northern Ontario established community owned application service providers which purchase public benefit bandwidth services from K-Net to support a variety of local applications. All major institutions in each community have been connected to broadband service. Fort Severn, Fort Hope, Webequie and Neskantaga also provide coaxial cable Internet to residents. Over 50% of homes bought service within one year of service being available. Local dial Internet was also provided. Band and local institution staff received various software, applications and Internet training.

First Nation and Inuit Health Branch (FNIHB) Health Canada purchases connectivity and technical support for tele-health services for 10 public benefit sites in northern Ontario. On going training is provided to the half time tele-health coordinator at each site. Tele-health service to Peawanuk will be added in the summer of 2005. Nursing stations at Martin Falls and Attawapiskat will be equipped for videoconferencing at that time as well. Intranet and IP telephony services will be supplied to all the above sites once FNIHB establishes protocols for their use by the nursing stations. Part time X-Ray technicians in Fort Severn were trained to use digital radiology[18] technology.[19]

[18] To see video on digital radiology in the satellite-served communities, go to http://K-Net.ca and click on archives and then type “teleradiology” in the search engine.
[19] For more information about KOTH, see http://telehealth.knet.ca/ and see Appendix D: Keewaytinook Okimakanak Telehealth Health

KiHS[20] developed sophisticated on line tools for managing the Internet high school and for interactions between student, teacher and administration. Teachers, classroom assistants and students were trained to use these tools daily.[21]

Northern Nishnawbe Education Council (NNEC) Wahsa classrooms were equipped for videoconferencing. NNEC is responsible for adult education in the First Nations as well as operating secondary boarding schools in Sioux Lookout and Thunder Bay. NNEC arranges video visits from time to time between students at its boarding schools and parents in the 10 northern Ontario First Nations currently served by public benefit. First Nations SchoolNet covers the cost of school Internet and videoconference connectivity in the 10 public benefit communities.

Web site development seminars were delivered to students by K-Net under FNS[22]. K-Net in partnership with First Nations schools across Ontario hosted thirteen two-day workshops across Ontario. During the workshops, participants learned all of the skills required to create and maintain school websites. Workshops were held in every tribal area in the province including Nishnawbe Aski Nation, Grand Council Treaty #3, the Union of Ontario Indians, AIAI and the Independent First Nations. The workshop trainers were Aboriginal people who had learned their IT skills as a result of their employment with K-Net. Participants of these workshops created almost one hundred First Nations school web sites.

User Organizations, northern Quebec

KRG trained network and local technicians which operate the Internet Service Provider in each of 14 KRG villages. Local government staff received various tools including software, applications and Internet training that enabled them to use their additional bandwidth. The details of training delivered by the school board, medical facilities and other institutions and the private sector are not known.

3.5.3 Service Providers

Section 3.4, Financial Investments by Stakeholders provides a high level view of over $13 million in capital expenditures. This narrative describes the facilities established.

24 C-Band earth stations were established in remote communities which to that point had virtually no access to the Internet. 3 other communities had established C-Band earth stations one or two years previous to the public benefit. These were upgraded to use TDMA and frame relay technology. 17 of the 24 communities established wireless or cable infrastructure, which delivers high speed Internet to institutions and homes.

K-Net added, to its Sioux Lookout hub, TDMA and frame relay technology, a NMS which enabled K-Net and KRG to manage the 12.5mhz public benefit and DVB technology which improved the throughput per MHz. Diesel back up power was added. Significant improvements were made in links between the C-Band hub and K-Net's land based network. A fibre optic cable loop was run to link the hub to some 25 aboriginal service agencies in Sioux Lookout. Bell Canada invested to upgrade its facilities in order to provide K-Net with 100mbps service in Sioux lookout.

User Organizations

[20] KiHS classrooms are located in the following First Nation communities: Deer Lake, Fort William, Big Trout Lake, Keewaywin, Kejick Bay, North Spirit Lake, Poplar Hill which use land based broadband connections and Cat Lake, Eabametoong, Fort Severn, Sachigo, Webequie and Weagamow (6) which use public benefit bandwidth to connect. For more information on KiHS, see http://kihs.knet.ca/

[21] See Appendix E: Keewaytinook Internet High School

[22] For more information, go to http://firstnationschools.ca/ and click on "web site construction workshops."

K-Net provided, with FedNor funds, videoconference and some ICT equipment to several aboriginal agencies. These agencies and those in northern Quebec upgraded their ICT capacity with their own funds as broadband connectivity became available to their satellite and land served communities. Digital still and movie cameras and multimedia work stations were provided to each community to encourage multimedia postings to their developing web sites.

Slate Falls, which has no telephone system, installed IP telephony to serve band institutions. IP phones were also installed in K-Net community institutions, KiHS classrooms and 10 satellite served Tele-health facilities.[23]

K-Net installed tele-health equipment in the nursing stations of its 10 public benefit communities. The Fort Severn teleradiology unit was converted from film to digital images.

A very sophisticated K-Net web portal was developed with video streaming, distance education platforms, remote meeting software, and web development tools. Affordable software such as Post Nuke content management system, Breeze[24], and the Moodle[25] learning environment were chosen.

4 Activities

4.1 Current Services/Applications Enhanced

Band office, public health and school Internet access and email services in Fort Severn, Slate Falls and Kuujuaq improved markedly from those supported by the previous 128kbps. The other 24 communities now on the public benefit previously had only expensive long distance dial up Internet where the telephone system would support Internet. In most of these communities, a dial up connection could either not be established/maintained or speeds were very limited (under 14.4kbps).

Community Access Sites and First Nations Schools in the 10 communities had shared 400kbps download connections by DirecPC and 4.8kbps upload via MSAT phone. All were upgraded to high speed Internet when public benefit service was in place. All Internet applications were much more effective and used more software once high speed capacity was provided. FNS and FedNor equipped schools with at least one computer to eight students.

No other Internet or ICT applications were possible in these 24 communities. They are among the 38 Ontario and Quebec communities, which the CRTC had exempted Bell Canada from providing local dial Internet service due to the high cost of such service as a result of the Price Cap Decision 2002-34. [26]

4.2 New Services/Applications

K-Net, First Nations, schools, other institutions and individuals have deployed a broad range of simple and sophisticated applications.

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[23] For more information about Slate Falls, go to http://www.knet.ca/ and click on K-Net News archives and type “Slate Falls AND phones” in the search engine.
[24] To see how K-Net has been using the Breeze Platform, go to http://www.knet.ca/ and click on archives and type “Breeze” in the search engine.
[25] To see how K-Net has been using the Moodle Learning Platform, go to http://www.knet.ca/ and click on archives and type “Moodle” in the search engine.
[26] To see the decision, go to http://www.knet.ca/ and type “Telecom Decision CRTC 2002-34” in the search engine.

Fort Severn, Fort Hope, Webequie and Neskantaga launched cable Internet service to homes and band institutions. Slate Falls, Kasabonika Lake, Weagamow Lake, Cat Lake and Sachigo Lake First Nations provided high speed Intranet connections to institutions in their communities as well as establishing affordable local dial Internet. Slate Falls and Muskrat Dam will offer high speed cable Internet services to homes by spring 2005. KRG made high speed Internet and private network services available throughout its 14 communities. CAP sites and schools obtained high speed Internet access. A host of ICT applications became possible with the advent of shared broadband public benefit service of up to 2mbps to a community.

Post secondary education, and a broad range of public health, educational, cultural, economic and recreational information was now accessible to and used by these communities. K-Net offered free web hosting and on line web development tools. MyK-Net.org became a daily meeting place for thousands of the aboriginal people of Ontario's far north. Most residents have an email address and use it. There are 2,000 logins to K-Net chat in this Ontario public benefit catchment population of approximately 4,000.

Videoconference based applications were supported in each Ontario community although use was limited to one session at a time due to bandwidth available (12.5Mhz). Fort Severn joined 4 land served Keewaytinook communities in a Tele-health network in 2001 (http://telehealth.knet.ca/). Nine more sites were added in 2005 with the increase in bandwidth to a full transponder shared by 14 sites of the Kativik Regional Government (14), Obedjiwan, K-Net (13) and northern Manitoba (10 sites under construction). A distinct videoconference carrier was recently established to ensure medical quality videoconferencing. Elders, who have difficulty traveling, now visit by videoconferencing. Families have visited by video with their children whether in hospital, boarding school or young offender custody in the city. The justice system conducted a few court proceedings by video, but continues to fly the accused and escorting officers to court hundreds of kilometers from these remote communities. The system has not yet grasped the efficiencies of this video tool which is routinely used to conduct bail hearings between courts and detention centers within many Canadian cities.

A Health Canada technician travels among the northern Ontario communities with a portable ultrasound unit. Digital results are 'emailed' to Sioux Lookout for diagnosis rather that patients being flown to the hospital at an average cost to Health Canada of $1,000 per patient. A Thunder Bay ophthalmologist sends his technician to the communities to conduct the annual vision tests required to keep diabetes related problems in check. Digital files are sent to him. He also plans to conduct corrective laser surgery in the communities as this proactive approach should result in much improved – and cost effective – vision care for patients which tend to be reluctant to leave home for preventative care.

Digital X-Ray services in Fort Severn have improved both emergency and regular health care. A patient with a bad fracture was diagnosed and referred to the nearest specialist on duty, 800km distant in Winnipeg – before the air ambulance had reached him in Fort Severn! In the days of film X-Ray, the patient would have been flown to Sioux Lookout, a 4 hour trip for the air ambulance. The X-Ray would be taken and read in Sioux lookout, the patient referred to the specialist and the air ambulance called back to take him to Winnipeg in this case. The digital X-Ray unit resulted in the patient receiving care from the specialist 4 hours earlier than would previously be the case and saved 4 hours flight time for the air ambulance (approximately $4,000).

Numerous studies over the last thirty years have identified the growing grade gap between the academic achievement of First Nations students and their mainstream counterparts (Hawthorn, 1966; Indian Control of Education, 1972; National Review of Education, 1988, Final Report on the Minister's National Working Group on Education, 2002, Auditor General Canada 2004). As late as February 8, 2005, the Department of Indian Affairs Canada came under strong criticism from the House of Commons Standing Committee on Aboriginal Affairs Development for not making

progress on closing this gap. Mary Beth Biggs, Ph.D., reported to the Rae Commission taking testimony in Thunder Bay, that on-reserve grade 8 graduates in the Sioux Lookout district are functioning, on average, at the grade 6.5 level in key areas such as literacy, mathematics and science. These findings supported concerns raised by the Auditor General of Canada to the Standing Committee on Aboriginal Affairs.[27] Remote communities face extraordinary challenges in providing special education, recruiting and retaining qualified teachers, acquiring books & educational materials and providing secondary & tertiary services for education. The advent of broadband service presented opportunity to overcome some of the barriers distance poses to quality education in these impoverished communities.

Keewaytinook Internet High School (http://kihs.knet.ca/) began grade 9 and 10 courses in the following satellite-served communities: Fort Severn, Fort Hope, Sachigo Lake, Weagamow and Webequie, which have no high school. These KiHS students would otherwise have to board at school several hundred kilometers from home. Internet and videoconference tools are used in the classrooms. Operating costs are covered by INAC, which pays per diem fees to this and other aboriginal schools.

KO, the FNS Regional Management Organization (RMO), created the Grade 8 Supplementary Program (G8), an on-line supplementary program for elementary students attending First Nations schools in Ontario. A prime goal of G8 is to help bridge the grade gap in science, literacy and mathematics. Resources are provided to assist teachers in preparing First Nation students for high school by reinforcing academic skills in core subjects and by encouraging teachers to make better use of computers and the Internet to prepare lessons.

Several public benefit served schools used these services to provide a higher quality grade 8 experience than their local teachers could provide. G8 began as a pilot in April 2003 with an on-line science course. The following satellite-served First Nations schools participated in the pilot: Cat Lake, Fort Severn, Eabametoong and Sachigo Lake. G8 was officially launched in October 20, 2003 with a course in science.[28]

Community web sites were established in eight Ontario First Nations, which include large photo galleries, video clips, diabetes and other health information and local government information. Artists, crafters and others market their goods on line. Fort Severn has begun to market polar bear watching opportunities as well. Legends, Oji-Cree language and cultural values are preserved by on line use. K-Net created an on line syllabic keyboard which enables anyone to type in the Oji-Cree syllabic based written language.[29] Open source software such as Post Nuke Content Management System is used extensively to keep the tools within the pocketbook of the communities and people.

Digital Mapping (GIS) of the traditional territories of Fort Severn along with video documentation of the mapping trips with elders on the community web site are posted on-line.[30] Multimedia productions for diabetes education, cultural preservation, entertainment, etc are regularly produced in the more progressive communities. Fort Severn is negotiating with the Ontario Ministry of Natural Resources regarding a comprehensive GIS based inventory of land use values in its large traditional territory. Other First Nations have catalogued the location of roads, key buildings, sewer, water, hydro services and trap lines (Slate Falls). The GIS data is usually housed at the tribal council or on some other distant server and is accessed over the public benefit bandwidth.[31]

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[27] To learn more, click on http://www.oag-bvg.gc.ca/domino/other.nsf/html/05aa01_e.html
[28] Go to http://firstnationschools.ca/ and click on “Grade 8 Courses” or See Appendix F: Grade Eight Supplementary Courses
[29] Go to http://www.knet.ca/ and click on “Native Language.”
[30] Go to http://fortsevern.firstnation.ca/ and click on “videos”
[31] For more information, go to http://www.knet.ca/ and click on Archives and type “GIS” in the search engine.

Fort Severn utilized videoconferencing to participate in iishikiishiwewin, the On-Line Conference for Ontario Aboriginal Teachers / Instructors, the Kuh-Ke-Nah SMART International Gathering and the World Summit on the Information Society.[32] Fort Severn participated in over 40 videoconference demonstrations geared to show First Nations, aboriginal agencies and government the effectiveness of modern IP videoconferencing.

The ceremony celebrating the purchase of northern air service routes by Wasaya Airways was video streamed live from remote Bearskin Lake to allow the communities with shares in Wasaya to participate in the momentous event. Chiefs' meetings and other important events are regularly streamed and archived for future viewing. Each public benefit served community has the capability to video stream events and to watch others events live or from the archives.

"Voice over Internet Protocol" (IP) phones were introduced to Slate Falls to provide telephone service to band institutions in this community which had only one telephone for the entire community. The service will be extended to residences in the spring of 2005. IP phones were also deployed widely in Fort Severn institution offices, tele-health sites and KiHS classrooms.

A community E-Centre was established in each of Fort Severn and Weagamow Lake making high speed Internet, multimedia training and videoconference facilities and training available to the public.

On-line banking was quickly adopted as the nearest bank to most of these communities can only be reached by air. On-line shopping and booking of travel and accommodation are popular as local shopping is limited and there are no local travel services. Web cams allow people to keep in touch when out of town.

Fort Severn band meetings are conducted on-line by pooling the new ICT tools including digital video, IP phones and broadcast over the community cable TV system. Band administration has also gone 'paperless' with routine forms on line.

5 Outputs

Communities Served
K-Net's vision has resulted in 38 remote Quebec, Manitoba and Ontario communities receiving broadband services through the public benefit.

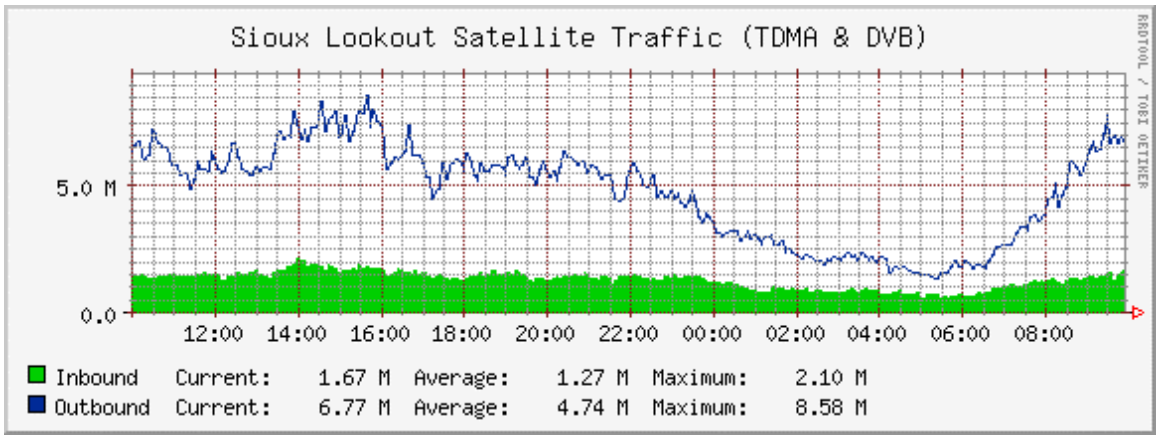
Three communities with C-Band earth stations constructed one to two years previous to the public benefit allocation were among the first to be served. Six earth stations were constructed and the respective communities were added to those served for a total of nine communities on line by May 2002. 14 more earth stations were constructed and in service for a total of 23 communities on line by May 2004. Five additional earth stations will be in service in Ontario (4) and Quebec (1) by the summer of 2005. 25 new C-Band earth stations and three existing sites will have been served by the original 12.5mhz allocation entrusted to K-Net. K-Net assisted KRG to secure its own allocation in NSI Round 1, which has released some of the original public benefit bandwidth to serve the latest five communities. KTC also secured NSI Round 2 bandwidth and will put 10 new earth stations in service by the summer of 2005.

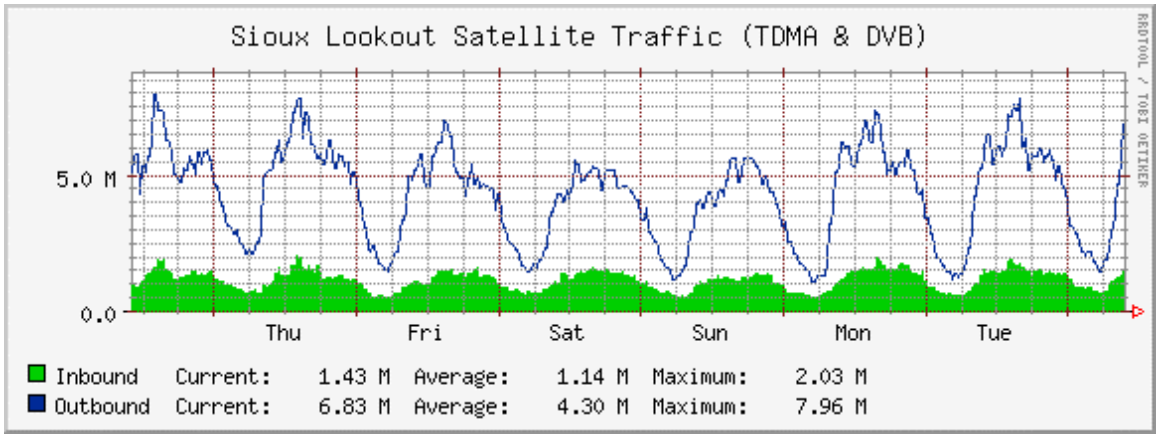
[32] Go to http://smart.knet.ca/ and click on Kuh-Ke-Nah International Gathering.

5.1 Traffic Reports

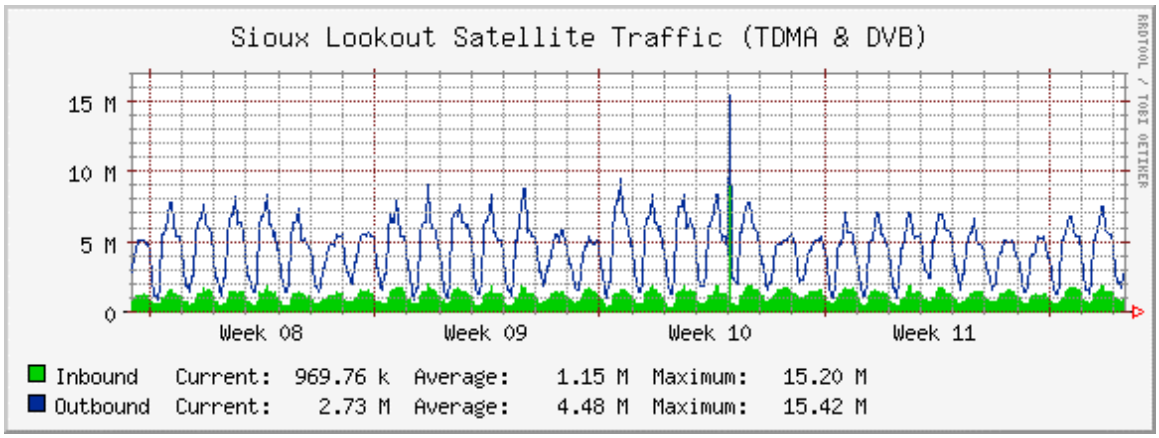
Bandwidth was delivered over 3 carriers to the first 9 communities. Adi Linden, K-Net Services, Network Systems Analyst, reports that a maximum of 6 mbps was drawn on this configuration. After K-Net launched its own NMS, it added a DVB feed (7mbps) and reduced to two TDMA carriers (4mbps) yielding approximately 11mbps of traffic. Twenty-three communities on line were using the full bandwidth at peak times each day by the summer of 2004. The Sioux Lookout dish was also at its maximum capacity. A 7.3m dish was put in service late in 2004 to deliver a full transponder on behalf of K-Net, KRG and KTC. He said that improved modulation had resulted in much better DVB efficiency. The current 10mhz DVB carrier is yielding 19mbps traffic. The traffic charts below are from May 2004.

K-Net traffic reports for the most recent 12 months are publicly available at http://tech.knet.on.ca.[33] Unfortunately, older records are not available, as K-Net has not been archiving traffic statistics. Software will be configured to archive network statistics periodically for future reference.





[33] See Appendix I: Traffic Reports for Satellite-Served Communities in northern Ontario



5.2 Application Statistics

The C-Band Public Benefit has made it possible for satellite-served communities to participate in applications such as KO Tele-health and KiHS that terrestrially served communities have taken for granted. Prior to C-Band public benefit, some of the satellite-served communities had email and Internet access through slow, unreliable and expensive long distance dial-up connections. The introduction of broadband services to the satellite served communities touched almost every aspect of life in these isolated communities in the far north of Ontario and Quebec.

KiHS

KiHS classrooms in Fort Severn, Cat Lake, Eabametoong, Sachigo Lake, Weagamow, and Webequie are supported by public benefit broadband services. Enrollment increased from 8 Fort Severn students in 2000/01 to 61 students from six satellite served communities in 2004/05. These grade 9 and 10 students took the new option of being educated in their community rather than boarding at a high school hundreds of kilometers from home. The table below presents enrollment and credits granted for KiHS both as a whole and for the six public benefit served communities

Total KiHS Enrolment and Credits Granted in Ontario

Community	Year	Enrolment	Credits Granted
	2000-2001	30	53
	2001-2002	79	78
	2002-2003	136	206.5
	2003-2004	141	269

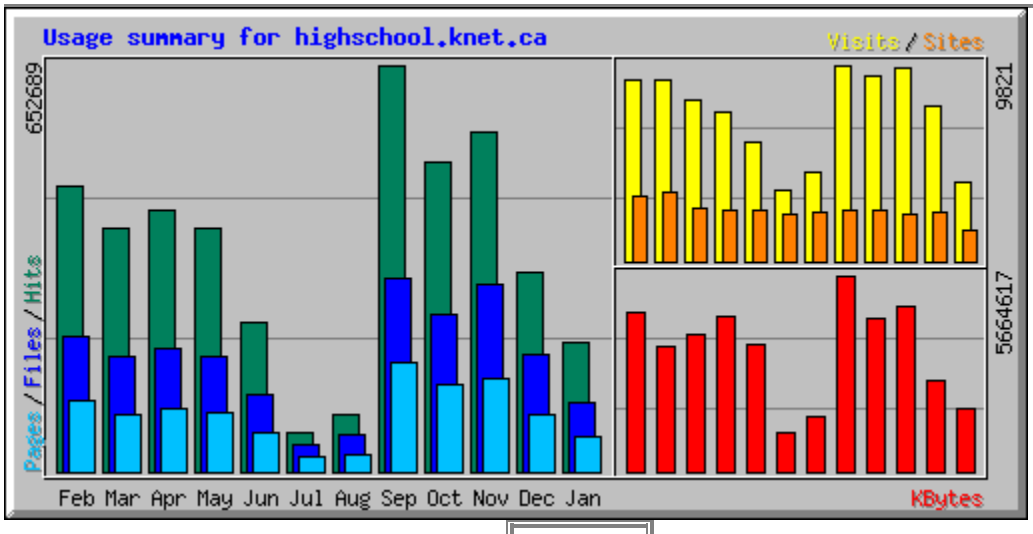
KiHS Enrolment and Credits Granted for Satellite Communities

Community	Year	Enrolment	Credits Granted
Fort Severn	2000-2001	8	18
	2001-2002	9	13
	2002-2003	7	8.5
	2003-2004	12	19
	2004-2005	11	7
Cat Lake	2001-2002	9	8
	2002-2003	7	39
	2003-2004	7	24
	2004-2005	4	9.5
Fort Hope	2002-2003	18	2

	2003-2004	15	11
	2004-2005	10	7
Sachigo	2002-2003	9	17
	2003-2004	13	26
	2004-2005	7	8
North Caribou	2002-2003	17	40
	2003-2004	18	60
	2004-2005	19	19
Webequie	2002-2003	10	15.5
	2003-2004	7	32
	2004-2005	10	8

Although the credits granting history of the Dennis Franklin Cromarty and Pelican Falls High Schools, managed and operated NNEC, are not released, KiHS students are said to earn approximately sixty percent the number of credits per student at these schools. KiHS performance has been climbing steadily since the establishment of the school. Although KiHS was originally designed to offer grade nine and ten students the option of schooling in their homes communities, a significant number of KiHS students have attended secondary schools in the south, dropped out and resumed their education at home. KiHS looks forward to improving its effectiveness with both groups of students. Cost per credit granted is actually lower for KiHS than the NNEC schools as INAC contributes approximately double the funds per NNEC student due to room and board, travel and social support costs. KiHS continues to negotiate with INAC for operating funding that approximates that invested in the system that removes students from their communities. Darrin Potter, Principal KiHS states that equitable funding would enable KiHS to improve the performance of its students. KiHS has modified and uses effective software such as Moodle and Breeze to facilitate learning at a distance. http://highschool.knet.ca received almost 10,000 visits per month in the fall of 2004.

Usage Statistics for highschool.knet.ca
Summary Period: Last 12 Months Generated 14-Jan-2005 02:23 CST



Summary by Month										
Month	Daily Avg				Monthly Totals					
	Hits	Files	Pages	Visits	Sites	KBytes	Visits	Pages	Files	Hits

Jan 2005	14777	7944	4124	279	1507	1809413	3910	57742	111229	206891
Dec 2004	10322	6067	2910	249	2491	2626547	7746	90235	188099	320009
Nov 2004	18146	10059	4951	323	2333	4775741	9717	148533	301795	544393
Oct 2004	16070	8104	4473	297	2567	4442924	9231	138664	251245	498187
Sep 2004	21756	10341	5804	327	2592	5664617	9821	174149	310254	652689
Aug 2004	2929	1916	890	142	2456	1564450	4412	27615	59409	90809
Jul 2004	1975	1372	726	116	2365	1113355	3603	22528	42556	61245
Jun 2004	8010	4104	2062	200	2548	3649011	6009	61888	123142	240321
May 2004	12626	5922	3009	241	2560	4467505	7498	93299	183609	391430
Apr 2004	13932	6553	3364	269	2692	3966013	8082	100938	196603	417984
Mar 2004	12652	5994	2913	293	3422	3589722	9104	90320	185814	392234
Feb 2004	15779	7520	3990	313	3277	4587952	9082	115733	218107	457602
Totals						42257250	88215	1121644	2171862	4273794

Generated by Webalizer Version 2.01

KO Tele-health

Fort Severn and four other KO communities joined the NORTH Network in May 2002 for medical consultations, continuing medical education and public health services. Doctor/patient consultations were available in over 30 medical specialties from doctors at any of 70 NORTH Network sites. Services were drawn from one end of Ontario (Toronto's Sick Children's Hospital) to the Manitoba Health Sciences Centre which is the major hospital serving much of Ontario's far north.

105 Fort Severn patients 'saw' a doctor over distance in the year ended March 31, 2004. Consultations were most often scheduled, but the technology was found to be useful in emergency cases as well. Tele-psychiatry and dermatology were particularly effective. Medical and public health education sessions, demonstrations and staff meetings were also conducted by videoconference. Families visited with patients in distant hospitals.

During this period, the doctor who traveled to Fort Severn to serve patients for one week per month, 'saw' patients from her office in Vancouver. Previously, patients needing medical attention during the other three weeks of the month, or those needing a specialist, were flown, at Health Canada expense, to the doctor.

