

R E P O R T O F T H E N U N A V U T B R O A D B A N D T A S K F O R C E

Sivumuuqpallianiq, Moving Forward:



STRENGTHENING OUR
SELF-RELIANCE IN THE
INFORMATION AGE



Cover photograph of caribou by Mike Beedell

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Introduction

As members of the Nunavut Broadband Task Force, we are pleased to submit this report to the Honourable Olayuk Akesuk, Minister of Sustainable Development, Government of Nunavut.

We believe that the availability of satellite-based information technology is a key to Nunavut's economic growth. We look to a future when knowledge and information, conveyed through computers and telecommunications networks, will play a major role in the new Nunavut economy.

The establishment of a sophisticated telecommunications network, linking our widely dispersed population, was a major concern during the creation of Nunavut. Since April 1, 1999, such a network has been built, enabling the successful decentralization of the Government of Nunavut to ten communities across the Territory, in addition to the capital, Iqaluit. We know this initiative is only the first step toward a truly "connected" territory, in which all Nunavummiut will be linked via telecommunications to each other, and to the rest of Canada.

Minister Akesuk created the Nunavut Broadband Task Force in February 2001. He gave our task force a mandate to provide advice and recommendations on broadband issues affecting Nunavut, and to assist in the preparation of reports and responses to the National Broadband Task Force, which had been established by the federal government in October 2000.

Like the federal task force, the majority of the members of the Nunavut Broadband Task Force is

drawn from the private sector, and non-governmental organizations (NGOs). Four Government of Nunavut departments also are represented.

As leaders in the communications field, we recognize the importance of broadband to Nunavut's future. We have worked to create a series of recommendations that we believe will facilitate the development and growth of broadband in Nunavut.

We have been grateful for the opportunity to advise government before major policy initiatives have been launched. Nevertheless, in the spring of 2001, we had to work quickly to produce in draft a series of recommendations directed at the federal government and its task force, which released its report in June. Since then, these recommendations have been expanded to include both senior levels of government.

Sivumuuqpallianiq, Moving Forward presents the final recommendations of the Nunavut Broadband Task Force. We hope the report conveys some of the excitement and optimism about the future of broadband in Nunavut that motivated us in our work on the task force.

It is also our hope that the private sector, government, and our NGOs will continue to work together to ensure that our citizens have full access to broadband, so that Nunavummiut can play a prominent role in Canada's growing knowledge economy.

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Overview: Bringing Broadband to Nunavut

Challenges – in Nunavut, we identify them, and then we learn to overcome them.

For countless generations, Inuit have risen to the challenge of surviving in one of the world's harshest environments, by creatively using the materials at hand.

Our traditional materials have come from the land, but when new materials and tools became available – rifles, snowmobiles, high frequency radio, satellite telephones, global positioning systems, among many others – they were adapted readily and put to work for the benefit of our society.

This tradition of self-reliance, and openness to innovation and new technology, provides the foundation for Nunavut's development today.

Another new tool is about to enter our lives, one that will change the way we communicate with each other, the way we do business, the way we learn and, at the same time, show the world about Inuit and Nunavut. This tool will help us build healthy communities, strengthen learning, extend and simplify governance, and bolster our self-reliance.

This new tool is broadband – high-speed telecommunications networks connecting all Nunavut communities with each other, and connecting Nunavut with the rest of the world. Using broadband, we can instantly share images, voice, video, and text, connecting with each other via satellite communications. With broadband, connections between our computers will be fast enough for us to be able to watch each other's faces moving across the screens on our computer monitors, as

we talk to each other across vast distances. We will be able to meet with medical specialists who are thousands of kilometers away without leaving our homes, participate in specialized training courses easily from our own communities, and promote our unique products to the world.

Today, network services connecting our communities are slow – we have “narrowband” connections, so it takes a long time for information to go from one location to another. Imagine a herd of caribou coming to a narrow water crossing – the herd slows down to a halt, falls into single file, and takes a long time to cross the stream. This is the way information is currently being transmitted in Nunavut.

With broadband, information can pass through our networks very quickly. Imagine the same herd of caribou arriving at a wide-open broad river crossing. Hundreds of caribou rush across at a time – reaching their destination quickly. Broadband can help us reach our health, education, business, governance, cultural and language goals more quickly – without leaving home.

Guiding Principles and Overview of Report

In our past, survival depended on our abilities to collect, understand, and share knowledge with each other. Today, we live in the “information age,” and we depend on high-speed communications to assure our participation in the knowledge-based, global economy. As we take our place in Confederation, and work to reduce the social and economic gaps between Nunavummiut and other Canadians, our ability to use knowledge to support our development will be tested. We are convinced that Nunavummiut, with broadband, can meet this challenge.

In developing our recommendations for bringing broadband to Nunavut, we were guided by seven principles. These principles are based on an understanding of our population as an oral-based culture, supported by equally accessible, affordable broadband tools that are used and controlled by people in our communities. With the participation of business, and with the support of government regulatory and policy frameworks, broadband can be used to further our cultural, educational, social, and economic goals.

Principles

1: Support Our Oral Culture

Nunavummiut communicate orally to create healthy communities, a vibrant economy, and a culturally strong people. We will build broadband applications that help us use our oral tradition to

connect our communities and lead to increased self-reliance.

2: Provide Universal, Affordable Access

All Nunavummiut must have access to broadband services equally. We will ensure broadband services are affordable, so that we all can use communication tools to achieve economic, social, and cultural goals.

3: Communities Come First

We recognize that community involvement is the key to developing appropriate uses of broadband for all to benefit. We will ensure all members of a community will have access to broadband tools, and if they wish, can play a role in shaping how broadband is used in their community.

4: Build Capacity In The Private Sector

Broadband services must evolve and grow to meet the needs of Nunavummiut over time. We will stimulate private sector development in broadband services, and encourage competition and innovation to build a strong responsive communications industry – from small companies at the local level, to regional service providers.

5: Provide Equality Of Access To Public Services

The small population in our remote communities means we often have reduced opportunities for delivery of face-to-face public services. We believe broadband tools can be developed to help Nunavummiut obtain equal access to the public

services (especially in the areas of education and health) available to other Canadians.

6: Promote Our Language And Culture

With the introduction of any new English-based technology, we know there are risks to the survival of our language and culture. We must ensure that broadband tools increase the opportunity to communicate in the various dialects of Inuktitut, to enhance the promotion, preservation, and evolution of our language and culture.

7: Ensure Advancement And Innovation Of Services

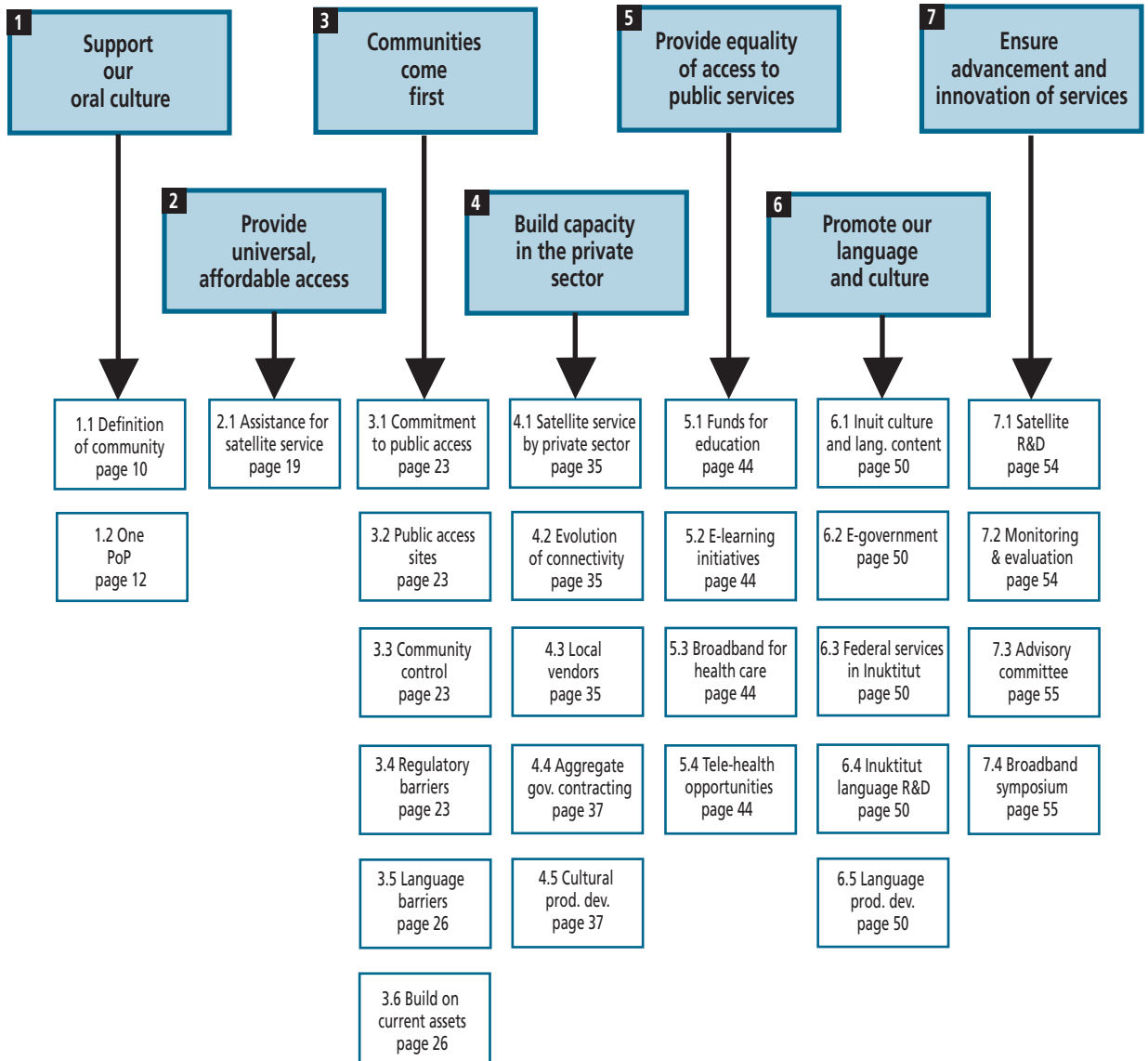
Broadband services must evolve as technology advances, but they must also respond to innovation in our communities and to local aspirations. To enable this broad evolution, we need to set out a broadband plan that is community driven, and accommodates our specific cultural, language, technical, and training needs. The plan must be subject to on-going assessment, to help measure our progress in attaining our goals, and to allow for changes in direction in response to changes in technology and community needs.

Report Structure

This report is divided into seven chapters. Each chapter begins with a principle – a concept that outlines where we began our thinking. It is followed by some background related to the issues, and concludes with recommendations, which address the principles and issues.

The chart on the next page links each principle to the final recommendations. For the full text of each recommendation, refer to the page number provided.

Principles and Recommendations



1. Nunavut in a Digital World

Principle #1: Support Our Oral Culture

Nunavummiut communicate orally to create healthy communities, a vibrant economy, and a culturally strong people. We will build broadband applications that help us use our oral tradition to connect our communities, leading to increased self-reliance.



Photo: NWT Archives

Broadcasting's early days in Frobisher Bay (now Iqaluit). We rely on our oral tradition for communicating all that is important to us.

Broadband must reinforce our self-reliance. To do that, policy for the development of broadband must recognize our unique place in Canada: the barriers we must overcome, and the opportunities we share as Nunavummiut.

Our defining characteristic, in terms of communications, is that we are an oral culture.

Face-to-face meetings, learning, discussions, and community involvement have been the key to Nunavut's success in the past, as they will be to our success in the future. Whether in education, health care, justice, economic development, or governance, we rely on our oral tradition for communicating all that is important to us. This knowledge, what makes us unique, is shared first in our communities.

The role of each of our communities must be recognized in claiming Nunavut's place in the digital world, if we are to retain and enhance those qualities which make us unique, and on which our self-reliance depends.

Our People

Nunavut's population structure is unique in Canada. Inuit make up 85% of our total population, and communications in Nunavut reflect this reality. As an oral culture, decision-making traditionally has been based on direct discussion and sharing of knowledge.

This approach continues today. Whether we're operating businesses, managing wildlife resources, or creating a new government – things work best when Nunavummiut can meet face-to-face to discuss how we will achieve our goals.