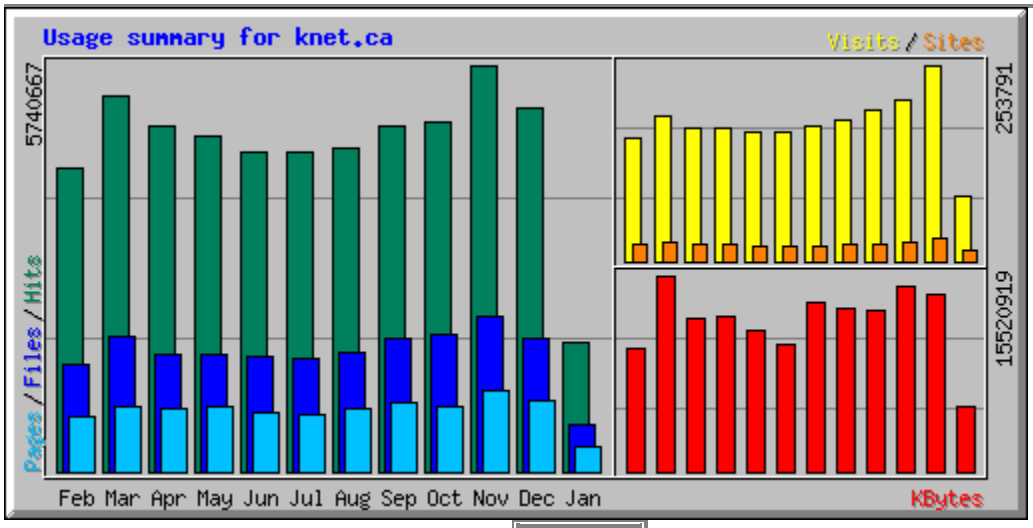
KO Telehealth attracted $6 million from Health Canada and other partners due to its success with tele-health to extend services to 19 additional communities in the Sioux Lookout zone. By the summer of 2005, tele-health services will be delivered over public benefit bandwidth in Fort Severn, Sachigo Lake, Eabametoong, Webequie, Slate Falls, Muskrat Dam, Kasabonika, Muskrat Dam, Cat Lake, Weagamow and Neskantaga.[34]

Statistics are not available on the number of digital X-Rays sent from Fort Severn.
K-Net shares almost all of its knowledge and project developments on line. As the National Smart Communities Demonstration project, it was committed to passing lessons learned and best

[34] For more information, see http://telehealth.knet.ca/ or see Appendix E

practices to First Nations and other communities across Canada and around the world. Monthly visits passed the 200,000 mark in November 2004.

Usage Statistics for K-Net.ca
Summary Period: Last 12 Months
Generated 11-Jan-2005 02:16 CST



Summary by Month

Month	Daily Avg				Monthly Totals					
	Hits	Files	Pages	Visits	Sites	KBytes	Visits	Pages	Files	Hits
Jan 2005	164885	61606	31268	7578	13234	5190956	83359	343956	677675	1813735
Dec 2004	165228	60897	32417	8186	29895	13958215	253791	1004930	1887829	5122092
Nov 2004	191355	73499	38081	6910	24571	14720515	207324	1142446	2204979	5740667
Oct 2004	159521	62216	29754	6348	23044	12751784	196801	922398	1928726	4945162
Sep 2004	162206	62744	32735	6105	21259	12846818	183167	982066	1882331	4866206
Aug 2004	146920	54362	28652	5675	20356	13338779	175932	888227	1685224	4554526
Jul 2004	145910	51965	25606	5382	20145	10091685	166850	793816	1610930	4523233
Jun 2004	150285	54047	27944	5561	20031	11206281	166854	838328	1621431	4508553
May 2004	152669	53768	29428	5556	21639	12263868	172246	912275	1666809	4732768
Apr 2004	162333	55445	29538	5733	21816	12052509	172010	886154	1663376	4870018
Mar 2004	170623	61519	30046	6047	24903	15520919	187466	931432	1907102	5289335
Feb 2004	147673	52292	26430	5470	21227	9739868	158634	766472	1516476	4282534
Totals						143682197	2124434	10412500	20252888	55248829

Generated by Webalizer Version 2.01

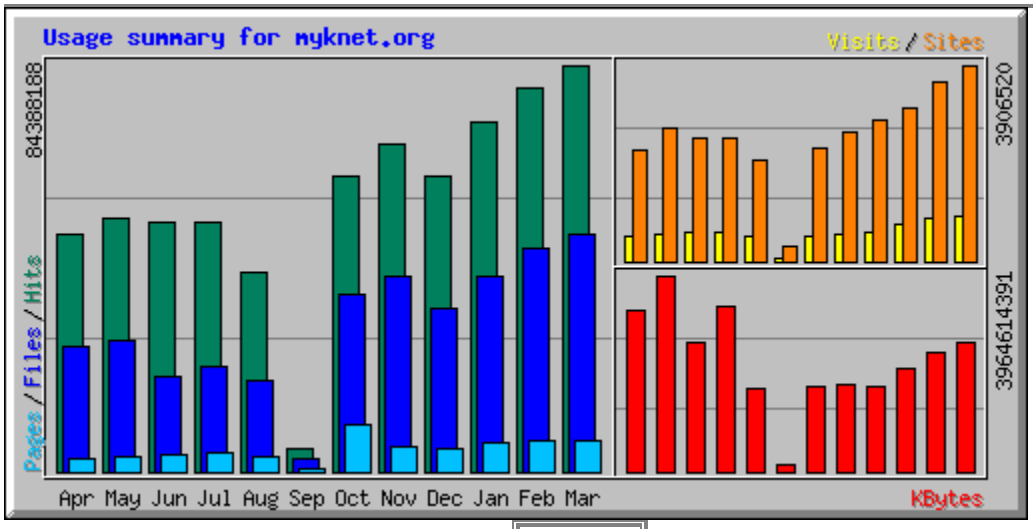
Broadband Services and Personal Communications: http://mail.knet.ca

K-Net has provided web based email accounts and toll free dial access to the estimated 20,000 aboriginal people in over 40 Nishnawbe Aski Nation (NAN) communities for over 8 years. There were 29,000 active email addresses in January 2005. Accounts with no activity in six months are deleted. Approximately 25,000 emails, exclusive of Spam, are delivered daily by webmail.knet.ca. The ten public benefit served communities represent approximately 20% of the population. An estimated 5,000 emails per day are therefore sent or received over public benefit bandwidth in communities which previously had very limited access to email.

Broadband Services and Personal Communications: myK-Net.org web sites and usage

K-Net also provides free web hosting and on line web creation tools to the communities of Nishnawbe Aski Nation. An astounding14,000 personal web pages are hosted on myK-Net.org! 27,000 visits per day, over 800,000 visits per month are made to web pages on this site resulting in over 80 million hits in March. The majority of these pages are owned by First Nations youth. In most cases, these personal web pages are the principal form of communication for these young people. The satellite served First Nations (4000 people) comprise an estimated 20% of the user population and make approximately 160,000 visits per month to personal sites on myK-Net.org. MyK-Net.org is a web phenomenon which defies comprehension.

Usage Statistics for myK-Net.org
Summary Period: Last 12 Months
Generated 28-Mar-2005 01:24 CST



Summary by Month										
Month	Daily Avg				Monthly Totals					
	Hits	Files	Pages	Visits	Sites	KBytes	Visits	Pages	Files	Hits
Mar 2005	3013863	1753434	229856	31650	3906520	2595625905	886209	6435971	49096152	84388188
Feb 2005	2845926	1656500	225959	30583	3570889	2394515537	856349	6326866	46382022	79685945
Jan 2005	2334928	1308767	194009	23148	3060456	2098564691	717594	6014298	40571792	72382775
Dec 2004	1983556	1093093	160813	18148	2812289	1715386541	562606	4985204	33885911	61490248
Nov 2004	2261041	1348763	175505	17600	2553389	1750305405	528018	5265176	40462903	67831244

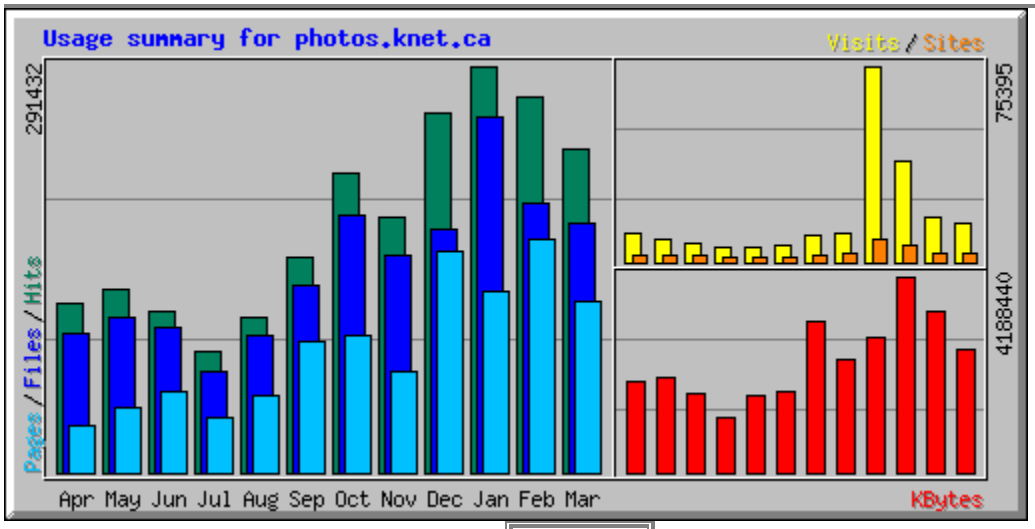
Oct 2004	1982143	1187107	309671	15582	2267968	1729836395	483070	9599819	36800329	61446433
Sep 2004	162006	87078	25384	1584	301328	149847449	47546	761522	2612353	4860180
Aug 2004	1340491	604608	99339	16131	1993856	1670460380	500076	3079534	18742875	41555231
Jul 2004	1674584	707314	121862	19145	2456197	3349558920	593496	3777738	21926741	51912126
Jun 2004	1723611	662466	121278	19460	2454257	2592581321	583801	3638353	19873986	51708330
May 2004	1702055	883343	99517	17773	2631734	3964614391	550976	3085056	27383648	52763717
Apr 2004	1648945	869494	96349	16186	2227590	3275692836	485588	2890498	26084824	49468366
Totals						27286989771	6795329	55860035	363823536	679492783

Generated by Webalizer Version 2.01

Broadband Services and Personal Communications: photos.knet.ca

K-Net hosts a large photo gallery of material posted by K-Net or its communities. The Webalizer report for February 2005 captured 17,056 visits which viewed 167,500 pages containing 3.4 terabits of photographs.[35]

Usage Statistics for photos.knet.ca
Summary Period: Last 12 Months
Generated 28-Mar-2005 02:15 CST



Summary by Month										
Month	Daily Avg				Monthly Totals					
	Hits	Files	Pages	Visits	Sites	KBytes	Visits	Pages	Files	Hits
Mar 2005	8273	6403	4409	547	3467	2637965	15337	123462	179306	231662

[35] To see more pictures, click on http://photos.knet.ca/albums.php

Feb 2005	9600	6901	5982	609	3450	3427075	17056	167500	193231	268815
Jan 2005	9401	8214	4213	1247	6328	4188440	38658	130614	254664	291432
Dec 2004	8304	5615	5101	2432	9039	2873947	75395	158158	174094	257441
Nov 2004	6095	5179	2408	375	3088	2409473	11253	72268	155385	182864
Oct 2004	6946	5940	3168	331	3074	3239466	10279	98231	184160	215338
Sep 2004	5135	4453	3124	228	2234	1718127	6869	93728	133613	154073
Aug 2004	3594	3165	1801	180	1975	1631317	5598	55847	98115	111414
Jul 2004	2819	2351	1293	195	1961	1159242	6070	40092	72893	87412
Jun 2004	3828	3492	1961	231	2360	1704205	6957	58859	104762	114869
May 2004	4240	3605	1486	287	2545	2043129	8924	46072	111783	131447
Apr 2004	4042	3330	1147	366	2705	1924603	11002	34432	99900	121267
Totals						28956989	213398	1079263	1761906	2168034

Generated by Webalizer Version 2.01

Grade 8 Supplementary Program

The Grade 8 Supplementary Program was developed in response to the growing grade gap that exists between Aboriginal students and their Mainstream counterparts. Broadband services is proving to be an effective tool in bridging this "gap." Studies of inner-city students in the United States indicate a positive relationship between academic readiness and home computer use and home Internet access. The relationship is so strong that the Indiana Department of Education has established Buddy2, an on-line program for teachers, students and parents to improve performance in writing, mathematics and science (http://www.btlc.org/btlc/home.asp)

In Canada, there are examples where First Nations students with access to computers and access to the Internet have not only bridged the grade gap but also outperformed their mainstream counterparts on provincial curriculum. First Nation students attending Eel Ground School in New Brunswick[36] and Pic River High School[37] in Ontario have done just that, however, no research has been undertaken to determine how this was achieved and to what level the changes occurred. Information Communications Technologies are used extensively in both programs.

First Nations students in Keewaytinook Okimakanak have had full access to broadband services for almost four years as a result of the C-Band Public Benefit, Smart Communities, FedNor and other federal government program investments. No research has been conducted to determine the levels, if any, of academic performance of these students.

G8 began as a pilot in April 2003 with an on-line science course. The following satellite-served First Nations schools participated in the pilot: Cat Lake, Fort Severn, Eabametoong and Sachigo Lake. G8 was officially launched in October 20, 2003 with a course in science. One hundred and nine students attending eleven First Nations schools across Ontario participated submitted over 1,900 assignments. Fort Severn was the only satellite-served community to participate in G8 and provided 10 per cent of the total enrolment in the program. During the G8 mathematics supplementary course (January 19 to March 22, 2004), One-hundred and seventy-seven

[36] To see how this community uses ICTs, go to the K-Net News Archives and type "Eel Ground School" in the search engine.
[37] To learn more about this school, go to http://www.picriver.com/high.html

students in seventeen First Nations schools submitted 1,450 assignments. Fort Severn participated in the program. Nine Fort Severn students signed up for the program, almost five per cent of the total G8 enrolment. During the spring term (April 26 to June 20, 2004), one-hundred and forty-seven students in seventeen First Nations schools were enrolled in the English literacy supplementary program. The following satellite-served communities participated, Fort Severn (9), Muskrat Dam (7) and Slate Falls (4).

During the second year of operation of G8, the following satellite-served communities participated in the science course (October 11, 2004 –January 10, 2005): Cat Lake (12), Muskrat Dam (17), Slate Falls (6) and Fort Severn (4)38. These communities also participated in the G8 mathematics course: Cat Lake (12), Muskrat Dam (14), Slate Falls (7), Sachigo Lake (11) and Fort Severn (4).

The annual operating costs of the Grade 8 Supplementary Program are approximately $80,000. This figure does not include start-up and development costs associated with the program. Additional funds are required to tackle the gap with grade seven students. Without the bandwidth provided by the C-Band Public Benefit, G8 could not be delivered to satellite-served communities. No formal evaluation of the Grade Eight Supplementary Program has been undertaken due to funding constraints.

The Community Broadband Network – A Social Enterprise

One of the most significant economic impacts of ICTs reported by community members involved the creation and maintenance of local community broadband networks. The Kuh-ke-Nah Network is a consortium of community owned broadband networks across Ontario's far north. All ten First Nations in Ontario, which receive public benefit, established and operate their local network. Six of these are joint cable TV/Internet service providers. KRG established 14 similar networks in northern Quebec that may grow to be independently operated. Net revenues are re-invested in the network or other community services.

Training and Capacity Building

These local networks require skilled IT technicians. Keeping these skills in the remote and isolated First Nations is a priority, especially in satellite-served communities. To ensure this, K-Net Services received funding from FNS to employ forty youth living in First Nations across Ontario as part of the Youth Initiatives Training (YIT).[39] The following satellite-served communities are participating in the YIT program: Fort Severn, Slate Falls, Weagamow, Kasabonika, Webequie, Eabametoong (Fort Hope), Neskantaga (Lansdowne House) and Muskrat Dam. YIT workers received two days of intensive training in all aspects of networking, web site development, digital video production and other essential IT skills. These workshops were held in Thunder Bay and Six Nations. After the workshop, the YIT workers returned to their home communities where they continued IT training using the Moodle Learning Platform. YIT workers are expected to develop additional IT skills and populate personal websites as well as the YIT home page by participating in discussion forms, writing news stories and conducting special projects. At least three of the YIT trainers are First Nations youth who developed many of their IT skills through participation in Industry Canada's Smart Communities program. One of the YIT workers discussed her work at the CRACIN workshop on civic participation in Vancouver in

[38] The elementary school in Fort Severn was order closed by the Chief and Council in June 2004 following two engineering reports identified mold at levels dangerous to human health. The school remains closed and many parents have removed their children from the community to continue their education in other First Nation elementary schools or in Thunder Bay, Sioux Lookout and other urban centres. This explains the dramatic decline in the numbers of Fort Severn students enrolled in G8.

[39] For more information, see http://yit.firstnationschools.ca/

February 2005.[40] A YIT worker participated in the RITCA discussions via videoconference from Sault Ste. Marie.[41] One of the measurements of success for the YIT program will be if the First Nations hire these young people as IT workers in their home communities.

The C-Band Public Benefit means that local entrepreneurs in the satellite-served communities are taking their IT skills learned in the south and returning to their home communities where they are working as consultants and IT technicians. Like a growing number of employees who avoid daily commutes to the city a growing number of Aboriginal people are learning that they can return to their home communities and take their IT skills and jobs with them. At least one employee of the Keewaytinook Okimakanak has returned to her home community in Fort Severn but continues to work full time for the tribal council using IT. This potentially could have a major impact on the economies of satellite-served communities in the north. There are other examples of this trend. In Webequie, another satellite-served community, the C-Band dish heaves due to frost. With technical support over the phone, the community IT technician can effect alignments without the hiring of an outside consultant to make the necessary adjustments. This accounts for a significant and on-going cost saving. In contrast, when the same problem occurs with the Telesat Canada dish that feeds Bell Canada service, a technician from outside of the Webequie is flown in to make the same adjustments.

Other agencies are recognizing the advantages of supporting local community-based IT technicians. Health Canada, as part of its monthly fee for tele-health network services, receives on-site services from the community IT technicians in the twenty-four remote telehealth sites. The costs of travel alone for sending a Health Canada technician once into each community is approximately the same as the monthly fee for bandwidth and technical support from the community network.

Broadband and Institutional Communications: Videoconferencing and Webcasting

Videoconferencing is one of the applications, which the satellite-served communities would not be available if it were not for the C-Band Public Benefit and the collective decision to pool the benefit for the common use of all partners. Videoconferencing is available because K-Net supports and manages its network on behalf of its partners. K-Net manages traffic flow and provides quality of service that ensures that even satellite-served communities have equal access along with terrestrially served ones.[42]

Videoconferencing ensures that the satellite-served communities can fully participate in telehealth and teleeducation. The full potential of the Keewaytinook Okimakanak Internet High School (KiHS) is realized when videoconferencing is used along with other ICT tools such as VOIP and the Moodle and Breeze. Fort Severn has actively participated numerous international conferences using ICTs.

Fort Severn is not the only satellite-served community to utilize videoconferencing as a tool to communicate beyond its traditional territories. Weagamow participated in the founding meeting of Researching ICTs with Aboriginal Peoples (RICTA), a SSHRC Knowledge Cluster with academic researchers from Canada, the United States and Mexico. Videoconferencing is a effective tool to reduce the costs of travel but to broaden institutional perspectives.

[40] To view this event, go to http://www.knet.ca/ and click on Archives and type “YIT AND Vancouver” in the search engine.
[41] To view this event, go to http://www.knet.ca/ and click on Archives and type “RICTA” in the search engine.
[42] To learn more how the satellite-served communities use this application, go to http://www.knet.ca/ and click on K-Net News archives and type “videoconferencing” in the search engine.

In addition to videoconferencing, K-Net uses webcasting[43] extensively as a communication tool. Webcasting is an effective tool to broadcast meetings, workshops and conferences to a broader audience. It is also useful as an archival tool. Both videoconferencing and webcasting were used during the founding meeting of Researching ICTs with Aboriginal Communities (RICTA). Academics from across Canada and the United States discussed the challenges of conducting research with community leaders in education, health and wellness and economic development from across Canada. Several First Nations across Ontario participated via videoconference including Batchewana Bay, Six Nations, Akwesasne and Fort William.

6 Outcomes

Other than an evaluation of the Smart Communities program and the provincial-federal study "Ontario's Far North Study" (January 2004)[44], there is little academic research on the impacts of broadband service on public benefit served First Nations in northern Ontario or Quebec. While it is too early to determine the long-term impacts of broadband services on major socio-economic indicators, there is, however, strong qualitative evidence that ICTs are being used by remote First Nations people to "turn the corner" in these key challenges to life in remote communities. SSHRC-funded research clusters such as Canadian Research Alliance For Community Innovation And Networking (CRACIN)45 and Researching ICTs with Aboriginal Communities (RICTA)46 have taken a strong interest in the ICT work of the Kuh-Ke-Nah communities. Still, there is great debate within the academic community over the usefulness of trying to measure the impacts of ICTs on developing communities. Charles Kenny, a senior economist at the World Bank who has studied the role of ICTs in rural development, says that traditional cost-benefit calculations are in the best of cases "an art, not a science". With ICTs, he adds, the picture is further muddied by the newness of the technologies; economists simply do not know how to quantify the benefits of the Internet.[45]

Acknowledging the inherent challenges associated with capturing the ultimate outcomes of the use of modern ICT applications, the following outcomes are presented for consideration.

6.1 Passionate Adoption of ICT applications

The aboriginal people of Ontario's isolated communities have lived off the land for centuries. They have enjoyed sewer & water services for only 10 years. Electricity and telephones were introduced in most communities 20 or 30 years ago. Until recently however, Slate Falls First Nation, which operates remote hunting and fishing camps, owned more floatplanes than telephones. Public benefit bandwidth brought a host of ICT services within reach. They seized the opportunities and took the initiative to harness broadband technology to overcome many of the barriers distance posed to the socio-economic health of their communities. The information below shows the successful integration of ICT into community life. Behavior was adapted to apply the technology to everyday life.

- Twenty-seven communities to date founded, own and operate the local ISP
- Local community technicians and the K-Net help desk maintain all networks
- K-Net and KRG manage the public benefit transponder
- 60% of residents subscribe to high speed service, compared to 40% nationally

[43] To learn more how the satellite-served communities use this application, go to http://www.knet.on.ca/ and click on K-Net News archives and type "webcasting" in the search engine.
[44] To see the Smart Evaluation, go to http://smart.knet.ca/ and click on "Harnessing ICT's: A Canadian First Nation's Experience" and to see the provincial/federal study go to http://www.knet.ca/ and type "Ontario's Far North Study" in the search engine.
[45] See CRACIN home page at http://www.fis.utoronto.ca/research/iprp/cracin/index.htm
[46] See RICTA home page at http://www.ricta.ca/
[45] The Economics (March, 10, 2005)

- Tele-health services were established and operated by the K-Net communities
- Residents, old and young have embraced the tele-health service
- KRG & KTC are pursuing tele-health services for an additional 24 communities
- communities which had no high school now offer Grade 9 & 10 courses
- Slate Falls is installing community wide Internet Protocol telephony over cable
- All Fort Severn institutions are equipped with band operated IP telephony
- KiHS classrooms and tele-health coordinators are equipped with IP telephony
- Six K-Net First Nations, with a population of about 4000, have created 2,500 web sites
- Approximately 50 of these web sites are updated daily on myK-Net.org
- Residents of these communities log 4,000 visits/day to myK-Net.org web pages
- They have approximately 4,000 active email accounts
- They sent and receive approximately 10,000 emails/day
- They routinely post news and photos on community and/or K-Net web site

6.2 Outcomes Identified by Users in Satellite-Served Communities

Over thirty interviews were conducted with community members from Fort Severn, Slate Falls, Fort Hope, Weagamow and Webequie who access the 'Net on a regular basis for work or pleasure and who receive services such as tele-education or tele-health and other high bandwidth applications as a result of the C-Band Public Benefit.[47] The respondents shared a number of common themes about the impact of the accessing a fast and reliable connection to the 'Net through the C-Band Public Benefit.[48] The answers reveal significant changes in actions and behaviors among the users, in almost every aspect of their lives. Some of the major themes include:

- Fast and Reliable Connections
- Strengthening the Social Fabric
- E-Government
- E-Commerce
- Improved Access to Secondary and Post Secondary School Opportunities
- Better Access to Health Care
- A Window on the World that Swings Both Ways
- Fast and Reliable Connections

Almost all of those surveyed indicated that they enjoy more reliable service as a result of the C-Band Benefit. "Our Internet is faster now (with the C-Band Benefit) and much more reliable," one of the respondents said. The C-Band Public Benefit ensures that even satellite-served communities enjoy the same access to applications as terrestrial ones. Fort Severn First Nation, for example, has a Keewaytinook Internet High School (KiHS) classroom, a KO Telehealth station, videoconferencing, and VIP telephony. None of these applications would have been possible without the C-Band Public Benefit. Although providing a faster and more reliable connection for Fort Severn, a founding member of Keewaytinook Okimakanak, was a priority for K-Net Services initial proposal to Industry Canada, the public benefit was shared with other satellite-served First Nations in Ontario's far north including Slate Falls, Cat Lake, Sachigo Lake, Weagamow, Kasabonika, Webequie, Eabametoong, Landsdowne House as well as the members of the Kativik Regional Government representing First Nations in northern Quebec.

Strengthening the Social Fabric

Fast and more reliable connections mean families can communicate with each other even over great distances. The needs of employers, marriages, education and accessing health care services often force First Nations families across Ontario's far north to live apart. The C-Band Public Benefit allows applications such as videoconferencing, web cams and VOIP providing

[47] See Appendix G: Community Interview Questions
[48] See Appendix H: Summaries of Community Interviews

people with a number of tools to maintain family ties even when career opportunities, educational requirements or accessing health care create temporary separations. The Northern Nishnawbe Education Council (NNEC) provides videoconferences between students at its schools in Sioux Lookout and Thunder Bay with their parents and grandparents throughout the academic year. With the C-Band Public Benefit, this program can be provided to satellite-served communities. In addition, many parents keep in contact with their children attending school in the south through web cams. "My wife and family left the community when we discovered the elementary school was infested with mold. I had to stay here for work. I can say goodnight to my children almost every night using the web cam."

Like youth who traditionally leave home to continue their studies in the south, many Elders are forced to leave their communities to seek medical treatment. As the keepers of knowledge and wisdom, the Elders play a critical role in the wellness of many northern First Nations. The loss of these leaders is keenly felt.

As part of Industry Canada's Smart Communities program, Keewaytinook Okimakanak developed a pilot program to provide telehealth to its member communities. KO Telehealth links physicians and specialists in the urban south with patient in remote and isolated regions of the north. Telehealth allows patients to access better health care without having to travel. For Elders, this means they can receive treatment without having to leave their families and communities. With the C-Band Public Benefit, these services are available in satellite-served communities.

E-Governance

The C-Band Public Benefit has impacted on governance issues in satellite-served communities in the near north. At least one community has conducted a pilot where band meetings are conducted over the 'Net during the winter. This is made possible because the C-Band Public Benefit provides the First Nation with enough bandwidth to operate VOIP telephony and live digital video over the local community television station. This allows young families and Elders to participate in band meetings where they were prevented by cold temperatures and other factors to fully engage.

The C-Band Public Benefit has allowed at least one First Nation to create a "paperless" administrative office. All documents including application forms for all services are now on-line. While at least half of the community is computer literate, those who do not use ICTs are assisted by those who do either in the band administration or in the E-Centre
A faster and more reliable connection means that First Nations leadership is better prepared for meetings with officials from the public and private sectors. "Before C-Band, we pretty much had to accept whatever was said. We never knew if they were telling us the whole story. Now, we get on the 'Net before a meeting and we know exactly which programs are available and how much money had been spent on similar projects in other regions."
Many respondents indicated that their First Nations had community portals, which provided on and off-reserve members with news from the respective band offices. They also identified K-Net News as an important communications tool for governance. K-Net News provides, many said, information about government policy and news about changes that could affect their lives. At least three said that they signed an on-line petition found in K-Net News calling on the government to end its practice of taxing funds provided to First Nations post secondary students. Others praised K-Net for web streaming the various meetings that the Chiefs attend. "People like to know what the Chief is doing. Now when he attends a NAN or KO meeting, we can follow what's going on."

E-Commerce

Satellite-served communities can now participate in e-commerce. E-banking is common. On-line shopping is a convenient and money saving alternative to existing retailers on-reserve. "I use the 'Net everyday. I do my banking on-line and much of my shopping on-line. When I'm planning a

trip, I order my plane tickets and make hotel reservations on-line. Its cheaper and faster and I get the service that I want." A reliable Internet connection means that more people in the North will be able to participate in e-commerce.

The additional bandwidth is providing crafts makers and artists with a tool to market their work to potential customers around the world. Outfitters are attracting new customers as more and more tourists are viewing community web portals to seek out new vacation destinations that offer a different experience than commercial venues in the south. "We get people signing the guest book from Japan and China. We get a lot of Americans and Europeans too. They look at our community web site and download some video. Who knows, if they like what they see, they might just come up. We're getting more and more people asking us how they can get up here." However, artists and crafts makers are not the only entrepreneurs using broadband to increase market share.

Just as urban workers are discovering that they can keep their jobs, work at home and avoid the commute to the office so too are young skilled ICT technicians learning that they can keep their IT jobs and raise their families on-reserve. Jesse Fiddler, a former multimedia technician at K-Net Services, returned to Sandy Lake First Nation to raise his young family. He is building an ICT business that services various organizations in the community such as the educational authority and the administrative office. He is currently contracted with the First Nation to develop an ITC strategy for Sandy Lake. The C-Band Benefit will provide more skilled ICT technicians such as Fiddler with the opportunity to earn an adequate income and raise their families in the communities of their choosing. A reliable connection to the 'Net is critical for this migration of young skilled workers back to their home communities is to continue. The C-Band Public Benefit has already made it possible for at least one employee of Keewaytinook Okimakanak to move back to her home community and take her job with her.

Improved Access to Secondary and Post Secondary School Opportunities

Respondents said that the single most significant impact of the C-Band Public in the field of education for satellite-served communities in Ontario's far north is the ability to participate in the Keewaytinook Internet High School (KiHS). KiHS is an alternative secondary school program that allows students to remain in their home communities and achieve Ontario Secondary School credits in a traditional classroom under the supervision of an accredited teacher. There are thirteen KiHS classrooms, six of which, Fort Severn, Fort Hope, Cat Lake, Sachigo Lake, Weagamow and Webequie, are satellite-served communities which could not have utilized this application without the C-Band Public Benefit. Each KiHS classroom is equipped with computers and broadband Internet connections and is linked together using the Moodle Educational Platform. Teachers are specialists who deliver lessons over the KiHS network and provide mentoring and tutoring for KiHS students in their community. KiHS is essentially important to these communities where the traditional languages and culture is still practiced and where parents and community leaders want to pass these values on to their children before their leave. Without the C-Band Public Benefit, it would not be possible to provide this application to students in satellite-served communities.

It is difficult to measure the social and cultural impacts of the Keewaytinook Internet High School. Many of those interviewed, however, stated that the opportunity to have their youth remain home for Grade Nine and Ten was the most significant factor for them. Before KiHS was available in the satellite-served communities, students had to leave their families if they wanted to pursue a high school diploma. At thirteen or fourteen years of age, many were too young and immature to deal with the pressures of urban life, the cultural shock and the heavier demands of secondary school without the guidance and support of their parents. The schools would encourage these students to remain in the city until the final nominal role was taken for the Department of Indian Affairs and then they would be free to return home. Once back in their communities, there would be little for them to do. Some became frustrated and angry, turning to drugs and alcohol. Without the KiHS alternative, these students would not have any way of continuing their

secondary school education. At least two respondents remarked that KiHS is one of the most important tools in combating the youth suicide crisis in Ontario's far north.

In addition to KiHS, access to broadband services in the satellite-served communities means greater opportunities for further education and training beyond high school. At least one respondent indicated that a family member was enrolled in a college program on-line. Upon graduation, the candidate will be an early childhood education specialist qualified to develop curriculum for children in daycare or the initial years of elementary school. One of the reasons this student has undertaken this course of study is to take advantage of the new opportunities created by the federal government's new national day care initiative.

Better Access to Health Care

KO Telehealth started as a pilot project for the member First Nations of Keewaytinook Okimakanak. One of the reasons why K-Net Services initially approached Industry Canada to access the C-Band was the need to provide this application to Fort Severn. The public benefit also made it possible for other satellite-served communities in Ontario's far north to access KOTH. In total, ten of the twenty-three First Nations in the Sioux Lookout zone who are part of the telehealth migration project are satellite-served communities. They include: Fort Severn, Sachigo Lake, Eabametoong (Fort Hope), Webequie, Weagamow, Cat Lake, Slate Falls, Muskrat Dam, Kasabonika and Neskantaga (Landsdowne House).

Those surveyed indicated that one of the biggest impacts of ICTs and Health involved the introduction of KO Telehealth. Prior to telehealth, the sick and the injured in these communities had to fly south to access health care. The trips were expensive, waiting lists to travel were long and, for the Elders and the young, family members would have to accompany the patients. The introduction of telehealth to the satellite-served communities meant that patients could remain home during initial consults with family doctors and specialists. In some cases, a diagnosis can be made, treatment prescribed and follow visits done without the patient ever leaving the community. When the physician requires a face-to-face consultation, she can access critical information via telehealth before the arrival of the patient so treatment can begin immediately upon arrival. KOTH has been an effective tool for follow-up visits after patients have returned home from surgery. Before telehealth was available, patients with hip replacement operations had to return to either Sioux Lookout or Thunder Bay for x-rays and other post op procedures. KOTH provides a health care tool where patients can return home for recovery and still meet for follow-up consultations with their physicians. This is especially important for the Elders who find travel from their communities in the north to the health care professionals in the south to be taxing.

Some of those surveyed commented on the array of tools used in KO Telehealth centers. The ADCOM telemedicine workstation used in the Sioux Lookout Zone includes the videoconferencing equipment and the following peripherals: an otoscope, a stethoscope and a patient exam camera. This versatile piece of equipment allows the telehealth coordinators in remote First Nation communities throughout the region to connect to nurses, community doctors, or specialists anywhere in Ontario, and indeed the world. Once connected, the Community Telehealth Coordinator (CTC) can, for example, magnify a patient's skin rash or wound up to 50 times, or show the patient's ear drum so that the health care professional who is watching on the other screen has a very clear picture of what is happening with the client hundreds or thousands of kilometers away. With this equipment, the health care provider at the far site can listen to the patient's heart or breath sounds. The result is improved access to primary health care providers and specialists for people living in remote First Nation communities.

Others surveyed talked about the growing list of new services that KO Telehealth, including a portable ultrasound, a portable retinascope, and digital radiology.

Many of those surveyed praised the role played by the Community Telehealth Coordinators (CTCs)[49]. CTCs are community members who are trained to operate the telehealth workstations. In addition to their regular duties, CTCs champion the use of telehealth throughout the community. CTCs are often cited as one of the reasons why First Nations have a greater sense of community ownership of telehealth than other health care programs at the local level. One of those surveyed indicated that unlike health care professionals in the Nursing Stations, many CTCs are bilingual who can better serve Elders who usually speak their traditional languages.

A Window on the World that Swings Both Ways

During the opening of the Northern Indigenous Community Satellite Network (Sioux Lookout, January 19, 2005), the Grand Chief of the Keewatin Tribal Council said that with the C-Band his communities in northern Manitoba are still remote but "we're no longer isolated."[50] This is an idea that is shared by many of those interviewed for this study. This is especially true for young people. KiHS students in Fort Severn are allowed to listen to radio on-line on Friday afternoons if all of the assignments are completed. The KIHS teachers reported that, when he first introduced this incentive, students would tune in to radio stations in Thunder Bay or Winnipeg, within six months they were moving towards stations in New York and Los Angeles. Currently, students are tuning into cultural programming created by youth in South Africa and Australia. "I can imagine what it would be like without it," a student said.
Many of those surveyed said one of the most popular applications available is myK-Net web pages (http://myK-Net.org). It is another Keewaytinook Okimakanak on-line service that continues to grow in popularity. The daily average of visits in February 2005 was 30,583 with an average of over 2.8 million hits each day. The total number of visits to this server in February was 856,349 with nearly 80 million hits occurring in this short month.

MyK-Net.org is primarily made up of personal homepages created and maintained First Nation members across northern Ontario. There are over 14,000 homepages on this server today. This on-line space is rich in the sharing of personal experiences, stories, pictures and events. Everyone helps to make it the positive learning and sharing environment that the chiefs wanted to create by making sure the content on each page is suitable for all ages of people who check out these homepages.

K-Net was also acknowledged by some of the respondents for assisting other Aboriginal organizations with the creation of web pages and the use of ICTs.

6.3 Outcomes: Stakeholder Organizations

The C-Band Public Benefit is changing expectations among those who live in the satellite-served communities in northern Ontario. People are adopting and adapting technology to increase educational, health access and economic development opportunities in their communities. Broadband services in the satellite-served communities mean that young people have more options to get educated and to work at home. Applications such as the Keewaytinook Internet High School and KO Telehealth mean people have choices. Dollars, which had previously flowed from these communities to access services in the south, can now remain in these communities where they can stimulate economic development.

6.4 Economic Outcomes / Cost Avoidance

Economic Outcomes

[49] For more information about the Community Telehealth Coordinators, click on http://telehealth.knet.ca/ and follow the links to "CTCs"
[50] To see video from this event, click on http://smart.knet.ca/satellite/index.html

Commercial satellite bandwidth is prohibitively expensive for these remote communities with populations averaging fewer than 700 people. The public benefit brought the operating cost of ICT applications within reach of the service agencies and citizens of remote northern Ontario and Quebec. Significant economic benefits have been realized through ICT applications in use despite limited economic opportunity in these impoverished communities. The remoteness of these communities provided grounds for considerable costs avoidance by improved efficiency in delivery of services.

Cost Avoidance

One hundred and five (105) doctor/patient consults were conducted from Fort Severn in 2003/04 alone by tele-health. The alternative was for the patient to fly, at Health Canada expense to Sioux Lookout, Winnipeg or Thunder Bay. The cost of the 90 minute flight from Fort Severn to Sioux Lookout is approximately $1,000 return. Thunder Bay is another one hour (and $600) by air. Patient accommodation and meals are also covered by Health Canada. When all costs are considered, an average visit to a doctor in the city costs over $1,200. Children and the elderly are often accompanied by an escort, which almost doubles Health Canada's cost for the visit to a doctor. An average trip, when escort costs are considered, would cost over $3,000. 105 tele-health consults in Fort Severn in one year alone avoided Health Canada 'uninsured' travel costs of almost $160,000.

Health Canada spent $20 million, almost $80% of it total 2002/2003 Sioux Lookout Zone budget, on this 'non-insured' travel. Health Canada's Primary Care Transition Fund accepted KOTH's business case, which estimated that approximately 20% of doctor/patient consults would be done by tele-health within three years of the introduction of the service. Projected annual 'cost avoidance' for the 10 public benefit supported First Nations would therefore be over to $1.5 million. As access to health care improves through tele-health, people in remote communities are more likely to see a doctor when they are sick. Non-insured travel would therefore decrease by somewhat less than the costs avoided. Improved health care is overdue in these communities. One reason given for Canada slipping from the number one to the number four place to live in the world, according to the United Nations, was the living conditions of Canada's indigenous people.

The Department of Indian Affairs pays KiHS approximately $10,000 per student per year on its nominal roll, which KiHS is then responsible for investing in school operations. The Department states that this is the amount it also pays to area boarding schools operated by the Northern Nishnawbe Education Council (NNEC). KiHS, however, avoids approximately $10,000 per student per year for room and board, travel, social counseling and other expenses which the Department pays for students attending boarding school. KiHS avoided education costs of $3.9 million while educating 386 students to June 2004. KiHS has had a very difficult time establishing its innovative teaching model within the educational structures and policies of the Department of Indian Affairs. KiHS continues to lobby the Department of Indian Affairs to develop policies that reflect the realities of ICTs in the classroom, cyber-education and the needs of community-based teaching models. KiHS is challenged by the fact that the Department bases its funding on a static nominal roll. While this reflects the needs of conventional educational institutions, it's a funding policy that is unfair and challenges the sustainability of KiHS. Unlike most secondary schools where the Aboriginal population decline as students drop out and return to their home communities, the KiHS student body actually increases throughout the academic year. The needs and realities of cyber-education and community-based initiatives are not reflected in the education funding policies of the Department of Indian Affairs.

Artists and crafters market their goods on the web directly to the world crafts without the cost of a middleman. Fort Severn has created a web site to market its wilderness polar bear experience. Some First Nations youth are receiving their education in the south and because of broadband services available in the north are returning home and taking their "city jobs" with them. Multimedia technicians living in remote and isolated satellite-served communities are winning contracts from urban-based organizations.

6.5 Social Enterprise

Each community is responsible for its own operations and maintenance and purchases bandwidth at wholesale prices from K-Net Services. The local community network provides IT services to its members at a rate which the market will bear. K-Net Services assumed the role of negotiating with different service providers for the communities and then enter into service level agreements. Any surpluses created by the community networks stay in the community. These surpluses can be used by the First Nations to hire IT workers or provide IT training for community members. First Fort Severn, then Slate Falls and then other satellite-served communities were able to establish their own community-owned and operated networks. These communities included the following First Nations: Cat Lake, Sachigo, Weagamow, Kasabonika, Webequie, Eabametoong, (Fort Hope), Neskantaga (Lansdowne House), and Muskrat Dam. With the control and management of community networks, each First Nation can set its own individual priorities for ICTs and profit from any surplus created by usage. Profits created in the communities remain there.

KRG has established a municipally owned entity that operates the 14 community wireless ISPs. They have 600 customers after three months of operation.

6.6 Employment Opportunities Created

The C-Band Public Benefit has created a number of employment opportunities in the satellite-served communities. The Keewaytinook Internet High School has an economic impact on the satellite-served communities. Historically, students left their communities after graduating from Grade Eight to attend high school in urban communities in the south such as Sioux Lookout and Thunder Bay. The federal funding for education therefore flowed directly from the Department of Indian Affairs to either a provincially run board of education or secondary schools run by First Nations organizations. Little if any economic impact was felt in the communities. KiHS has changed this situation. KiHS employs a teacher, a computer technician and in where numbers warrant, a teacher's aid. Most of the teacher's aids and computer technicians and at least three of the teachers are band members who are residents of the KiHS communities where they work. These salaries, largely, stay in the communities and stimulate demand. The community-born teachers also provide KiHS students with role models, a critical factor in the determination of Aboriginal academic achievement levels. Similar employment opportunities have been created by KOTH and the Community Telehealth Coordinators (CTCs).

The table below outlines 66 fulltime and 6 student intern positions created to deliver ICT related services. The total annual salary paid to these IT workers is approximately $3 million. This is a significant economic boost to 24 remote communities with a combined population of approximately 15,000. Salary and ICT operating costs are offset $5.4 million in costs avoided as detailed above for only two ICT applications. KiHS not only gave parents and students the choice of a grade 9 & 10 education in their home community, it created jobs for a teacher and classroom assistant in each of 6 satellite served communities. KOTH employs a part time tele-health coordinator in each of 10 communities. Almost 30 technicians have been employed and have acquired marketable IT skills. Four Ontario communities operate combined Internet/ cable TV businesses.

Employer	Position	Salary	Satellite-Served Communities	Total
Keewaytinook Internet High School (KiHS)	Teacher	50,000 per annum	651	300,000

[51] KiHS teachers are employed in the following satellite-served communities: Fort Severn, Sachigo Lake, Eabametoong (Fort Hope), Webequie, Weagamow, and Cat Lake.

	Teacher's Aid / IT Technician	30,000 per annum	652	180,000
Keewaytinook Okimakanak Telehealth (KOTH)	Community Telehealth Coordinator (CTCs)	15,600 per annum	1053	156,000
Youth Employment Initiatives (YIT)	YIT workers	$350 per week X 10 weeks	6	20,000
First Nations	E-Center Manager	35,000	154	35,000
	E-Center Techs	28,000	155	28,000
Keewaytinook Okimakanak	Payroll Clerk	32,000	156	32,000
First Nations	Community Network Technicians	26,000	10	260,000
K-Net	Satellite Network Technician	55,000	1	55,000
KRG	Satellite Network Technicians	55,000	2	110,000
KRG	Community Network Technicians	30,000	14	420,000
KRG	ISP sales etc staff	26,000	14	364,000
				3,000,000

6.7 Outcomes Recognized by Five Communities in Ontario's Far North

While all of the partner communities have agreed to pool the additional bandwidth made available by the C-Band Public, each community has developed different strategies to use ICTs to address the challenges facing their peoples. To assess the new community capacities developed within the communities as a result of the public benefit, five satellite-served First Nations have been selected to showcase the changes. These communities include Fort Severn, Slate Falls, Eabametoong (Fort Hope), Weagamow and Webequie First Nations. Each highlight different lessons learned and demonstrate best practices experienced at the community level.

6.7.1 Fort Severn: Supporting Local Economic and Social Development On-line[57]

Community leadership and a comprehensive training program has played a fundamental role in the rapid growth in the use of Information Communication Technologies (ICTs) in Fort Severn First Nation. ICTs have touched almost every individual in the remote and isolated community on the shores of Hudson Bay in Ontario's far north. It has certainly changed the way that business is

[52] IBID.
[53] KOTH operates or will operate in the following satellite-served communities: Fort Severn, Sachigo Lake, Eabametoong (Fort Hope), Webequie, Cat Lake, Slate Falls, Muskrat Dam, Kasabonika and Neskantaga (Lansdowne House).
[54] Fort Severn
[55] IBID
[56] The payroll clerk for Keewaytinook Okimakanak lives and works in Fort Severn. She is able to carry on with her day to day duties because Fort Severn has broadband services. She is currently on a leave of absence.
[57] Click on http://smart.knet.ca/satellite/fortsevern.html

conducted by the band administration. It also has transformed the way people conduct their personal communications.

Like their urban counterparts, Fort Severn youth use email and their web pages as tools to meet other young people and to tell their stories. Several young people in the E-Center agreed that the 'Net provides them with a powerful way to establish and maintain relationships. Youth are not the only people using the 'Net to communicate. Parents use their email and web pages to communicate with their children attending school in the south. Elders who cannot use access the 'Net directly press their children and grandchildren into completing various forms, make purchases and access other community services on-line. "Its more fun and sometimes cheaper to buy things on-line than to purchase them at the Northern Store," said George Kakekaspan, a former Chief of Fort Severn.

Kakekaspan, personifies both the kind of champion that has made Fort Severn an ICT leader in the region and a community member who "walks the ITC walk" Like many community members, ICTs are tools that George uses every day as a senior manager in the Fort Severn administration office. He uses the 'Net to book hotels and airline tickets. After work, he goes home where he does his banking and much of his shopping on-line. Since the school was closed due to mold infestation, his family moved to Thunder Bay so his children could continue with their education. He uses a video cam so that he can see his spouse and children so he can stay in touch. His children are not the only ones going to school. The 'Net allows his spouse to continue her studies Early Childhood Education at St. Lawrence College on-line. She started the program when the family was living at Fort Severn. In spite of the need to move their family due to the school's mold contamination, her post secondary education was not interrupted.

Access to ICTs has provided Fort Severn community members with a new tool to promote and preserve their traditional language. As part of First Nations SchoolNet, Fort Severn has been provided with training and equipment to produce digital videos that can be broadcast on the 'Net. Using a GPS and other ICT tools, Fort Severn Elders and Youth recorded their experiences arising from two Wahaso canoe expeditions along major river systems in their tradition territories. The working language during the two trips was Cree. During these trips, Elders shared their knowledge, wisdom and historical experiences with the young people of Fort Severn. While ICTs are being used to preserve and promote the past, they are also improving community participation in the present and the future. These digital videos are popular programs on the community cable TV station.

Located near the shores of Hudson Bay, weather is a factor of everyday life that often makes it difficult for Elders and young families to attend band meetings, especially in the winter months. The E-Centre team has utilized its ICT tools to make band meetings more accessible for band members. The E-Centre facilitated the broadcast of a band meeting over the community cable television station using its digital video camera. Community members at home were encouraged to phone in their questions. "It was one of the best community meetings that we ever had. Most of the time, you have three or four people speaking at once. With the phone-in, the leadership could hear the questions and had plenty of time to answer them," Angus Miles, the E-Centre technician said.

ICTs have had a dramatic impact on other aspects of the band office operations. Most of the internal communications are conducted with email and IP "voice-over-Internet" phones. The office is virtually paperless. All forms are electronic and are protected by a firewall. Students applying for funding to attend college or university or community members seeking welfare benefits must do so on-line. "Almost half of the community members have most of the necessary skills to use computers, the Net and a variety of software, those who do not, like Elders, know someone who had those skills who can help them fill out the forms electronically," Madeline Stoney said. "Since many of our Elders do not speak English, they would still need help to fill out paper forms so electronic forms are not much more inconvenient." Deputy Chief Brian Crowe, a commercial pilot, says it would be hard to imagine Fort Severn without access to the 'Net. "Almost everything we

do involves ICTs. Much of the office is paperless. All of the forms and most of the paperwork is done on-line. The only paper that leaves this community are letters to the Department of Indian Affairs," he said.

ICTs have changed the way people pass their free time. The community television cable station provides Fort Severn with many entertainment options from movies, to sports and news. It also operates a community station that provides news about local events. The station also broadcast Cal Kenny's documentary about the Wahaso canoe expeditions that saw Elders and Youth "back to the land" to explore parts of their traditional lands.

Chief Roy Gray credits ICTs with attracting media attention to one of the major challenges facing Fort Severn. In February 2004, a critical infestation of mold was discovered in the basement of the community school. An engineering report recommended that the school be condemned in 2001. Since then, the situation has deteriorated dramatically. Acting on the recommendations of another engineering study that identified at least three types of mold dangerous to human beings, the Chief and Council ordered the closing of the school in March 2004. Chief Roy Gray, his senior staff and community members have conducted a series of meetings with INAC officials over the crisis but little progress has been made. However, a CBC TV crew arrived in Fort Severn in December 2004 to cover the school closing. David Common, the reporter, said that the CBC discovered the story on the K-Net news services. "K-Net News is one of web sites our research department checks out looking for story ideas" he said. Chief Gray says the 'Net provides Fort Severn not only with a "window in the world" but a means to tell our stories and pressure decision-makers to change policies.

Ken Thomas, the Director of Education, says access to the 'Net has had a tremendous impact on Fort Severn. He says elementary school students use computers and the Internet in the classroom. Fort Severn students have the option of remaining home for grades nine and ten through KiHS, KO's Internet High School. "This is an important application that addresses the concerns of many parents in our community who do not want to see their children leave home at such an early age." He says he is especially interested in seeing the 'Net as a tool for our youth to explore their artistic abilities. "There are many artists in this community who just have not had the training to explore their talent. I want to use the 'Net as a tool to train our youth people to use their talents creatively," he said.

The Fort Severn E-Centre has changed dramatically since it opened. Its original mandate was to provide a point of presence and train community members in the use of computers, email and other ICT applications. "It was once the centre of all Internet activity here," said Madeline Stoney, the E-Centre Manager at Fort Severn, but now so many people are trained and so many people have access at home that fewer and fewer people use the E-Centre." She says people still drop in from time to time but most of the time people just email. "Without the 'Net, we'd be pretty isolated," she said.

6.7.2 Slate Falls: The power of partnerships: "We're not remote anymore"[58]

Slate Falls First Nation may not have year-round road access today but telecommunications means that the small First Nation north of Sioux Lookout is no longer isolated, according to community member, Lorraine Crane. "Everything has changed," she said. "Before we had one phone booth to serve the entire community. Now, we can shop, bank and do just about anything on-line."

Chief George Bunting agrees that community members have many more options now that his community is connected to the rest of the world through the 'Net. "Last night, my daughter showed me how to bank on-line." He says this is only the beginning. Slate Falls is a satellite-

[58] Click on http://smart.knet.ca/satellite/slatefalls.html

served community with a single Bell Canada pay phone, a C-Band earth station, IP video and IP telephone service.

Slate Falls First Nation has a population of about 130 members on reserve in the winter and over 200 in the summer. It is one of many remote fly-in First Nations in Nishnawbe Aski Nation. Until recently, if you wanted to make a telephone call you had to stand in line near the single outdoor phone booth in the community. There was no business case to provide better telecommunications service until Windigo First Nations Council, in partnership with K-Net, introduced ICTs into Slate Falls through a variety of Industry Canada programs. Slate Falls was selected as one of the first Community Access Program (CAP) and First Nations SchoolNet sites in the Windigo tribal region. It had access to the 'Net six years before it had residential telephone service.

A year ago, Industry Canada officials saw first hand the need for telecommunications in Slate Falls. In January 2004, Ross Macleod, at that time Director General of the Information Highway Applications Branch, flew to Slate Falls to meet with the leadership and community members. Macleod is one of the most senior government official to tour the community. He was responsible for most of the Industry Canada programs that have been used to connect the community to the 'Net including FedNor, Smart, BRAND, SchoolNet, CAP, NSI and others. Carl Seibel, Telecom Projects Officer, as well as members of Windigo Tribal Council and K-Net accompanied him. The tour included application demonstrations and discussions about the importance of connectivity, broadband applications and adequate telecom infrastructure in First Nations across the province. Dan Pellerin, K-Net's Network Manager, said it was a positive experience. "It helped them to understand that people will use technology when they have access and they saw real needs being met by the technology," he said.

Later that spring, Slate Falls in partnership with another First Nation and the Windigo First Nations Council, was approved to implement its plan to provide broadband connectivity to residential users. This was the second phase of a two-phase project that earlier has seen broadband connectivity link the band administration and other agencies on reserve to the 'Net and to IP telephone service. This past spring, Industry Canada's Broadband for Rural and Northern Development (BRAND) program and FedNor, announced that Slate Falls would be funded to expand its telephone system by connecting all the buildings in the community to their new local cable network.

The migration project was a partnership between Slate Falls, Muskrat Dam First Nation, Windigo Tribal Council, Blair Electronics and K-Net Services. By July, Dan Pellerin, K-Net's Network Manager and Bill and Ivan Blair from Blair Electronics traveled to Slate Falls to meet with community leaders and band staff to discuss the installation and operation of their local community broadband network. The team needed to determine the best hub location and construction requirements for their new local community cable system. Slate Falls has hired local staff to support and manage this local economic development initiative on an ongoing basis. Crane says community members are quite excited now that contractors are working in the community connecting the houses to the network. "People here really like the options available as a result of Internet access. However, these IP phones sometimes go down during bad weather. People get pretty frustrated when they can't use their phones," she says.

Debbie Korobanik, the Finance Advisor for the Windigo First Nations Council, says the introduction of ICTs will play an important role in the economic development of Slate Falls. In addition to owning and operating its own Internet and telephone service, Slate Falls will be using the 'Net to promote and expand its successful tourism business and Bamaji Lake Airlines, its charter service. "The 'Net will also play a role in the development of its forest management plan and land use plan," she said. Slate Falls is working in partnership with a local forestry company to provide employment in the logging industry over the next five years.

Sarah Mitchell, Education Coordinator, says access to the 'Net increases the efficiency of doing productive work, particularly with videoconferencing and internet technology. "The school staff and students," she says, "plan to develop a school web site and individual web sites with the usual monitoring and directed programming. Keewaytinook Internet High School provided much of the catalyst for increased internet services when Slate Falls first joined this service for a two year period. However, the local KiHS classroom has since shut down due to a lack of grade 8 graduates.

Ruby Bighead, Health Director, says information, particularly information on health and public health issues are more available now that Slate Falls is connected to the 'Net. "Information is readily accessible, particularly in the area of medical consultations and the state of personal health of family and friends in medical facilities," she said.

The installation of IP phones and broadband technology in Slate Falls community homes is expected to be completed by March 2005. In addition, KO Telehealth is expected to be available by February. So much has changed in Slate Falls as a result of the introduction of ICTs. There is new equipment, new ways of doing things and new attitudes. "We're not remote anymore," Lorraine Crane explains.

6.7.3 Weagamow: Making education opportunities available in satellite-served communities[59]

Weagamow First Nation, also know as North Caribou Lake, embraced the use of ICTs even before KO's Internet High School (KiHS) was introduced into the community more than three years ago. While some community members had access to the 'Net through such private operators such as Bell Sympatico, access was neither affordable nor dependable for most people prior to KiHS connection. The establishment of a KiHS classroom along with the broadband satellite connection into the community changed all that.

Director of Education Saul Williams says once the KiHS connection was established there was tremendous pressure to extend internet access throughout the community. "Everybody wanted community access. There was not just one champion pushing for this. If I had to name just one, it would have to be Roy Sakchekapo," he said. "But everybody wanted it."

Once the KiHS connection was in place as part of the Windigo First Nation Broadband funding proposal in partnership with K-Net Services, community offices such as the band office, the nursing station and the Nishnawbe Aski Police Services were provided with a DSL connection from the local point-of-presence. A dial-up server in the band office was added that provided residential access for $25 a month. The fees help pay for the network connection and the cost of the phone lines. Up to six lines can be connected to the internet at once using this server. On average, the server provides seventy-two hours of use per day with approximately seventy connections a day. The heaviest usage, not surprisingly, occurs between 7 pm and 10 pm. North Caribou, however, still has not completed its last digital mile with connections to all the houses. People wanted more. Not everyone could afford the monthly fee. Not everyone had either a phone or even a computer. Upon hearing about the E-Centres in KO communities, North Caribou members decided that their community needed one too.
The establishment of the North Caribou E-Centre faced many obstacles. There was no funding available for a building, for computer equipment or even for connectivity. Still, community members pressed ahead. The Christian school donated a server and the band office offered a dozen broken computer parts which were stored in a warehouse. Lyle Johnson, a KiHS computer tech / classroom assistant used the parts and rebuilt four computers. Still, a building was required. Community members inspected the old Wahsa classroom but it required too much renovating and they had no funding. Someone suggested that the Drop-In Centre allocate space for the E-Centre. It had a paid staff member, adequate floor space and an established track

[59] Click on http://smart.knet.ca/satellite/weagamow.html

record of usage. The North Caribou E-Centre now provides connectivity during regular office hours to band members in the community.