Elders, our respected leaders, make up 10% of our population. Many of our elders speak Inuktitut only, and while the majority of younger people speak both Inuktitut and English, Inuktitut remains the first language and mother tongue. Another 35% of our population is between 25 and 49 years of age. The majority of our population, however, is under 25 years of age – over 55% of Nunavummiut are youth – the group most likely to make use of, and benefit from the development of appropriate Nunavut broadband applications.

Our Geography And Communities

When we need to communicate with people outside our community and outside Nunavut, we face huge geographic and financial challenges. There are no roads or land-based communications facilities linking our 27,000 people, who live in 25 communities spread across one-fifth of Canada's landmass. Our largest community is the capital city of Iqaluit, with a population of 5,000. Other communities range from populations of 148 (Grise Fiord) to 2,200 (Rankin Inlet).

Without roads, we travel between communities by plane, snowmobile, and boat. We are dependent on air travel for regular and reliable connections between communities, but it is very expensive. For example, the cost of regular airfare for a return flight from Iqaluit to Cambridge Bay (the regional centre serving the Kitikmeot region in the west) is over \$5,000, and requires an overnight stop to make connections. The

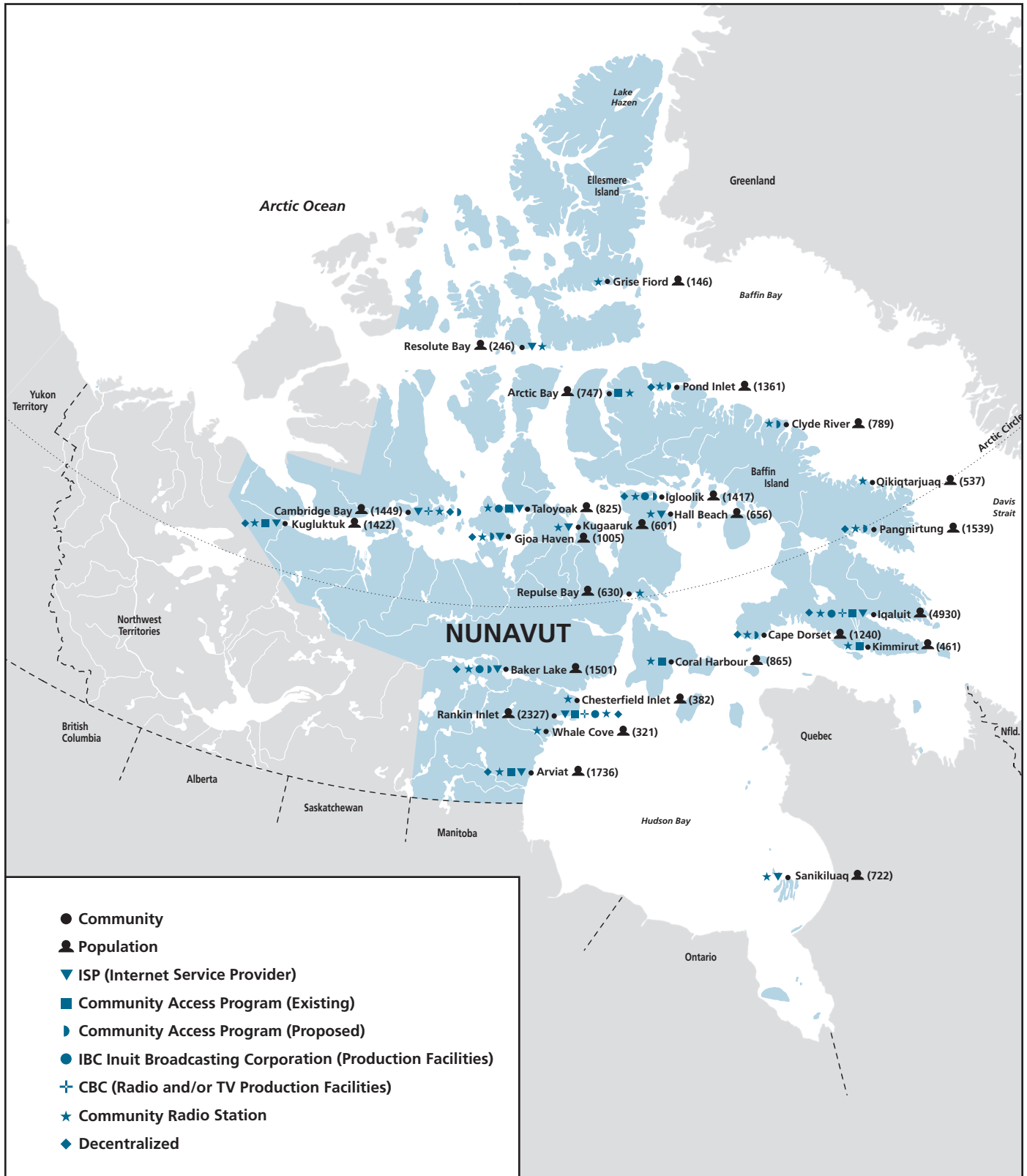
financial cost of a small one-day meeting in Cambridge Bay involving five people from across Nunavut adds up quickly: at least \$30,000 for airfare and accommodations alone.

Communications within our communities are much different - it is very easy to get together. Houses, stores, and community services are all close by. Every community has a health centre, a school, an arena and recreation centre, a store, a power plant, a municipal office, and an airstrip. All are linked through a web of organizations and informal networks. The telephone, often used in combination with the local community radio station, is the principal communications tool in town. When camping on the land, HF radio serves as the means to stay in touch. These are communications tools that take advantage of our oral culture, and help bind communities together.

As broadband helps to overcome the expense and difficulties of communicating between communities, it will build on the strong communications networks that exist within each community. Our population is widely dispersed, but has coalesced around 25 vibrant centres of community life. By linking these communities through broadband, we can build on one of Nunavut's greatest strengths, bring down the barrier created by our geography, and work together to meet our social, cultural and economic goals for the Territory.

Our Economy

Today, we talk about how the "new knowledge economy," based on the communication and interpretation of information, is as important as the older resource-based economy that relies on physical assets and commodities. Across all economic sectors today, knowledge matters most.



In planning the administration for the new Territory, the Nunavut Implementation Commission identified the need to have highly developed information and communications technology systems. This is critical, given the Government of Nunavut's decentralization plans and the need to better link the numerous communities scattered across such a vast territory. Enhanced connectivity can also play a key role in socio-economic development, such as by improving access to information and services (e.g., telehealth), increasing distance education opportunities, and supporting marketing opportunities and the growth of e-commerce opportunities (e.g., planning and reserving vacations via the Internet, purchasing crafts).

Nunavut Economic Outlook
The Conference Board of Canada

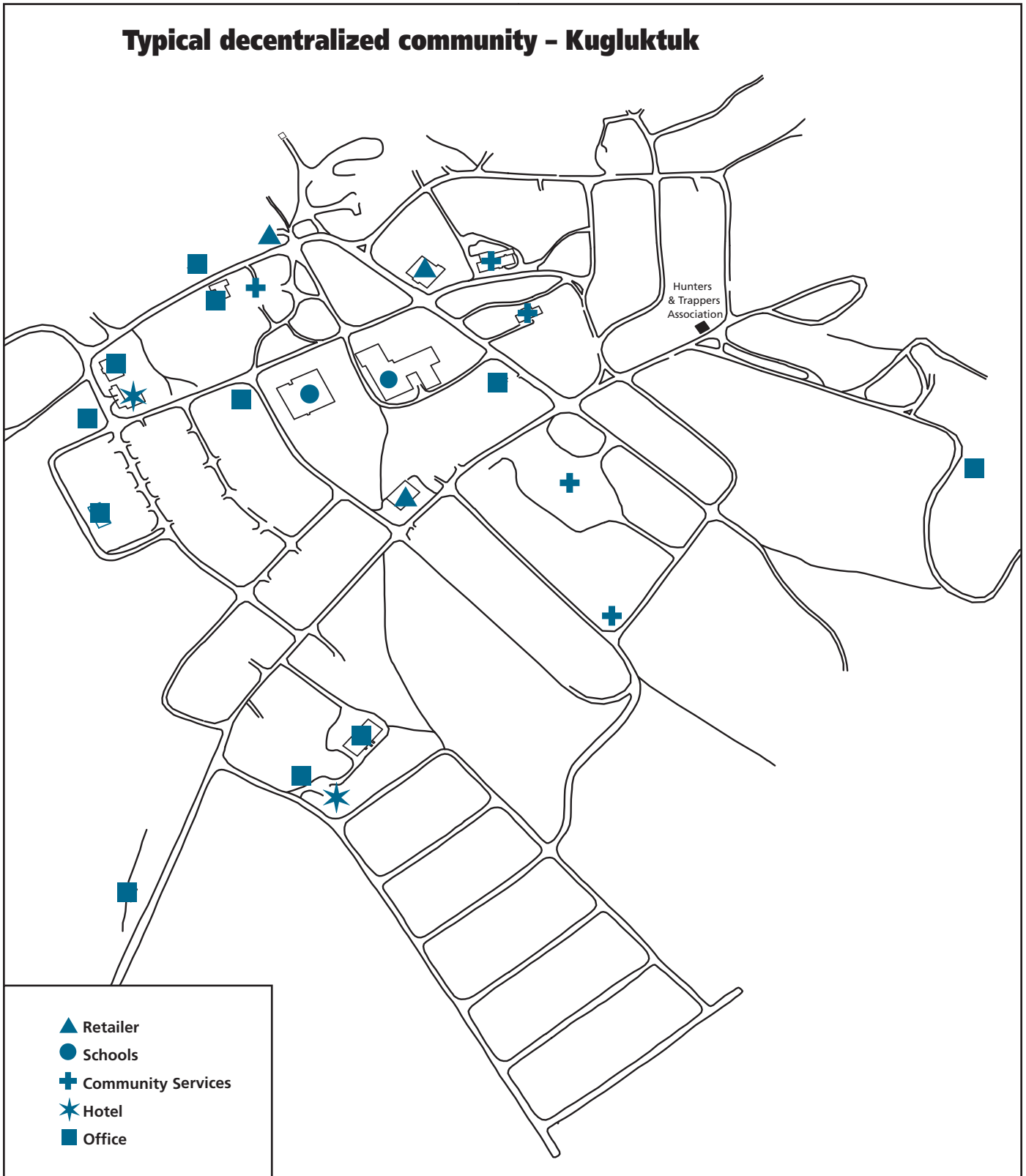
Inuit have always lived in a knowledge-based economy. The correct interpretation and communication of information about the land, weather patterns, and the activities of wildlife has been crucial to the production, distribution, and consumption of food, shelter, and clothing, and therefore essential to survival. Nunavummiut will not be “moving into” a knowledge-based economy; because of the strength of our economic traditions, we are already there!

Nunavut's traditional land-based (non-wage) economy continues to provide food and clothing for many Nunavummiut, to inspire our artists and craftspersons, and to support our growing tourism industry. We participate in the wage economy in the commercial fishing, mining, arts, tourism, and service sectors. All sectors, in both the land-based and wage economies, will depend on our capacity to use and share information with each other, and with those who use and purchase what we produce.

Currently, Nunavut is relying on the government services sector to create more than half the jobs in the wage economy. While the private sector must play a greater role in the future, government today is the key economic driver in Nunavut. Government will have to play a lead role in developing our broadband infrastructure. Through its procurement practices, government can encourage private sector growth in the communications services industries, and ensure a strong private sector base for our knowledge economy in the future.

In our large and sparsely-populated territory, the costs and logistics of organizing and implementing everything from government services in a decentralized government, running Inuit organizations, a health system, a school system, a justice system, to starting up and running any size of business, are daunting. The cost of living in Nunavut is up to three times higher than in southern Canada. A major part of this cost is incurred by ensuring effective communications through face-to-face meetings – for government services, business, health care and education – with their attendant travel, time, and expenditures of effort.

Typical decentralized community - Kugluktuk



“We serve Inuktitut-speaking Nunavut communities struggling to preserve a minority language and a rich oral culture in the face of overwhelming waves of foreign data, mostly through TV. At the same time, we compete financially in a global information market whose fascination with the Arctic goes back many centuries, during which all content was provided by foreign sources from a foreign point of view. We urge the task force to factor into Nunavut’s priorities uses of broadband which not only allow Nunavummiut an equal chance to become assimilated into a single global e-culture, but which also capitalize on unique uses of broadband to maintain and modernize Nunavut’s distinctness and the strengths of Inuit oral culture, land-based knowledge and traditional values.”