The KiHS classroom in North Caribou has undergone substantial expansion since its creation three years ago. Last year, it provided Grade Nine and Ten credits for 21 students, seventy-five per cent of whom began their high school education in the south. On average, KiHS students earned between four and five credits per student in the KiHS North Caribou Lake classroom. North Caribou students enjoy working with the various ICT tools available at KiHS. James Benson is preparing for a career in this field. After school during the winter 2004 semester, James provided assistance to community members who are experiencing software and hardware problems with their Internet connections. Lyle Johnson, KiHS' ICT technician in North Caribou, says James has a promising future with a career in IT. Kayla Williams was the first KiHS student in North Caribou to earn the maximum number of credits in her first year and won an award for best attendance during the 2003-04 school year. She tried attending grade ten in the south but returned home to complete Grade Ten in North Spirit Lake. She is currently exploring options to continue her high school education while remaining home. David Beardy was labeled as a special needs student while living in Kenora. After his family returned to North Caribou, he continued his studies at KiHS. He has used ICTs to overcome the obstacles that prevented him from succeeding in a conventional classroom. Georgina Jones, the KiHS teacher, is especially pleased with David's progress. "He has overcome great odds and has succeeded beyond everyone's expectations," she said. "We are all very proud of him."

Students, staff and teachers are looking forward to the addition of new applications such as voice-over internet phones and videoconferencing this fall. Former M.P. and Chief, Elijah Harper famous for his stand during the Meech Lake Accord has agreed to speak with KiHS students via videoconference. See the classroom's new website at: http://weagamowkihs.firstnationschools.ca.

Much has been achieved with connectivity but much more needs to be done. North Caribou students were not able to effectively participate in the Grade Eight Supplementary Course provided by First Nations SchoolNet. There was a shortage of both computers with Internet access and bandwidth. Both of those issues are now being addressed. First Nations SchoolNet provided new equipment for the Native Sena Elementary School Computer Lab and the bandwidth issue is being addressed by the new satellite service being supported by K-Net. Chief Zeb Kenequanash says this is only the beginning. "We need videoconferencing and other things that the internet can provide. This is a powerful tool but we need more access and more training to use it effectively. People are still afraid of the technology but as they know more, their fears go away".

North Caribou also known as Round Lake or Weagamow Lake is a remote First Nations community located 500 kilometer northwest of Thunder Bay via air. In addition to KiHS, North Caribou is part of the KO Telehealth expansion.

6.7.4 Webequie: ICTs from the Ground Up: Grassroots Demand Pushes Expansion and Growth[60]

Chief Scott Jacob of Webequie feels that access to the ‘Net is an essential part of the infrastructure of any remote and isolated First Nation in Ontario’s far north. “With the Internet came a lot of new things to our community. Technology is really moving us forward,” he said. “I use it everyday to communicate, conduct research and to stay on top of political and economic events that could impact on my community.” The Chief says he cannot imagine a day without access to the ‘Net. “There are a lot of research opportunities. I can communicate more effectively and my correspondence is easier and faster,” he said. “Things get done a lot faster,” he added. Chief Jacob finds email a more useful communication tool than the telephone. “I don’t have to rely

[60] Click on http://smart.knet.ca/satellite/webequie.html

on the phone to contact anyone. I can get my message across to the band employees whether they are at their desks or not."

Chief Jacob says the Internet is one the most effective ways to seek out funding opportunities and grants. "We get a lot of our information regarding available programs that the community can use. On line applications also make things a lot easier." He says he saves time and money on travel with the Internet and videoconferencing. "We can reduce expenses by utilizing the technology."

Broadband cable internet was installed in Webequie though the existing cable system in 2002 by a partnership between the community, Blair Electronics and K-Net Services with funding support from Industry Canada / FedNor. Prior to the introduction of broadband, the community had dial-up service. It was slow and unreliable. The point-of-presence (PoP) was the Simon Jacob Memorial Education Center, the local school. The school was connected to the "Net through a satellite dish. It provided only four outside lines to the community. Webequie also was approved as a Community Access Program (CAP site). The community had five computers on-line in the Distance Education classroom. "Back then, we were forced to have time limits for members accessing the 'Net", said Ennis Jacob, the Education Director. With more bandwidth and better equipment, Chief Jacob estimates that at least sixty percent of the houses on-reserve have access.

Paul Capon, a Political Advisor with Matawa, says Webequie is a role model for other First Nations which want to improve access to the 'Net. "At first, access to the 'Net was limited by necessity to the leadership in Webequie, elected and technical. However, the members quickly recognized the power of the 'Net and they wanted access too first through the CAP site and later though home access."

Lillian Suganaqueb, Webequie's Health Director says demand for better and faster service is generated by grassroots community members who are realizing the power of the 'Net. "Until recently, only a few people had access. That's changed in the last couple of years. Now everybody is demanding better and faster service." She has some concerns about the growing use of the 'Net in Webequie. "Over the holidays, there was a sharp decline in those who were participating in the Christmas activities. The organizers believe that people were too busy being on-line. They even threatened to shut the internet down to get more participants out to community events." Suganaqueb adds many people are concerned about some of the negative influences available on the 'Net and believes that the community should study ways to limit the more harmful material and prevent access to the most objectionable web sites.

The next priority for Chief Jacob is to connect the remaining houses in the community. "There is a demand for more access from people who don't have the service at homes." He also wants to hire an on-call computer/IT technician to maintain the community network. He says the community members want more computers in the CAP site. Becoming a partner in KO Telehealth is also a major priority for Webequie, he says, however, currently they have neither the space to house the program or adequate bandwidth to support the extra usage. "Telehealth," he says, "is something the community needs."

One of the greatest challenges in the future will be to ensure that traditional First Nations values of sharing are maintained and promoted in the way the 'Net is used . "The technology should be used for the benefit of everyone," said Lillian Suganaqueb.
For more information, see the community website at http://webequie.ca

6.7.5 Fort Hope: Access Increases Demand for even more Bandwidth[61]

[61] Click on http://smart.knet.ca/satellite/eabametoong.html

Eabametoog (Fort Hope First Nation) was one of the first Matawa Tribal Council to venture into the digital world through an early CANCOM connection. Many members of the community have embraced the 'Net as a tool both for work and recreation. That is one of the problems. "We have three videoconferencing units, one in the band office, one in the nursing station and another in the school," said Andy Yesno, the Capital Planning Manager, "unfortunately, if we want to use any one of them, we have to virtually shut down Internet access to the entire community." He echoes the comments of many of the remote and isolated First Nations who hunger for more bandwidth.

"Fort Hope has had to struggle and sacrifice to create and maintain a strong community network," according to Paul Capon, a political advisor with the Matawa Tribal Council which Eabametoong is a member. He believes much of the First Nation's success with ICTs is due to the fact that the community has owned and operated its own community cable TV station for many years prior to the migration of the 'Net and a strong entrepreneurial spirit. "Their experience with cable TV put them ahead of many other communities in terms of accessing the 'Net effectively," he said. "Community members were also prepared to pay reasonable user fees to access the 'Net because they had already been paying for cable TV for years," he added. Strong community support made it possible for Eabametoong to seek bank financing to expand its Internet network with capital and operations infusions, however the need for more bandwidth prevents the First Nation from fully utilizing all of the applications otherwise available there.

The first point of presence for the community was through the school through CANCOM, however, the community wanted better access. In response, it established Fort Hope Cable TV Incorporated in 2002 as a community-owned and operated business initiative. It soon was responsible for operating the Internet network. It was a vast improvement in service over dial-up according to Noreen Missewace, the manager of the local cable TV station.

"Bandwidth is a major factor that holds us back," Yesno said. "We have plenty of hardware and know-how in Eabametoong but forget about getting on the 'Net after the school is over and the offices close for the day," he said. The community has explored ways to purchase more bandwidth but the costs are prohibitive. "People are willing to pay user fees but there is an upper limit about what they can afford. Right now, they are paying for an Internet connection and cable TV. Some people are paying $60 per month," said Yesno.

One project in particular demonstrated how ICTs could benefit the entire community. Shortly after Eabametoog was connected, the school started a community-based GPS map making project that documented the traditional lands of the First Nation. It was a project that generated much excitement introducing many community members including Elders, women and youth to the digital map making. "After years of hiring various outsiders to undertake this kind of work, the community discovered that they could do much of it themselves if they had the right training and support," said Mattawa's Capon.

One of the most popular ICT applications used by Eabametoong members, according to Capon is personal web sites. "People love their personal web sites. Some are quite sophisticated," he said. "Those who really know what they're doing are willing to share their knowledge with other community members," he said.

Sharon Allen, Eabametoong Education Director, says access to the 'Net has changed the way education is conducted in the community. "The Internet is a useful tool in creating awareness for our community and we have created a website for that purpose http://eabametoong.firstnation.ca/ It is also useful for teacher recruiting," she said. Unfortunately without additional bandwidth, Eabametoong may have to close its KiHS classroom forcing many students to go south to either Thunder Bay or Sioux Lookout if they want to continue their secondary school education. Eabametoong will soon be connected to KO Telehealth. "Currently our nursing station is equipped to provide telehealth but our nurses use the telephone for consultations," said Yesno.

There are concerns that telehealth will put greater demands on bandwidth that will limit access for the rest of the community.

In spite of the demands for more bandwidth, Eabametoong is turning its attention to economic development opportunities on the 'Net. Youth are lobbying the leadership to establish a Cyber Café in the community. The local hotel is already connected with broadband and it is proving popular with visitors.

7 Conclusion

7.1 New Opportunities Created

The C-Band Public Benefit is changing expectations in the satellite-served communities in Ontario's far north. Parents no longer expect their children to leave their home communities and go south after they graduate from elementary school. Broadband services in the satellite-served communities mean that young people have the option of remaining at home and not sacrifice their educational goals. The Keewaytinook Internet High School means people have choices. The sick and the injured no longer expect to receive diagnosis and treatment in the south. Broadband services mean that people can access physicians and specialists via Keewaytinook Okimakanak Telehealth. They no longer have to wait for a doctor to conduct fly-in visits or see the physician on call rather they have a wide choice of health care professionals in Winnipeg, Thunder Bay, Toronto and beyond. Dollars which had previously been allocated for travel and lodgings can now, with broadband services, be reallocated towards initiatives that will allow communities to address the challenges facing them, if the political will exists to change funding policies.

Access to such applications as videoconferencing encourages people in satellite-served communities to participate in a growing number of workshops and conferences available on-line. People in the satellite-served communities have enthusiastically embraced the new applications made available as a result of the C-Band Public Benefit that many in the terrestrially served communities had come to expect. These First Nations communities in Ontario's far north have shaped these new applications to address their own needs and challenges and most importantly, they have reached out to share their knowledge and experience with others across the Digital Divide.

7.2 Industry Canada's Strategic Investment

When Telesat Canada applied to Industry Canada for their new orbital space for their next generation of satellites, they included two public benefit transponders as part of their investment in their business. The cost of these transponders is worth approximately $10 million each for the life of the satellites. By making this resource available to regional satellite connected groups and remote communities across the country, Industry Canada and Telesat Canada began a development process that is unparalleled. In the thirteen satellite-served First Nations across northern Ontario, over $10 million has been invested in infrastructure development since the start of this initiative to bring broadband connectivity solutions and applications to these remote communities. In northern Quebec, another $5 million is now invested in strategic infrastructure in that is connecting fourteen remote communities with the rest of the world. In northern Manitoba, the cost of including ten satellite-served communities is now costing over $1 million. Programs and services are resulting in millions of dollars being invested by other partners in utilizing these new resources. Digital highways are now being developed and utilized to carry information, services and understandings that support remote communities to take their rightful place in the Canadian mosaic.

7.3 C-Band Public Benefit: A tool for social change

Few federal policies have such a profound impact on First Nation communities in Ontario's far north. The additional bandwidth means members of the ten satellite-served communities in northern Ontario have new tools to address the challenges that have confronted them for

decades.[62] It increases educational opportunities. It means better communications. It creates better access to physicians, specialists and other health care professionals. Industry Canada's C-Band Public Benefit means local people have unprecedented employment and entrepreneurial opportunities as ICT technicians and other IT careers. The additional bandwidth means opportunities for young people to carry their education and their jobs back home. Few federal policies have had such a dramatic impact, so quickly and so comprehensively. It will be years before the full impacts will be fully realized or understood.

[62] Satellite-served First Nations in Ontario's far north that benefited from the C-Band Public Benefit include: Fort Severn, Sachigo Lake, Eabametoog (Fort Hope), Webequie, Weagamow, Cat Lake, Slate Falls, Kasabonika and Neskantaga. The tenth community Muskrat Dam will come on-line in April 2005.

Appendix A: K-Net, an Early Adopter of ICT

The structure and development of Kuh-ke-Nah Network (Knet Services) prepared Keewaytinook Okimakanak for the opportunities created by Industry Canada's C-Band Public Benefit. In the years leading up to the announcement, Keewaytinook Okimakanak had undertaken a variety of telecommunications initiatives that laid the groundwork for the successful utilization of this additional bandwidth. As early at 1995, KO was working to ensure that all of its First Nations communities had equal access to reliable telephone, fax and computer services. It was building a broadband connection between local knowledge and economics to the rest of the world. As early as the mid 90's, KO was using telecommunications to support community development, education, health and well being. By October 1996, KO began the installation of satellite–band Internet workstations in its communities. As a priority for KO, computer networking was extended to on-reserve community schools. It was an investment of $95,000 per year.
Always willing to work with other First Nations, KO shared its knowledge and experience with telecommunications with other Aboriginal groups outside of its tribal council. Soon, distributed support for users and technology was provided to the sixty Nishnwbe Aski First Nations whose territory occupies much of Ontario's far north. Telecommunications provided educators and students with a powerful tool to address the growing "grade gap" that exists between Aboriginal and Canadian students. More importantly, it also created a "window on the world" that allowed KO students to share their stories and experiences with anyone with a computer and an Internet connection.

Another pillar that prepared KO members to fully engage in the C-Band Public Benefit was the concept of community networking. KO began Community Area Networks in February 1997 when Internet access was extended to nursing stations, band offices and Nishnawbi Aski Police detachments. The Community Area Networks remain one of the cornerstone of local control and management of telecommunications in each of the partner First Nations. Technical support was provided at a distance by Knet Services at Sioux Lookout, Ontario. Soon wireless networking technology was developed and installed. Local community access sites provided email and web browsing for local people. It was a public investment of $620,000.

By 1998, KO communities were going digital. Digital upgrades were completed in Poplar Hill First Nation and Deer Lake in 1999. Funding for Fort Severn First Nation's upgrade was secured and partial funding was approved for Keewaywin First Nation during the same year. The total public investment was $3.1 million in addition to a $5.4 million contribution from Bell Canada. These upgrades established Keewaytinook Okimakanak communities as leaders in First Nation digital broadband development in Canada.

Importing new technology, however, was not enough. Capacity building at the local level was essential. Local people were trained in network support and use of computers. Training was never limited solely to members of KO communities. Fifteen people outside of the tribal council were trained in telecommunications by Knet Services. Since 1998, on the average of 2.5 KO community members have been trained in network support and computer usage annually, many of these people have become community champions or peer to peer trainers in their First Nations. The total investment totaled $1.1 million dollars. This philosophy of capacity building has prepared local KO members to participate in the knowledge-based economy.
Community-based planning and meaningful consultation ensured local "buy-in" and "a sense of ownership" at the local level. In 1998, a telecommunications study on the communities north or Red Lake identified gaps, needs and local telecommunications usage. In response, a submission was prepared for the Canadian Radio and Television Commission (CRTC) that recommended a special subsidy be created for remote and First Nations communities. Keewaytinook Okimakanak clearly demonstrated demand and provided workable solutions supported by local First Nations communities. A favourable reception at the CRTC encouraged Knet Services to create a design and business plan for a broadband network connecting KO communities. It also piloted the first telehealth demonstration projects in KO communities. Industry Canada's Smart Communities program provided Keewaytinook Okimakanak with the necessary resources to

create new applications such as the Keewaytinook Internet High School (KiHS) and KO Telehealth but it was not enough. These applications demanded much bandwidth and could not be provided in satellite communities such as Fort Severn and Slate Falls unless more bandwidth became available. In response, KO began working with Telesat Canada, Industry Canada, and FedNor in 1998 to find a solution for delivering broadband services to Fort Severn. The following year, FedNor provided KO with funding for the installation for earth stations in Fort Severn and a Sioux Lookout hub utilizing Telesat R&D bandwidth to connect Fort Severn to services delivered from Sioux Lookout. By 2000, KO's earth station in Sioux Lookout was supporting broadband connection and applications to Slate Falls First Nation and Anaheim Lake, British Columbia with funding from FedNor and Industry Canada's Smart Communities Project. In 2001, Industry Canada announced a competition for a satellite orbital position license (118.7 West) that included a requirement for a public benefit as part of its evaluation criteria. The C-Band Public Benefit was to be made available at no charge for use by public institutions in remote regions of Canada. Telesat applied to Industry Canada for the orbital space for Anik F3 with support from Keewaytinook Okimakanak. The application included in part for the provision of two transponders to Industry Canada for public benefit applications. KO presented a business case to Industry Canada to use the first transponder available on Anik E2. In January 2002, Industry Canada approved KO's application to access the first public benefit transponder on Anik E2, its original satellite and assisted neighbouring tribal councils to establish earth stations and connections to band buildings in six remote satellite served First Nations in the Sioux Lookout district. In February, Telesat announced its partnership with Keewaytinook Okimakanak to use the public benefit transponder on E2 for community applications with an 18mhz allocation from Industry Canada.

Appendix B: FedNor Contract

Statement of Work, Contract for Services #5004043

Keewaytinook Okimakanak (K-Net) shall develop a portion of the satellite benefit channel on Anik E2 C-Band satellite, which Telesat made available at no charge for public institutions and benefits pursuant to the licensing conditions of satellite position 118.7 West as follows:

provide bandwidth for a variety of public benefit applications, such as tele-health, education as well as other community-based non-commercial benefits in three communities - Fort Severn, Slate Falls (Ontario) and Anahiem Lake (BC) by spring 2002;

- work with other communities in remote areas across Canada who require C-Band capacity, with the cooperation of Telesat Canada, to assist them in using the available capacity for public benefit applications, such as tele-health, education as well as other community-based non-commercial benefits;
- work with Telesat Canada, Communications Research Centre Canada (CRC), Industry Canada and others toward efficient use of the benefit available to as many remote communities as feasible;

K-Net shall assist remote communities which demonstrate a sustainable plan for community wide aggregation of bandwidth demand in the execution of a agreement with Telesat Canada for C-Band service.

FedNor shall pay a maximum of $1.00 for K-Net expenses incurred in assisting remote communities in northern Ontario.

K-Net shall charge remote communities for service provided by Telesat Canada public benefit a price which is equivalent to the cost of terrestrial service to remote communities. The current price, which is based on $2,700 per month for 1.5mbps service, may be changed by mutual agreement of FedNor and K-Net. K-Net shall collect these revenues only while this agreement is in force.

Revenues raised under the terms of this agreement will be used to pay expenses incurred in accordance with K-Net's proposals dated December 5 & 11, 2001 to Industry Canada (attached) to deploy the public benefit to remote communities across Canada.

K-Net, with FedNor approval, may adjust the proposed activities and expenses eligible for payment by revenues under this agreement throughout the life of the agreement should Industry Canada determine that such changes enhance the deployment and policy objectives of Telesat's C-Band public benefits channel.

Activities and related Expenditures paid by sale of bandwidth:

Telesat Research and Development Team (estimated at $60,000 per yr)

K-Net Full-time and Part-time Staff and/or purchased expertise providing:

- Helpdesk Services for troubleshooting
- Community and Regional Business plan facilitation
- Web-based lessons learned, best practices, design options, community and partnership development activities
- review and evaluate community proposals
- broadband application development

- support to Assembly of First Nations and other political organizations to incorporate broadband connectivity
- advise and support to Tribal councils and other community agencies to develop satellite broadband business plans
- research to migrate to hardware and software protocols (TDMA, caching servers, network operating centre for example), in cooperation with Telesat Canada, Communications Research Centre Canada, Government Telecommunications and Information Services and others to increase efficiencies in bandwidth utilization
- consultation with government agencies (Health Canada, INAC, IC)
- Equivalent to 1.3 Full-time staff - estimate $80,000 - to $120,000 per year

Travel necessary to meeting contracted objectives and Telesat public benefit policy objectives
- estimated $20,000 per year

Administration (facilities, financial, management, etc) @ 15% of actual expenses above

The balance of revenues after accounting for the expenses above will be used for improvements to hardware and software protocols and other activities, which promote Telesat public benefit policy objectives. (Estimated $30,000 in year one and $260,000 in year two)

Deliverables of Contract:

The equivalent of 9 megabits/second of Telesat Canada public benefit C Band satellite capacity shall be deployed to 17 remote Canadian communities by May 31, 2003.

The equivalent of 18 megabits/second of Telesat Canada public benefit C Band satellite capacity shall be deployed to 23 remote Canadian communities by May 31, 2004.

Written reports are to be submitted quarterly complete with; an assessment of activities conducted and their effectiveness, satellite capacity deployed, communities connected and Information and Communications Technologies in use, a statement of revenues and expenses to date and an estimate of new capacity and new communities to be connected in the following two quarters. An evaluation methodology shall be developed and used to capture, and report tangible benefits of the C Band public benefit to the participating communities over time and to identify significant successes.

Schedule of Work: Reports above are to be submitted quarterly by the following dates:

Quarter ending May 31, 2002	July 31, 2002
Quarter ending August 31, 2002	October 31, 2002
Quarter ending November 30, 2002	January 31, 2003
Quarter ending February 28, 2003	April 30, 2003
Quarter ending May 31, 2003	July 31, 2003
Quarter ending August 31, 2003	October 31, 2003
Quarter ending November 30, 2003	January 31, 2004
Quarter ending February 29, 2004	April 30, 2004
Quarter ending May 31, 2004	July 31, 2004

Appendix C: C-Band Transponder Meeting in Winnipeg

Industry Canada's C-Band Transponder: A Public Benefit for Delivering Broadband Connectivity in First Nations, Rural and Remote Communities

April 22, 2002

Chariperson's Welcoming Remarks:

Ken Thomas Neegan Burnside Engineering & Technology, AFN, K-Net

- vision of broadband, NBTF
- opportunity for sharing and examining the opportunities to use these resources

Introductions

1.	Alison Rogan	CED Division, Government of Nunavut
2.	Rick Kimbell	Public Works, Iqaluit, Nunavut
3.	Glenn Steiner	IC representative in Nunavut
4.	Borys German	Spectrum Engineer with IC working with Nunavut
5.	Linda Maljan	GNWT (Yellowknife)
6.	Jacquelyn Burles	GNWT (Yellowknife)
7.	Jeff Philipp	SSI Micro (Yellowknife)
8.	Eric Eid	NWTel (Whitehorse)
9.	Wayne Boyce	Telehealth Program Manitoba (Winnipeg)
10.	Glen Collins	Project Manager, Manitoba Telecom (Winnipeg)
11.	Maurice Montreuil	Manitoba Broadband (Winnipeg)
12.	Frank Fazio	IC Business Development Officer, Manitoba
13.	Alfonz Koncan	Western Economic Diversification Program, Manitoba
14.	Sheila Engel	Manitoba Health
15.	Norma Spence	Manitoba Industry, Trade & Mines
16.	Ian Cameron	BC / Alberta Schoolnet help desk, BC
17.	Peter Boorman	Vancouver Teleport (Vancouver)
18.	Bryan Orthner	Headwaters Project (Smart Saskatchewan)
19.	Ken Alecxa	Western Economic Diversification Program, Sask
20.	Ken Thomas	Neegan-Burnside Engineering & Technology (SK)
21.	Brian Beaton	K-Net (Sioux Lookout, ON)
22.	Dan Pellerin	K-Net (Sioux Lookout, ON)
23.	Carl Seibel	FedNor (Thunder Bay, ON)
24.	Mike Collins	Telesat (Ottawa)
25.	Ed Miller	Telesat (Ottawa)
26.	Jim Hamilton	Communications Research Centre Canada (Ottawa)

27.	Patrick Haggerty	INAC (Ottawa)
28.	Jacques Drouin	Connectivity Manager, IC SchoolNet (Ottawa)
29.	Rachel Roy	Industry Canada First Nations SchoolNet (Ottawa)
30.	Will Dubitsky	Industry Canada SchoolNet (Ottawa)
31.	Rick Sellick	Neegan Burnside Engineering and Technology
32.	Gordon Cobain	Katavik Regional Government, Kuujuuaq/Nunavik (QC)
33.	Stéfane Boudrias	SOCAM (Quebec City), (via teleconference) - 3 additional participants
34.	Cindy Robbins	Smart Labrador (via teleconference)
35.	Doug Robbins	Smart Labrador (via teleconference) Glen Collin, Manitoba
36.	Bill Evans	EB Systems Limited, Winnipeg

REGIONAL PRESENTATIONS

1. Presenter: Gordon Cobain **Katavik Regional Government, Kuujuuaq/Nunavik (QC)**

# of Communities requiring satellite services:	14
# of Operational Communities with C-Band data earth stations in place	1
# of Communities using Anik E2	1
Target dates for proposed network (14 sites)	Q3 2002

Summary of Presentation: (powerpoint presentation available)

- Nunavik Satellite Communication,
- population of about 8,700, mainly Inuit people, community sizes range from 2000 to150 people
- Bell Canada only service provider delivering voice services with a maximum of 14.4k data service to connect via long distance to an ISP
- Challenges include shipping equipment to communities
- pilot project funded by Quebec government to complete phase 1 involving the installation and testing of C-Band satellite dish and applications
- established a non-profit organization to deliver high speed internet, improve access to broadband services / applications (health, distance education, gov't services, video conferencing, wide area networks, worldwide exposure for e-commerce)
- the project (Phase 1) objectives involved designing and establishing a single hop inter-community data traffic (full mesh) satellite service capable of delivering video conferencing, dynamically assigned bandwidth as required
- Outcomes: Kuujjuaq - dish in place, proof of concept established, testing and evaluation completed, demos of wireless, video conference and voice over IP completed, client evaluation of system done, and complete analyze and evaluation presented (about 200 page document)

- Phase 2: All other Nunavik Communities, targeting Q3 2002

2. Presenters: Cindy and Doug Robbins **SmartLabrador**

# of Communities requiring satellite services:	11
# of Operational Communities with C-Band data earth stations in place	10
# of Communities using Anik E2	10
Target dates for proposed network (23 communities)	UP

Summary of Presentation: (powerpoint presentation available, handout in package)

- 41 sites in 23 communities plus 2 communities in NFLD
- clinic and public access sites established in each community delivering internet access, video conferencing, telehealth (making up about 1/2 the project), every health site but one connected today
- Labrador consists of about 30,000 people, 32 communities with 4 to 14 people in the smallest communities, the SmartLabrador network is serving communities ranging in size from 65 to 10,000
- objective is to deliver equal access no matter where you live
- seeing changing to the region with the introduction of a new road along the south coast connecting some of the communities in this part of the region but the communities in along the northern coast are remote
- Goose Bay (service centre for the region) and Labrador City are considered urban providing links to the smallest centres across the region
- the network consists of a hybrid solution consisting of satellite, terrestrial and local wireless technologies
- Board of Directors are community development folks with the project being developed by the regional economic development board, the project is built on models proven by these groups with a focus on community-based learning
- Training of volunteers at sites for video conferencing, network of volunteers
- Partners include educational institutions
- Sample applications already utilizing the network include meetings of cancer support groups, literacy groups wanting to get together, contacting other groups, teachers testing students, virtual student exchange with England and North coast students (now interested in getting connected to neighbouring community)
- Half sites in schools, video conferencing and public access (now the other schools are interested in getting connected)
- Smart services include telehealth, court services, education, video connections to Gov't departments in Goose Bay and St. John's
- Labrador residents committed to their own communities, train-the-trainer, building a learning network along side the technology network, take off
- link to St. John's - telemedicine and St Anthony
- 11 by satellite and the others by frame relay, wireless used between the communities and within the communities, miles between the communities,

Lucent technologies
- telecom partners are Alaint and Telesat
- separate bandwidth, 512K for video and internet providing 128K outbound on separate channels (Internet traffic share a common inbound channel 768K)
- same strategy for frame relay service with 128k allocation for local internet service

3. Presenters: Stefan / Pierrette / Danielle / Anne Marie **SOCAM Initiative for Quebec First Nations**

# of Communities with access problems (some might require satellite service):	23
# of Operational Communities with C-Band data earth stations in place	0
# of Communities using Anik E2	0
Target dates for proposed network	dependent on fundraising

Summary of Presentation: (handout in package)
- 27 communities on CAP, 24 were able to be connected
- 3 ended up returning the dollars to Industry Canada due to connectivity problems
- see information distributed in the package for description of different regional challenges and needs
- some do 56k, T1 ($3,300 per month),

4. Presenters: Dan Pellerin / Brian Beaton **Keewaytinook Okimakanak (K-Net Services)**

# of Communities requiring satellite services:	12
# of Operational Communities with C-Band data earth stations in place	2
# of Communities using Anik E2	2
Target dates for proposed network	UP (with 6 more being added Q2 2002)

Summary of Presentation: (powerpoint presentation, handout in package)
- tribal council partnering with a number of others to establish broadband connectivity and required applications
- scalable network model, 2 communities on-line today with 6 more being added Q2 - 2002, 4 other First Nations are satellite served as well
- utilizing the community aggregator model from the NBTF

5. Presenters: Linda Maljan / Jacquelyn Burles, GNWT Eric Eid (NWTel) / Jeff Philipp (SSIMicro) **Northwest Territories**

# of Operational NWT Communities with C-Band data earth stations in place: 21

# of NWT using C-band infrastructure to offer ADSL high speed Internet Service to residential and business customers:	1 (Inuvik)
# of NWT Communities using Anik E2:	21
Target dates for proposed network	UP

Summary of Presentation: (from speaking notes)

Linda Maljan and Jacquelyn Burles, GNWT:

- GNWT leases space on Ardicom, - 33 communities, population of about 40,000 ranging in size from 53 to 18,000
- telehealth services being delivered in 3 NWT communities with 4 more communities scheduled to come on-line, bandwidth and pricing concerns
- Distance education is available for completing high school in every school. In the smaller communities some Grades 10, 11 and 12 courses are available only via distance education for a number of reasons. Distance Ed courses are purchased from Alberta, which has the same curriculum as the NWT. As Alberta increases their bandwidth through Supernet and alters the delivery of course content to take advantage of this increased capacity, NWT students may lose the ability to participate in the distance ed. courses.
- 64K data services that is shared by the community resulting in no one being happy any longer due to increased usage / demand and required broadband applications
- Community members use the school sites or community learning centres for public access through CAP sites, and through a new virtual libraries project.
- Issues - big hopes for NBTF, local access in 8 communities (local ISPs), last mile connectivity, GNWT pays to use network as anchor tenant, need more bandwidth, cost of services, partnership vs contract
- Looking for partners and finding ways to improve efficiency and reduce cost
- objective is to establish equitable access

Erik Eid, Northwestel:

- Northwestel provides telecom services for Yukon, NWT and Nunavut regions using a satellite network involving dishes ranging in size from 4.5 to 10 meter, can add bandwidth without investing in additional infrastructure but transponder (i.e bandwidth) costs are a big factor
- Ardicom is a joint venture with Northwestel with the gov't being the anchor tenants on the network
- Northwestel can add Bandwidth to existing C-band satellite infrastructure, have 48 satellite nodes in total: 26 Nunavut, 1 in Yukon, 21 in NWT

Jeff Philipp, SSI Micro

- new venture private venture to build their own satellite network after reviewing the alternative business cases, Power Corp is anchor tenants, business case for providing internet in the smaller communities if they can be all sharing the same virtual network, lower cost to access, 4.5 m dishes used (shipping and cost challenges), capable of 6M transmission, bandwidth is dynamically allocated

using TDMA platform, video conferencing, multi-tasking, 10 communities on-line today (Nunavut) with potentially 13 this year (plan involves connecting all communities in Nunavut and half in the NWT), overhead is lower, IP based, VOIP capabilities, inter-community traffic is lower, determined that the return on investment is 12 months, expansion of the network is possible using existing platform but would require additional resources to add in video conferencing management with QoS and CIR, partnering with birth-right corporations

6. Presenters: Eric Eid - Northwestel **Yukon overview**

# of Communities requiring satellite services:	1
# of Operational Communities with C-Band data earth stations in place	1
# of Communities using Anik E2	1
Target dates for proposed network	UP

Summary of Presentation: (from speaking notes)

Northwestel has a total of 48 C-band satellite nodes in the North:
- 1 in the Yukon
- 21 in the Northwest Territories (NWT)
- 26 in Nunavut

All of Northwestel's Satellite Communities use Anik E2
Bandwidth to each community ranges from 64 kbps to >T1.

- ADSL services in place in all 12 Yukon communities with government being the anchor tenant, video bridging services available, long-term service contract, development strategy involved levering infrastructure to offer local connectivity, interactive video, ICT business development
- completed by 2001
- 90% of households have access to high speed
- 384 to 768 kbps for video conferencing
- a terrestrial build- trunking between data switches ranges from 2Mbps to 45Mbps

7. Presenters: Alison Rogan / Rich Kimbell **Nunavut**
Eric Eid / Jeff Philipp

# of Nunavut Communities requiring satellite services:	26
# of Operational Communities with C-Band data earth stations in place	26
# of Communities using Anik E2:	26
Target dates for proposed network	UP

Summary of Presentation: (from speaking notes)

- Nunavut Broadband Task Force (NBTF) formed to get private sector partner, gov't of Nunavut main driver of the economy, 26 recommendations to deploy broadband to businesses, gov't, agencies
- Culture, education, health big drivers for broadband in Nunavut
- working with private sector to submit proposal to IC, recommended that deploying 17 projects to push transformation to knowledge economy
- Decentralized gov't, covering a region making up 1/5 of Canada, population of about 50,000,
- Health budget of about $670 million with $30 million to cover medical travel, quality of health care is terrible
- Education is similar as NWT, Grade 12 available in all schools
- Public access sites available in 11 communities with partnerships with Microsoft and Gates to develop an enhanced local service
- Challenge to afford present costs for connectivity, no tax base, 94% of population in public housing
- with a very vibrant economic potential for example film making, stone carvers, etc requiring on-line presentations and broadband connectivity
- 14 communities are not part of the decentralized gov't providing local jobs and services, ie. very challenged economically
- 26 communities connected via satellite, 64K to 512K with room to expand, paying for bursting capabilities - main tenants include RCMP, Parks Canada, Articom, Gov't of Nunavut
- Challenged to deliver to decentralized communities, developed and implemented 2.5 to 1 for compression, scale the usage to manage the available bandwidth on site, majority of internet traffic is thru Yellowknife POP with several bottlenecks, the double hops to T1 that is filled very quickly
- Moving Forward proposal instead of subsidizing connectivity, looking to Gov't of Nunavut, support local organizations and services that are not on-line
- commitment from Industry Canada for public benefit usage of transponder for projects, bring together players
- willing to circulate Moving Forward proposal

8. Presenters: Maurice Montreuil / Glen Collins **Manitoba**
Wayne Boyce

# of Communities requiring satellite services:	?
# of Operational Communities with C-Band data earth stations in place	3
# of Communities using Anik E2	3
Target dates for proposed network	UP

Summary of Presentation: (from speaking notes and powerpoint presentations)
- representing the telecom needs of First Nation, northern and Metis communities
- Connectivity in the PDN (provincial data network) but others are not included

- some have one party line, looking for equitable access
- government supporting the principal of equity of service and price no matter where we live
- Community members lacking education opportunities, 62 First Nations and many Metis communities, north of 54 parallel, nursing stations do not have the connectivity, need to start with health and move to the community wide applications
- supporting the concept of regionally owned telecos and provision of local services
- some resource based communities are losing75% of their population (Leaf Rapids, Lynn Lake)
- satellite served communities connecting to terrestrial network serving all community members and owned by the region
- communities are raising their own capital with the plan to develop their own business
- sharing the resources so they can grow and develop local opportunities
- telehealth network (funded by Health Canada - CHIPP), 17 sites, Health Sciences Centre as the hub
- Churchill, Lynn Lake and Leaf Rapids (C-Band), Berens River (Ku-band)
- 512K access for video connectivity
- legacy ISDN equipment is being kept in operation for reaching other centres
- delivering some services into Keewaytinook Okimakanak (telepsychiatry, etc) Nunavut (5 communities) therefore dealing with different carriers and cross border health issues
- contract with Gov't services, Provincial Data Network,
- using T1 lines, can be expanded as move to broadband, multi-point control unit to be able to connect all the sites, need for ongoing CME, grand rounds, from site- to-site-to-site for seeing patients, establishing a gateway for connections to other ISDN served health centres
- cost avoidance studies, HC studies, for patients avoiding travel, need to consider health administrators, health professionals as well
- PDN - shared network access point, VPNs for various clients,
- establishing 100 M, 4-10M, broadband circuits on an IP network in 85 communities
- replacing existing Frame relay network
- government is purchasing services from telecommunication vendors under contract until December 2006, using MPLS for QoS
- telecommunication vendors can sell services to other customers within the community
- 3 satellite served sites - roving 768 for telehealth with downlink to Winnipeg
- satellite service under contract until Nov, 2002

9. Presenter: Bryan Orthner **Saskatchewan**

# of Communities requiring satellite services:	~6
# of Operational Communities with C-Band data earth stations in place	0
# of Communities using Anik E2	0
Target dates for proposed network	

Summary of Presentation: (from speaking notes)

- Northern Sask, size of Texas, same challenges, distance, requirements as described from other regions
- using connectivity to solve some challenges
- Fairly good road infrastructure, there are a few communities only accessible by winter roads and plane
- Region has a population of about 35,000 with 2 communities without any phone at all
- SaskTel has fibre infrastructure providing toll free dial up ISP service for those community off the digital network
- In the north, 28.8 to 14.4k connect speeds due to quality of existing phone network
- SaskTel is owned by provincial gov't therefore the shareholders are the people of the province
- Provincial gov't CommunityNet announcement providing connectivity across the province with the gov't being the anchor tenants, SaskTel uses the dollars to scale up to DSL service throughout the communities
- Provided to 45 communities, DSL available to anchor tenants but no incentive for the rest of the community
- in the Headwaters Project (under the Sask. smart communities demonstration project) 42 CAP sites in 35 communities, 6 have DSL in 9 sites, with new 9 sites scheduled to receive DSL service
- Sasktel provides the educational community with the equivalent of the DirecPC solution but using an existing transponder for Sask only and therefore the speeds back into the communities is reasonable and consistent
- about 400K down with phone connections for uplink from the provincial schools
- First Nations education system is another story, limited to satellite solution (example of local First Nation had to buy DSL as their own local solution - $45 dollars a month - $1700 for T1)
- satellite service is managed by SCN
- Sasktel for DSL access in LaRonge in the north
- Internet provided by MSAT phone and DirecPC and cell phone connections in a couple of community schools
- About 30 communities, reached by land
- estimated 6 communities outside of SaskTel network and might require satellite
- story of receiving 4.8 m dishes folded in half by shipper

10. Presenter: Ian Cameron **British Columbia / Alberta**

# of Communities requiring satellite services (estimate): ~12 in BC, 2 in Alberta
# of Operational Communities with C-Band data earth stations in place 2
# of Communities using Anik E2 2
Target dates for proposed network

Summary of Presentation: (from speaking notes)
- providing First Nations with helpdesk advice (technical, installation, some operational) for the local schools through Industry Canada's First Nation SchoolNet program
- North of 50 degrees all the schools are using the DirecPC back haul limited by outbound speed (9.6k with a max 14.4k for dial up service) - no longer satisfactory due to overselling and congestion on DirecPC service
- 6 without phones, therefore using MSAT phones with DirecPC backhaul (4.8K outbound) - no longer acceptable
- communities are now purchasing two-way satellite system (C-Com) and using it for things like e-mail to doctors (in one community without phones), shopping on-line, etc
- further north, some communities are reporting paying $1200 to $1400 in long distance charges to the nearest ISP
- these communities do not have fair and equitable access to telecom services
- economic development opportunities are undermined by this situation
- communities are looking for the solutions to make this work and some are now investing in getting their own solutions but most lack the financial resources to deliver true broadband
- in northwestern Alberta there are 2 communities that can only be reached by satellite and on the coast in BC, 15 communities will need C-Band solutions
- telehealth, education, economic and business development will be the main applications for broadband delivering data, video and voice services

11. Presenter: Peter Boorman **Skybridge a Global Solution**

Summary of Presentation: (from powerpoint presentation)
- Vancouver Teleport, involved in building networks for telecos and enterprise networks
- as Northwestel's ex-president, lots of experience in design, construction and maintenance of satellite service in very difficult environments
- weather conditions, technicians get noisy lines, service requires high cost, very expensive if we use the same standards established by the telecom industry
- Ardicom contract, 58 communities using a frame relay connection
- Partnership of both aboriginal partners and the local telco with government as the anchor tenant
- Low speed IP data and video on demand only

- Provides communications to 70 plus remote communities
- Voice over IP not feasible in present network architecture
- 54 communities out of 96 do not have internet for residential level
- $14M to put in place, expensive switching, new sites (almost all of them)
  Identified Pitfalls include:
  - development has not kept pace with innovation
  - bandwidth very limited eg 64/128k on satellite
  - bandwidth oversubscribed in the communities
  - frame relay costly on satellite connections with only 30% payload
  - latency excessive especially between remote sites
  - poor utilization of satellite transponder with 50% wasted assignment
- cooperative networks are one solution for management of earth station, cooperative management of network, bidding on the sites

12. Presenter: Jeff Philipp **Inukshuk Wireless Solutions for the Last Mile**

Summary of Presentation: (from experience of working with Adamee and Microcell)
- wireless 802 Ghz, 802.11a and b standards coming on-line
- product pricing is reaching point where is affordable and accessible
- access point into the commercial market is getting closer
- ISM band
- IC 2.5ghz, boost power, non line of sight, low cost, high density, customer centre
- Dial up Internet service is an impossible business case without aggregation of communities
- Co-management - roaming with accounts, multi-sites, with billing based on usage
- Controls to limit connecting, establishing policy.

Summary:

Ken Thomas - different points of view, exploring all the options, representing the interest of First Nations, learn from other solutions

Meeting adjourned at 6:00 pm to meet again at 8 am the next morning

Industry Canada's C-Band Transponder: A Public Benefit for Delivering Broadband Connectivity in First Nations, Rural and Remote Communities
April 23, 2002

Chariperson's Opening:

Ken Thomas - review of agenda to discuss the available C-Band transponder resource and identify utilization strategies

Meeting Participants - Day 2

1.	Alison Rogan	CED Division, Government of Nunavut
2.	Rich Kimbell	Public Works, Iqaluit, Nunavut
3.	Glenn Steiner	IC representative in Nunavut
4.	Borys German	Spectrum Engineer with IC working with Nunavut
5.	Linda Maljan	GNWT (Yellowknife)
6.	Jacquelyn Burles	GNWT (Yellowknife)
7.	Jeff Philipp	SSI Micro (Yellowknife)
8.	Eric Eid	NWTel (Whitehorse)
9.	Wayne Boyce	Telehealth Program Manitoba (Winnipeg)
10.	Glen Collins	Project Manager, Manitoba Telecom (Winnipeg)
11.	Maurice Montreuil	Manitoba Broadband (Winnipeg)
12.	Norma Spence	Manitoba Industry, Trade & Mines
13.	Frank Fazio	IC Business Development Officer, Manitoba
14.	Alfonz Koncan	Western Economic Diversification Program, Manitoba
15.	Sheila Engel	Manitoba Health
16.	Ian Cameron	BC / Alberta Schoolnet help desk, BC
17.	Peter Boorman	Vancouver Teleport (Vancouver)
18.	Bryan Orthner	Headwaters Project (Smart Saskatchewan)
19.	Ken Alecxa	Western Economic Diversification Program, Sask
20.	Ken Thomas	Neegan-Burnside Engineering & Technology (SK)
21.	Brian Beaton	K-Net (Sioux Lookout, ON)
22.	Dan Pellerin	K-Net (Sioux Lookout, ON)
23.	Carl Seibel	FedNor (Thunder Bay, ON)
24.	Mike Collins	Telesat (Ottawa)
25.	Ed Miller	Telesat (Ottawa)
26.	Jim Hamilton	Communications Research Centre Canada (Ottawa)
27.	Patrick Haggerty	INAC (Ottawa)
28.	Jacques Drouin	Connectivity Manager, IC SchoolNet (Ottawa)
29.	Rachel Roy	Industry Canada First Nations SchoolNet (Ottawa)
30.	Will Dubitsky	Industry Canada SchoolNet (Ottawa)
31.	Rick Sellick	Neegan Burnside Engineering and Technology
32.	Gordon Cobain	Katavik Regional Government, Kuujuuaq/Nunavik (QC)
33.	Bill Evans	EB Systems Limited, Winnipeg

Draft minutes from the previous day were distributed for review and corrections.

1. Jacques Drouin - Industry Canada Schoolnet Connectivity Manager and member of IC's innovations / Broadband Planning

- powerpoint presentation distributed and will be posted describing the available

C-Band transponder resource and its utilization strategy
- Comments / Questions including:
  - challenge to ensure the have and have-not communities needs are adequately addressed and supported (avoid the further expansion of the digital divide)
  - great need for community and regional engagement and identification of roles and responsibilities to ensure everyone has access to resource
  - business model required by communities to ensure a sustainable and locally driven solution and utilization of the broadband connectivity
  - any community that is not accessible by terrestrial service are able to access this resource under the agreement between IC and K-Net
  - there is a need to get the message to the communities and the community leaders so everyone knows of this resource (ie. commitment by the participants in this meeting to share and distribute this information and develop this resource and its utilization in their regions)

2. Carl Seibel - FedNor - "Investing in community-based broadband connectivity solution for economic development"

- distributed contractual agreement between Industry Canada and Keewaytinook Okimakanak (K-Net)
- focus on regional Economic Development initiatives, ie investing in teleom infrastructure (over $5 million in different projects in KO region since 1998 with over $10 million invested in the region)
- working with Jacques and Michael Binder on Spectrum, Information Technologies and Telecommunications (SITT) working group on innovations and broadband connectivity across the country
- starting in 1999 tried to identify solutions to bring broadband connectivity to Fort Severn First Nation (a satellite served community) - able to support the C-Band solution with earth stations in Fort Severn and Sioux Lookout (service centre for the community with tribal council office, regional hospital and other service and government agencies)
- other tribal councils working with KO now want to get similar broadband connectivity infrastructure in their member First Nations (Slate Falls, only one toll telephone now has 6 lines with IP telephones serving many of the offices in the community)
- KO staff identified the availability of the C-Band transponder space made available to IC by Telesat under their licence
- applications driven business cases to develop local services to support economic viability of the communities (for example, major telehealth project involving NORTH network with connection in Winnipeg)
- C-Band satellite solution presently includes Fort Severn, Slate Falls and Anahiem Lake in BC coming into Sioux Lookout to access broadband applications and high speed data services through the connections within the K-Net terrestrial network

3. Resulting Discussion

- concerning Health Canada satellite pilot projects (the First Nations National Telehealth project) - stove-pipe projects developed for single application ignoring community needs and unable to support local development that are left hanging upon project end dates. Manitoba is now carrying the costs for the connectivity into Berens River FN to continue to deliver service on Ku-band.
- need for clearly defined long term strategy by the community, working together with people in the trenches including the funding agencies
- stronger / greater need in remote regions of the country need to be respected
- support for infrastructure, mandate for economic development are important components for successful and ongoing implementation of network
- role of government is critical to ensure affordable and equitable access
- distinct realities of the far north (Nunavut, NWT, Yukon) need to recognized and supported to ensure survival of culture and understanding by others
- government relationships with the municipalities and the people is recognized and respected and provides an opportunity for supporting local development
- gaining access to the required financial resources is a major challenge
- developing strategies to support and back up Michael Binder and the NBTF goals and recommendations to complement local objectives
- establishing community driven solutions working with different communities of interest will ensure the long term sustainability of infrastructure and applications
- strategies to remove barriers for accessing services such as health, education, gov't on-line, economic and business development opportunities, etc
- important criteria must be to ensure existing businesses are supported and included in these developments, ie open and transparent development process, sharing all the information
- working with existing and successful models, such as the Smart Communities demonstration work being shared on-line
- applications based delivery model (Moving Forward)
- the available C-Band transponder is a limited resource that needs to be aggregated to serve as many communities as possible using the most efficient management platform possible to optimize bandwidth needs and usage
- through these communities of interest, a tenable game plan might evolve
- need to be pointing to what others are doing to encourage and support other regions and communities to join into the service

4. Jeff Philipp - an operational TDMA network management system

- http://www.ssimicro.com/static/skyxpressrelease for an article about their platform
- existing and operational system is applicable to the discussion
- provides network management and utilization of the resource
- platform features - SCPC design, flexible, multi-casting once and receiving, dynamically allocating bandwidth from a pool based on policy, allocation of the CIR pool, burst pool, single hop, dynamic build a PVC between users, get what was paid for, can support multi transponders, video conferencing shared
- network management system needs two NOC (Yellowknife and Hay River) - staffing, $500K in system and $250K in operational costs

- KRG - one site, video conference between sites, sharing existing resources, better utilization of the resource, multiplexing and sharing between the communities
- utilizing different time zones with peak periods and flexible to adjust for demand
- today there are 10 sites on-line, 7 committed, VOIP, video, data services
- TCP acceleration - 2.5 M to desktop, reducing the return channel
- can accommodate multi satellite

5. Ed Miller, Telesat Other satellite network management options

- powerpoint presentation available

6. Next Steps - Ken Thomas - Chairperson

- presented a discussion strategy to examine and determine vision, mission statement, values / principles, goal and objectives, and strategies

Vision - The What

- shared resource, common agenda
- utilize existing work already completed, ie. the National Broadband Task Force
- community-driven, the Canadian way, things that are best done collectively, recognizing what these are while respecting individual autonomy
- need to bring forth the information to the government
- reference the NBTF and the Innovations Agenda
- need to draft of vision and circulate
- **Sample:** Cooperatively and collaboratively working towards fulfilling the unique needs of the different regions across Canada by respecting local cultures, environments and situations through the collective use of the available resources and in the efficient development of broadband satellite connectivity opportunities that support the economic and social development of all rural and remote communities as documented in the National Broadband Task Force report - *"The New National Dream - Networking the Nation for Broadband Access"*.

Mission - The Why

- services - ensuring critical applications are supported and shared
- obtaining equitable access at affordable prices
- maximizing the current resource and demonstrating effective ways to utilize the C-transponder
- model the use of the available resource for other communities
- continue to pressure the government to keep the vision of the NBTF active and supported by the governments Innovation Agenda
- partners with Telesat, Industry Canada and all the other groups

Values / Principles

- public / private partnerships
- recognition of and support for regions that lack the traditional business case
- communities of interest

- community involvement of local connectivity development

Goals & Objectives - The How

- Saskatchewan and other groups have a strategy for development and will continue to develop regional networks that address government and telco corporate requirements
- different scenarios - National group representing all groups and speaking as one group OR everyone working separately to access and utilize limited resources
- national economies of scale make sense but need to recognize that some groups might feel they need to do their own thing
- must allow flexibility to address regional needs
- applications - health, education, 911 - unique opportunities between communities, helping each other, supporting private networks

Strategies
Last Mile

7. Concluding Comments

Brian - K-Net Services

- planning and organizing a national First Nations connectivity conference - on-line but with regional components linked together virtually
- hosting and supporting local and regional workshops and participation at conferences
- as a component of the Smart Demonstration project, Keewaytinook Okimakanak will be hosting an international virtual conference in 2003-2004
- developing community driven model that is sustainable

Peter - Vancouver Teleport

- need to learn from the past - Ardicom - 3 key development elements - stakeholder (gov't), service provider (telco) and critical mass from First Nations (58 communities to begin to make this happen)
- public benefit - critical mass to make this feasible, what does it take to put in infrastructure, support system, who will be the supplier
- questions within the grey scale goals / strategies / last mile (regional / community)

Bryan - Headwaters Project in Northern Saskatchewan

- hosting a list serve to continue the discussions began at this meeting

Jacques - Industry Canada, Connectivity Manager, Schoolnet

- terrestrial and urban centre influence on deployment of broadband
- it took a long time for member of the NBTF to recognize that 20% of the population are unserved and are located in regions that required satellite and wireless solutions
- this group needs to determine how to position satellite users within this

development / opportunity
- opportunity for this "community of interest" to focus on satellite solutions to push the broadband objectives and to put in place the satellite technology to deliver the kind of services that are available elsewhere
- economic and social development requirements of rural and remote communities must be addressed while respecting local needs and solutions
- exploit and develop benefit
- options include developing a vision to promote satellite and bring broadband into these regions
- demonstrate the utilization of the resource (innovation, laboratory, clear benefits)
- develop a strong case for Michael Binder to move this forward because this is just the beginning and he needs successful models to lobby for broadband deployment
- take the lessons learned and best practices back to Cabinet from the grass roots, to show the benefits and opportunities

Dan - K-Net Network Manager
- avoid working in a vacuum
- **Question:** Do we have a consensus to work collaboratively? Yes
- then everyone needs to be working with the whole group in mind and developing strategies to access the dollars required to work to achieve a national goal

Follow up activities:
- Drafting group - volunteers - Alison, Jeff, Wayne, Jacqueline, Brian, Ken
- come up with a name, for example National Satellite Broadband Working Group
- need to:
  - demonstrate innovative solutions / models and applications
  - continue to attract other groups (ie. Health Canada) to be sure they come to next meeting
  - identify applications to be carried on the C-Band resource ASAP

Thanks to all coming together and being willing to be the voice for the communities and take the message back home.

Appendix D: Keewaytinook Okimakanak Telehealth (KoTH)

KO Telehealth was created in 2001. However, this application is a heavy user of bandwidth and some satellite-served communities such as Fort Severn and Slate Falls could not access this service until the C-Band Public Benefit.

Like many First Nations communities in Canada, members of Keewaytinook Okimakanak lack access to quality health care as a result of remoteness and isolation. Five of the six member communities that form KO, have no roads and can only be reached year round by plane. Rates of heart disease, diabetes and mental illness are far above the national averages. Prior to KO Telehealth, community members had few options. Most remote and isolated First Nations have nursing stations, however, their resources are limited. Without tele-health, many community members still must be flown south for treatment by physicians who are located in large urban centres. By the time those who require care are provided with a plane ticket and a referral, the disease has often progressed to the point where aggressive measures must be undertaken. KO Telehealth provides community members with the opportunity to seek medical help earlier in the course of disease and therefore the prognosis for success improves greatly. The C-Band Public Benefit and the additional bandwidth available to First Nation communities such as Fort Severn and Slate Falls have made it possible for satellite served communities to participate in this critical application. Slate Falls has the equipment for KO Telehealth station, however, the technology has yet to be installed.

Although KO Telehealth was made possible by Industry Canada's Smart Communities Program, it could not have been provided to Fort Severn and Slate Falls without the bandwidth made available by the C-Band Public Benefit.
KO Telehealth provides comprehensive community-based access to existing medical, health, and health education services and facilitate regional integration within the provincial health care system. There are many benefits. Patients from across the region enjoy improved accessibility to integrated primary health care services in Ontario's most isolated health region. Although no definitive data exists yet, there may be a reduction in travel costs. The need to travel has been reduced. The savings could potentially be substantial. These costs can range from visible dollar amounts including items such as meal allowances, accommodations, taxi fare and airfare. The greatest cost savings, however, may be so-called non-visible costs such as lost work time, productivity and sick time pay. The patient depending on their employment status may also incur lost wages.

KO Telehealth also provides nurses and other health care professionals in these communities with improved access to health education. It reduces professional isolation and improves opportunities for physician and nurse recruitment and retention. It also offers the opportunity for capacity building at the community level. As skills transfer, the community will be empowered to play a greater role in the delivery of Telehealth allowing local people to coordinate effectively and efficiently with the physician at an alternate location. Telehealth may not only make it easier to recruit and retain health care professionals but it may provide a vehicle by which community members can receive training and accreditation as nurse's aids, nurses and other health care professionals.

Telehealth by its very nature ensures that the patient and the family become active players in the recovery process through the transferring of knowledge and skill sets from the physician through video conferencing. To be successful, Telehealth demands the expansion of the community level skill sets. This is critical for telehealth growth and promotion.

When KO was introduced Telehealth into new communities, some community members have expressed concern that they would lose their access, such as it is, to doctors and nurses who travel to practice in their communities. No community is forced to accept KO Telehealth, however, most early fears about losing face-to-face contact are quickly dispelled. People quickly realize the advantages of Telehealth as a tool to improve local health care. Reducing the need to

travel to see specialists is seen as a positive aspect of Telehealth. By working closely with each community, KO Telehealth staff has created a service that is requested by many other First Nations in Northwestern Ontario.