- Norm Cohn
Igloolik Isuma Productions

With broadband access, we can communicate over long distances using new technologies that take advantage of our oral and visual-based culture. In our tightly knit communities, we can work together locally to shape the use of broadband tools that can help strengthen our communities, our local economy and our culture. Across Nunavut, we can work together to use broadband to improve access to all services, and

most importantly, develop Nunavut’s economy in the digital world.

We must ensure that every one of our 25 communities, no matter what size, have equal access to broadband services. We must recognize that the development of both our wage economy and the land-based economy depends on effective communications, and that just as in our past, our productivity will be determined by how we obtain and interpret information in the knowledge-based economy.

Recommendations:

1.1 Definition Of Community

The Government of Canada includes each of the 25 organized communities in Nunavut as “communities” for the purpose of broadband assistance under the Action Plan proposed by the National Broadband Task Force.(see Appendix A for a list of these communities).

1.2 Functioning Broadband Point Of Presence In All Communities

The Government of Canada and the Government of Nunavut (Public Works & Services) ensure that funding and procurement actions guarantee a minimum of one broadband Point of Presence (PoP) in each organized community in Nunavut. Where a single broadband PoP exists in a community, governments must ensure, through a contractual commitment, that service will not be disrupted due to procurement, financial, legal, or technical issues.

● ● ● Imagine Nunavut in 2004

Objective:

To develop Nunavut's fledgling commercial fishing sector, combining traditional knowledge with scientific data collection.

Technology used:

Multi-point videoconferencing, document sharing.

Imagine ...

Coral Harbour elders meet with Arviat elders by room-based videoconference to discuss the changing patterns of fish stocks on the west coast of Hudson Bay. Officials with the Department of Sustainable Development in Rankin Inlet and Iqaluit, along with officials at the Department of Fisheries and Oceans watch the discussion on their desktops. Simultaneous translation is provided to those scientists requiring translation into English.

The elders' knowledge is being shared among each other, and recorded into the research being conducted into the fish stocks of Hudson Bay.

Presentations are then made in Inuktitut, to the elders by Department of Sustainable Development in Rankin Inlet. Elders are provided with detailed maps of their traditional fishing grounds, indicating what scientists have found in researching the fish stocks of Hudson Bay.

Combining traditional knowledge with scientific research helps the Kivalliq region plan its sustainable commercial fishing industry.

2. Broadband Access Through Satellite

Principle #2: Provide Universal, Affordable Access

All Nunavummiut must have equal access to broadband services. We must ensure broadband services are affordable, so that we all can use communications tools to achieve our economic, social, and cultural goals.



Photo: NorthwesterTel

Arctic Bay, Nunavut – Ours is the only jurisdiction in Canada completely dependent on satellite for data and telecommunications services.

Access to broadband services must be affordable for everyone – individuals, businesses, organizations, and communities. Indeed, affordability defines access. When the cost of using broadband exceeds our ability to pay for it, access is effectively denied. In Nunavut, where the operating costs of satellite services are very high, affordability is a critical issue.

Satellite Costs And Limitations

The great distances between our communities mean we must rely completely on satellite technology within Nunavut and beyond. The high cost of operating satellite-based services means we do not currently have affordable access to broadband. Without government intervention, we will never have affordable access. In this way, Nunavut is unique – no other jurisdiction in Canada is completely dependent on satellite networks for broadband. We need creative solutions where government, industry and community members work

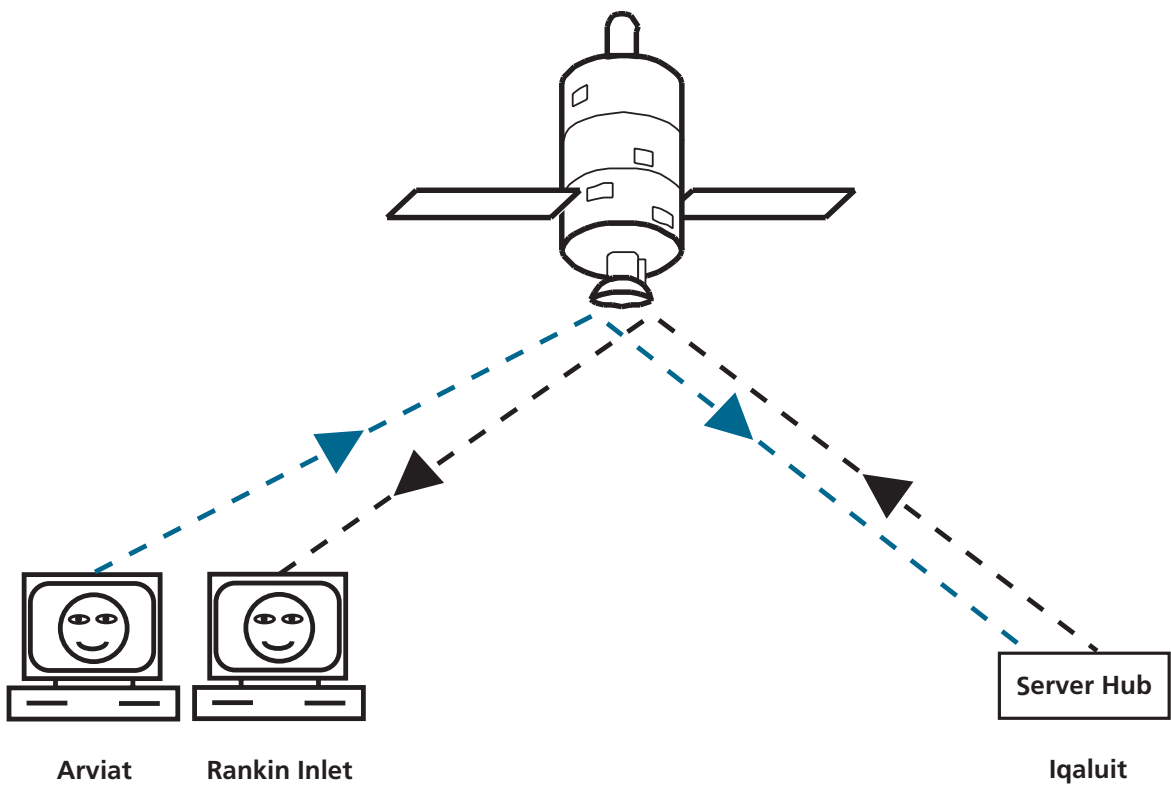
Right now, someone in Ottawa sitting in his basement with an Internet connection provided by the local cable company has access to more bandwidth than all users in a single Nunavut community.

together to build and pay for the installation and high operating costs of access.

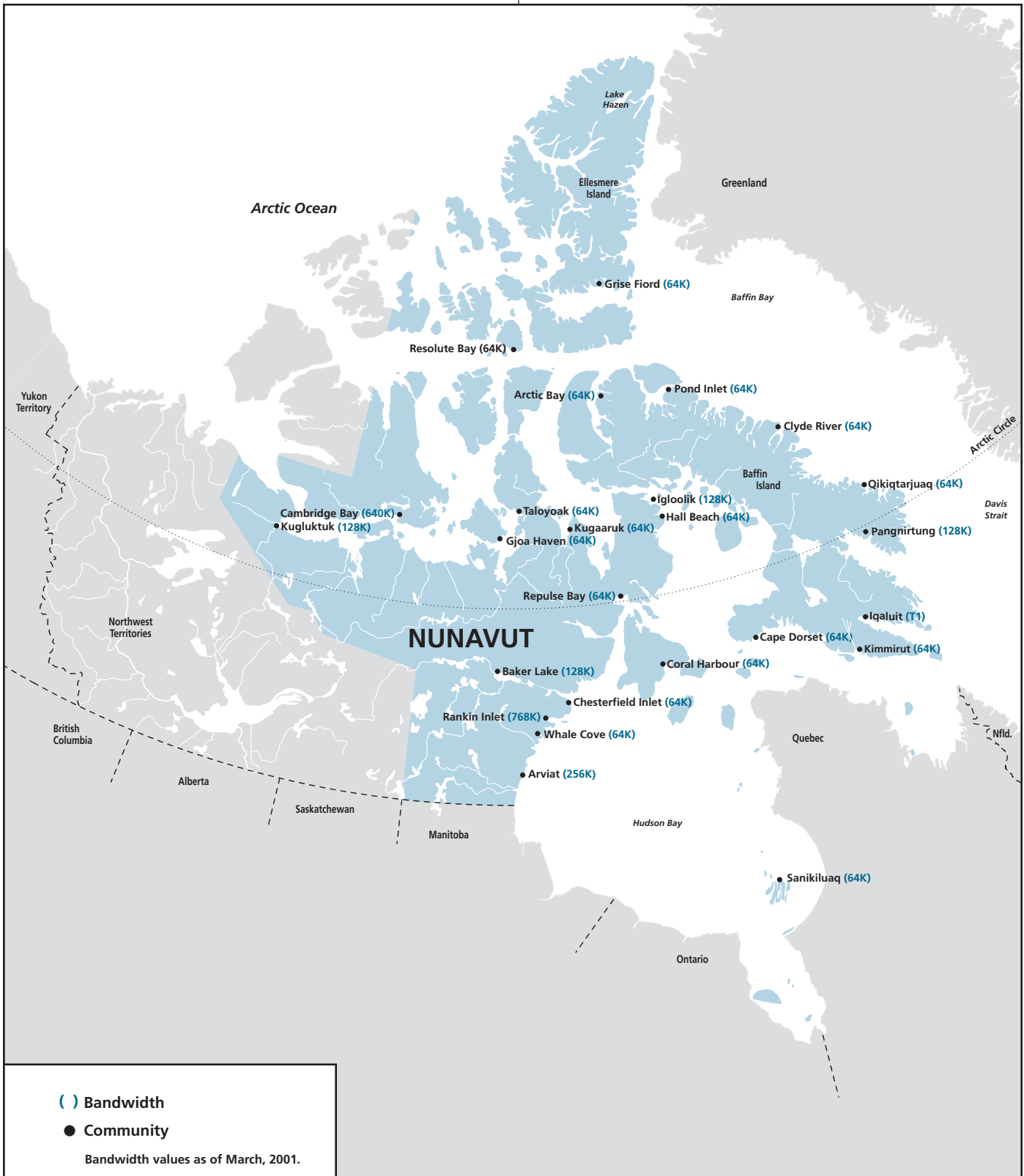
Satellite connections pose some unique cost and technical problems that do not occur with fibre optic and microwave options used in road-linked communities in southern Canada.

For the infrastructure to support broadband use, every Nunavut community requires a broadband point of presence (PoP). The front-end capital cost for installing broadband PoP is minor compared to the satellite operating cost. Today, all of our communities have a ground station and equipment to run voice

Double Hopping on Satellite: Technical and financial challenges



Total time for signal to go from Arviat to Rankin Inlet: 2.4 seconds



phones, as well as access to the current digital communications network (DCN). It would be a one-time, relatively inexpensive investment to add the required additional ground station equipment to handle broadband communications. The real cost problems for Nunavut begin once the ground stations are upgraded, because the ongoing operational costs of buying satellite time are many times higher than the operational costs for fibre optic or microwave broadband in the south.

What differentiates Nunavut communities from places with roads, is that our operational costs to buy satellite time far exceed our infrastructure upgrade costs. In places with roads, fibre optics or microwave transmission is used, where the infrastructure upgrade accounts for 90% of the cost and effort. In Nunavut,

In most communities, a single audio session (such as RealAudio) will consume the entire community bandwidth. Even an e-mail attachment, a map or a blueprint may consume the entire community bandwidth for many minutes, or even hours. When a routine message can effectively block the use of the Internet by a local business, some have been forced to host their servers in the South, where they are inaccessible to local citizens.

our costs are reversed: the infrastructure to put in ground stations is a fraction of the ongoing costs we have to pay for satellite time. For example, for our limited bandwidth usage today, the Government of Nunavut spends \$3 million per year on data transmission alone – about \$100 per citizen. This is an ongoing cost that is incurred year after year.

Today in Nunavut, guaranteed bandwidth costs \$1,704 per month in 64 K increments. At this rate, an equivalent Bell Canada ADSL connection in the South would cost more than \$25,000 per month. When Nunavut starts using broadband, our costs will not be \$3 million in satellite costs per year, it will be tens of millions of dollars per year.