Just as community members had concerns about the introduction of Telehealth, so too do physicians and other health care professionals at the beginning of the new service. However, those concerns quickly disappeared, as more people in the health care sector became familiar with the technology. Acceptance was accelerated by the interest in Telehealth by Thunder Bay Regional Health Sciences Centre and the newly accredited Northern Ontario School of Medicine. Dr. Roger Strasser, the Founding Dean of the Northern Medical School was impressed with what he saw during a tour of a community-based telehealth facility at the Deer Lake Nursing Station. "The achievements of Keewaytinook Okimakanak's K-Net, Telehealth and Keewaytinook Internet High School (KiHS) initiatives are remarkable," he said. "NOMS can learn much from the experiences of KO with regard to the operational platform and educational framework of the Keewaytinook Internet High School, as well, KO's expanding tele-medicine capacity within telehealth," he said.63

KO Telehealth aims to build a sustainable and accountable service model that will enhance existing nursing, physician, and community health worker health delivery and improve First Nations access to integrated health services. The expansion project proposes that this system will improve community well-being by building local capacity, supporting regional accountability and by facilitating a coordinated approach to achieving improved health outcomes in Ontario's most remote communities. For more information, see http://telehealth.knet.ca/

[63] Brian Walmark, "NOMS Dean Impressed by KO's Achievements in Tele-Medicine and Tele-Health" April 3, 2003. See the archives at http://knews.knet.ca/

Appendix E: Keewaytinook High School (KiHS)

Keewaytinook Internet High School (KiHS) was established in 1999 as an educational alternative for students who wished to remain in their communities rather than attending secondary schools in large urban centres in the south. KO chiefs mandated the creation of a pilot project to determine whether the Internet could be an effective tool to deliver education. The purpose of the project, as directed by the KO chiefs, was to find a method for grade nine and ten students to remain at home in their community while earning accredited high school courses. In the past, virtually all KO students had to leave their families if they wished to continue their high school education. Many of these students were as young as fourteen years of age when they had to leave home for the first time. Many struggled with the cultural shock of leaving their small tight-knit communities for life in the relatively large cities of Sioux Lookout and Thunder Bay. Few completed the requirements to attain a high school diploma and many returned to their home communities frustrated and angry at their failure to complete their education in the foreign urban settings of the south. Too many of these students upon their return home would abuse alcohol or drugs and engage in other anti-social activities. Without a high school diploma, employment opportunities on-reserve were poor. According to Nishnawbe Aski Nation, over three hundred on-reserve youth have committed suicide over the past ten years, many of these young people had recently dropped out and returned home prior to completing their academic year in the south. KiHS was born out of the belief that these students were too young to leave home at grade nine. Many community members think that if these students could complete the first years of high school at home they would be better prepared to face the challenges of high school in the south. Following a successful evaluation of the pilot project, the first intake of thirty grade 9 students was admitted to KiHS. At first there was only three KiHS classrooms, all of which were located in KO communities. By 2001, KiHS expanded to eight communities and had an enrolment of 79 students. Growth continued the following year with the addition of five new First Nation communities, including Fort Severn First Nation with a total of 134 students. In 2003 KiHS began its fourth year of operation with 142 students in 13 communities. Currently, there are KiHS classrooms in the following First Nation communities: Cat Lake, Deer Lake, Eabametoong, Fort Severn, Fort William, Big Trout Lake, Keewaywin, Kejick Bay, North Spirit Lake, Poplar Hill, Sachigo, Webequie and Weagamow.

KiHS is not a distance education program. It represents a unique departure from both traditional classroom models and conventional models of distance education. Unlike other Internet based secondary school programs, KiHS requires students to attend a classroom in their community from 9:00 am to 4:00 pm under the direction of an accredited teacher who is responsible for classroom management, tutoring, and mentoring as the students complete their assignments online. In addition to the normal classroom responsibilities, each KiHS teacher is a specialist responsible for delivering two courses to classes across the network. The KiHS teacher for example in Eabmatoong First Nation is a specialist in computer science and, while he is responsible for classroom management in his home community, he teaches computer science to all 148 students attending the 13 KiHS classrooms across Ontario's far north.

KiHS does not use Blackboard or any other Learning Management System. Rather, KiHS has adapted its own platform using Moodle, an open source software application that has specifically created to suit the needs of Aboriginal students and teachers. The KiHS platform has been adapted for use by other Aboriginal educational organizations including Oshki-Pimache-O-Win, Nishnawbe Aski's post-secondary institute. In 2004, Dr. Julia O'Sullivan, the Dean of Education at Lakehead University in Thunder Bay traveled to Balmertown to see first hand the operation of KiHS. The Faculty is currently assessing whether to use the KiHS platform for the delivery of its proposed community-based Bachelor of Education degree.

Appendix F: Grade Eight Supplemental Courses

Numerous studies over the last thirty years have identified the growing grade gap between the academic achievement of First Nations students and their mainstream counterparts (Hawthorn, 1966; Indian Control of Education, 1972; National Review of Education, 1988, Final Report on the Minister's National Working Group on Education, 2002, Auditor General Canada 2004). As late as February 8, 2005, the Department of Indian Affairs Canada came under strong criticism from the House of Commons Standing Committee on Aboriginal Affairs Development not only not addressing the crisis in First Nations education. During the Rae Commission taking testimony in Thunder Bay, Mary Beth Biggs, Ph.D, reported that on-reserve elementary school students in the Sioux Lookout district are 6.5 grade levels behind in key areas such as literacy, mathematics and science. The Department of Indian Affairs Canada does not have a plan to bridge the grade gap. The situation is most acute for students attending on-reserve elementary schools in satellite-served communities which traditionally face extraordinary challenges providing special education, recruiting and retaining qualified teachers, acquiring books & educational materials and providing secondary & tertiary services for education. In response to the crisis in education, Knet Services, the Regional Management Organization (RMO) of Industry Canada's First Nations SchoolNet, created the Grade 8 Supplementary Program (G8), an on-line supplementary program for elementary students attending First Nations schools in Ontario. One of the goals of G8 is to help bridge in grade gap in science, literacy and mathematics. It helps to prepare First Nations for high school by reinforcing academic skills in core subjects and by encouraged teachers to make better use of computers and the Internet to prepare lessons.

The Grade Eight Supplementary Program began as a pilot in April 2003 with an on-line science course. The following satellite-served First Nations schools participated in the pilot: Cat Lake; Fort Severn, Eabametoong and Sachigo Lake. G8 was officially launched in October 20, 2003 with a course in science. One hundred and nine students attending eleven First Nations schools across Ontario participated and 1,900 assignments were submitted by students. Fort Severn was the only satellite-served community to participate in G8 and provided 10 per cent of the total enrolment in the program. During the G8 mathematics supplementary course (January 19 to March 22, 2004), One-hundred and seventy-seven students in seventeen First Nations schools submitted 1,450 assignments. Two-satellite-served communities participated in the program, Fort Severn and Wapekeka. Nine Fort Severn students and seven Wapekeka signed up for the program, almost ten per cent of the total G8 enrolment. During the spring term (April 26 to June 20, 2004), one-hundred and forty-seven students in seventeen First Nations schools were enrolled in the English literacy supplementary program. The following satellite-served communities participated including: Fort Severn (9), Wapekake (1), Muskrat Dam (7) and Slate Falls (4).

During the second year of operation, the Grade Eight Supplementary Program, the following satellite-served communities participated in the science course (October 11, 2004 –January 10, 2005): Cat Lake (12), Muskrat Dam (17), Slate Falls (6) and Fort Severn (4)64. These communities also participated in the G8 mathematics course: Cat Lake (12), Mustrat Dam (14), Slate Falls (7), Sachigo Lake (11) and Fort Severn (4).

The annual operating costs of the Grade 8 Supplementary Program is approximately $80,000. This figure does not include start-up and development costs associated with the program. Funds are needed if this program is to be developed to provide supplementary courses for Grade Seven

[64] The elementary school in Fort Severn was order closed by the Chief and Council in June 2004 following two engineering reports identified mold at levels dangerous to human health. The school remains closed and many parents have removed their children from the community to continue their education in other First Nation elementary schools or in Thunder Bay, Sioux Lookout and other urban centres. This accounts for the dramatic decline in the numbers of Fort Severn students enrolled in G8.

students. Without the bandwidth provided by the C-Band Public Benefit, G8 could not be delivered to satellite-served communities.

No formal evaluation of the Grade Eight Supplementary Program has been undertaken due to funding constraints. Studies of inner-city students in the United States indicate a positive relationship between academic readiness and home computer use and home Internet access. The relationship is so strong that the Indiana Department of Education has established Buddy2, an on-line program for teachers, students and parents to improve performance in writing, mathematics and science (http://www.btlc.org/btlc/home.asp)

In Canada, there are examples where First Nations students with access to computers and access to the Internet have not only bridged the grade gap but outperformed their mainstream counterparts on provincial curriculum. First Nations students attending Eel Ground School in New Brunswick and Pic River in Ontario have done just that, however, no research has been undertaken to determine how this was achieved. Information Communications Technologies are used extensively in both programs.

First Nations students in Keewaytinook Okimakanak have had full access to broadband services for almost four years as a result of the C-Band Public Benefit, Smart Communities and other FedNor investments. No research has been conducted to determine the levels, if any, of academic performance of these students.

Appendix G: Community Interview Questions

Thirty interviews were conducted with community members from satellite-served communities that benefited from the C-Band Public Benefit. The interviews were conducted over the phone and selected randomly by calling administration / band offices and other agencies on-reserve and, when possible, face to face in Thunder Bay, Sioux Lookout and Fort Severn. Community users were asked the following questions to determine how their lives had changed as a result of the C-Band Public Benefit. The questions were based on the logic model (Output / Outcome story). The original questions found in the logic model are within brackets The interviews were conducted between December 2004 and February 2005.

Social / Cultural
How has your life changed as a result of faster and more reliable access to the 'Net? How do you do things differently? At home? At work? During your free time? What is the most important new service available now because of broadband ie KiHS, KO Telehealth etc (What social or cultural effects have been prompted by the use of enhanced or new services listed above? E.g.: Changed actions/behaviour of users / New community capacities developed)

Economic
How has your job or work changed? Have you used the 'Net to make money? (What economic effects have been prompted by the use of enhanced or new services listed above? E.g.: Cost avoidance/savings, Employment opportunities created)

Organizational development
How has the work of the Chief and Council changed as a result of the introduction of broadband services? How has the administration office changed as a result of broadband services? How have other services on reserve changed ie education, health, culture, work etc? (What learning & changes in stakeholder organizations [i.e. recipients, users, service providers, Industry Canada] has been prompted through the implementation of the C-Band Public Benefit? E.g.: Changes in agenda / structure, New opportunities created, Other)

New equipment acquired/installed
What new equipment is now available in your community? What equipment has been installed in your community? (What new equipment was acquired or installed because of the C-Band Public Benefit by:
Service providers (managing the network/offering services across it?)

What agencies are using broadband in your community? (User organizations [using the bandwidth, e.g. schools, clinics, government offices]?)

Activities
What on-line services and applications were available before broadband was introduced? (Current services/applications enhanced … What services and applications that were in place BEFORE the C-Band Public Benefit were enhanced because of it?)

What on-line services and applications were enhanced because of the introduction of broadband services? (What new on-line services and applications were made possible because of the introduction of broadband services? (New services/applications made possible …What NEW services and applications that were not available before the C-Band Public Benefit were made available because of it? List of new services deployed. … List of new applications created)

Appendix H: Summaries of Community Interviews

Thoughts and Opinions from Knet Users with respect to Outcomes of the C-Band Public Benefit regarding social / cultural / economic changes

Thunder Bay (6)

I left my community to attend university several years ago. When I left, our community was just starting to access the 'Net and modern communications technology. We had just started our own community cable TV station. Back then, I was really isolated from my friends and family back home. I could make telephone calls but it was difficult to get through most of the time. It was also pretty expensive. Now I can email my parents anytime and anywhere. We can even web cast now. I still want to visit my community but I don't feel so isolated from my friends and family now that we have a better connection to the 'Net. I don't get so homesick so much anymore so I can better concentrate on my studies.

The C-Band Public Benefit is changing the way that our people are getting educated. KiHS (Keewaytinook Internet high School) would be impossible without the C-Band Public Benefit. Until KiHS, our students had to leave home and the support of their parents and friends and go south to get a high school diploma. There were opportunities available to get courses via the radio or through correspondence but this was not necessary the best option for those students who need extra personal attention and tutoring that a teacher can provide. KiHS provides a bridge between the traditional classroom and the promise of ICTs. KiHS is a conventional high school with a principal, vice principal, school counselors and teachers. Each classroom is lead by an accredited teacher who is responsible for classroom management, tutoring and administration. Students are expected to attend classes everyday and complete all of their assignments. Teachers who are specialists in their field of study teach courses at the grade nine and ten levels. The students select options from a variety of courses offered during any given term. The difference between KiHS and a conventional high school is simple. The teacher does not have to be in the same classroom as the student. In fact, in most cases she is not. The students are scattered across the 13 KiHS classrooms across Northwestern Ontario. The extra two years give the students more time to learn family and community values and also they are able to be more influential in the community. ICTs mean that our communities have access to a much larger faculty than each could hope to hire on an individual basis and this is a great benefit for our students who are typically three to four grades behind mainstream students by the time they enter high school. All this would not have been possible without the C-Band Public Benefit.

We are just beginning to scratch the surface with using the 'Net as a teaching tool. Email was important but it was only the beginning. More bandwidth has opened many doors. Students in remote and isolated communities are still remote but they aren't isolated anymore. KiHS is a powerful tool in bridging the grade gap. Its too early to be definitive but we are starting to see some progress. Its great for peer to peer learning too.

Fort Severn and Slate Falls have benefited the most from the C-Band Public Benefit. Both communities needed the additional bandwidth necessary to use video conferencing and other things like KiHS and Tele-health. Fort Severn certainly is a role model for the entire Nishnawbe Aski Nation. They regularly participate in international workshops and conferences through videoconferencing. I believe that Fort Severn in particular embraced the 'Net because of its physical isolation.

As leaders, we all respect what KO and its member communities have accomplished with the Internet. During one of our Chiefs Meetings, Knet broadcast all of the proceedings over the Internet. In the past, these meetings were broadcast via the Wawatay Radio Network but it was a little different when our people could follow the meeting on their computers. It brings the

deliberations of our NAN chiefs closer to the members when they can watch as well as listen to what is going on. I think this is a good thing and will change the way politics is done in the future.

I find that I'm using videoconferencing more and more. It saves time and money. Its extremely expensive to travel. I spend too much time on the plane. With videoconferencing, I can use my time more effectively and the people see me more in the community.

Sioux Lookout (10)

No one remote and isolated First Nation community could afford to provide such applications such as video conferencing, telehealth and KiHS on an individual basis. Imagine one person working in an office with a telephone connected to a telephone line. There's not too much you can do with it. Imagine two people working in an office with phones. You still can't do very much. But imagine if you have 100 employees each with a phone. Can you afford one hundred telephone lines? No, so you install a PBX box, which connects these 100 phones to 5 or 6 telephone lines because not everybody is on the phone at the same time. Now you have an affordable telephone system. The C-Band Public Benefit works the same way for our First Nations communities in Ontario's far north. All of our member First Nations agree to pool the C-Band Public Benefit. Each has access to the Net but we can do a lot such as videoconferencing, telehealth and other ICT applications. Now we have thirty-five communities, which share twenty-eight MHz. By managing the traffic ourselves, we can redistribute the C-Band to where its required. Telehealth demands a lot of bandwidth. Two consults can take place at the same time with the additional bandwidth created by the C-Band Public Benefit. Videoconferencing is another application that demands a lot of bandwidth. Tele-education is another application that would not be possible without the C-Band Benefit. None of these applications would be possible without the C-Band Public Benefit.

Ten years ago, we didn't know a lot about the 'Net. Back then, we chartered a bus to the Nation's capital. Our Chiefs and Elders went down to see a demonstration of telehealth at the Ottawa Heart Institute. We watched as a cardiologist treated a patient up north. Our leadership immediately saw the potential of this new technology and they wanted it for their communities. Since then, much has changed. We have had to learn and work and take many risks. People must have been crazy to go down this path when we started but by the time we had the opportunity to participate in the C-Band Public Benefit we were ready to take full advantage of such applications as tele-health, tele-education and videoconferencing.

Our leaders took a chance (on expanding connectivity). We found out after a year that everyone was using it (the 'Net). We just didn't dump the computers into the communities. If you understand what the Internet is, you're more likely to support it.

It's really neat how people have been using the technology to bring their families and communities together. Some families are spread throughout various remote and isolated communities.

One of the most powerful tools for building and maintaining web sites is Post Nuke, (a content management system). Its easy to learn and easy to share. Most of the computer community and school portals up north are maintained with Post Nuke. Unfortunately, it uses a lot of bandwidth. Without it (the C-Band Public Benefit), we wouldn't have this tool and a lot of schools would not have web sites.

More bandwidth means our people can take their jobs back to their home communities. Even if you're in the same office, you're using the same Internet tools such as videoconferencing, IP phones, emails, chat and instant messaging. I can work as easily in Sioux Lookout as Thunder Bay or back home.

With a better connection, we have been able to offer a course on-line as part of the Native Parenting Project. (http://raisingthechildren.knet.ca/) The course is based on the "Raising The Children" program. The course gives parents an opportunity to learn about child development from an Aboriginal perspective. We have delivered the course via the 'Net and with videoconferencing.

The extra bandwidth makes so many things possible. I'm particularly excited about the Wawatay Communications project to digitize their newspapers over the past thirty years. It's a wonderful resource. The history of Nishnawbe Aski, over fifty remote and isolated First Nations, is captured in the pages of Wawatay News. Who keeps their back issues? Who keeps them that far back? I don't think a single library in Ontario has a complete set dating back to the very beginning. Now anybody who wants to know our stories can access them easily and quickly. This is a powerful legacy and shows the power of access to the Net. (http://archive.wawatay.on.ca/modules.php?op=modload&name=gallery&file=index&meid=7)

It (the C-Band Public Benefit) makes it tele-radiology possible. In the past, if a patient suffered an injury, an x-ray would be taken and then shipped by air to Sioux Lookout where it would be examined. If the x-ray was of poor quality, we had to work with it. If the injury was serious enough, the patient would be flown to Sioux Lookout for treatment. Once in the Sioux, the patient could be airlifted to either Thunder Bay or Winnipeg, if the injury was serious enough. It was a lengthy and painful experience for the patient. With the extra bandwidth, we can provide tele-radiology up north. The x-ray is digital file that can be emailed to databases in Kenora and Thunder Bay. It can be examined by radiologists in Sioux Lookout, Kenora or Thunder Bay. In one case, we had a patient who was already in the air when a radiologist diverted the patient from Sioux Lookout to Winnipeg. In the past, the patient would have landed in Sioux Lookout, examined and then sent to Thunder Bay which would in turn sent him to Winnipeg. It's (tele-radiology) is a tremendous cost saving to the health care system and an important tool in improving the quality of health in the north.

The C-Band Public Benefit has had a tremendous impact on us. KiHS would not have existed without it. KiHS is important because it addresses a social crisis among our youth. For years, they were shipped south to attend high school. They were just too young. Most were not ready to be on their own in an urban environment and were therefore getting into trouble.

Fort Severn (16)

We're a little spoiled here when it comes to the 'Net. Before the C-Band Public Benefit, we were pretty much on our own. We established a cable tv station here a couple of years ago and we were connected to the 'Net but that was just about all. All telephone calls were long distance and very expensive. Much changed with C-Band. Our Internet is faster and much more reliable. We have tele-health to assist the nursing station and we have KiHS for our youth who want to stay in Fort Severn for a couple of years before going south to finish their high school. We'd be pretty isolated if we didn't have it (the C-Band Public Benefit).

I use the 'Net everyday. I use it at work and I use it at home. I book hotels and airline tickets on-line. After work, I do my banking and much of my shopping on-line. Since the school was closed (due to a mold infestation), my family moved to Thunder Bay so my children could continue with their education uninterrupted. I use a video cam so that I can see my wife and children. It's a better way to stay in touch than the telephone. My wife is getting educated too. The 'Net allows her to continue her studies in Early Childhood Education at St. Lawrence College on-line. She started the program when the family was living up here. In spite of everything, her post-secondary education was not interrupted.

Last year, I started a post-secondary program on-line. I travel a lot and I was forced to leave here and move south. First of all, I never could have enrolled in this kind of program through correspondence or by teleconference before we had the C-Band Benefit. It would have been too expensive. Its all different with the 'Net. I can go on-line whenever I have some free time and I can do my work wherever there is a connection.

It would be hard to imagine Fort Severn without access to the 'Net. Almost everything we do involves ICTs. Much of the office is paperless. All of the forms and most of the paperwork is done on-line. The only paper that leaves this community are letters to the Department of Indian Affairs. Without (the C-Band Public Benefit) we could not run any of the applications that our people have come to expect.

The company that I work for could not possibly compete with its major competitor here if it weren't for the good Internet connection that we have here. It means a job for me and I think that we'll get more job opportunities for people around here in the future.

Almost half of the community members have most of the necessary skills to use computers, the Net and a variety of software, those who do not, like Elders, know someone who had those skills who can help them fill out the forms electronically, Since many of our Elders do not speak English, they would still need help to fill out paper forms so electronic forms are not much more inconvenient.

It (the C-Band Benefit) has had a tremendous impact. Email is now reliable and we can depend on a good connection. We have three videoconferencing units here, one in the band office, one in the nursing station and at KiHS. If a meeting is needed with the other communities and work associates, videoconferencing makes that possible without the expense and time of travel. We also use it for evaulations, planning sessions, and other types of work.

Last winter, we conducted a band meeting over the cable tv network. Many people especially Elders and young families can't go to band meetings in the winter time. We connected digital cameras from the E-Centre to the cable tv station. It was one of the best band meetings we ever had. People called in from home with their questions for the Chief and Council. At a regular band meeting, the Council might have to deal with three or four questions from the floor. People with the strongest voices usually were heard but with now everybody can be heard. I hope that we do more of these in the future.

KiHS would simply not be possible with out it (the C-Band Benefit). The students like it because its easier for them to be at home with their parents when they start high school. So much is happening to you when you are that age to be with the people who are most important in your life. KiHS allows them to be home at this critical time in their lives.

I think its important to not just know what's going happening in our community. Its also important to know what's happening outside the community.

The personal web pages show a lot of pride. It promotes awareness of community lifestyles. In May 2002, there were 26,202 hits a day. By April 2003, it rose to 142,760 hits a day. Children pick up computer usage really fast. My eight-year old daughter recently designed an invitation, using Paintshop Pro and Fireworks, which she then emailed to her friends.

Live web casting is now possible. Many of our members have web cams. It's a much better way to communicate with your children when they are away at school.

Check out our community web page. In the guest book we have signatures from as far away as China and Japan. Some of these people are saying they want to come here and visit us. People tell us they really love looking at the videos (Elders / Youth canoe expeditions) and the photogallery. If we didn't have it (the C-Band Benefit) we simply could not do streaming video

and other applications. I really think that some of those people who are visiting our website will someday find themselves right here on our doorstep.

Many people can access the 'Net here at home with their cable connection. However, we have at least 48 homes connected to the 'Net but we also have many public access points including the E-Centre, KiHS, the Learning Centre and the Youth Centre. We provide access for our visitors too. Every room in the hotel has access to the 'Net.

Digital video production is really big here. Last year, there were two documentaries made by (Knet's) Cal Kenny. He was invited to accompany two canoe expeditions of our Elders and Youth who traveled throughout our traditional territories. The youth learned a lot about their culture and their language. They learned to live off the land and appreciate their traditional culture. I think that we need to do more things like this. It helps to strenghten our youth for the challenges that they must face in the future. I think its important that we record these lessons so we can share them with future generations. These videos also show outsiders who we have here and why we choose to live here.

We need satellite-based systems because we are too far away from the main land-based telephone systems. But there are problems with satellite connections. Snow can throw the any of the satellites out of line and there are limits on the kinds of things that you can. We've developed an approach to share the bandwidth with all of the satellite communities and we pretty much get what we need when we need it. We have applications such as tele-health, KiHS, the Grade Eight Supplemental Courses (in literacy, math and science). We simply wouldn't have any of this if we didn't pool our resources and the C-Band Benefit.

Slate Falls (10)

Everything has changed. Before we had one phone booth to serve the entire community. Now, we can shop, bank and do just about anything on-line. Community members are quite excited now that contractors are working in the community connecting the houses to the network. People here really like the options available as a result of Internet access. These IP phones sometimes go down during bad weather. People get pretty frustrated when they can't use their phones.

Last night, my daughter showed me how to bank on-line. This is only the beginning. Our offices are equipped with IP Phones and by spring all of the homes will have them too. These things will create economic opportunities for us in the future that would have been impossible even a few years ago.

The introduction of ICTs will play an important role in the economic development of Slate Falls. In addition to owning and operating its own Internet and telephone service, Slate Falls will be using the 'Net to promote and expand its successful tourism business and Bamaji Lake Airlines, its charter service. The 'Net will also play a role in the development of its forest management plan and land use plan. Slate Falls is working in partnership with a local forestry company to provide employment in the logging industry over the next five years.

I can barely remember what it was like before we had the extra bandwidth (that came with the C-Band Public Benefit). We didn't have phones. If you needed to make a call, you had to use the pay phone. So much has changed but for me, KOTH (KO Telehealth) is the most important change. You can't operate tele-health without enough bandwidth to operate videoconferencing. Our community is just to small to afford videoconferencing on our own but because we share it (the C-Band) we all benefit.

Access to the 'Net increases the efficiency of doing productive work, particularly with videoconferencing and Internet technology. The school staff and students plan to develop a school web site and individual web sites with the usual monitoring and directed programming.

Keewaytinook Internet High School provided much of the catalyst for increased Internet services when Slate Falls first joined this service for a two-year period.

Information, particularly information on health and public health issues are more available now that Slate Falls is connected to the 'Net. Information is readily accessible, particularly in the area of medical consultations and the state of personal health of family and friends in medical facilities.

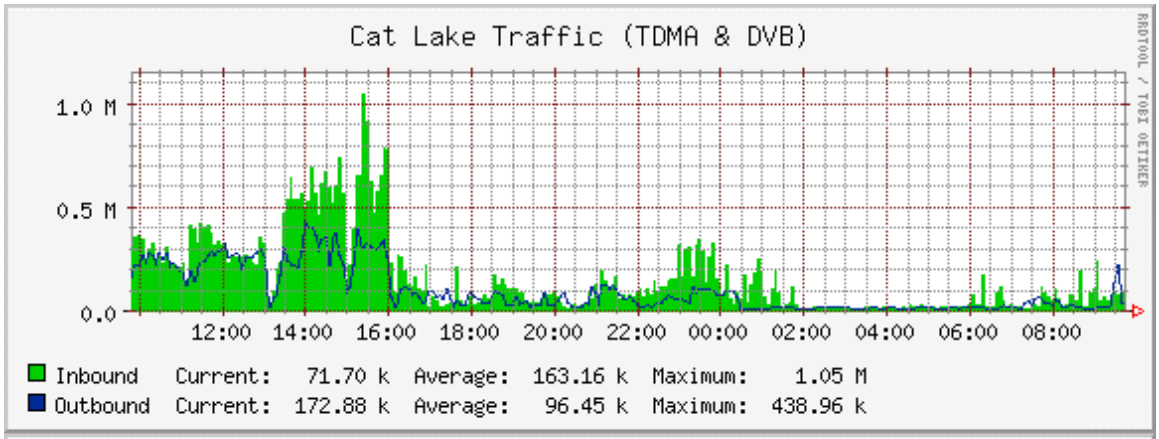
The installation of IP phones and broadband technology in Slate Falls community homes is expected to be completed by March 2005. In addition, KO Telehealth is expected to be available by February. So much has changed in Slate Falls as a result of the introduction of ICTs. There is new equipment, new ways of doing things and new attitudes. We're not remote anymore.

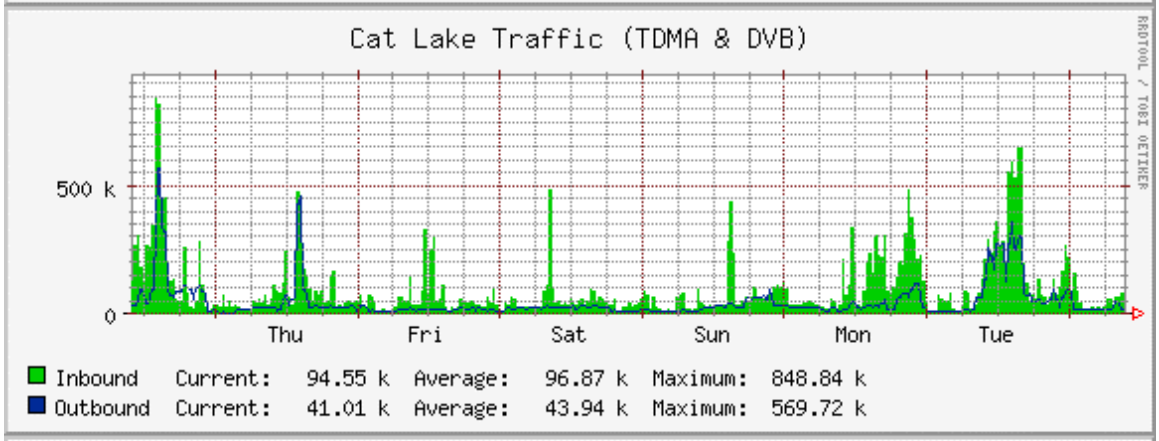
Not all applications work in every community. KiHS (KO's Internet High School) didn't. It was one of our most successful schools in its first year but after the first intake completed their courses and went south to finish their high school they just didn't have the numbers so it was decided to close down.