If the cost of paying for satellite time is so high that we cannot afford to use it, then broadband is not accessible. Already, Nunavut is years behind in accessing Internet-based services readily available in the South, and the gap is continuing to widen. Many of our communities do not have Internet access through ISPs or public access sites. People trying to run companies, government departments or adult education centres either don't have access, or have very poor access to the Internet.

In most of our communities, we don't have access to universities, markets, banks and many of the products and services southern communities take for granted. We rely on distance communications to access to these services. Because of our low population density and vast distances between our communities, we cannot close the physical gap between services offered in the North compared to

the South. We *can* close the digital gap – the gap in equitable access to broadband services.

In future evaluations of northern compared to southern access to digital services, we must measure by comparing the northern service to the current southern service. For example, in the year 2004, we do not want to compare Nunavut's service to the service that southerners were receiving back in 2001. We want to compare our 2004 service with the South's service in 2004.

To improve Nunavut's self-reliance, we need to close the “digital divide” so that we have access to services and markets via the Internet and broadband tools.

Recommendations

2.1 Satellite-Only — High Operating Costs

The Government of Canada recognize that satellite services are the only option for connecting Nunavut communities with each other, and to the rest of the world. This recognition should include assistance with ongoing and increasing operating costs, the cost of evolving broadband technology, and financial assistance with capital costs. It is further recommended that assistance provided to users of land-based technology in jurisdictions in southern Canada, and assistance provided to users of satellite technology, be reviewed on a regular basis and compared to ensure equity between the satellite, fibre optic, microwave, and other evolving technology options.

Right now, someone in Ottawa sitting in his basement with an Internet connection provided by the local cable company has access to more bandwidth than all users in a single Nunavut community.

● ● ● Imagine Nunavut in 2004

Objective:

To attract more tourists to Nunavut.

Technology used:

Videoconferencing, virtual reality software, web site creation.

Imagine ...

A Gjoa Haven outfitter discovers that tourists are arriving with fewer misconceptions about the North and less apprehension about cultural differences now that his web site incorporates videoconferencing for question-and-answer sessions, as well as virtual reality software.

The virtual reality tours take visitors through the George Porter Hamlet Centre, where they can circle around a miniature replica of explorer Roald Amundsen's ship, the *Gjoa*, then to watch a local carver at work in his front yard, and finally out to the golf course to watch golfers tee off at Canada's most northerly golf course. The Internet is still the most affordable way to market his business, faster and cheaper than print media or trade shows.

The new technological tools have also been harnessed by Nunavut Tourism, the Government of Nunavut, and the Canadian Tourism Commission to train outfitters like himself about tourism marketing, alliance building, bookkeeping, office management, and some theoretical aspects of guiding. This last element supplements hands-on training for guides out on the land.

3. Local Empowerment

Principle #3: Communities Come First

We recognize that community involvement is the key to developing appropriate uses of broadband for all to benefit. We will ensure all members of a community will have access to broadband tools, and if they wish, play a role in shaping how broadband is used in their community.



Brianna Fulgham at the June 2001 launch of Iqaluit's expanded community Internet Access Site. Community members must lead the development of broadband use.

Broadband services must benefit every member of our community – from hunters, artists, and tourism operators, to students, elders, business people, and users of health, education, justice, and other government services. Successful broadband initiatives will depend first on community involvement, direction, and support. Resources must be dedicated to the

development of knowledge and skills to use broadband network services. In the Inuit concept of *Pijitsirniq* – Serving Others – broadband is a tool that can serve community members to help achieve our goals and aspirations.

Making It Work In Communities

Clearly, for broadband to be a success in Nunavut, community members must lead the development of broadband use to meet our needs. How do we introduce broadband to the community, so people can make informed decisions on how it will be used? How do we make sure everyone has access in order to pursue his or her goals? How do we ensure that we have the technical knowledge to connect and maintain broadband tools with our key institutions for effective use? How do we ensure the proper training is available to people using the equipment? Most importantly, how can we ensure that those people who need linguistic, technical, and financial assistance to make use of these tools receive that help?

We do not expect that broadband will simply be delivered one day, and that people will start using it the next. The implementation of broadband is a process that requires consultation and informed decision-making based on real uses that meet real needs in appropriate cultural settings.

Public Access, Public Control

For the average person, accessing services using technology has been quite difficult in many communities to date. While government workers have largely been connected at work, they make up only a small portion of the population. There has been no sustained Nunavut-wide implementation of public access to the Internet – either by the government, the voluntary sector, or the private sector. This state will continue, even with the implementation of broadband, unless specific action is taken to extend Internet services and to address Nunavut community needs.

Currently, non-government Internet access exists sporadically throughout Nunavut. Infrastructure barriers only begin to address the underlying issues. The Internet itself is a predominately English, print-based tool. It uses equipment that can be difficult to repair when it malfunctions. Imagine trying to set up a new computer that operates in a language you do not speak, and where there is nobody you know within 750 kilometres that can help you. Lack of technical support, lack of access to training, and even lack of places from which to buy a computer are part of the difficulties. At the close of the year 2001, there were only eight operational public access sites in Nunavut's 25 communities. With these barriers, we must ask ourselves how likely it is that a unilingual, Inuktitut-speaking hunter with a limited cash income will invest

in a computer in order to file his income tax on line, or to report his harvesting activity to the Nunavut Wildlife Management Board (NWMB).

In 1995, The Nunavut Implementation Commission produced a report entitled *Nunavut Telecommunications Needs: Community Teleservice Centres – A Supplementary Report of the Nunavut Implementation Commission*. It examined the options of putting public teleservice centres in every community. In this scenario, a hunter could go to a public place where he would be welcomed in his language, and would be treated with respect and confidentiality. A bilingual staff person would maintain the computers, and have the knowledge to assist him. The public access worker would have received training to help the hunter file a tax form on line, and could read the NWMB web site and submit data from the hunter in both Inuktitut and English. With broadband, the staff

“Public access cannot be a secondary consideration; it must be primary because:

- ‘government online’ requires that all Canadians are able to access information, forms, etc. from the Internet
- economic development opportunities will emerge from here.”

-Lorraine Thomas
Nuluaq Community Access Society

person would be able to also connect the hunter to a multi-point videoconference where the presidents of the Hunters and Trappers Organizations from the various communities in his region meet to discuss, in Inuktitut, the latest quotas for wildlife hunting.

The staff at the public access centres would require input from community members, to ensure that services needed in that community are available. The hunter who uses the service would be able to sit on a community board to provide formal input for how the centre operates, and what services the staff provide. The staff, in turn, would have support from a Government of Nunavut department responsible for the centres, equipment maintenance and upgrades, and for providing the training required for staff to run the site as required by the community.

Recommendations:

3.1 Commitment to Public Access

The Government of Canada and the Government of Nunavut (Sustainable Development) ensure that funds are available for broadband public access sites in every Nunavut community for use by citizens, community organizations and small businesses.

3.2 Public Access – Organization And Support

The Government of Nunavut (Sustainable Development/Education) establish a policy and an ongoing program that ensures that every Nunavut community, based on community interest, has the capability of obtaining and managing ongoing funding for a public access site. This program should include:

- access to appropriate physical space and related facilities such as power;

- a community-based society to provide direction; and,
- an established government program partner to work with the community-based society.

The government program partner, where needed, should provide the program space for the public access site. The government program partner should be the conduit for funding to communities, and provide ongoing management, technical assistance, and financial support to ensure that the access is not interrupted by local circumstances, such as staff turnover. Further, a territorial society or association, mandated to support and advise community-based public access sites, should be created to provide developmental support and inter-community linkages.

3.3 Public Access Sites – Community-Driven

The Government of Nunavut (Sustainable Development/Education) ensure that all planned and ongoing activities related to broadband within a community be reviewed by a local committee representing the specific views of the community. Further, community views should be represented in the implementation of locally developed broadband content, technology choices, resolution of access issues, and evolution of the local content and technology.

3.4 Minimizing Regulatory Barriers To Access

The Government of Nunavut (Education) review its Income Support, Student Financial Assistance, and other similar financial support programs, to ensure that people using these programs are able to access broadband and related computer services on a consistent basis. It is recommended that the Government of Nunavut include broadband access fees

History of Consultation

From the “Inukshuk Project” to the Inuit Broadcasting Corporation

In 1979, successful video trials linked hunters and elders between communities as part of the Inukshuk Project. Inuktitut-speaking elders immediately saw the potential of communication using video connections over long distances, and pushed for further uses of this new technology. At the time, costs for two-way broadband meant that at best, one-way television broadcasts would be the only affordable option. As a result of the Inukshuk Project, the Inuit Broadcasting Corporation (IBC) was created in 1981 to promote and preserve the Inuktitut language and culture. IBC television is by, for, and about Inuit, and has won worldwide acclaim and awards for its innovative and critically important programming. IBC has long been a model for other Aboriginal groups worldwide.

Connecting the North Consultations

The Connecting the North Symposium held in 1994, organized by IBC and the Department of Education, Culture and Employment of the Government of the NWT (GNWT), used the digital tools then available in the Arctic to show people what telecommunications were all about.

The three-day symposium was broadcast live on Television Northern Canada (TVNC) (predecessor to Aboriginal People’s Television Network). Broadcasting from Iqaluit, Yellowknife, and Whitehorse, presentations were made on current and future information highway opportunities in health, social services, justice, education, public administration, economic development, and self-government. In communities across the Arctic, people gathered to watch the broadcasts, and provided their comments directly back to all participants via phone and fax.

The results of this massive consultation were documented in a full report to the CRTC and the Information Highway Advisory Board. It contained hundreds of pages of comments from the almost 300 northern participants.

The symposium generated huge excitement about the potential of new communications technologies. People understood what could be possible with the technology, and had a number of recommendations on implementation, which are even more applicable today, as we move closer to the possibility of broadband. Broad recommendations included:

- **Access:** Ensure technical, equitable and affordable access
- **Culture and Language:** Ensure the technology is used to strengthen northern cultures and languages – not undermine them.
- **Training:** Ensure training for the use of new communications tools – both to design and use tools for northern applications, and to use the tools themselves for delivery of education.
- **Research and Development:** Ensure northerners are involved in research and development at every stage: from the initial determination of needs, through development and testing of new products and services, to implementation of the new systems and services.
- **Paying for the infrastructure:** Pool resources and make partnerships between governments, private sector, NGOs and community groups to pay for the information highway

Nunavut Implementation Commission

The Nunavut Implementation Commission (NIC) was set up in 1994 to make recommendations to the federal government, the GNWT and Nunavut Tunngavik Inc. on governance structures for the new territory of Nunavut, which would be created from the Northwest Territories in 1999. Reports published in 1995 following the Connecting the North consultations outlined a vision of how communities could be connected – to meet government, business and individual needs through a blending and shared use of common telecommunications infrastructure facilities and services. A strong, reliable information technology infrastructure was seen as critical to the governance of Nunavut. One of the reports outlined an entire strategy on building community teleservice centres that would provide public access to everything from fax machines to broadband services, paying particular attention to ensuring appropriate services for people with limited incomes and specific language and cultural needs.

as an allowable expense under its Income Support policy.

3.5 Minimizing Barriers For Unilingual Inuktitut Speakers

The Government of Nunavut (Sustainable Development/Education/ Culture, Language, Elders & Youth) address the needs of unilingual Inuit, particularly elders, and develop programs and content that use the audio and video facilities of the Internet, address any associated misunderstandings or misapprehension about the use of the technology, and demonstrate a value for this segment of the population.

3.6 Building On Current Assets

The Government of Nunavut and the Government of Canada will, wherever possible, build on their existing infrastructure to ensure that community capacity for public access sites exists in a sustainable and responsible manner.

Imagine Nunavut in 2004

Objective:

To further the sale of Nunavut-made products by marketing to new global markets.

Technology used:

Digital video camera, video and audio e-mail.

Imagine ...

A well-known unilingual Inuktitut-speaking artist brings two recently completed carvings into the public access centre in Kugaaruk. A trained public access centre employee shows the artist how to use a digital video camera that shoots still or moving color images. The artist decides to shoot his carvings both ways. The public access site employee then explains how to record an audio e-mail, so that the artist can explain in Inuktitut how a recent hunting trip inspired his two new creations.

The artist is then taught how to e-mail the video and still shots along with his audio message to the Nunavut Arts and Crafts Association (NACA), where a bilingual staff member jots down the information from the artist's audio note, and uploads the files to the artist's biography that resides on the globally promoted NACA web site. A video e-mail announcement alerting top art dealers and distributors worldwide to the famous artist's two new sculptures, and the background behind their genesis, is also sent out through the NACA listserv (a mechanism that automatically sends e-mail messages to a large list of people).

4. Building our Economy – (E-Business)

Principle #4: Build Capacity In The Private Sector

Broadband services must evolve and grow to meet the needs of Nunavummiut over time. We will stimulate private sector development in broadband services, and encourage competition and innovation to build a strong responsive communications industry – from small companies at the local level, to regional service providers.

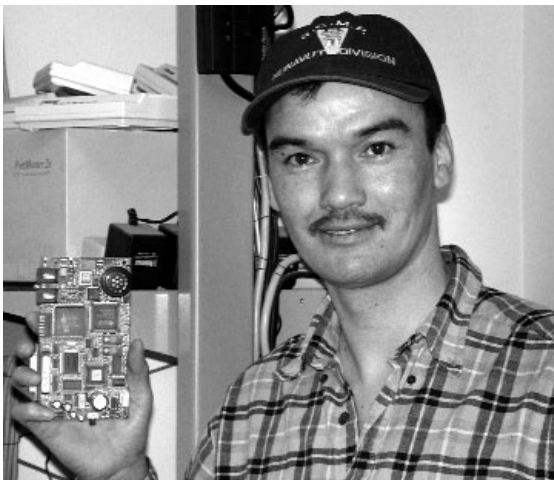


Photo: Tami Doyell

Adamee Itorbeak, President of Nunanet Worldwide Communications. Local information and communications technology businesses can provide services to all levels of government and to businesses, non-government organizations and households.

Market forces alone will not extend broadband to all our communities, but wherever possible, the private sector must be encouraged to invest in the new Nunavut economy, and to operate in a competitive environment. The private sector must be provided a range of e-Business opportunities: in businesses that provide broadband and its related services; and,

businesses that use broadband to expand their markets, improve access to suppliers, and increase productivity. Broadband is the essential infrastructure for the new economy, which is based on knowledge and global information networks. Economic growth also depends on human resource and organizational development, to which broadband can add great value. The Inuit concept of *Pilimmaksarniq* – Capacity Building – is what broadband enables for the Nunavut economy.

Developing Broadband Services

It is no secret that providing broadband services in small, remote, Arctic communities is expensive and difficult. The barriers businesses face in order to deliver these services are many, including:

- high cost of satellite bandwidth;
- high cost of travel and labour for installation and maintenance;
- lack of trained technicians at the local and regional level to set up and deliver services;
- high cost of housing and building infrastructure for staff and facilities;

- lack of local business expertise in the high-tech field;
- linguistic and cultural barriers;
- small community populations, unable to support infrastructure and maintenance costs; and,
- no hope of a return on investment for companies willing to take the risks of providing bandwidth services, without government purchasing its services from these companies, acting as an anchor tenant.

Our challenge is to recommend ways that government purchasing power can help to break down these barriers. We believe the way that government buys broadband services can encourage local and regional companies to invest in infrastructure development, train local people, and set up new services.

We want to create an environment that provides an incentive for our private sector to develop a wide range of broadband services in a variety of languages that respect cultural needs, both at the local and regional level. We want to ensure that these companies can survive financially, and their services evolve at a pace that matches services elsewhere in Canada.

These issues apply to companies providing services for connecting between communities (connecting to each other via satellite), and to companies that provide services within communities via some form of local area network (a network that connects a number of computers to each other or to a central server so that the computers can share programs and files).

Connecting Between Communities

Connecting *between* communities depends completely on each community's ability to send and receive signals via a satellite that connects them to the rest of Nunavut and beyond. In order for broadband to

operate, each Nunavut community requires at least one broadband "point of presence," or PoP. The broadband PoP is the earth station (a satellite dish and appropriate computer equipment) that sends information from the community up to the satellite, down to other communities, and then back again.

A business that wishes to provide services that connect Nunavut communities would, at a minimum, need to:

- purchase bulk satellite bandwidth from a supplier;
- apply the purchased bandwidth to the Nunavut communities it serves;
- install and maintain the earth stations; and,
- set up an administrative, technical and financial system to operate the service.

Providing dedicated satellite bandwidth to communities, along with installation and maintenance of earth stations, requires a substantial financial and administrative investment.

The Nunavut Broadband Task Force members could not agree on how government should purchase satellite services between communities in order to stimulate private sector investment that would grow and evolve. The debate focused around whether or not government should issue one request for proposal (RFP) that would award the purchase of satellite services for all 25 communities to one company, or purchase services from more than one satellite service vendor.

Some Task Force members believed that the required investment in earth stations, local equipment at the Broadband PoP site, new technology and network control operations would not be made unless

the winning vendor got a fixed-term contract and a guarantee of usage that could help pay off the required investment over a number of years. They argued that if government pooled its resources to purchase long-term satellite services from one vendor to connect all 25 communities, benefits could include the following:

- the equipment at each broadband PoP would be interoperable with all Nunavut communities;
- the government contract could require that the vendor serve every single Nunavut community with a minimum of one broadband PoP, regardless of size, guaranteeing that all communities get served;
- serving all 25 communities at once allows for bulk purchase of satellite time, reducing the overall cost to the vendor, and ultimately, the consumers; and,
- the RFP can specify that the winner of the service must allow local access to the broadband PoP at reasonable rates, allowing other companies to provide competitively priced services *within* the community.

However, other members of the Task Force argued that the purchase of longer-term satellite services may result in the following problems:

- only one company would get substantial economic benefits;
- other companies would be barred from entering the satellite provision service industry;
- the incentive to find ways to deliver services more cheaply over the long term would be removed, and consumers would pay more in the long run; and,
- the incentive to adopt new state-of-the-art technologies as they become available would be removed, thereby locking in Nunavut to a technology that may not respond to evolving opportunities.

Some members argued that if multiple companies provided satellite services to connect Nunavut communities, the drawbacks could include:

- less reliable service due to differing levels of technical, administrative and financial resources of the various companies;
- possible higher costs to the consumer because of inability to purchase satellite bandwidth in bulk;
- interoperability of equipment between communities may be compromised if different companies invest in different broadband PoP equipment (some communities serviced by one company may not be able to talk to communities serviced by another company); and,

“(Broadband) is particularly important given the Government of Nunavut’s decentralization plans... Enhanced connectivity can also play an important role in socio-economic development... by improving access to information and services (e.g. telehealth), increasing distance education opportunities, and supporting marketing opportunities and the growth of e-commerce...”

- *Nunavut Economic Outlook*
Conference Board of Canada, May 2001

- no ability for government to ensure all communities get served (one of the companies could withdraw or go bankrupt).

While the issue of guaranteed usage and fixed term was not resolved, all Task Force members did agree that governments must use their collective purchasing power to buy broadband services from Nunavut companies, abiding by Article 24 of the Nunavut Land Claims Agreement and the Government of Nunavut’s Nunavummi Nangminiqqtunik Ikajuuti (NNI) policy.

Connecting Within Communities

Connecting *within* communities is another situation altogether, where Task Force members agreed that government must create the opportunity for many vendors to provide services in competition at the local level. The connections *within* communities are not

“At current rates, commercial Internet service in a community costs approximately \$2,500 per month before labour costs. A local company would require 100 subscribers to make a reasonable business case without assistance.”

- Marcel Mason
Nunanet Worldwide Communications

dependent on satellite as long as the local connection to the broadband PoP is guaranteed. A municipal area network (MAN) that connects the school, the health centre, government offices, power plant, public access site(s), and members of the public can be created using a variety of technologies (cable, phone, or wireless) by a variety of companies, or even community members. Services don’t stop at connecting cables either.

Purchasing procedures for government will apply to all broadband-related services – from the provision of a municipal area network, to training and end user services.

Currently, the Government of Nunavut does not purchase its local connection services from local vendors. Instead, the Government of Nunavut has installed and maintains its own network to ensure security and reliability. All Task Force members agreed that this must be reviewed as it does not enable the development of local and regional service companies. Essentially, the way that the Government of Nunavut currently provides and maintains its local connections crowds out all other suppliers because the remaining market share is too small for a business to provide local service.

Local broadband development is a potentially powerful economic engine that must be developed beyond meeting government needs. While using broadband can help government deliver services more effectively and efficiently, broadband usage can also stimulate community economic development by contracting local firms to provide broadband and related services. As governments purchase their local services in each community from a local company or organization, the government purchasing power will stimulate the growth of local expertise and services, in

order to fulfill the government contracts. These same companies can then serve the entire community for the benefit of all businesses, organizations and individuals. Residents can use broadband tools through public access centres, with relevant technical training, cultural and language assistance as decided by the community. It is the most effective way to ensure the development of local businesses that can provide services to all – not just government customers.

Members of the Task Force raised some issues that will have to be taken into account as governments issue RFPs for local services:

- length of contracts are to be carefully determined so that on one hand, competition is not inhibited by long contract terms, and on the other hand, companies will be able to recoup their investment;
- governments must be able to purchase reliable, secure services from the private sector in order to meet their requirements;
- interoperability between systems must be assured;
- government back-up, maintenance and administration protocols must be clearly spelled out and adhered to by private sector service providers; and
- financial and administrative capability of local companies must exist to ensure a successful transition from government-run services to private sector-run services.

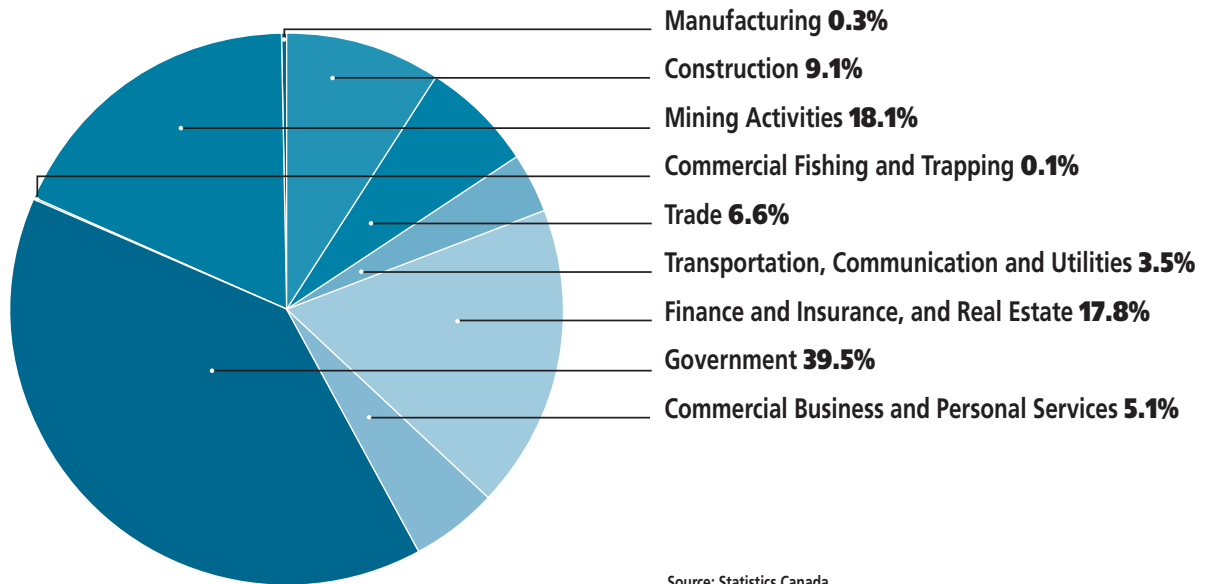
While the road to private sector capacity development may be bumpy, the long-term benefits are worth staying the distance. Following these policies will pave the way for the maximum number of jobs to be created

in Nunavut, developing a strong local presence to service everyone in the community. When we implement broadband, the government should encourage the development of a strong private sector that benefits the entire community in the most economical way.

Task Force members want to see government help to stimulate broadband-related services far beyond connections. We believe that with the right incentives and support, companies can develop broadband-related businesses, ISPs and provide a range of services: public access, computer training and local area networking, local and national web site development, Unicode tools for dealing with Aboriginal languages, satellite-only broadband solutions, and systems for successful integration of broadband into remote communities. Incentives will help create jobs and expertise at the local and regional level. Federal and territorial governments must adhere to contracting procedures for Inuit as outlined by the Nunavut Land Claims Agreement, and Inuit, Nunavut and local companies as outlined by the Government of Nunavut's Nunavummi Nangminiqaqtunik Ikajuuti (NNI) Policy.