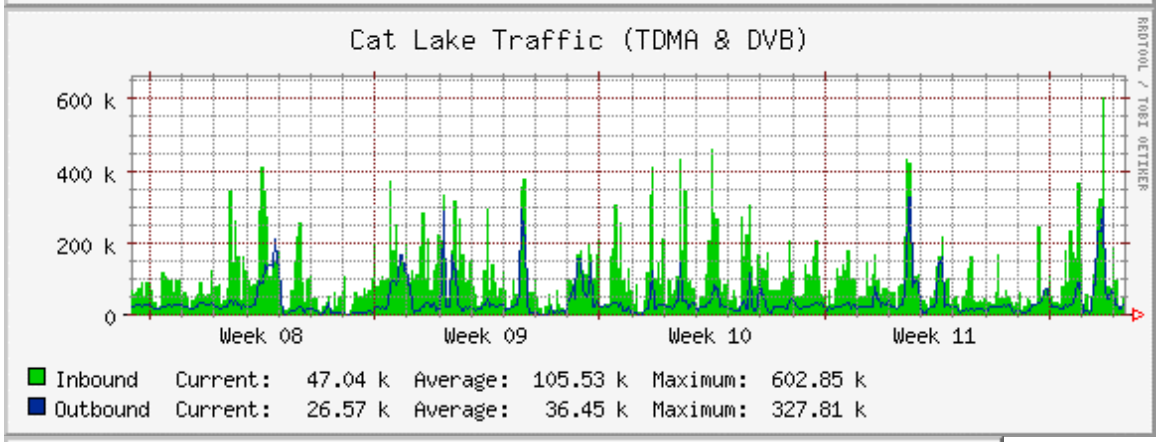
We were able to get access to the Internet before (we had) telephones largely because of the C-Band Public Benefit. Quickly, the Internet has become our main means of communication with one another.

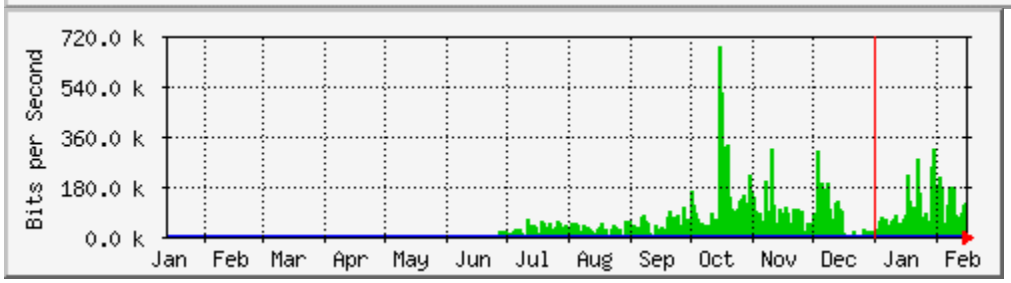
Its (IP Phones) changed the way we're able to work in the band office. Before the IP Phone system was installed, you had to wait in line along with other community members to use the one Bell phone. A sign-up list had been used to provide everyone in the community with fair access. Some days you could only make one or two calls on band business during the entire day.

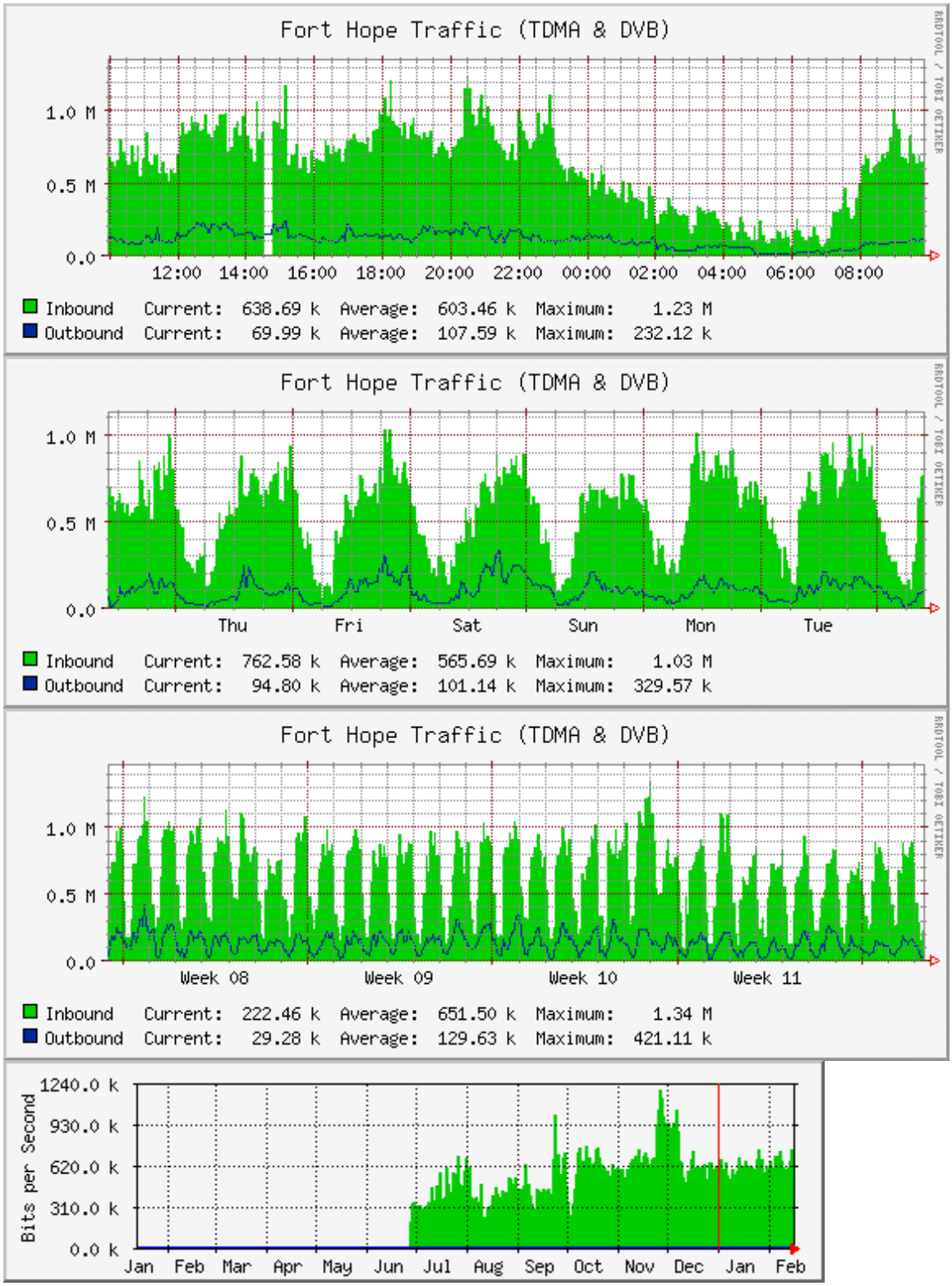
Appendix I: Traffic Reports for Satellite-Served Communities in northern Ontario

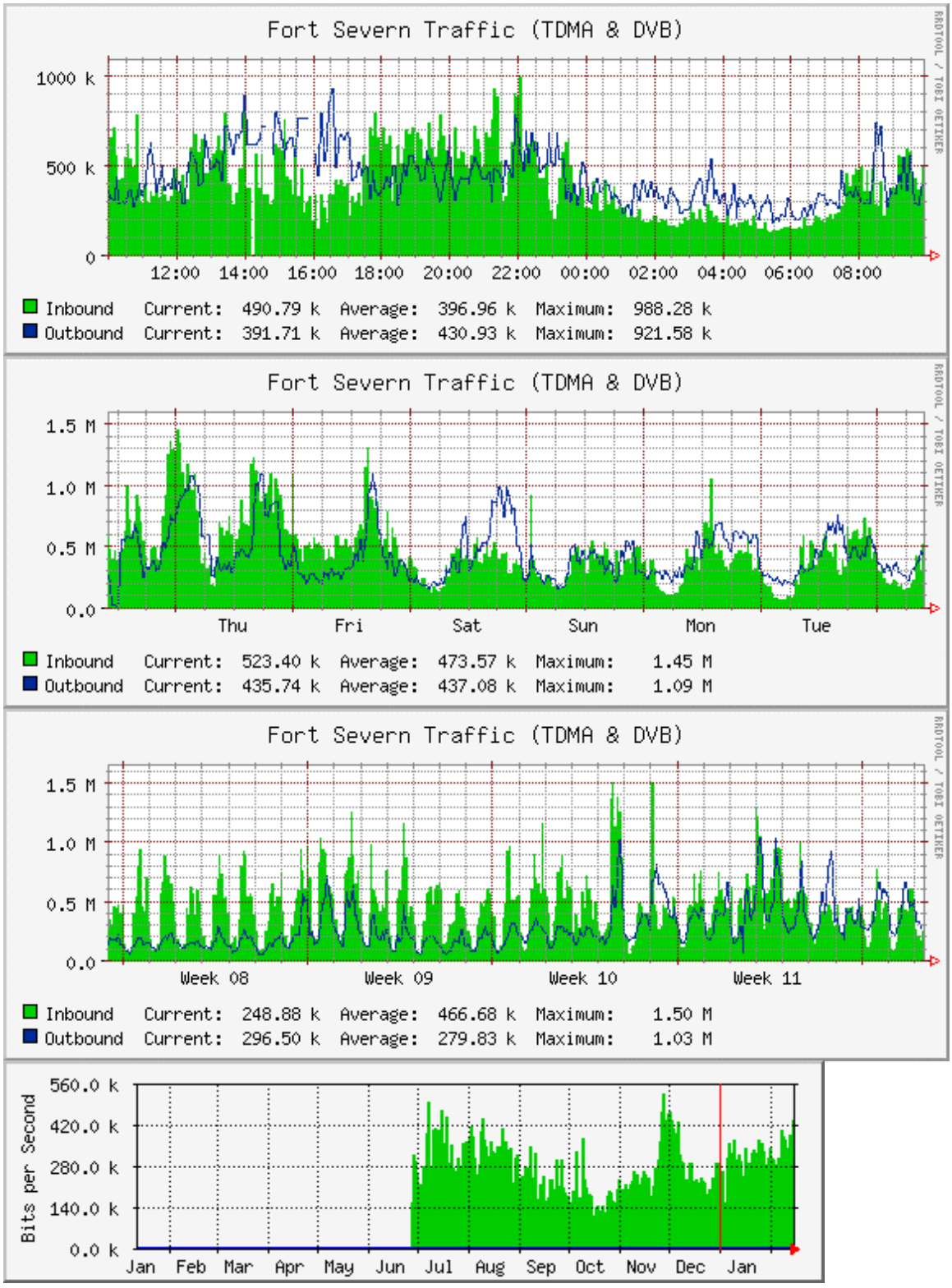


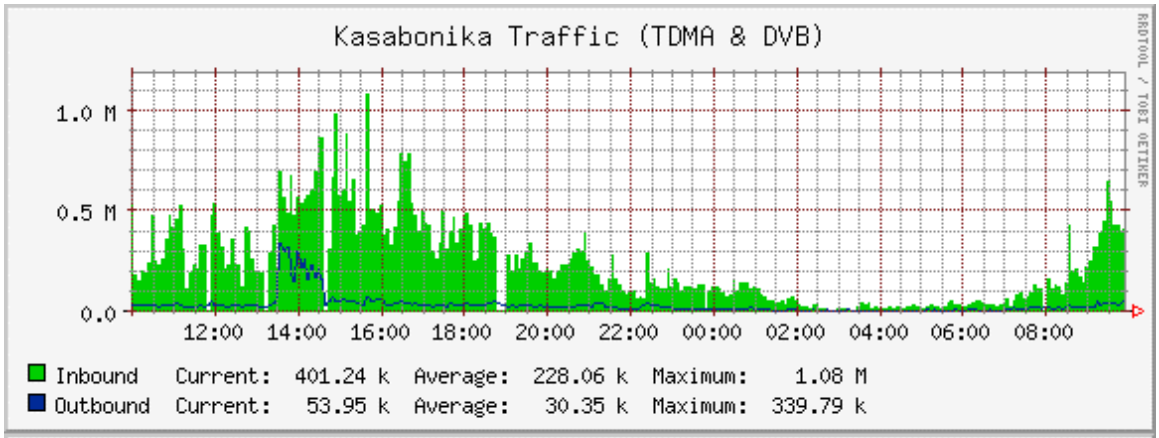


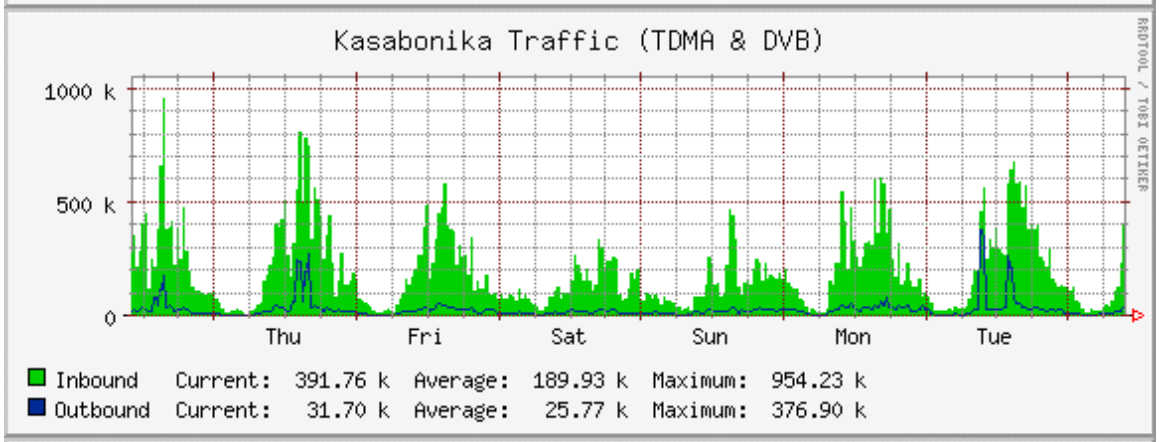


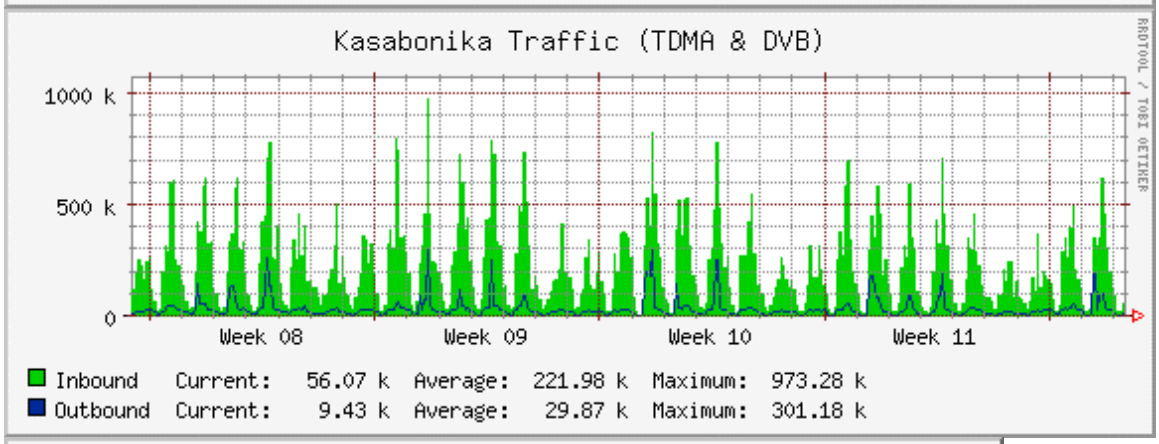


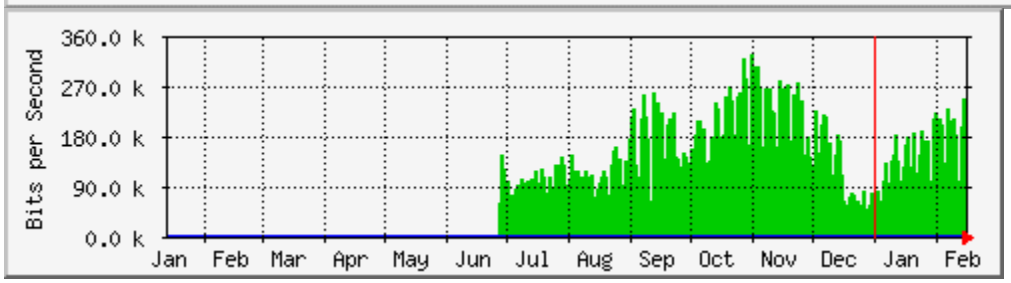

Fort Hope Traffic (TDMA & DVB)
1.0 M
0.5 M
0.0
12:00 14:00 16:00 18:00 20:00 22:00 00:00 02:00 04:00 06:00 08:00
Inbound Current: 638.69 k Average: 603.46 k Maximum: 1.23 M
Outbound Current: 69.99 k Average: 107.59 k Maximum: 232.12 k
Fort Hope Traffic (TDMA & DVB)
1.0 M
0.5 M
0.0
Thu Fri Sat Sun Mon Tue
Inbound Current: 762.58 k Average: 565.69 k Maximum: 1.03 M
Outbound Current: 94.80 k Average: 101.14 k Maximum: 329.57 k
Fort Hope Traffic (TDMA & DVB)
1.0 M
0.5 M
0.0
Week 08 Week 09 Week 10 Week 11
Inbound Current: 222.46 k Average: 651.50 k Maximum: 1.34 M
Outbound Current: 29.28 k Average: 129.63 k Maximum: 421.11 k
Bits per Second
1240.0 k
930.0 k
620.0 k
310.0 k
0.0 k
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb

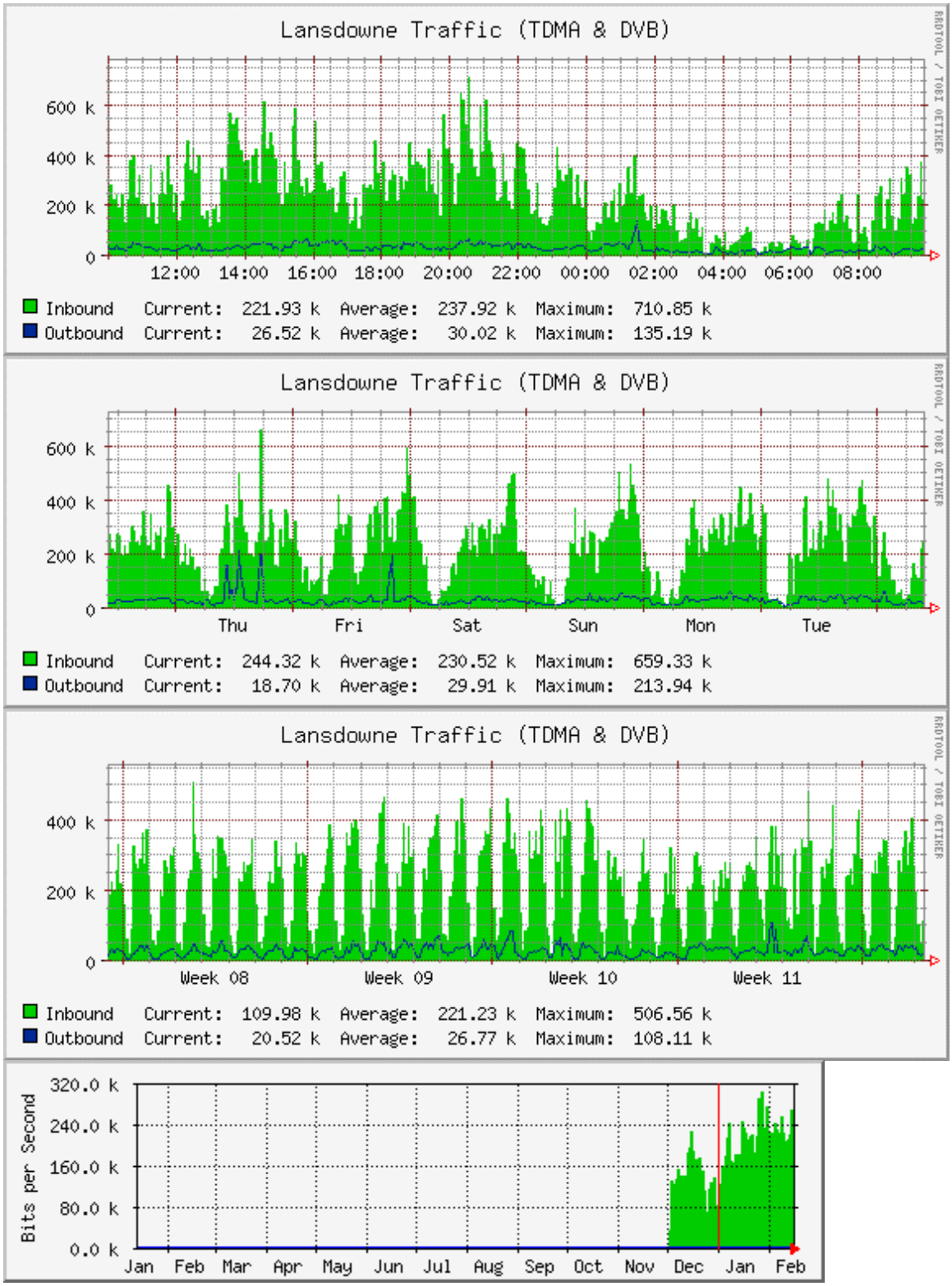

Fort Severn Traffic (TDMA & DVB)
1000 k
500 k
0
12:00 14:00 16:00 18:00 20:00 22:00 00:00 02:00 04:00 06:00 08:00
Inbound Current: 490.79 k Average: 396.96 k Maximum: 988.28 k
Outbound Current: 391.71 k Average: 430.93 k Maximum: 921.58 k
Fort Severn Traffic (TDMA & DVB)
1.5 M
1.0 M
0.5 M
0.0
Thu Fri Sat Sun Mon Tue
Inbound Current: 523.40 k Average: 473.57 k Maximum: 1.45 M
Outbound Current: 435.74 k Average: 437.08 k Maximum: 1.09 M
Fort Severn Traffic (TDMA & DVB)
1.5 M
1.0 M
0.5 M
0.0
Week 08 Week 09 Week 10 Week 11
Inbound Current: 248.88 k Average: 466.68 k Maximum: 1.50 M
Outbound Current: 296.50 k Average: 279.83 k Maximum: 1.03 M
Bits per Second
560.0 k
420.0 k
280.0 k
140.0 k
0.0 k
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan

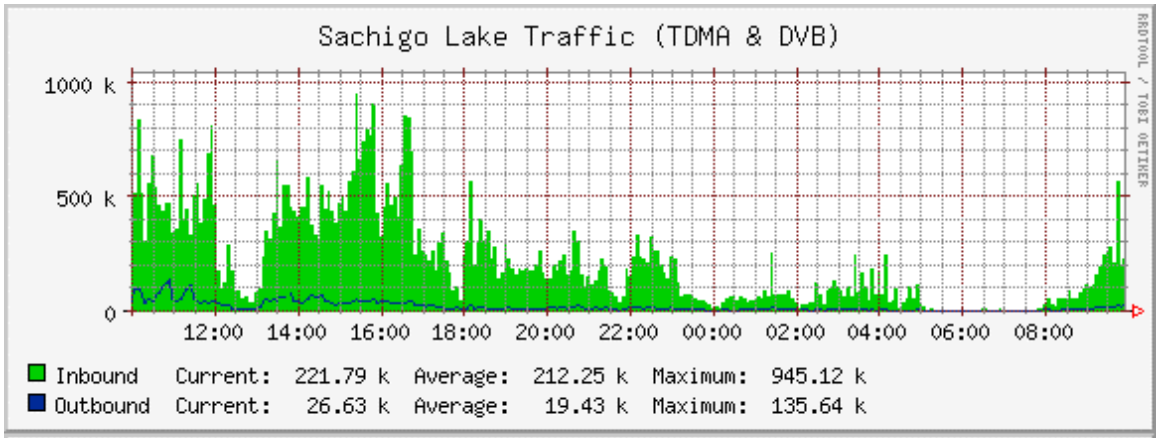

Kasabonika Traffic (TDMA & DVB)
1.0 M
0.5 M
0.0
12:00 14:00 16:00 18:00 20:00 22:00 00:00 02:00 04:00 06:00 08:00
Inbound Current: 401.24 k Average: 228.06 k Maximum: 1.08 M
Outbound Current: 53.95 k Average: 30.35 k Maximum: 339.79 k

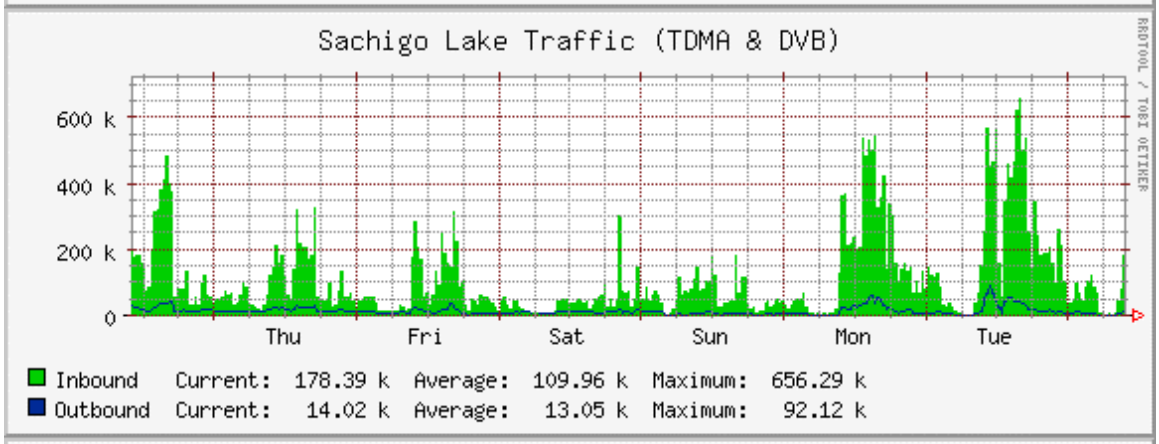

Kasabonika Traffic (TDMA & DVB)
1000 k
500 k
0
Thu Fri Sat Sun Mon Tue
Inbound Current: 391.76 k Average: 189.93 k Maximum: 954.23 k
Outbound Current: 31.70 k Average: 25.77 k Maximum: 376.90 k

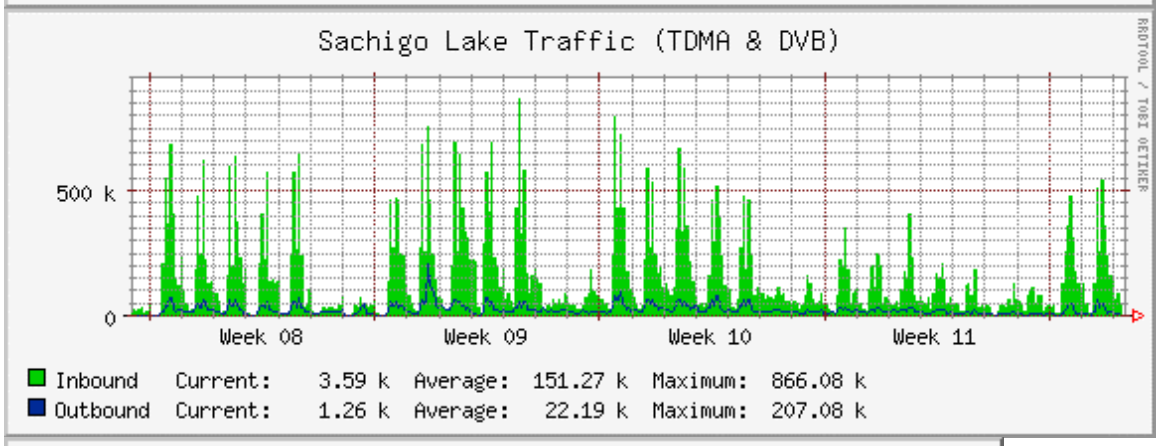

Kasabonika Traffic (TDMA & DVB)
1000 k
500 k
0
Week 08 Week 09 Week 10 Week 11
Inbound Current: 56.07 k Average: 221.98 k Maximum: 973.28 k
Outbound Current: 9.43 k Average: 29.87 k Maximum: 301.18 k