In summary, the Task Force members were unanimous in recommending that governments change the way they currently procure, develop and operate communications infrastructure and services. By implementing the recommendations, governments' role becomes one of "model user." Every dollar spent from the community level to the territorial level is leveraged to help pay for local business development. In turn, these local businesses can provide services to the Government of Nunavut and the Government of Canada, and then also provide services to others, such

Nunavut's Economy: Wage-Based Sectors (1999)
(percent of real Gross Domestic Product)



Source: Statistics Canada

as municipal governments, other businesses, non-government organizations, or residents.

Companies Using Broadband Tools For Economic Development

Developing Nunavut's economy within the global economy is a huge challenge, due to our small population and remote location. We believe that all companies in Nunavut can benefit from using broadband to develop and expand their businesses.

Broadband will enable access to global markets. World-class artists and fashion designers, prospectors, tourism outfitters, construction companies, fishing and fish processing businesses, information and communication technology specialists among others

will find that dealing directly with a greatly expanded customer base enhances export of their goods and services around the world.

At the same time, services available to our businesses will be improved by broadband. Legal, translation, financial and banking services can be accessed instantly regardless of where they are located. Moreover, a wider range of choices in business services will be available.

Taken together, the increased markets and improved access to business services enabled by broadband will improve production and distribution

chains. Improved access to knowledge – about our suppliers, customers, financial and legal processes – will increase productivity and improve bottom lines.

The development and export of Inuit content merits special attention. We are already a world leader in developing technology that supports syllabics (the Inuit system of writing, which is not based on roman characters). Inuit have been recognized internationally for successfully producing feature films in Inuktitut, using Inuit actors, directors and writers. The market for Inuit art is strong and global. However, because the Internet is primarily English-based, these world-class products run the risk of being marginalized because they are created in Inuit languages and within an Inuit cultural context. To maximize the economic potential, special efforts must be made to harness broadband tools that support the development and commercial distribution of Inuit cultural products.

The potential to improve Nunavut's overall economy through the use of broadband services is very great. The Nunavut Broadband Task Force recommendations are geared toward capturing these economic development opportunities for the benefit of all Nunavummiut.

Recommendations:

4.1 Satellite Service Provision By The Private Sector

The Government of Canada and the Government of Nunavut (Public Works & Services) ensure that wherever possible, high-speed satellite services are provided by a Nunavut vendor in the private sector. It is further recommended that the Nunavummi Nangminiaqtunik Ikajuuti (NNI) Policy be strictly applied to foster participation by local and Inuit

businesses, and that wherever possible, contracts are structured to preserve competition and ensure evolution of service and technology throughout the planning horizon and the contract term. It is further recommended that where long-term contracts must be awarded to a single supplier, the procurement and the resulting contract should specifically address the issue of continual evolution of the service and the technology.

4.2 Evolution Of Satellite Connectivity

The Government of Canada and the Government of Nunavut (Public Works & Services/Sustainable Development) ensure that technology options and competitive local services are encouraged on a regional or a community-by-community basis. Governments should not adopt policies that might, inadvertently or otherwise, standardize the local technology solution across the territory, until the futures of the various emerging local distribution technologies are clear.

4.3 Local Distributor Of Information Technology Services

The Government of Nunavut (Public Works & Services) establish a policy and an ongoing program that ensures that every Nunavut community has a minimum of one computer and communications vendor available at all times to distribute broadband services to local homes, businesses, and other users of Internet access services. The policy should provide for assistance and support to ensure that the vendor survives the start-up phase and that management, financial, and technological advice is available on an ongoing basis. Once a single organization has been established, the policy should evolve community-by-community, to ensure that competition at the local level is encouraged over the longer term.

Remoteness no obstacle for e-commerce art gallery

In Sanikiluaq, where it still takes two weeks for a letter to arrive by post from Iqaluit, an Inuit-owned cyber art gallery has proven that geographic remoteness is no barrier when it comes to doing business with customers around the world.

The gallery, Soapstone Artists of Sanikiluaq, opened its virtual doors in April 1998 after owner Sarah Meeko and manager Robert McLean received funding from the Department of Sustainable Development to purchase a state-of-the-art computer system. The cyber gallery has seen its sales soar to between 400 and 500 per month, outdistancing the community's only other art buyers, the Co-op and Northern stores, in recent months. Between 80 and 100 sales are online orders. The rest are from two wholesalers with which Soapstone Artists of Sanikiluaq deals. Customers hail from Australia, South Korea, Germany, Holland, Belgium, and across the United States and Canada.

Enthusiasm for creating the site and reaching a huge global market was fuelled after Soapstone Artists of Sanikiluaq received a record-breaking order of 1,800 individually wrapped, one-of-a-kind soapstone carvings placed by IKEA Canada – unique Christmas presents for the Swedish furniture maker's employees.

When first opened, the sluggish pace of mail hurt cash flow because it slowed down incoming cheques. That prompted Soapstone Artists of Sanikiluaq to become e-commerce enabled so that customers could pay by credit card over the Internet, greatly speeding up the payment process.

The next business challenge to overcome was long-distance charges of between \$1,200 and \$1,500 a month for Internet usage, "depending on how many images I had to upload and how much maintenance I had to do on the site," recalls McLean. Like many communities in Nunavut, Sanikiluaq had no local Internet Service Provider.

They do now.

Meeko launched her own Internet Service Provider firm in October 2000, again with McLean at the helm as manager. Sanny Internet is equipped with eight phone lines and modems for dial-up access, and has 31 customers. But in the long-term plans is a wireless local area network for the entire community that ties into Sanny Internet's server. It would mean more residents could become customers since they wouldn't be using Sanny Internet's modems and dialing up, and connections would be faster, moving from 31,000 bps to 1 megabyte – "like changing channels on TV," says McLean.

4.4 Government Contracting Processes Support Local Distributors Of Information Technology Services

The Government of Nunavut (Public Works & Services/Sustainable Development/Education/Health & Social Services/Community Government & Transportation) establish a policy and an ongoing program that provides for the aggregation of government computer and communications services in a community, so that they may be contracted out, by competitive tender, to qualified vendors in that community (as recommended in 4.3). This policy should provide for delegation of tasks from several government departments to the local vendor, ensuring that a critical mass of technology skills within each community is developed. The policy should provide for assistance and support to ensure that the vendor survives the start-up phase and that management,

financial and technological advice is available on an ongoing basis. Once a single organization has been established, the policy should evolve community-by-community to ensure that competition at the local level is encouraged over the longer term.

4.5 Content Development – Culture (A)

The Government of Canada and the Government of Nunavut (Sustainable Development/Education/Culture, Language, Elders & Youth) ensure that funds are made available to support the development of e-Content by the private sector that reflects the Inuit culture and language, and with a view to eventual distribution of cultural products outside the territory on a commercial basis.

● ● ● Imagine Nunavut in 2004

Objective:

To strengthen Nunavut's private sector by reaching more potential entrepreneurs and helping them set up shop.

Technology used:

Videoconferencing, document sharing, audio and text e-mailing.

Imagine ...

Two officers with a Baffin Region small business development organization see up to eight clients daily via videoconferencing to public Internet access sites to the 12 communities they serve outside Iqaluit. They answer questions about how to apply for business licenses, register with Workers' Compensation, track down product suppliers, and a myriad of other queries. They'll also e-mail forms for grant and loan applications and help their customers fill them out, and touch base with Community Economic Development Officers to pass along business development news, and co-ordinate business development efforts.

When something like an unexpected search-and-rescue call comes up, and clients can't make their videoconferencing appointments, the officers forward information by audio e-mail, the preference of unilingual Inuktitut-speaking clients. Then, when their clients get back into town, they can listen to their audio e-mails. The process is a far cry from the days when, just a few years ago, the officers spent almost half of each month traveling to up to only four communities.

5. Real Access To Services (E-Learning And E-Health)

Principle #5: Provide Equality Of Access To Public Services

The small population in our remote communities means we often have reduced opportunities for delivery of face-to-face public services. We believe broadband tools can be developed to help Nunavummiut obtain equal access to public services (especially in the areas of education and health) enjoyed by other Canadians.



Photo: Tina McKinnon

Pitseolila Manning (standing) and Tasiuqtaq Ragee, at Cape Dorset's telehealth station. Broadband improves the quality of care in Nunavut communities and will eventually reduce the high cost of travel to access medical services.

In most of our communities, we simply can't access many public services without traveling thousands of miles from home. For anything beyond the most basic services, we must leave our home communities, or the

services must come to us – with huge delays and huge costs.

Nunavummiut must have access to the social benefits that arise from the application of broadband networks to vital services in education and health care. The use of these networks is being extended into new areas, like justice and governance, as government services increasingly move to the broadband environment. Broadband can reduce the high cost of travel associated with these services, reduce delays in delivery, and in some cases, restore an element of personal contact between case worker and client. However, as more services shift to delivery via high-speed networks, especially those of the federal government, Nunavummiut will be further disadvantaged without a capable broadband service.

We must take this opportunity to ensure that Nunavummiut are able to develop and integrate broadband tools that can help us achieve equal access to health, education, and other public services today

The Sivuliuqtit Management Development Program, the flagship program of the Nunavut Unified Human Resources Development (NUHRD) program, was set up to train Inuit managers to staff Nunavut's new territorial government. Running from 1997 to 1999, face-to-face learning instruction was delivered by the Canadian Centre for Management Development in Quebec, while all other course requirements were delivered by Nunavut Arctic College, including a sizeable distance education component.

Students were scattered across Nunavut, and the program supplied them with computer equipment if they weren't already connected to the Internet from home. It paid for their connectivity costs and long distance charges, too. The distance education component should have been a hit – except that many students couldn't even get logged on to the Internet due to poor service. The circumstances forced Sivuliuqtit to create more traditional text-based materials for its distance education component, instead.

and in the future. Otherwise, we risk an ever-widening gap in access to services between the North and South.

Health and Education Lead

Health and education needs have driven a great deal of Nunavut's existing communications infrastructure development. The Government of Nunavut has invested heavily in information and communication technologies for health and education to provide better services for citizens, regardless of where they live.

Nunavut has the same health care and education challenges everyone faces in Canada – recruiting and retaining professionals to deliver services. However, we also have the added difficulty of professionals who work in isolation.

Most nurses who work in Nunavut have a much broader scope of responsibility for community health and well-being than their southern peers because they are not supported by resident doctors or allied health professionals (for example: respiratory therapists, physiotherapists, etc.). At the same time, nurses are unable to keep pace with changes in their field because they are unable to access learning opportunities and peer support.

Isolation has a similar impact on teachers working in Nunavut. Curriculum material and support are often not available in schools, and specialized skills particularly in advanced high school classes do not exist in all communities. As with nurses, many Nunavut teachers find that professional development opportunities are limited, particularly in their communities.

We want to ensure that broadband is used to provide better support to our health care and

Arviat web site captures international attention

The Inuktitut Pictionary/Local History Project put Arviat on the virtual map and in spring 2000, was selected as a finalist in The Stockholm Challenge Award, sponsored by the City of Stockholm Economic Development Agency.

The Stockholm Challenge salutes innovative information technology projects around the globe. The Arviat Inuktitut Pictionary uses dynamic illustrations by Donald Uluadluak and Paul Taleriktok to teach the Inuktitut words for animals, tools and clothing, games, plants, snow, land skills, shelter and transportation, time and month, and the human body. The history site paints the historic roots of Arviat and the surrounding area.

The web site was created by Qitiqliq High School students, volunteers, project staff and a local web design firm Inukpuk Technology in the summer of 1998. While the site did not win at the Stockholm Challenge, the nomination alone spoke volumes about the quality of the site.

Mark Kalluak, the project manager, and Eric Anoe Jr., part of the web design team, journeyed to Stockholm, Sweden to take part in the awards program.

“Some people were surprised and impressed that this kind of project is being done in a remote location,” says Anoe Jr. “The crowd was also impressed that we here in Canada’s North are ‘not too far off’ in terms of having knowledge and using modern technology such as building web sites and using the Internet.”

education professionals in order to retain professionals for longer periods of time, and provide them with access to training opportunities and support. They, in turn, will provide better face-to-face services in communities, and will embrace new ways to use broadband tools in delivering enhanced services at the local level.

Based on experience from previous broadband trials, Task Force members identified a number of requirements in order to develop and integrate successful broadband applications:

- funding to pay for the development and implementation of applications relevant to our communities;
- investment in research to learn about successful programs in other jurisdictions, so that we can adapt them to our unique environment; and,
- reliable connections to broadband to allow us to truly integrate services we have tested into our health and education system.

Right now, education and health spend close to half of the Government of Nunavut’s financial resources delivering basic levels of service – \$298 million out of a budget of \$679.5 million in 2000-2001.

Health Trials

In health care, we have been working with broadband tools in a successful multi-year pilot with three Baffin Island communities – connecting Iqaluit to Cape Dorset and Pond Inlet – and a Kitikmeot community, Cambridge Bay. The project is called Ikajuruti Inungnik Ungasiktumi (IIU) Network, which in Inuktitut means “a tool to help people who are far away.”

We have succeeded in using videoconferencing in the fields of mental health, diagnosis/care, telepsychiatry, teleradiology, dermatology, education, staff training, and prenatal and family visits.

The government of Nunavut’s three-year-old Telehealth system allows videoconferences to be conducted between psychologists or out-of-town psychiatrists in Iqaluit with patients in Pond Inlet or Cape Dorset. But in these days before broadband, there are technical problems — like waiting up to 50 minutes to get a connection for the videoconference.

“You lose the connection frequently, too,” adds Doug Sage, Director of Mental Health and Family Services, Department of Health and Social Services. “Then you’re scrambling to set it up.”

Until recently, these trials could not be expanded without major additional financial resources. But in March 2001, Health Canada, through the Canadian Health Infostructure Partnership Program, contributed \$3.7 million to expand the IIU network to all communities in collaboration with the Department of Health and Social Services. This funding was part of a national two-year, \$80-million fund called the Canada Health Infostructure Partnerships Program. The program aims to establish links with the Northwest Territories, Alberta, Manitoba and Ontario to provide Nunavummiut with better access to services. This program is a perfect example of how accessing funding for relevant trials combined with the opportunity to learn from other jurisdictions will pave the way for successful integration of broadband tools.

Trials have been very successful - when the connections work well. Among the biggest problems with the trials has been unreliable connectivity, and lack of necessary bandwidth. With an improved broadband infrastructure, it is our hope that the IIU will significantly improve residents’ access to health care services as well as support public health programs, social services, education and administration. The project will also impact the existing infrastructure and provide greater access to information for professionals working in Nunavut communities. The continuing education and contact with other health care providers will give much-needed support to health care workers – potentially improving health care resource shortages by encouraging the recruitment and retention of medical professionals.

Education For Life

We are leaders in distance and Internet-mediated education, developed to support students in Arctic communities. Successful pilot projects have demonstrated the ability of both teachers and youth to embrace broadband applications in order to increase our opportunities to learn.

However, basic Internet services are not consistently available in every school. A lack of funding, human resources, and a reliable infrastructure prevent us from truly taking advantage of the educational opportunities the Internet provides. The gap between educational opportunities in Nunavut and those in southern Canada is very wide, and promises to increase if we are not able to solve the financial and human resource barriers in this field.

Although Nunavut youth receive some computer training in school, a large proportion of the population may never receive it because they have finished school, are unilingual, cannot afford to purchase the necessary equipment and software, or live in communities without the infrastructure required to access the Internet. Moreover, computer education is often left to teachers who have little computer and technology training themselves. “In-service” training programs are costly and the need for them is never-ending in the rapidly changing technology and communications sector. We need to ensure that our educators are able to access training in order to use broadband tools for their own learning and for delivering training to others.

We will also need technically trained Nunavummiut to provide on-site servicing and repairs of telecommunications equipment in each community – whether that equipment is used for education, health

“I completed a Masters degree in Continuing Education from the University of Calgary. Eighty per cent of the course work was online. It was fine as long as I lived in Rankin Inlet where I had access to a local Internet Service Provider. But when I moved to Arviat (where there was no local Internet Service Provider), it was very difficult to complete the last few courses. In fact, I would say ‘stressful.’ At the Community Access Program Centre, you had to line up and wait to use a computer. There were so many high school students.

I wouldn’t feel so strongly about (the Internet) if it hadn’t made such a difference in my own life. I’m a married woman with children. I couldn’t have relocated to the South.”

- Linda Pemik
Director of Academic Affairs
Nunavut Arctic College
Arviat

care, justice, business, or public access. We will need trained people to operate and maintain community earth stations, and other equipment required for local networks. A lack of trained on-site technicians involves costly service and repair visits. The Nunavut education system will be tasked with delivering information technology training to primary and secondary level students, and the adult population.

In summary, the education and health sectors' ability to develop and integrate broadband applications for delivery of services will set the stage for broadband use in all other fields.

Recommendations

5.1 Education

The Government of Canada and the Government of Nunavut (Education) ensure that funds are made available to support the use of broadband in the education sector within Nunavut.

5.2 Education – Securing And Managing E-Learning Opportunities

The Government of Nunavut (Education/Finance & Administration) should use assistance available from the Government of Canada to ensure that selected e-Learning broadband initiatives are identified, prioritized and documented in proposals so that research, analysis, planning, project management and execution of e-Learning initiatives can be implemented without delay. Specifically, the Government of

Nunavut should ensure that available funding opportunities from the Government of Canada and other parties are identified, that successful proposals are developed, and that projects are managed professionally.

5.3 Health – Supporting Bandwidth Requirements

The Government of Canada and the Government of Nunavut (Health & Social Services) ensure that funds are made available to cover the broadband services and to support the use of those services in the health care sector within Nunavut.

5.4 Health – Securing And Managing Telehealth Opportunities

The Government of Nunavut (Health & Social Services) use assistance available from the Government of Canada to ensure that selected e-Health broadband initiatives are identified, prioritized and documented in proposals so that research, analysis, planning, project management, and execution of e-Health initiatives can be implemented without delay. Specifically, the Government of Nunavut should ensure that available funding opportunities from the Government of Canada and other parties are identified, that successful proposals are developed, and that projects are managed professionally. These awards should be based on need, not on population size.

● ● ● Imagine Nunavut in 2004

Objective:

To provide support to family members when traveling for medical services, and provide follow-up services when the patient returns home.

Technology used:

Videoconferencing.

Imagine ...

A child in Pond Inlet is medivaced to Ottawa for treatment and only one of her parents is able to fly with her. Her condition is serious enough to cause great worry and concern. Her mother is in Pond Inlet caring for the rest of the family thousands of miles away from her husband and child. A videoconference is arranged between Ottawa and Pond Inlet. Through the use of the technology, her mother is able to see her child and interact with the physicians and nurses in Ottawa. It is also possible to hold case conferences between nursing staff at the community health centre and the discharging hospital so when the child comes home there is a continuity of care.

6. Our Evolving Culture And Language

Principle #6: Promote Our Language And Culture

With the introduction of any new English-based technology, we know there are risks to the survival of our language and culture. We must ensure that broadband tools increase the opportunity to communicate in the various dialects of Inuktitut, to enhance the promotion, preservation and evolution of our language and culture.



Atanarjuat lead actor Natar Ungalaaq (left) with Pakkak Innuksbuk. Nunavummiut have a long history of demonstrated excellence using communications technology to promote Inuit culture.

The use of broadband – its content – must be our principal concern. Broadband must serve our unique purposes, and not be permitted to distort or change them to suit the limitations of available technology and infrastructure. Broadband applications must respect and further our oral culture, and strengthen our written forms of communicating in Inuit languages.

We can strengthen our language and culture using appropriate oral and text-based, broadband tools. We will use broadband to assist us in promoting our culture, and our technical innovations, both in Nunavut and on the world stage. The Inuit concept of *Qanuqtuurunnariq* – Resourcefulness – will be applied as we use new technologies in innovative ways to meet our cultural and language needs.

“Literacy improves through web surfing... Local users become more knowledgeable about computers as they use them and these skills can be transferred to other applications.”

- Bryan Martin
Formerly of Sanirayak Internet Services

Broadband Use Must Enhance Our Culture

The impact of broadband on language and culture is the most profound broadband issue facing Nunavummiut. People are concerned that broadband will increase the use of English and reliance on non-Inuit technicians and ‘experts’ to harness the supposed potential of broadband for the benefit of Nunavut. Broadband is not necessarily a golden opportunity just because communications specialists say it is. For it to be truly beneficial, we have to customize it to serve our needs.

Our recent history shows that with the opportunity to experiment and shape the use of communications tools, we have adapted HF radio, community radio, and television to strengthen our

“Nunavut can play a leadership role in discovering new uses of information technologies that strengthen and enrich distinct oral cultures in remote regions like ours without sacrificing access to the global marketplace. This leadership role in advanced applications of the new technologies is a ‘product’ we can market.”

- Norm Cohn
Igloolik Isuma Productions

culture and language. From the use of HF radio on the land and community radio in our communities, to the triumphs of the Inuit Broadcasting Corporation, CBC Inuktitut programming, and, most recently, Igloolik Isuma Productions’ film *Atanarjuat* – winner of the Cannes Caméra d’Or Award in 2001 – we have successfully adapted and used communications technologies like no other culture. If the past century of adaptation can be a guide to the future uses of broadband, Inuit will lead the way in creative use of broadband tools, given the opportunity to learn and experiment to meet our needs.

Content is a critical issue. Content must enhance our ability to communicate – not decrease it. Every decision involving broadband implementation must be carefully considered as to how it will affect Inuktitut and Inuinnaqtun, and how it will either promote or demote Inuit culture. It is important that Inuktitut and Inuinnaqtun speakers are considered first. If a special effort is not made to promote our languages and way of life, broadband could be yet another tool of assimilation that pulls Inuit culture further apart. We cannot afford to make that mistake, as further erosion of our language and culture is not easily reversible.

Nunavut Broadband Task Force members recognize the importance of dedicated funds for the development of appropriate tools and resources. Not only will we conduct research into using our languages on the Internet and broadband, we will also produce world-class cultural products for our own consumption, and for the world market. We need to have training funds for a wide range of Nunavummiut to learn how to use these technologies to meet our own needs – both from a cultural and an economic perspective.

Using the Internet to preserve Inuktitut

The government of Nunavut has pledged that Inuktitut will be its working language. Now the government's Department of Culture, Language, Elders and Youth is working to preserve and promote Inuktitut through the new interactive web site, *Asuilaak - The Living Dictionary* (www.livingdictionary.com).

The web site – the recent winner of the 2001 Technology in Government Week Distinction Award, recognizing innovative service – is in Inuktitut, English and French, and it allows visitors to search for terms and phrases using roman orthography or syllabics. People can suggest alternative or new translations, and these comments are added to the site. The site started with 5,000 terms from Nunavut Arctic College glossaries, about 1,700 terms from Louis Jacques Dorais' *Igloodik Dictionary*, and roughly another 500 terms from Dorais' *1000 Inuit Words*. Not only does the interactive experience get communities involved in preserving and strengthening Inuktitut, the site itself acts as a quick and accurate translation service for terms and phrases.

For example, Inuktitut syllabic characters present a unique problem for our territory. They do not currently work properly on the Internet, as the Internet was designed to work in English with roman characters. Our government services must be available in Inuktitut – so we are forced to use fax and mail for Inuktitut forms, as people cannot currently submit Inuktitut syllabic information online. The introduction of the Internet has worked against the preservation of Inuktitut, as it is very difficult to make it work for the average user. This doesn't mean that we shouldn't use the Internet. It means we must fund research and development to find ways to make it work.

The Government of Nunavut has the responsibility of communicating in all of Nunavut's official languages – Inuktitut, English and French. It must make materials available in Inuktitut, Inuinnaqtun (a dialect of Inuktitut), English and French. The government must look at ways to ensure Nunavut's official languages are used equally in applications.

Nunavummiut are capable of producing world-class products that serve our needs, and are of interest to a global market. We must ensure that broadband helps us to develop our language resources, and our ability to communicate with each other and the world.

Recommendations:

6.1 Content Development – Culture (B)

The Government of Canada and the Government of Nunavut (Sustainable Development/Education/Culture, Language, Elders & Youth) ensure that funds are made available to support the development of content that reflects the Inuit culture and language. The assistance should cover both audio-visual and written content.

6.2 E-Government

The Government of Nunavut (Executive & Intergovernmental Affairs/Culture, Language, Elders & Youth) focus on distributing information on the Internet in all official languages (including the written forms and dialects of the Inuit language) to Nunavut citizens. At this time, significant e-Government projects (service delivery applications) are not recommended, with the exception of those involving the delivery of education and health care services.

6.3 E-Government – Federal Government On-Line And Inuit Languages Considerations

Where the Government of Canada provides the delivery of services to citizens, organizations, and businesses via the Internet, care should be taken to

accommodate the local language and cultural needs of the citizens of Nunavut.

6.4 Technology Support – Government of Nunavut

The Government of Nunavut (Culture, Language, Elders & Youth) continue its support of research and development in technology and linguistic projects to ensure that the oral and written forms of the Inuit language can be used on the Internet, by the public and private sectors, and by individual citizens, and on a routine basis, equal to the use of English.

6.5 Technology Support – Government of Canada

The Government of Canada review the technology and linguistic status of the Inuit language and where appropriate, using Nunavut resources as a base, assist the private sector and non-government organizations in transferring these innovations for use within other Canadian aboriginal situations and to other languages that do not use roman characters, such as those based on the Cyrillic alphabet.

● ● ● Imagine Nunavut in 2004

Objective:

To promote and strengthen Inuit culture by presenting it to audiences around the world, to encourage the production of Inuit content, and to entrench Inuktitut learning skills in young Inuit.

Technology used:

Full-motion video.

Imagine ...

An independent filmmaking company from Igloolik streams about 50 hours of Inuktitut video each week to all Nunavut communities through a community-based territory-wide network serving schools, businesses and homes, creating writing, editing, acting and video production jobs for local residents, and filling the appetite of Nunavummiut around the territory for more programs in their own language. Through e-commerce, the filmmaker also sells the Inuit content videos (subtitled in English and other languages) to distributors around the world, furthering global knowledge of Inuit and prompting more interest in the new territory's cultural and economic affairs.

7. Working Together For Maximum Benefits

Principle #7: Ensure Advancement And Innovation Of Services

Broadband services must evolve as technology advances, but they must also respond to innovation in our communities and to local aspirations. To enable this broad evolution, we need to set out a broadband plan that is community-driven, and accommodates our specific cultural, language, technical, and training needs. The plan must be subject to ongoing assessment, to help measure our progress in attaining our goals, and to allow for changes in direction in response to changes in technology and community needs.

Governments must work together, and with interested parties in the private sector, Inuit organizations, and other non-government organizations, to ensure the development of broadband networks and services in Nunavut. The Inuit concepts of *Aajiqatigiingniq* – Collaboration – and *Piliriqatigiingniq* – Working Together – are the keys to sustainable broadband implementation in Nunavut.

Ensuring Evolution

There is no one group, organization, or government department responsible for ensuring that best practices are shared among regions. There is no formal way to

measure how much bandwidth is being used, or for what purposes. Nunavut has three distinct regions, often operating quite independently of each other. With the introduction of broadband tools, there is no guarantee that one region will know what is happening in another region, unless particular effort is made to share resources and knowledge. Because government, industry, Inuit organizations and non-government organizations must collaborate in order to make effective use of broadband, we must also collaborate to measure our usage, share our knowledge between users and regions, and plan for the future.

Satellite time is very expensive. As Nunavut is the only jurisdiction completely dependent on satellite, we are the jurisdiction most concerned with cutting ongoing satellite costs through advanced compression and caching. We look to the prestigious National

Research Council to assist in finding ways to provide broadband services via satellite, using less bandwidth.

We need to know how much bandwidth we are using, who is using it, and what it is being used for. If we are able to assess our use effectively, we can better plan for the future, and allocate the right resources for the right applications.

Every region in Nunavut is attempting to land a wide variety of projects, using inadequate bandwidth. By creating a task force and a yearly meeting of champions, we will see a sharing of experiences and knowledge that will ensure that lessons learned in one region or sector can be applied to the next.

The Nunavut Broadband Task Force was asked to make recommendations to the Government of Canada and the Government of Nunavut as we look toward the year 2004. Every one of the 25 recommendations apply to one or both of these governments. The report has already covered the recommendations on communities, equal access, economic development, social benefits and culture and language.

Recommendations outlined earlier that are aimed at the Government of Nunavut and Government of Canada focus on changing the way they buy services, and using limited resources wisely to encourage growth of employment and opportunity outside of the government. These changes are meant to prompt

private sector involvement in the creation of broadband services, with a particular emphasis on Inuit participation, and attention to culture and language issues. The Government of Nunavut must also ensure a regulatory regime that encourages private sector investment in our territory.

A final set of recommendations from the Nunavut Broadband Task Force concentrates on improving our ability to implement broadband applications more effectively, saving precious resources.

Recommendations:

7.1 Satellite Only – Maximizing Available Bandwidth Through Research And Development

While costs for satellite services are expected to drop in the future, the relative cost of satellite will always be significantly higher than the technology options available in the South. To assist in closing this gap, the Government of Canada should undertake or support specific research that develops and implements techniques for compression, caching and time shifting satellite traffic as part of automatic features in the infrastructure with the objective of maximizing satellite bandwidth usage during peak hours. The research program should be introduced immediately and reviewed regularly for effectiveness.

7.2 Monitoring And Evaluating The Impact Of Broadband In Nunavut

The Government of Nunavut (Sustainable Development/Executive & Intergovernmental Affairs) gather statistics and publish an annual report on the use of broadband services in the territory. These data should be used to assess the progress of national and

Nunavut programs designed to support the use of computers and broadband communications services in the territory. Further, the Government of Canada should use these statistics when assessing the effectiveness of the national broadband program as it applies to Nunavut.

7.3 Nunavut Broadband Advisory Committee

As a successor to the Nunavut Broadband Task Force, the Government of Nunavut (Sustainable Development) should establish and support a Nunavut Broadband Advisory Committee for a minimum one-year period to consider issues related to the use of computers and communications in the territory, and to advise the Government of Nunavut and other stakeholders on these issues. It is recommended that the members on the committee be drawn from the private sector, government, and non-government organizations, and from among individual members of the community.

7.4 Highlight Broadband Successes And New Ideas

The Government of Nunavut (Sustainable Development/Education/Health & Social Services/Finance & Administration) hold an annual symposium that highlights broadband application and technology advances for citizens, organizations, businesses, government, and non-government organizations for the purpose of exchange of ideas and the promotion of Nunavut successes.

● ● ● Imagine Nunavut in 2004

Objective:

To communicate better among board members and with the public, and function more cost effectively.

Technology used:

Multipoint desktop videoconferencing, audio/video press release.

Imagine ...

Board members of a large Inuit organization have turned to videoconferencing in order to discuss pressing issues between quarterly meetings and even, when the weather turns bad, as an alternate to in-person quarterly meetings. This is especially convenient for the board members from the High Arctic, who have limited air service. After the meetings, the board uploads an audio/video press release to its web site to inform the public of recent decisions, and asks that the public provide input by recording an audio/video message at their public Internet access site and e-mailing it to them.

Conclusion

Throughout this report, recommendations have concentrated on how governments can stimulate the development and delivery of appropriate broadband services that meet the economic, educational, cultural, language, health, community, and governance needs of Nunavummiut.

A key feature of this report is in how we see government changing the way it purchases communication services. Using government purchasing power as a catalyst, we see our communications infrastructure and service companies flourishing – from small as-yet unformed local companies, to larger regional companies. We envision local, community-based businesses hiring and training Nunavummiut to operate and develop broadband services for everyone – in both the private and public sectors.

We also hope that implementation of broadband can be done in partnership with educators and health care workers, elders, youth, and government departments. It is our hope that this report's discussion of the issues facing Nunavummiut illustrates how broadband will involve all members of our society.

Our remote location and vast physical size have always been among Nunavut's greatest assets, and one of our greatest barriers. With broadband access, it won't matter where our citizens or businesses are located. Broadband access gives equal opportunity to all to benefit from improved education, and health-care services, and reap the rewards of new economic opportunities.

We hope that this report of the Nunavut Broadband Task Force will be reviewed by the Governments of Nunavut and Canada. We have recommended the creation of a Nunavut Broadband Advisory Committee, modeled on the Nunavut Broadband Task Force, to consider information and communications technology issues, and to make further recommendations to the Government of Nunavut.

It is time for Nunavut to have a broad river crossing, so that we too, can reach the other side of the stream quickly, to help us seize the economic, educational, health, governance, and cultural opportunities that will help us strengthen our self-reliance into the twenty first century.

By the year 2004, we hope to see broadband access in every one of our communities, with well-supported public access sites and trained private sector workers providing services to government, businesses and individuals. We want to see an expansion of the innovative uses of communications technologies already applied in Nunavut. Most of all, we want to see Nunavummiut use broadband tools to help realize their dreams.

Appendix A: Glossary

analog – representing data in a form other than binary bits. The image picked up by a camera or scanner and the sound picked up by a microphone are examples of analog data that must be digitized (converted into the computer’s internal representation) in order to be stored in a computer

applications – the software used in computers and computer networks

Article 24 – the section of the Nunavut Land Claims Agreement that spells out how the procurement policies of the governments of Canada and Nunavut are to benefit Inuit-owned businesses and Inuit in general

backbone - the part of a communications network that handles the major traffic using the highest-speed – and often longest – paths in the network

bandwidth – the rate at which a communication system can transmit data; more technically, the range of frequencies that an electronic system can transmit. High bandwidth allows fast transmission or the transmission of many signals at once

bit – a shorthand term for “binary digit.” There are only two possible binary digits: 0 and 1

broadband - broadband is the largest size bandwidth category, meaning that there are the most channels of data moving over a single communication medium, thus information such as data, voice, and video can be received and sent most quickly

byte – the number of bits (usually 8) that stand for one character. Memory is usually measured in units of kilobytes or megabytes

connectivity - the ability to connect to or communicate with another computer or computer system

dial-up connection – a connection between computers established by dialing a telephone number through a modem

full-motion video - the projection of 20 or more frames (or still images) per second to provide real-time, continuous motion. Broadcast video in the United States uses 30 frames per second, and most film technologies use 24 frames per second

hardware - the physical components, such as electronic and electrical devices, of a computer

infrastructure - the underlying foundation or basic framework of a system

Internet Service Provider (ISP) - an organization offering and providing Internet access to the public using computer servers connected directly to the Internet

Kbps - kilobits per second

Kilobit - 1,000 bits

Kilobyte - 1,000 bytes

“last mile” – a term that refers to the last chunk of network needed to get Internet access into communities

Local Area Network (LAN) - a network that connects several computers that are located nearby, allowing them to share files and devices such as printers

Megabit - 1,000,000 bits

Megabyte - 1,000,000 bytes, or 1,000 kilobytes

modem (MOdulator-DEModulator) - a device that encodes data for transmission over a particular medium, such as telephone lines, coaxial cables, fiber optics, or microwaves

Municipal Area Net (MAN) – a network connecting schools, the health centre, the power plant, public access site(s), and members of the public.

narrowband - a designation of bandwidth less than 56 kilobits per second

Nunavummi Nangminiqatunik Ikajuuti (NNI) – this is the Government of Nunavut’s business incentive policy that deals with the territorial government’s Article 24 obligations under the Nunavut Land Claims Agreement. The NNI is intended to give Nunavut businesses (including Inuit businesses) an edge over southern contractors and suppliers and, in particular, help to boost local employment and training

Nunavummiut – residents of Nunavut

Nunavut Land Claims Agreement (NLCA)

– the largest aboriginal land claims agreement ever settled in Canada, the NLCA provides beneficiaries with 1.9 million square kilometres of land and water (Nunavut Settlement Area) and \$1.1 billion in financial compensation, paid out between 1993 and 2007, in exchange for aboriginal title

point of presence (PoP) - the physical point of connection between a data network and a telephone network

software - computer programs

traditional knowledge – in Nunavut, traditional knowledge is known as “Inuit Qaujimajatuqangit” (IQ), first-hand knowledge obtained from knowledgeable Inuit elders, pertaining to language, culture, values and beliefs, survival skills, use of resources, human and sustainable harvesting, and understanding of society, ecology and environment. “IQ” consists of the past, present and future experience, knowledge and values of Inuit society

wireless – the transmission of electromagnetic signals from place to place without cables, usually using infrared light or radio waves

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