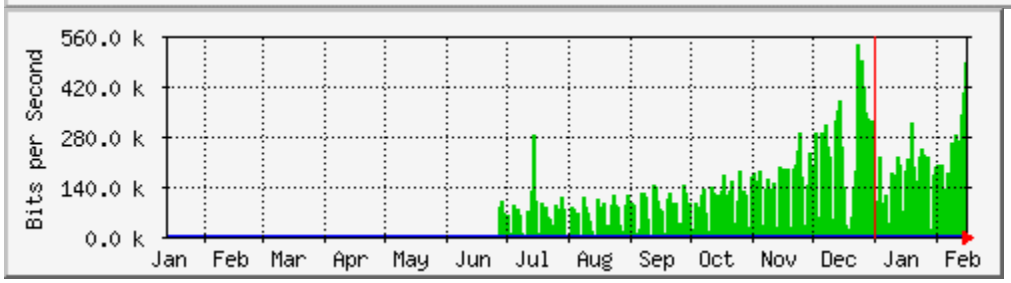

Bits per Second
360.0 k
270.0 k
180.0 k
90.0 k
0.0 k
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb

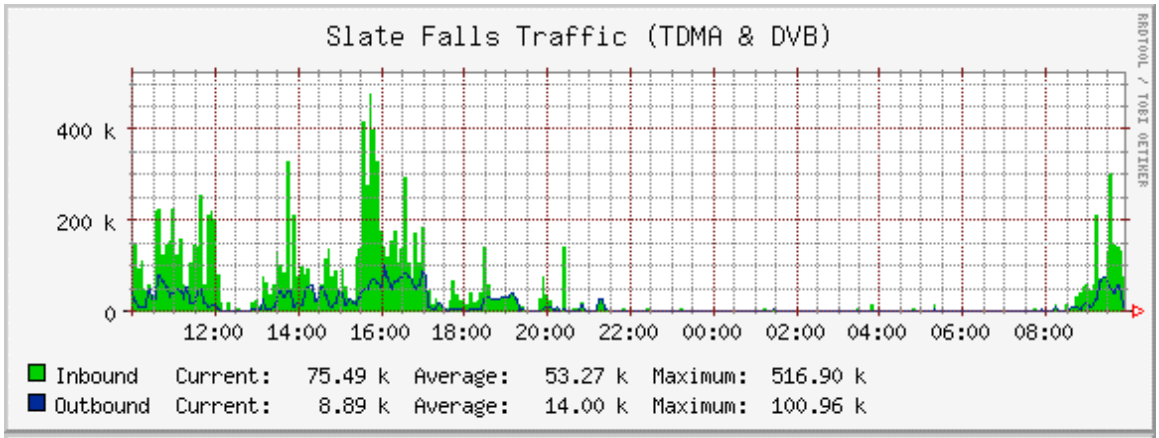

Lansdowne Traffic (TDMA & DVB)
600 k
400 k
200 k
0
12:00 14:00 16:00 18:00 20:00 22:00 00:00 02:00 04:00 06:00 08:00
Inbound Current: 221.93 k Average: 237.92 k Maximum: 710.85 k
Outbound Current: 26.52 k Average: 30.02 k Maximum: 135.19 k
Lansdowne Traffic (TDMA & DVB)
600 k
400 k
200 k
0
Thu Fri Sat Sun Mon Tue
Inbound Current: 244.32 k Average: 230.52 k Maximum: 659.33 k
Outbound Current: 18.70 k Average: 29.91 k Maximum: 213.94 k
Lansdowne Traffic (TDMA & DVB)
400 k
200 k
0
Week 08 Week 09 Week 10 Week 11
Inbound Current: 109.98 k Average: 221.23 k Maximum: 506.56 k
Outbound Current: 20.52 k Average: 26.77 k Maximum: 108.11 k
Bits per Second
320.0 k
240.0 k
160.0 k
80.0 k
0.0 k
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb

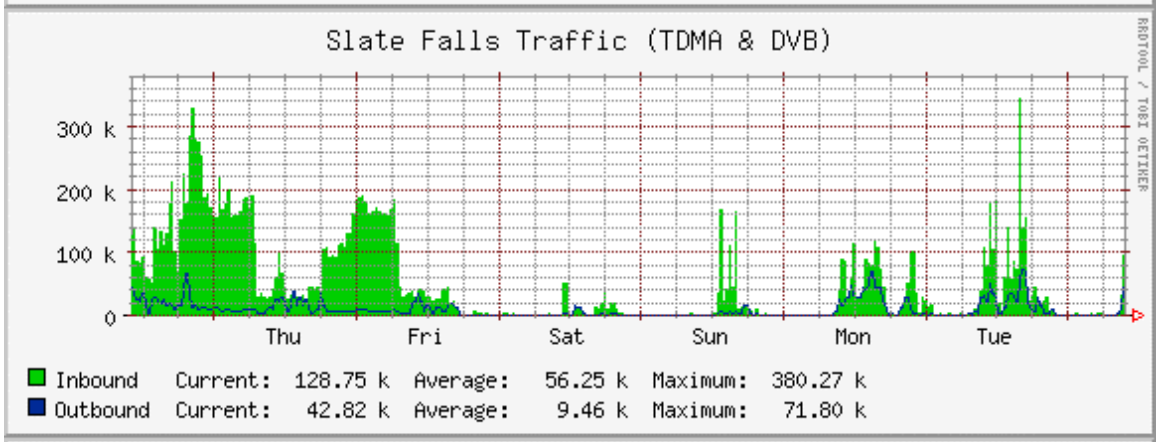

Sachigo Lake Traffic (TDMA & DVB)
1000 k
500 k
0
12:00 14:00 16:00 18:00 20:00 22:00 00:00 02:00 04:00 06:00 08:00
Inbound Current: 221.79 k Average: 212.25 k Maximum: 945.12 k
Outbound Current: 26.63 k Average: 19.43 k Maximum: 135.64 k
RRDTOOL / TOBI OETIKER

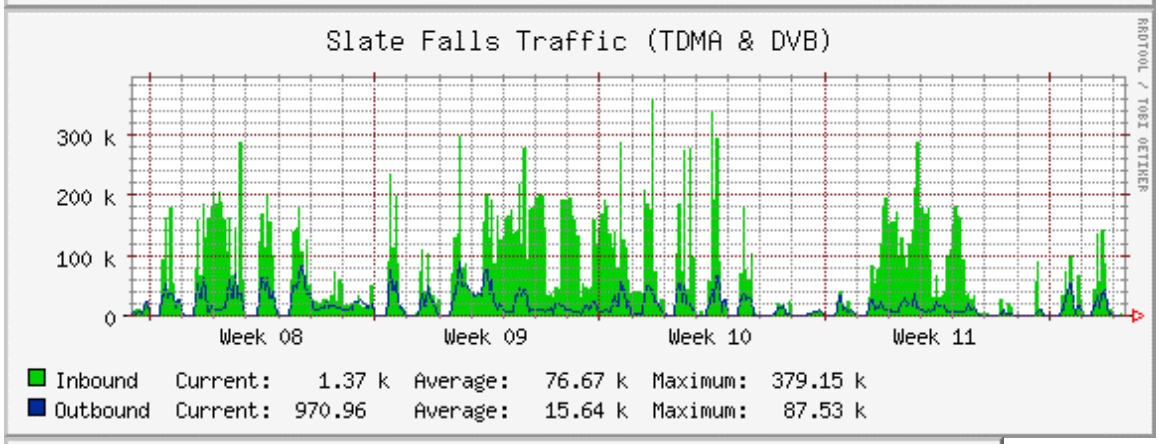

Sachigo Lake Traffic (TDMA & DVB)
600 k
400 k
200 k
0
Thu Fri Sat Sun Mon Tue
Inbound Current: 178.39 k Average: 109.96 k Maximum: 656.29 k
Outbound Current: 14.02 k Average: 13.05 k Maximum: 92.12 k
RRDTOOL / TOBI OETIKER

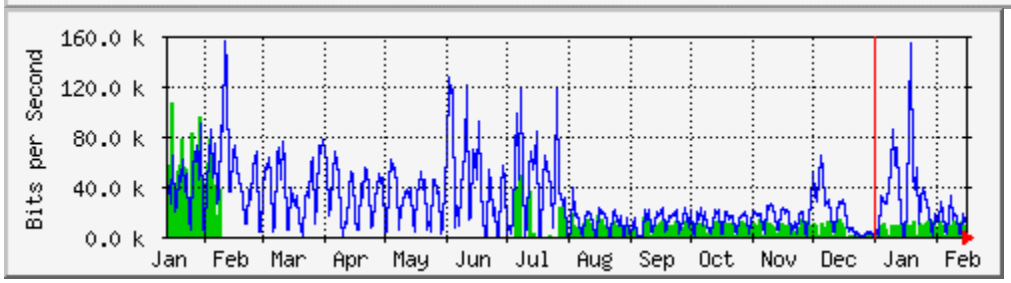

Sachigo Lake Traffic (TDMA & DVB)
500 k
0
Week 08 Week 09 Week 10 Week 11
Inbound Current: 3.59 k Average: 151.27 k Maximum: 866.08 k
Outbound Current: 1.26 k Average: 22.19 k Maximum: 207.08 k
RRDTOOL / TOBI OETIKER

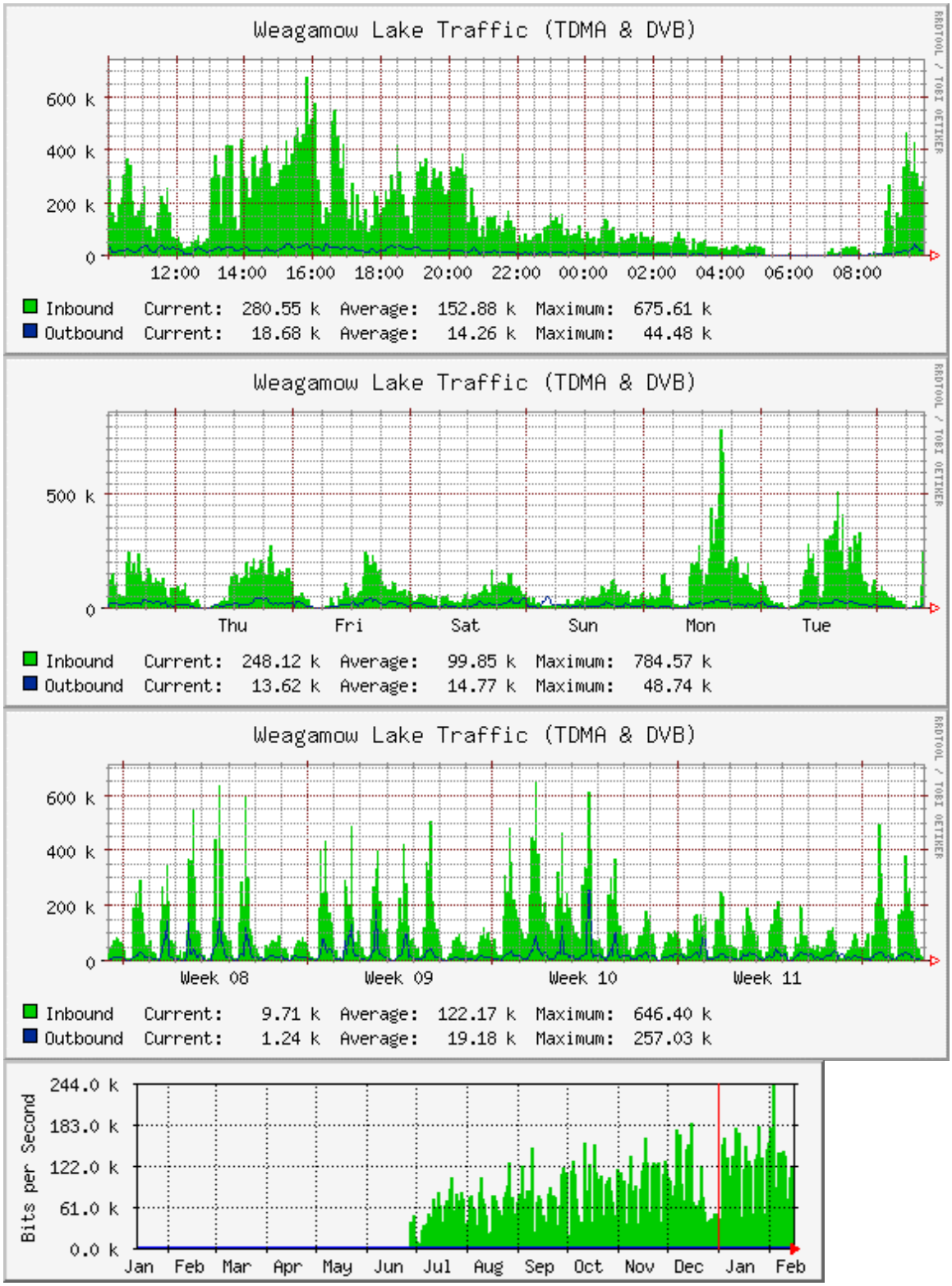

Bits per Second
560.0 k
420.0 k
280.0 k
140.0 k
0.0 k
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb

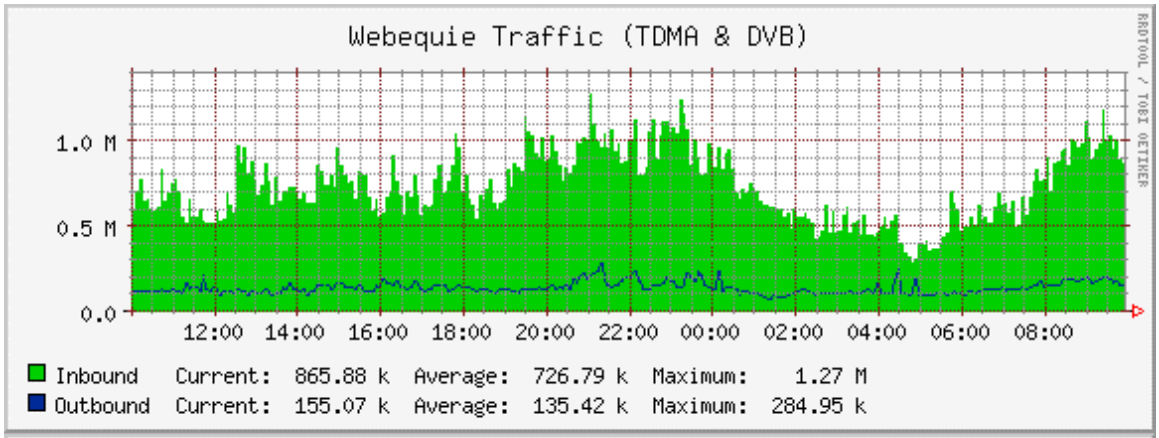

Slate Falls Traffic (TDMA & DVB)
RRDTOOL / TOBI OETIKER
400 k
200 k
0
12:00 14:00 16:00 18:00 20:00 22:00 00:00 02:00 04:00 06:00 08:00
Inbound Current: 75.49 k Average: 53.27 k Maximum: 516.90 k
Outbound Current: 8.89 k Average: 14.00 k Maximum: 100.96 k

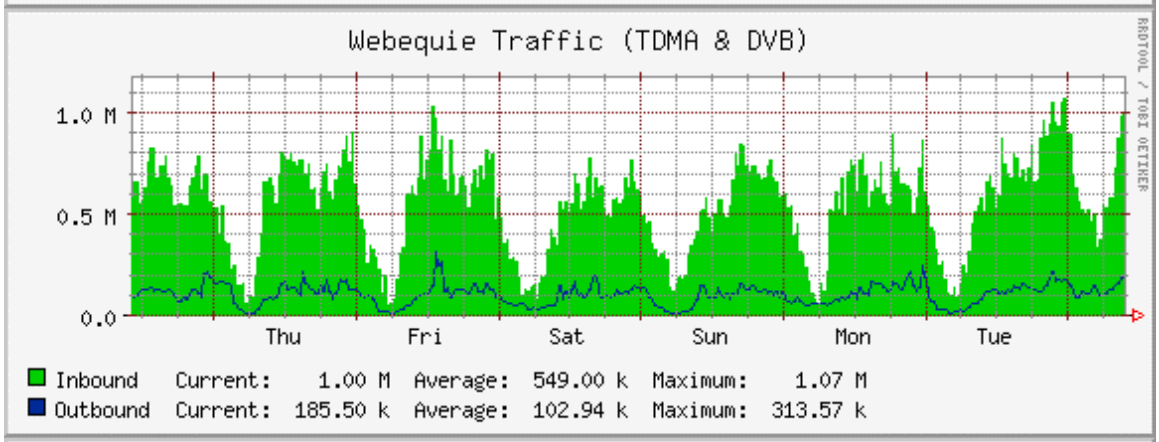

Slate Falls Traffic (TDMA & DVB)
RRDTOOL / TOBI OETIKER
300 k
200 k
100 k
0
Thu Fri Sat Sun Mon Tue
Inbound Current: 128.75 k Average: 56.25 k Maximum: 380.27 k
Outbound Current: 42.82 k Average: 9.46 k Maximum: 71.80 k

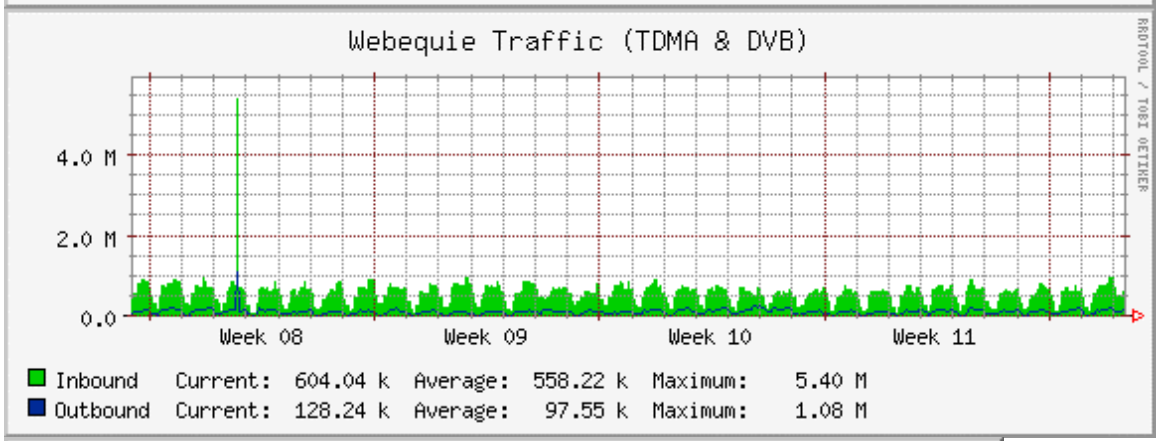

Slate Falls Traffic (TDMA & DVB)
RRDTOOL / TOBI OETIKER
300 k
200 k
100 k
0
Week 08 Week 09 Week 10 Week 11
Inbound Current: 1.37 k Average: 76.67 k Maximum: 379.15 k
Outbound Current: 970.96 Average: 15.64 k Maximum: 87.53 k

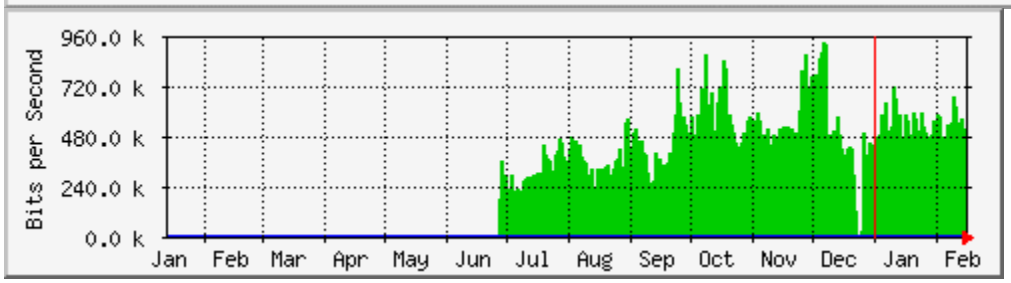

Bits per Second
160.0 k
120.0 k
80.0 k
40.0 k
0.0 k
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb

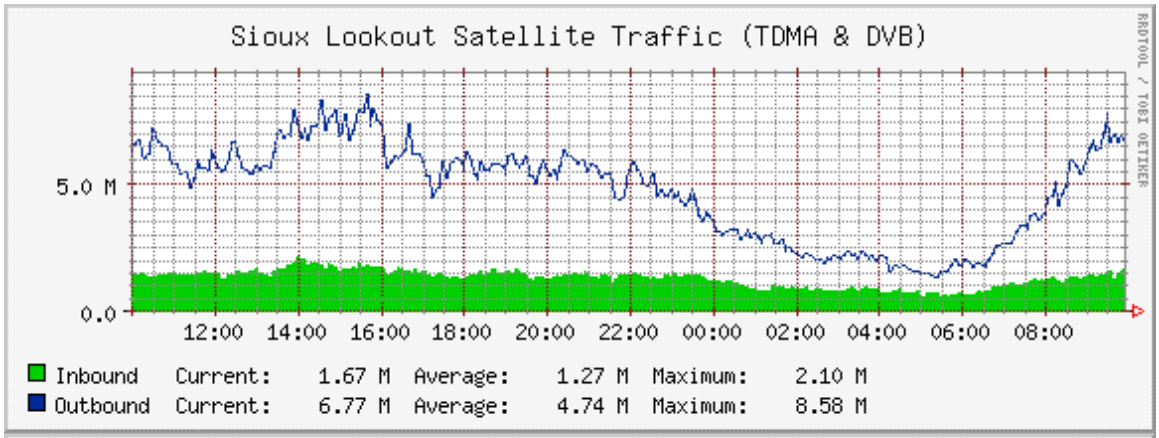

Weagamow Lake Traffic (TDMA & DVB)
600 k
400 k
200 k
0
12:00 14:00 16:00 18:00 20:00 22:00 00:00 02:00 04:00 06:00 08:00
Inbound Current: 280.55 k Average: 152.88 k Maximum: 675.61 k
Outbound Current: 18.68 k Average: 14.26 k Maximum: 44.48 k
Weagamow Lake Traffic (TDMA & DVB)
500 k
0
Thu Fri Sat Sun Mon Tue
Inbound Current: 248.12 k Average: 99.85 k Maximum: 784.57 k
Outbound Current: 13.62 k Average: 14.77 k Maximum: 48.74 k
Weagamow Lake Traffic (TDMA & DVB)
600 k
400 k
200 k
0
Week 08 Week 09 Week 10 Week 11
Inbound Current: 9.71 k Average: 122.17 k Maximum: 646.40 k
Outbound Current: 1.24 k Average: 19.18 k Maximum: 257.03 k
Bits per Second
244.0 k
183.0 k
122.0 k
61.0 k
0.0 k
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb

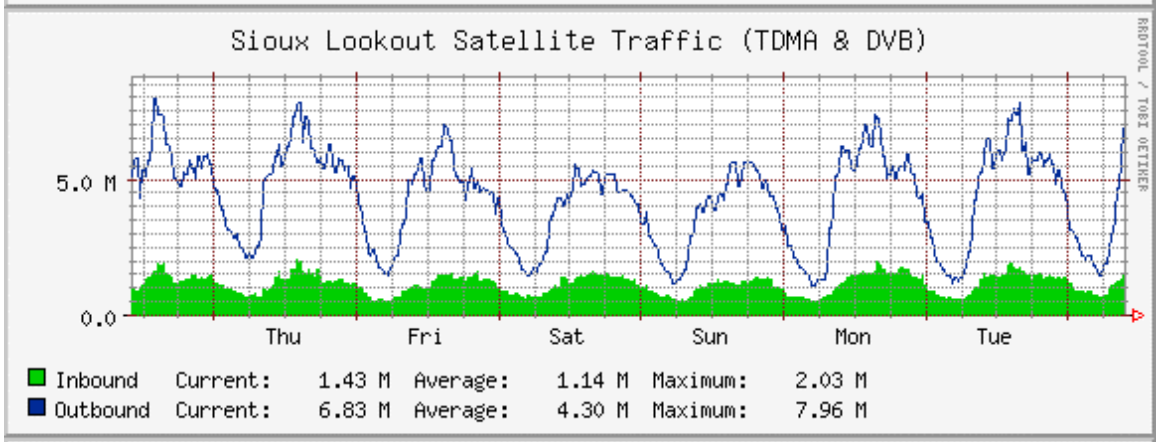

Webequie Traffic (TDMA & DVB)
1.0 M
0.5 M
0.0
12:00 14:00 16:00 18:00 20:00 22:00 00:00 02:00 04:00 06:00 08:00
Inbound Current: 865.88 k Average: 726.79 k Maximum: 1.27 M
Outbound Current: 155.07 k Average: 135.42 k Maximum: 284.95 k

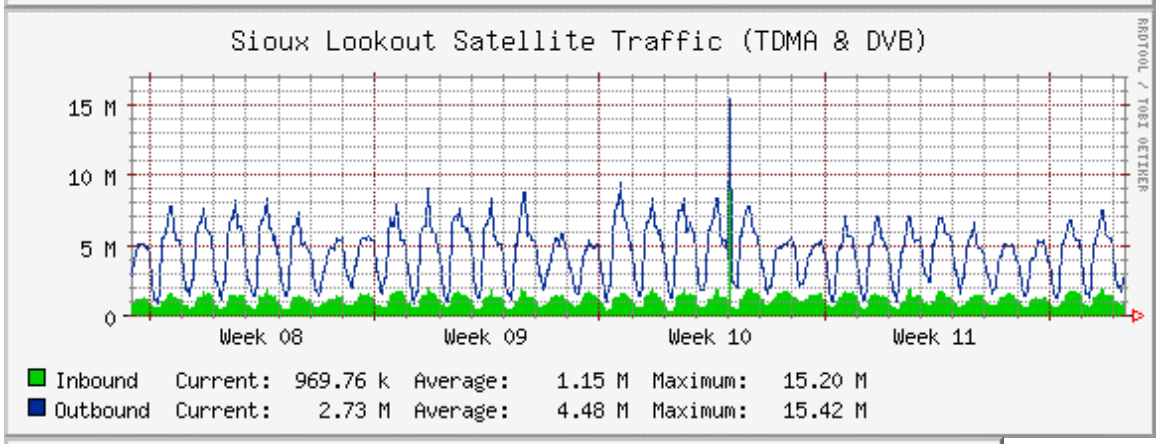

Webequie Traffic (TDMA & DVB)
1.0 M
0.5 M
0.0
Thu Fri Sat Sun Mon Tue
Inbound Current: 1.00 M Average: 549.00 k Maximum: 1.07 M
Outbound Current: 185.50 k Average: 102.94 k Maximum: 313.57 k

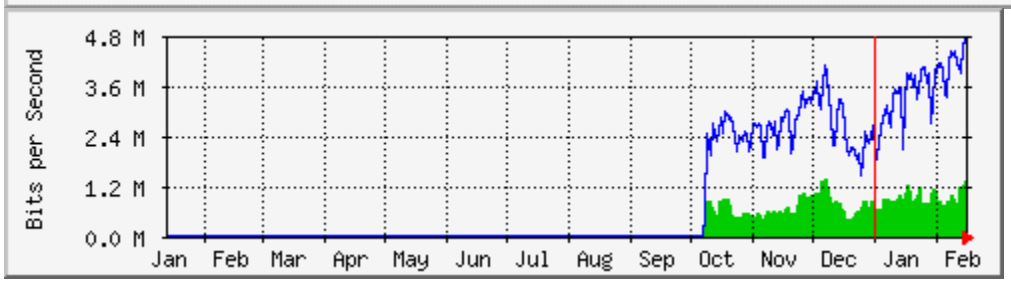

Webequie Traffic (TDMA & DVB)
4.0 M
2.0 M
0.0
Week 08 Week 09 Week 10 Week 11
Inbound Current: 604.04 k Average: 558.22 k Maximum: 5.40 M
Outbound Current: 128.24 k Average: 97.55 k Maximum: 1.08 M


Bits per Second
960.0 k
720.0 k
480.0 k
240.0 k
0.0 k
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb


Sioux Lookout Satellite Traffic (TDMA & DVB)
5.0 M
0.0
12:00 14:00 16:00 18:00 20:00 22:00 00:00 02:00 04:00 06:00 08:00
Inbound Current: 1.67 M Average: 1.27 M Maximum: 2.10 M
Outbound Current: 6.77 M Average: 4.74 M Maximum: 8.58 M


Sioux Lookout Satellite Traffic (TDMA & DVB)
5.0 M
0.0
Thu Fri Sat Sun Mon Tue
Inbound Current: 1.43 M Average: 1.14 M Maximum: 2.03 M
Outbound Current: 6.83 M Average: 4.30 M Maximum: 7.96 M


Sioux Lookout Satellite Traffic (TDMA & DVB)
15 M
10 M
5 M
0
Week 08 Week 09 Week 10 Week 11
Inbound Current: 969.76 k Average: 1.15 M Maximum: 15.20 M
Outbound Current: 2.73 M Average: 4.48 M Maximum: 15.42 M


Bits per Second
4.8 M
3.6 M
2.4 M
1.2 M
0.0 M
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb