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Executive Summary

The Nunavut Broadband Development Corporation (NBDC)\(^1\) was created by the members of the Nunavut Broadband Task Force and now works to ensure that communities, companies, organizations and individuals not served by existing government networks can gain affordable access to broadband.

NBDC has recognized that making better use of broadband is critical for the economic success of the region, and access to broadband is a critical underpinning of social equality. By researching and articulating the positive impacts of broadband access for Nunavut, NBDC seeks objective evidence of the gains that have been made and some measures of the potential that can be reached through continued investment. A case for better capacity has to be founded on detailed understanding of the economic and social use of broadband; now and into the future.

This report provides an assessment of the socio-economic impact of high-speed Internet on Nunavut, through data collection from end-users on the economic and social impacts.

Background

With its 2011 Census population of 33,387 residents spread over 25 communities in 1.9 million km\(^2\) area of land most of Nunavut lacks the market density to justify business investment in telecommunications infrastructure for communities with today’s technology and cost structure. Government support is required in order to create a workable business case for the ISP to enter the market and maintain a viable operation.

The prevailing theme is that economic development requires faster, more reliable Internet connectivity. One interviewee noted, “without this [broadband], the region will be stuck in its current state of economic development, having maxed out on the connection we have and as the rest of the world advances and moves quicker, we will be left further and further behind”. “If we want the economy to grow, we need to be able to connect with other economic hubs.”

Essentially, good progress has been made to date, but what is currently in place is not yet sufficient for a globally competitive level of Internet connectivity. Furthermore, the current level of ‘broadband’ service is far from the current service targets being set by developed nations. Internet connectivity in Nunavut is typically at a speed of between 384 kbps to 1.5 Mbps depending on the package and the carrier. Under the Canadian Radio-television Telecommunications Commission (CRTC) definition, this range is described as “high speed Internet” up to the minimum speed to be considered “broadband”\(^2\). This report makes use of the general description “broadband” as this is the environment in which the NBDC operates, but it is important to note that the low speeds available in Nunavut do not meet the definition of broadband adopted by the CRTC or Federal Communications Commission (FCC).

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\(^1\) Nunavut Broadband Development Corporation (NBDC) ran an unfunded RFP in March of 2003 to select a private sector vendor to build a broadband network to serve every building in every community in Nunavut, with the aim of ensuring affordable broadband services were made available to everyone. The NBDC business plan was approved by the Industry Canada BRAND program, who agreed to invest $3,885,000 into the almost $10,000,000 network build costs.

\(^2\) See [http://www.crtc.gc.ca/eng/publications/reports/broadband/bbreport1111.htm#n2.0](http://www.crtc.gc.ca/eng/publications/reports/broadband/bbreport1111.htm#n2.0)
Considerations

Communities who have been able to begin their evolution and journey along the Broadband Lifecycle\(^6\) fortified with relatively better quality and higher speed connections, are effectively leapfrogging communities in Nunavut out of the gate. Communities outside Nunavut may get their ‘early wins’ sooner, and then can build on those more affectively, than those in Nunavut. Furthermore, because there is currently an upper limit to the capacity of connectivity in Nunavut (and by all accounts, Nunavut residents and businesses need more bandwidth even as it stands), communities that have access to affordable, more reliable, and faster “high-speed” are able to take progress further and faster along their broadband lifecycle than is possible in Nunavut.

Strategic Networks Group, Inc. (SNG) has developed a methodology for assessing the level of use of e-solutions (for households, organizations and businesses) and this is known as a Digital Economy index (DEi)\(^3\). DEi scores summarise a series of questions about Internet usage. A higher DEi score shows a greater use of the e-solutions that can make businesses and organisations more efficient and household life easier. As can be seen in section 4.3.3 the scores for Nunavut are very low compared to those for SNG’s database overall and low for those who are restricted to satellite connectivity. These alone indicate that there is considerable scope for further development.

Attempting to quantify the value of development, past or future, will always be difficult and the numbers reflect the assumptions made. These are discussed in section 4.

Another consideration in Nunavut is the supply versus demand of broadband in Nunavut. Internet access via satellite has enabled remote communities in Nunavut to connect to the Internet. Despite this being a significant advancement, the limitations of satellite access to the Internet include:

- Limited speed (bandwidth) – e.g. having to take a whole evening to download a 5 minute YouTube video
- Latency – the delay between requesting data and the receipt of a response
- Limited capacity – there is only so much bandwidth available through the satellite at any moment in time and Internet connectivity is priced accordingly
- Higher cost relative to the south

These ‘supply side’ factors impact how the Internet is in fact used by Nunavut residents and to what extent they can incorporate Internet-enabled applications (i.e. e-solutions\(^4\)) in their day-to-day lives, i.e. the demand side of Internet access. There has been an explosion of bandwidth use in the south because of affordable reliable access to the Internet. Given the ‘supply’ of Internet access via satellite is limited, how this impacts the ‘demand side’ of Internet access by Nunavut residents needs to be taken into account for economic development planning.

A framework for understanding the socio-economic benefits of Internet utilization, a type of ‘broadband utilization framework’, is a useful tool in this type of planning. Such a framework provides a better understanding the linkages between the cause and effects in types of

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4 e-solutions – are Internet-enabled applications and process that improve productivity and quality of service.
utilization and their socio-economic benefits for individuals and their community. Leaders, whether local, regional, or federal, can then more effectively target incentives, support and programing to achieve desired socio-economic development goals.

**Key Findings**

Overall, the estimated economic impact of high-speed Internet access in Nunavut has included the following direct and spin-off economic impacts, on an annual basis:

- $15.2 million in GDP at market prices,
- $9.9 million in direct and spin-off wages and salaries (household income),
- 198 person years of direct and spin-off employment,
- $1 million in direct and spin-off federal tax revenues, and
- $530,000 in direct and spin-off other tax revenues.

Even with these important economic impacts, there is unmet demand for Internet connectivity. Stakeholder interviews and measurement of uptake across Nunavut compared to other jurisdictions indicate that organizations and individuals are waiting for a higher capacity service in order to be able to effectively implement and use the appropriate e-solutions that will support and accelerate local socio-economic development.

The potential take-up rate for broadband services and applications is high in Northern communities, but the initial investment costs must first be overcome — a role for which government is looked upon for assistance.

SNG’s research shows that if Nunavut were able to leverage high-speed Internet (or more accurately, broadband) with the same degree of success achieved by rural and remote communities in the south are able to, the current level of impact from Internet access could grow between 2 and 3.2 times their current levels, to between $30 and $50 million in GDP (at market prices), between $20 and $30 million in direct and spin-off wages and salaries (household income), between 390 and 630 jobs, and between $3 and 5 million in direct and spin-off federal, provincial, and municipal tax revenues.

The scale of these impacts is modest in comparison to the impacts that are potential from other jurisdictions. In Nunavut, only 18% of companies surveyed earn revenues from the Internet, at an average of $157,000. Looking at other jurisdictions across North America, 49% of companies earn revenues from the Internet, at an average of $832,000 per company, regardless of the type of Internet connection, and $500,000 for those connected via satellite and wireless. Likewise, only 15% of companies in Nunavut report savings from the Internet, at an average of $27,600 per company. The average savings per company in North America, for those with savings from the Internet, ranges between $90,000 and $100,000 among 35% of companies reporting Internet related cost savings.

**Going Forward**

In order to maximize socio-economic benefits locally for Nunavut, Internet connectivity must continue to evolve and improve beyond basic ‘high-speed Internet’ – this includes addressing: improving speed and quality of connection, as well as promoting meaningful use of the Internet and e-solutions. This requires further investment in broadband infrastructure, as well as initiatives that promote awareness and support effective utilization of e-solutions with Nunavut businesses, organizations, and residents.
Nunavut needs to develop a strategy to address utilization and the 'essential skills' residents will need to improve their use of ICT. Up until now, the focus has been on Internet connectivity.

Progress in economic development requires faster, more reliable and affordable Internet access. Without continued investment in Internet connectivity, Nunavut will fall behind as the rest of the world advances their Internet infrastructure. Progress has been made in connectivity across Nunavut, but even with this level of progress what is currently in place is not yet sufficient for effective participation in the global digital economy.

**More investment is needed for Nunavut’s effective participation in the global digital economy.** While connectivity is a minimum condition for effective participation in the digital economy, it is not a sufficient condition. productive and meaningful use of the Internet needs to be addressed by training and support. Anchor institutions (municipal, local health, education) will need bandwidth to help facilitate the transfer of essential skills; businesses will need bandwidth to implement more e-solutions across more business activities; and, local residents will need bandwidth to access services from government and businesses, to participate in social exchanges, and to leverage learning and communications opportunities as Nunavut economy continues to evolve and develop.

Furthermore, socio-economic development planning through broadband should prioritize which e-solutions will have the greatest socio-economic impact for Nunavut communities and residents. Such a framework would provide critical input to functional programing and the available options for infrastructure and support needed to achieve the intended outcomes.

Local leaders can then focus awareness and capacity building to drive utilization of key e-solutions with targeted groups. With a determination of use or possibilities, Nunavut can then examine efforts required to target desired outcomes and then engage the relevant stakeholder groups to assist in raising awareness and then driving utilization to realize those outcomes. The required infrastructure and bandwidth access required to support such programs can then more effectively be assessed to optimize levels of investment and maximize community returns on investment. The outcome measures could include:

- Level of utilization by businesses, organizations and households (DEI scores)
- Number of new businesses and type of business (e.g. online retail)
- Impact on businesses and organizations: new revenues, cost savings, quality of service
- Access and use of services online: health, education, etc.

In summary, Nunavut has achieved measureable economic and social gains through access to the Internet. Much has been accomplished over the last several years as the findings in this
report document. As the investment scenarios reveal, more investment is needed to ensure that what has been accomplished is not lost. Affordable, better and faster access to the Internet must continue to evolve. The ‘goal posts’ of digital economy participation are not static and to remain competitive further investment is needed in broadband and utilization to ensure the growing community of users are able to fully realize the promised benefits for broadband.
1 Introduction

Rural and remote areas need broadband even more than urban areas if they are to effectively participate in the digital economy, particularly as governments and non-government institutions provide services to citizens for an increasing number of their services via the Internet.

Yet, rural and remote communities are most often the last to be connected to high-quality, affordable broadband. The reason is economics: carriers will focus first on markets where the business case to provide services is greatest – where population density is higher, connection follows soonest.

With its 33,387 residents spread over 25 communities in 1.9 million km² area of land, Nunavut is seriously lacking the market density to justify business investment in telecommunications infrastructure with today’s technology without government intervention to support the business case.

The report “A Matter of Survival: Arctic Communications Infrastructure in the 21st Century” specifically states: Arctic residents do not have adequate access to broadband services, and the gap continues to increase as more services are delivered via broadband networks everywhere.\(^5\)

Government investment is necessary to ensure that Nunavut’s businesses, citizens and communities have access to high-quality and affordable broadband in order to participate in the growing and evolving knowledge economy.

The purpose of this socio-economic impact assessment of broadband is to quantify and qualify the ‘off-balance sheet benefits’ of broadband investment in Nunavut by government.

Quantifying the socio-economic case for broadband (i.e. the return on investment to the community/region) includes those benefits that accrue to households as well as those that accrue to businesses and organizations. Benefits include:

- Increased productivity and competitiveness of local businesses,
- Improving access to services (health, education, etc.),
- Reducing / eliminating the need for travel,
- Tele-working and collaborating with others anywhere in the globe,
- Sustaining vibrant arctic communities,
- Slowing arctic de-ruralisation (migration from smaller centers in Nunavut to larger centers within Nunavut) and out-migration,
- Supporting the assertion of Canadian sovereignty in the Artic, and
- Attracting and retaining doctors, nurses, teachers, engineers, and others.

1.1 Background

Nunavut is a unique jurisdiction in Canada both politically and geographically. Nunavut was created in 1999 as the result of a comprehensive Land Claims Agreement between the Inuit and the Government of Canada. The population of just under 35,000 is 84% Inuit with 82% identifying Inuktitut as their mother tongue and 64% stating that it is the language most often used at home.

Nunavut has a very young population with 59% under the age of 25. Over the past 10 years the population has grown by 19%. (Data from 2006 census, Statistic Canada.)

Geographically Nunavut consists of 25 communities in the Arctic spread over 2,000,000 square kilometers, constituting 20% of Canada’s land mass. All the communities are isolated -- reachable only by air and, for a brief period each summer, by sea. There are no roads or fixed communications links between any communities or with southern Canada. All electronic communication among the communities and with other parts of Canada is through satellite.

The unemployment level of Inuit is relatively high and the overall participation of adults in the labour force is low compared to the Canadian average. Secondary education is relatively new to most communities in Nunavut. As of 2006, 46% of adult Nunavummiut had not completed high school compared to the national average of 15% and only 13% of Nunavut residents had a university degree. Only 25% of students currently graduate from high school in Nunavut.

Additional profile information is provided in Appendix B.
1.2 Internet in Nunavut

For the last 10 years, private providers and public networks have offered Internet coverage in the 25 communities of Nunavut, but the technology available and the network’s capacity is limited.

Nunavut Broadband Development Corporation (NBDC) ran an unfunded RFP in March of 2003 to select a private sector vendor to build a broadband network to serve every building in every community in Nunavut, with the aim of ensuring affordable broadband services were made available to everyone. The NBDC business plan was approved by the Industry Canada BRAND program, who agreed to invest $3,885,000 into the almost $10,000,000 network build costs. SSI Micro built and launched the QINIQ network using satellite technology in 2005, and signed agent agreements with 20 independent local Community Service Providers (CSPs) that provided local services in every Nunavut community.

NBDC required that SSI Micro provide 20% of its gross revenue to the CSPs in order as part of their support of local economic benefits. NBDC (with approval from Industry Canada) set the prices to the end consumer so that Nunavut residents pay an affordable rate for services (still significantly higher than the south) and is ensuring the public continue to have access to affordable broadband services delivered by the private sector, obtaining investment as necessary for the continuation of services in all 25 communities. NBDC receives no benefit or income from QINIQ revenue or the QINIQ network operator.

The other main provider is NorthwesTel, which launched DSL services in Iqaluit in October 2004, with an immediate uptake by Iqaluit residents and small business, who until that time, relied largely on dial-up services. NorthwesTel and Barrett Communications have also offered KA Band services since July 2005 to residential and small business under the name NetKaster and Xplornet respectively, now operating in about six communities.

Among the other local solution offering Internet access, Community Services Network is centred out of Yellowknife and is based on the legacy design inherited from the Government of the Northwest Territories. This network covers all 25 Nunavut communities and services the following user groups: Public schools in Nunavut, Arctic College campuses and headquarters buildings, Health Centres in non-decentralized communities, Community Libraries.

Nunavut faces many challenges in terms of engaging and empowering local residents, enabling them to leverage economic development opportunities arising through the development of the region’s vast resources. These include the expansive geography that separates communities, the high unemployment and low education attainment. Managing an economy in transition from subsistence activities (for many) to leverage the opportunities of today, with comparatively low education levels, while trying to maintain and preserve language and culture - all within expansive geography that separates communities - is a huge task. High-speed Internet offers the potential to leverage economic development and help overcome some of these challenges.

Broadband services in Nunavut must continue to evolve and improve beyond basic high speed Internet to broadband and towards meaningful use of that broadband to maximize socio-economic benefits. This requires further investment in broadband infrastructure, as well as programming that promotes awareness and meaningful use of the Internet with Nunavut businesses, organizations, and residents.
An assessment of costs and benefits of broadband must not only demonstrate the return on existing investments, but also support the development of business plans for future investments in broadband infrastructure, services, and Internet utilization in Nunavut. For example, KNET, a well-known aboriginal satellite network has achieved economic sustainability via community-owned satellite systems which are economically sustained by charging the Canadian Government for delivery of health and educational services. See – http://knet.ca/documents/KNet&CanadanAboriginalCommunities.PDF

1.3 Nunavut Broadband Development Corporation (NBDC)

The Nunavut Broadband Development Corporation (NBDC) was created by the members of the Nunavut Broadband Task Force. NBDC works to ensure that communities, companies, organizations and individuals not served by existing government networks can gain affordable access to broadband.

NBDC is a not-for-profit corporation, controlled by Nunavut residents, with membership from the general public, private sector companies, Inuit organizations, community organizations, and hamlets. NBDC’s goal is to ensure that the people and organizations throughout Nunavut have access to reliable, affordable broadband services, in every single community within Nunavut.

NBDC’s published roles are:

1. **Be a Watchdog On Behalf Of The Public** – make sure the infrastructure built by the private sector provides reliable, affordable service;

2. **Information Dissemination and Made-in-Nunavut Solutions** – stimulate the development of applications that meet people’s needs – sharing information among regions, identifying funding sources and ensure funds are coming into Nunavut companies, organizations to develop made-in-Nunavut solutions;

3. **Encourage Local Development of Broadband Services** – encourage local businesses and organizations to deliver broadband services -- in order to ensure every community has local support for broadband; and

4. **Work with Government** – Work with Nunavut’s Inuit organizations, the Government of Nunavut, and the Government of Canada to ensure ongoing investment in broadband infrastructure and services in the territory so that Nunavummiut continue to have reliable, affordable access to broadband services in every Nunavut community.

NBDC has recognized that making better use of broadband is critical for the economic success of the region, and access is a critical underpinning of social equality.
1.4 Study Purpose

A wide body of research shows the importance of high-speed Internet access to communities and regions. However, absent from this body of research is the measurement and quantification of the social and economic benefits of high-speed Internet infrastructure as it relates to Northern Communities.

By researching and articulating the positive impacts of high-speed Internet access for Nunavut, NBDC seeks the objective evidence to the gains that have been made and some measures of the potential that can be reached through continued investment. Providing a case for better capacity has to be founded on detailed understanding of the economic and social use of high-speed Internet: now and into the future.

The goals of this study, therefore, include the following three elements:

1. Measuring the economic impact of high-speed Internet
   - Establish and implement a framework to provide an assessment of the socioeconomic impact of high-speed Internet in Nunavut for the Nunavut Broadband Development Corporation (NBDC),
   - Express the benefits of high-speed Internet in monetary and qualitative terms as they relate to regional businesses, residential customers, communities, and nongovernmental organizations,
   - Consideration of both economic and social factors,

2. Forecast the demand for Broadband in Nunavut
   - Assessment of Broadband Demand to 2020;

3. Present the impact of three scenarios for government investment in high-speed Internet in Nunavut
   - Assessing the impact of government investment on the trajectory of high-speed Internet impacts across 3 investment scenarios.

The studying findings for this report are addressed in Section 3, with the above deliverables reported throughout Section 4 of the report.

The over-arching deliverable is an assessment of the socio-economic impact of high-speed Internet on Nunavut, through researching and documenting both economic and social benefits from broadband.

1.5 Defining High-Speed

It is important to distinguish between broadband and what is largely considered by the NDBC to be a level of high-speed Internet broadly available throughout Nunavut. For the CRTC, speeds below 64 Kbps are generally considered to be as dial-up service. Speeds in excess of 128 Kbps are referred to as high-speed and Broadband service is considered a subset of high-speed. The
CRTC considers services as broadband at download speeds of 1.5 Mbps or greater. As well, the CRTC’s Telecom Regulatory Policy 2011-291 establishes a universal broadband Internet access target download speed of 5 Mbps for Canada.6

For reference purposes, Qiniq sell packages offering speeds from 384 kbps to 768 kbps and NorthWestTel offers packages from 512 kbps to 1.5 Mbps in download through DSL connection in Iqaluit.

In addition to upload and download speeds, the quality and competitiveness of Internet connectivity is defined by its reliability, especially as organizations and businesses become dependent on Internet transactions. SNG’s research in southern regions documents that satellite services experience low reliability compared to other types of Internet services such as cable, DSL and fixed wireless. 7 This places Nunavut businesses and consumers at a further disadvantage, compared to southerners.

In practical terms, SNG research shows that low connectivity speeds hinder adoption of many advanced e-solutions, notably delivery of services online, staff training, teleworking, and rich media.8 SNG research shows these advanced e-solutions to be linked to the ability to generate

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6 http://www.crtc.gc.ca/eng/publications/reports/broadband/bbreport1111.htm#n2.0
7 In a recent SNG 2012 study of over 2,200 organizations in a relatively rural and economically challenged part of the US, of non-dial-up technologies, satellite the least reliable with 32 percent of establishments with satellite service reporting frequent problems. While 26 percent of all respondents felt that the value of their Internet service was poor or below expectations, this number increased to 82.4 percent of satellite users. In this same study, only 10 percent of organizations had download speeds less than 768 kbps. The average satellite download speed was 2 mbps.
8 Given that the majority of Nunavut users on Qiniq would have less than 768kbps download (and much less for upload) and that satellite is known for reliability and latency issues, the available connections would certainly hinder adoption of e-solutions.
revenues and operational savings through Internet enabled applications and processes. However, it should be noted that selling goods over the Internet is one area not significantly impacted by type of service (e.g. satellite) or speed of connection.

Carriers in Nunavut would argue that services are reliable and NBDC’s research would support this. Satellite uptime is in the vicinity of 100% most times and outages for services and upgrades are usually scheduled. It is likely that survey participants are equating their notion of reliability with slower speeds, and that speed is more the issue than reliability. For their part, the carriers do offer subscriptions options that include higher speeds and more bandwidth.

Our research shows, however, that speed limits do not seem to be inherent in the technology of satellites. The limitations are more related to service costs and the need to manage (cap) bandwidth on satellites. After dial-up, satellite appears to be least scalable technology option for high-speed Internet coverage: the remoteness of the North, however, limits the range of solutions available.

1.6 Methodology

The research methodology applied in this project included primary and secondary research, leveraging SNG’s current research into broadband economics, and interviews with organizations across Nunavut. The methodology included the following steps:

- **Project Initiation, Literature Review and Background Research**, including SNG’s past and current projects on the economic benefits of Internet connectivity, academic research, as well as general literature on broadband economics;
- **Design & Administer Stakeholder Questionnaire/Interview Guides**, including interviews with businesses and organizations across Nunavut, a collection of data from businesses/organizations, a collection of data from households, and follow-up interviews;
- **Analyze Results**, including the production of a topline summary of all survey questions (provided separately from this report);
- **Measuring the Economic Impact of high-speed Internet**, leveraging the survey research on economic and/or financial implications associated with broadband, as well SNG’s past modeling of economic impact from broadband;
- **Assessment of Broadband Demand to 2020**, focusing, in particular, on the ‘plan-to-use’ data collected in the survey research;
- **Investment Scenario Analysis**, which leverage the demand assessment to produce:
  - **Scenario 1** – no government investment,
  - **Scenario 2** – minimal government investment to maintain current level of service, and
  - **Scenario 3** – ideal government investment to meet customer demand and achieve optimal benefits.

The scenarios were developed in the context of evolving global high-speed Internet standards in Nunavut, and uncertain competitive environment for telecommunications in Nunavut.
Within this analysis, it is important to place the development of Broadband in Nunavut into context.

### 1.7 Study Context

To understand the path and status of high speed Internet in an economic development context in Nunavut, it is useful to examine the lifecycle of investment in high speed Internet from an economic development perspective.

SNG developed a Broadband Lifecycle approach to provide a framework which clarifies the steps needed to fully leverage the impacts and benefits of bringing broadband to communities. The Broadband Lifecycle represents the “natural” progression for broadband investments and helps illuminate the key opportunities to drive policy that can accelerate a given community’s progression along this lifecycle.

SNG’s Broadband Lifecycle is a framework for understanding the dynamics of Internet / broadband utilization in the following key areas:

- Impacts (benefits, revenues, job creation)
- Who is leading and lagging in adoption of Internet-enabled applications and processes (e-solutions)?
- In what areas do differences in utilization occur?
- How do people and organizations acquire Internet skills?

The Broadband Lifecycle is a useful tool to help explain Nunavut’s current stage of high speed/broadband development. In the context of the Broadband Lifecycle, the recent investment provision of Internet access via satellite across Nunavut through the work of the NBDC and its partners has meant, by all accounts, significant progress for the communities. Ultimately, the determination of the degree of impacts is the subject of the balance of this study.

However, while progress has been made, Nunavut is in the initial stages of its broadband lifecycle. Relative to other jurisdictions highlighted in the subsequent literature review Nunavut is at a disadvantage. Although being connected to the Internet is significant step forward from other methods of communications and connectivity (e.g., dial-up and fax as indicated by key informant interviews), current technological and cost barriers need to be overcome.

Communities, who have been able to begin their evolution and journey along the Broadband Lifecycle, fortified with relatively better quality and higher speed connections, are effectively leapfrogging Nunavut out of the gate. This may mean that ‘early wins’ for other communities who are igniting their broadband lifecycle come sooner for those communities than they would for Nunavut.

Furthermore, because there is an upper limit to the monthly capacity of broadband in Nunavut within basic subscriptions (and by all accounts, Nunavut residents and businesses’ need more bandwidth as it stands), communities that have access to better, more reliable, and faster “high-speed” are able to take progress further and faster along their lifecycle than is possible in the
Nunavut context. As noted, the capacity is available at a cost. See Appendix D for a discussion on the Broadband Lifecycle®.

Nunavut is well on its way along this lifecycle. However, the emerging themes from stakeholder interviews suggest that while the needs have been identified (Stage 1), planning and strategies have been developed (Stage 2), and investment has been made (Stage 3), the fundamental challenges are in the area of Stage 4 – the investment has given Nunavut some level of capacity but that capacity requires further investment to ensure the community of users is able to fully leverage connectivity. As well, it is possible that, if connection speeds were increased, the cycle could start again, because the capabilities would significantly change for the user group.

1.8 Organization of Report

The balance of the report is organized as follows:

- Section 2: Literature Review
- Section 3: Data Collection Findings (Topline Analysis)
- Section 4: Economic Impact of High Speed Internet in Nunavut, Assessment of Broadband Demand to 2020 and Investment Scenarios
- Section 5: Conclusions & Recommendations

The Appendix provides reference material/sources, etc.
2 Literature Review

The scope of work for this project included a scan of the literature to identify how broadband and high speed Internet has benefited other jurisdictions. The following selection of case studies identified in the literature highlights the social and economic impacts that have been leveraged by rural and remote communities through the deployment and adoption of high speed / broadband Internet connectivity.

Case studies have been drawn from SNG’s own published research, Internet searches of current papers and commentary on broadband leveraged economic impacts in rural and remote communities and academic research.

We focused mainly on case studies that offered quantified measures of the pre and post broadband situation, concentrating on jurisdictions that are rural and / or remote. It must be noted, however, that Nunavut is unique. We found no case study offering characteristics that are perfectly analogous to the remoteness and isolated nature of Nunavut to other regions and the relative remoteness of communities from each other within Nunavut. With this caveat in mind, we present the following case studies:

**Academic Research**
- **Broadband Internet Use in Rural Pennsylvania** - Conducted in 2005–2006 by Amy K. Glasmeier, Ph.D., Chris Benner and Chandrani Ohdedar, it employed case studies to provide a qualitative description of how four sectors, specifically healthcare, local government, education and business, in rural Pennsylvania are using broadband Internet technology. The research was interested in determining whether these sectors were engaging in transactional or transformational uses of the Internet.
- **Broadband Internet: How to Implement Uncovered** - An academic review of Broadband Internet and Economic Development policy, written in 2012 by Kayvan Miri Lavassani, PhD, and Bahar Movahedi, PhD, that examines the impacts of the adoption of broadband by both individuals and businesses.

**Community-Wide Case Studies**
- To show the community level impact of broadband from three rural/remote examples.

**Industry Specific Examples**
- **Tourism Accommodations, Norway** - In Norway, Hotel Ullensvang, is a 300 room hotel remotely located between mountain and sea. Using the Internet is their way of getting closer to their clients and suppliers on a daily basis, and broadband makes their connectivity fast enough to be useful.

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10 Dr. Kayvan Miri Lavassani, PhD, North Carolina Central University, NC, USA
11 Dr. Bahar Movahedi, PhD, Carleton University, ON, Canada
12 SNG’s project in partnership with the Norwegian University of Science and Technology of Trondheim, on the hospitality sector of the Hardanger Fjord area in Norway, an area extremely dependent on tourism.
Program Investment Specific Examples

- Connect Ontario: Broadband Regional Access (COBRA)
- FedNor Initiatives

A detailed discussion of the literature review is provided in Appendix A while the following section summarizes the major lessons from the literature, synthesising findings from all sources together with our own understanding of developing economics by leveraging broadband.

2.1 Lessons Learned

The components for success in broadband investment and deployment include:

- **Community Commitment**: Although this aspect is not new, the depth of the commitment required to enable success in small communities may be more than has been previously considered. Commitment is about passion, energy and dedication. Communities with stronger commitment tend to have more successful outcomes for any larger project with long term activities, including broadband.

- **Project Champion**: Related to the point above, selection of a project champion has been a concept that has been invoked in almost all projects, but this in itself does not ensure success. The champion must be well respected and have the ability to enlist support from across the community, as well as being the spokesperson and contact. Champions need to understand the community and be capable of placing the value of broadband in an appropriate context for the community. In addition, champions need to have the support of local government as well as widespread support throughout the community. Champions who are self-appointed tend to have less success in this role.

- **Community Engagement**: The project champion needs to work with the community to meet the requirements for financial, organizational and human resource commitments. For success, these commitments of resources and people’s time must last over a two to five year timeframe to achieve success. This includes offering support in promotion and awareness creation, potentially supporting the network (as client), and ensuring that all constituents understand why the community is committed to the program.

- **Commitment is NOT Necessarily Just Financial**: Commitment is not just for fund-raising and initiating projects (components of readiness) but also for their sustainability. Without the ongoing commitment from the community, projects and providers will have problems sustaining affordable broadband services. There are other ways communities can make commitments to support projects as they build towards a sustainable base. For example, one First Nation community extended daily hours and opened the local school on Saturdays to provide additional access to the computers and the network. This was a decision that the community could make in terms of other infrastructure that was not a direct financial commitment.

- **Environment**: Environment provides the basis for gap analysis and assessment of market potential of a community. For smaller and remote communities where the business case for connectivity is limited or non-existing, the environment can offer a new perspective on how to create a stable, sustainable business. Previous studies
indicated that, if there is a forecast that subscriber rates will be too low to meet financial requirements of the carrier, innovative efforts can generate the required number of subscribers.

Parrsboro was able to approach their carrier with an advanced list of residents and businesses who wanted high-speed and were ready to subscribe: a community based pre-subscription campaign. Some broadband projects create an environment with anchor tenants (longer contracts – government or the mining industry many be an example in Nunavut) to support the initial capital deployment. In some cases, looking for new opportunities that can be created with the technology (either for existing or new businesses or local government) is part of the key that the providers and communities must work together to identify and to implement.

Stimulating usage to help support the sustainability requirements is critical to success in areas where self-sustainability is difficult or impossible. This does not require the community to have an extensive previous experience with ICT, or a complete understanding of broadband and its benefits. However, an ongoing (and perhaps intense) education process is required. Such efforts take time and must, therefore, be factored into the planning stages.

- **Broadband Value Proposition:** Value is an essential component of any type of service or proposition that individuals or entities consider. The value enabled by broadband has to be understood by a community based on its unique environment and the potential services that may be offered. Value is an important concept and it is often assumed that users understand the value because computing, dial-up Internet access and broadband have been around for a long period of time. However, often the conceived benefits of services that are enabled by broadband are not well understood until experienced. In small communities, where often only a small portion of the population has previous ICT experience, it can be difficult for them to relate to the value of broadband. Literacy and e-literacy are barriers to realizing benefits and need to be overcome to help communities progress along the Broadband Lifecycle.

- **Community Engagement:** Community engagement and hands-on experience are the only means of helping to create a deeper understanding of the benefits and opportunities that can be derived from broadband. Since all communities are unique, to some extent the benefits are also unique. The perception and the reality of broadband value will vary, and so do the services and content that will deliver that value.

Alignment of these issues is critical for success. Having only a subset of these does not prohibit success, but will make the effort required much more difficult. Communities need to understand what is required of them before launching into such initiatives. Governments need to make policies and take decisions that support initial investments and develop strategies for communities that cannot build independent sustainable cases. Moreover, focus on creating environment for training and experience needs to become a fundamental component of broadband activities in all communities. Sharing stories and experiences of other projects and what they have learned is a key enabler to supporting new initiatives. In the case of NBDC, the community is all of Nunavut, with NBDC filling the role of lead champion.
2.2 Readiness & Sustainability

The literature and past studies also illuminate the importance of readiness and readiness as it relates to sustainability. Of course, having broadband connectivity is a necessary condition for economic and socio-economic achievement and success though applying broadband as a tool in business and as household agents. The literature also clearly demonstrates that a higher level of impact is achieved (or achieved sooner) if the broadband rollout includes an accompanying strategy to match the deployment with the needs, opportunities, and constraints of the community for which the broadband program is being deployed. A number of key insights emerge from this, as summarized in Table 1 below.

### Table 1 Key Insights and Opportunities for Internet Readiness and Sustainability

<table>
<thead>
<tr>
<th>Insight</th>
<th>Opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadband needs to be viewed in context of the community</td>
<td>Each community needs to assess their situation. Anecdotal stories collected and shared (with multimedia and computing) can demonstrate to other communities the potential they do not fully leverage.</td>
</tr>
<tr>
<td>Remote areas /rural areas will struggle with, or never attain, self-sustainability from business-case perspective</td>
<td>Strategies will need to both encourage and support private investment to provide adequate facilities (either initial capital or ongoing expenses).</td>
</tr>
<tr>
<td>Communities that will have the greatest benefit often are the least ready and need the most direction</td>
<td>Anecdotal stories that are collected and shared within the community help initiate activity that further moves communities to readiness stages. Programs need to embed specific activities to help stimulate awareness (e.g., through sharing lessons learned).</td>
</tr>
<tr>
<td>Broadband alters cost of communications transactions – reducing time to decision, time to action, and/or time to money</td>
<td>Analysis needs to be completed to demonstrate the impact of savings and how new opportunities can be realized due to altered costs.</td>
</tr>
<tr>
<td>Sustainability is unique to every community in the context of its market and technology options</td>
<td>Sustainability Model indicates the issues/items that must be addressed to understand the potential for sustainability. Programs need to support communities that cannot achieve sustainability independently.</td>
</tr>
<tr>
<td>In smaller communities (&lt;3000) the main focus is delivery of services (Education, Medical, Government); local business exists primarily to support population</td>
<td>Programs for delivering services should focus on common infrastructure to demonstrate cost efficiencies and potential for sustainability.</td>
</tr>
</tbody>
</table>

Both the communities of Churchill, Manitoba, and Parrsboro, Nova Scotia, reveal the importance of broadband investment for rural and remote communities. In the three years that business operators in Churchill had been using broadband (in the report analysis period), business had developed a greater level of understanding of how to incorporate the Internet into
their business processes. The ‘break-in’ period took time wherein businesses include new Internet tools in their day-to-day business practices: a progression from limited adoption to a deeper level of use of a broader range of e-solutions.

Broadband has been an enabler for higher-level use of the Internet because of the bandwidth required and the ‘always-on’ requirements of these activities. Businesses that are on dial-up are discouraged from a better usage of the Internet because of slower speeds and unreliable connections. Broadband becomes a necessity for more sophisticated usage. In other cases, the technology divide between the business owner and the customer base is also a barrier. Relationships with customers, suppliers and partners have difficulty working effectively when simple tasks such as document transfer, or staying in constant contact cannot be completed if one party is on broadband and the other is on dial-up. Increasingly, however, the issue is not one of “broadband” versus dial-up, but rather better broadband versus basic broadband. In the Nunavut context, this may mean low speeds and bandwidth caps versus high speeds and good reliability.

Tillsonburg, Ontario, helps illuminate the importance of a committed and focused implementation team, among other factors critical to Tillsonburg’s successful implementation of a Strategic Technology Plan. These included:

- Readiness and planning;
- Broadband connectivity;
- Organizational and operational restructuring;
- Strategic implementation of technology;
- Awareness and promotion;
- Relevant content;
- Speed to implementation; and
- Training.

Like the Churchill and Parrsboro examples, the grass-roots movement also emerges as an important commonality and critical success factor, providing a lesson to other communities seeking to mobilize support for connectivity.

Unlike Nunavut, however, these single community examples of an investment initiative had only one community within which to organized focused support for broadband development – within each community project champions faced common socio-economic circumstances, common objectives, common capacities, and common needs, all of which can be more or less addressed with a common solutions. Nunavut has 25 distinct communities, distinct micro-economies, differing socio-economic circumstances, spread over 1.9 million square kilometers of land in Canada’s North.

NBDC, as the recognized champion of broadband deployment across Nunavut has a considerable task to move from the positive gains of becoming connected to maintain that connection, improve the services, and help develop the ‘essential skills’ that both households and businesses will require to continue to accelerate Nunavut’s effective use of broadband.
2.2.1 Role of Public Policy

The literature review clearly shows there is a role for public policy in the deployment (and adoption and use) of broadband, particularly in rural and remote areas. The literature is replete with examples of how a “digital divide” between rural and urban areas creates an economic and social disadvantage. Many examples exist in the literature demonstrating how and why broadband is as vital (or relatively more important), to rural and remote communities, compared to their urban counterparts. Public policy has a parallel role in broadband as in other utilities – ensuring affordable costs and equitable access to users – where the population base may make services ‘uneconomic’ on a fee-per-capita basis.

The requirement for rural areas to be as well connected as urban ones prompts some articles to claim that rural subscribers are actually willing to pay more than urban dwellers because they are so much more dependent on information delivered to their homes or place of works than urban populations who typically have more alternative avenues through which to access information and various services. Nevertheless, in practice, the trend is for commercial operators to continue to serve urban areas and by-pass rural customers under normal market circumstances.

In most jurisdictions, however, the debate is slowly shifting away from equal broadband for everyone, to high quality broadband for all key services (e.g., mainly health and education) and “decent” broadband for the rest of us (e.g., 1.5 to 5Mbps depending on the timeline being considered – CRTC has a 5Mbps target). Within this, businesses get what they pay for.

Still, Nunavut is unique when it comes to demographics and settlement: 2/3rds of Nunavut’s population lives outside the three regional capitals. Therefore the parity approach is important in this context and, as a result, is supported by NBDC as well as the survey respondents (see Section 3). Furthermore, the trend driven by market forces, as described by the literature, is one of broadband connectivity spreading outward from urban concentrations to suburban regions and then sometimes further into rural areas. Accordingly, the literature appears to agree that some sort of equalizing cost structure is desirable.

It used to be that we characterized a community as either having or not having broadband. The discussion is now becoming more nuanced, with identification of distinct markets (e.g., residential customers vs. businesses, and ‘strategic’ industries vs. the rest), and varying levels of broadband for each segment. It is important to distinguish between institutional uses that are essential, versus residential uses that are important for other reasons (e.g., quality of life, access to services, etc.). In this context, priorities may be to provide youth with good educational opportunities rather than opportunities for faster gaming and movie downloads.

Beyond the issues of affordability and equitable access to the enabling capabilities of broadband, there is also an opportunity to modify and coordinate the implementation of government economic development and social policies through effective interventions in support of broadband deployment.

Within communities, independent drivers may exist for deploying broadband services for social services, such as health services. The need for developing infrastructure in support of these services may be of such high priority that they justify implementation of network infrastructure, private or public, on their own merit.
Such initiatives should be leveraged, or at least coordinated, so as to utilise the infrastructure for broader benefits. Likewise, amongst communities within a region, one community may become a local driving force, but there may be economies of scale and efficiencies that can be gained from public funding to coordinate a broader range of activities across multiple communities as part of a larger plan.

Government interventions to promote broadband deployment should continue to promote community-based proposals and for local grass-roots organizations to take leadership and leverage local resources. However, this study documents in a comprehensive manner the issues necessary for ensuring successful broadband projects and provides a more strategic and focused approach for intervention. To ensure success and to be cost-effective when funding broadband in remote communities, it is necessary to address the individual needs of each community or region. In the Nunavut context, the NBDC fills the role of lead champion; bring to this task the corporate infrastructure that the NDBC has mobilized. NBDC is, in turn, supported by engaged communities across Nunavut for who the NDBC works to promote broadband service and availability.

From a social services perspective, more and more government services (e.g. health, education, governance) are being provided online. If all citizens have equal rights to government services and their social benefits, then it is important to understand where market forces cannot provide affordable access to broadband services. In such cases there is not just an economic argument for government intervention in broadband deployment, but also a social equity argument. What defines the boundaries between those two cases is an important follow-on to this study. As well, the findings and criteria from this study need to be tested in communities to ascertain whether thresholds and factors can be developed for policymakers to incorporate into planning and interventions for broadband deployment.
3 Findings

Primary research was the main source of information used in this analysis, collected through three principle sources. These included:

- Selected stakeholder interviews;
- A web-survey of households; and
- A web-survey of businesses and organizations.

In total, we heard from 342 households, businesses/organizations, and stakeholders, providing varied information on the impact of high-speed Internet connectivity across Nunavut. It is important to note that, bolstering the sample of respondents, we leverage SNG’s data of more than 25,000 surveys of high-speed / broadband users from across North America, as well as several secondary sources (as noted in section 2 of this report). We present the multiple lines of information in the following section.

3.1 Stakeholder Interviews

Stakeholder interviews were conducted with individuals across Nunavut who very often represented larger ‘high-speed’ Internet user groups. In total, we spoke with 15 individuals. Stakeholders were identified by NBDC and all interviews were conducted by SNG.

The resulting interviews are summarized below in the form of three case studies of how high-speed Internet has impacted specific sectors and organizations, as well as a collection of emerging interview themes.

3.1.1 Case 1: Project Nunavut's 2012 Sealift site

Project Nunavut is a social enterprise “implementing both for-profit and non-profit projects that improve the viability of the traditional economy”. Project Nunavut’s Sealift Project offers a case study in how organizations in Nunavut are finding unique and creative ways to leverage Internet access. In this case, the Sealift Project provides an example of how a locally based organization can connect through the Internet to locally based consumers for the purpose of importing goods from outside the region. As such, the services, and its value to the consumers it serves, is totally based on Internet connection.

The Sealift Project operates an online store that allows Iqaluit based residents the opportunity to place online orders for a variety of products that are purchased in volume, and on an annual basis\(^\text{13}\). Consumer orders were made online, though an online catalogue offering a variety of products sourced and organized by the project administrators. The web services became active in the Spring of 2011 to take orders up until June, targeting a bulk marine transport for fall arrival.

\(^{13}\) 2011 was the first year for this service and the Sealift Project had about 50 to 60 households participate. The expectation is that the orders will be larger this year (2012) and that roughly 25 more homes will participate in the project.
The development and administration of the Sealift Project involved 3 staff, while the distribution of the shipment involves 6 people for the short period of time it takes to distribute the goods that have been ordered. The value of the services is in:

- The broad spectrum of goods (and quality, all are organic) that are made available to the consumers that they themselves do not have to search out and identify,
- The discounts that are possible through consolidated shipping as well as bulk ordering, and
- The ease with which consumers can shop online.

The project is totally dependent on high-speed Internet access and is hosted through a basic (from 384 kbps to 768 kbps) subscription at $60 per month. With improved Internet connection, the project could increase the complexity of the web site, such as more or higher resolution product photography, flash, video, etc. At present, the web site is hosted locally and its design minimizes the bandwidth demand.

The dependency on affordable high-speed Internet is two ways: the online store needs the service to reach its customers and the customers, in turn, need the service to access the online store and place their orders. High-speed Internet access is the “core of the business model” and Sealift would simply not work without it: “there would be no business model if the order site could not be automated.”

As well, all of the arrangements with the suppliers were bridged through high-speed Internet access: none of the suppliers were met, except online, and the organizers say that it would have been very difficult to find the suppliers and conduct comparative pricing analysis without Internet access: Sealift would not have found their distributors and would not have been able to access the best pricing because there would be fewer options without the high-speed Internet access.

In terms of measurable impacts, it is difficult to quantify the results of the Sealift project. The 50 to 60 households ordered $60K to $80K worth of product, but if the individual consumers each assembled their order themselves, they may have paid up to 33% more, assuming they could do this at all\(^\text{14}\).

Affordable access is essential to Sealift. While the organization itself may be able to pay more for Internet access, affordable access among the client group is critical\(^\text{15}\). If the custom base, now with low cost Internet service, faces a price increase, Sealift may lose customers and the business will suffer. “It is critically important that the community has access to affordable broadband services. The business is online: if the business could not connect with the customers through this interface, it would not exist. The importance of high-speed to this business is the

\(^{14}\) Not factored into this is the fact that customers would have had to arrange the shipping themselves, identify the distributors themselves, and arrange the payment terms themselves. Furthermore, a distributor is less likely to want to deal with an individual, so it may not be possible to replicate the service as an individual. Under a scenario where the 50 to 60 households were attempting to do this, there would be 50 to 60 individuals doing what 3 individuals were doing within Sealift, and of course, they too would need the Internet to put this in place.

\(^{15}\) Testimonials also show that children and their technologically savvy play a big part in convincing and helping adults to become customers.
“network effect” of having the customers of the organization with the ability to access their online services. Simply put, the business would not exist without broadband connectivity.”

### 3.1.2 Case 2: Atiigo Media

Atiigo Media provides an example of an Inuit owned full service communications firm based in Iqaluit, Nunavut. The company offers graphic design, web, video, and a variety of other communications services and has established itself as a player in the communications industry in the North. The company began operations in January 2003 and has since grown in its services offerings. The company prides itself in being headquartered in Nunavut and in maintaining “professional design services in [their] own territory, building capacity in the communications industry, and keeping Nunavut dollars within Nunavut.”

The company has a staff of 7 individuals - 4 full-time and one associate, all of whom live in Iqaluit, along with 2 part-time staff that live outside of Nunavut.

Atiigo Media is dependent on high-speed Internet access, although they would not characterize their current services as such – “it is basically dial-up speed.” Atiigo Media pays about $250 per month for a business account that has no bandwidth cap. However, relative to the demands that Atiigo Media makes of its services, they consider the connections slow.

Atiigo Media would be considered a heavy user of bandwidth. All of their work is done digitally: they work in print, video, and audio, resulting in heavy uploads every day. They rely on high-speed connections 100% of the time and “could not function without” Internet access.

Limitations on connection speed mean that some forms of work need to be physically transported from site locations to the main office. Video shot in high-definition is an example. It is not feasible to upload remotely.

High-speed has also allowed the company to facilitate connections to suppliers, to conduct informal research on various projects and technology, video conference with collaborators and team members remotely, to connect with special contractors and to work with designers from outside the region, passing files back and forth often to complete projects. Without high-speed, this collaboration would not be possible. The company “cannot picture how we function” without high-speed. All the suppliers are in the south – printers, editors, file exchanges, CD makers, etc. Until five years ago the company had to send proofs and files by air cargo, however they have not had to do this in the last five years as a result of high-speed Internet.

Atiigo Media also builds websites and they design for the bandwidth limitations encountered in the region. Good web design capacity is present, but without broadband capacity at the web-user’s, the company is often designing for the lowest common Internet services. The affects the level of service that the client receives in design, and it affects the level of service clients receive when accessing the resulting web sites.

According to the company, the better the Internet connection, the more Atiigo Media will grow.

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16 In fact, Atiigo Media just completed the largest contract they have ever undertaken and this was done with a partner in Vancouver who, with the exception of a few trips to Nunavut, worked remotely via Skype or file transfers.
They believe the current slowness is very limiting on the company’s potential and productivity. For example, if they are stitching large files, they must do this over a series of evenings and plan for the operation. “Friday download night” has become the routine.

With better connectivity, Atiigo Media could be more efficient and faster with projects, and therefore more capacity and do more work. As an example it can take 6 hours to upload a 5-minute video for approval. If approval is needed before proceeding to the next step in the process, the time is wasted.

There are better packages available. Atiigo Media could pay $1,000 per month but at $12,000 per year, the cost becomes unaffordable. For the most part, Atiigo Media can accomplish the things it needs to accomplish with the services it has now, “but takes a long time” and the reliability does impact how the business operates. For example, they have looked at more video conferencing for meetings, but without reliable connections and certainty of available bandwidth, hosting a critical meeting can become frustrating for both the team and the client.

Atiigo Media says the services are getting better, but the higher-level services are not yet economical. Affordable pricing is important to the company and it is important to their clients. A recent tobacco awareness program with the Department of Health leveraged social media. For this to be effective, social media needs to be accessible to the client group: residents need affordable access.

3.1.3 Case 3: Tourism & Cultural Product Development

The development of tourism and cultural products opportunities in the region offers an interesting case study on the impact of high-speed and the potential of higher-speed. Trends in online tourism marketing are toward more intensive bandwidth, with flash and video now a common feature, if not expected feature, of tourism promotional web sites.

Nunavut Tourism (www.nunavuttourism.com) is a member driven, not-for-profit association whose role is “to encourage tourism development by providing specialized knowledge and expertise in five key areas: marketing, research, product development, training, and visitor services.” The group works to promote tourism opportunities for “sustainable economic growth, cultural preservation and social benefits for the people of Nunavut.”

Nunavut Tourism provides its membership of 140 companies with a variety of services and is reliant on electronic communications. It is constantly balancing the need to provide a richer selling experience for potential visitors who wish to explore Nunavut tourism offerings online, and web access to clients in Nunavut who are challenged with slower Internet connection speeds and bandwidth limitations. Faced with these limitations, none of Nunavut Tourism’s sites are hosted in Nunavut and none of Nunavut Tourism’s members who have web sites of any significance are hosted in Nunavut. The design of the member-facing side of the Nunavut Tourism’s site is purposely not graphically heavy so that members can access information from a comparatively utilitarian member-facing site.

In terms of tourism markets, Nunavut is competing with exotic destinations: safaris in Africa, or cruises to Antarctica, for example. These are high-end markets that will often work through travel agents to package a customized trip, but their research is done on the Internet. The Internet connection to Nunavut Tourism information has to be competitive globally with the
speed, sophistication, and level of information of competing destinations.

Presently, few of Nunavut Tourism members are “selling” though the Internet. Those that are, are mainly southern based companies. Part of this has to do with the way the market buys product, part of it has to do with the financial complexities at the sellers end, and less has to do with connection speeds. Many members do not have web sites, so Nunavut Tourism will provide landing pages.

Web access is also critical to some tourism certifications available in the industry. For example, the Canadian Tourism Commission (CTC) offers a Signature Experience Collection program. According to the CTC’s web site, this program entitles eligible tourism businesses to be promoted internationally through the CTC. Eligibility criteria include having a functional website (www.en-corporate.canada.travel/sites/default/files/pdf/sec-ced/sec_criteria_en.pdf). This has significantly limited the number of members that can participate.

Interview responses indicate that some tourism operators are not yet embracing technology to the degree they could or perhaps should. One person remarked that some operators “could have high-speed fibre and they still would not embrace technology”.

Ideally, capacity building in the tourism sector could be accomplished through the Internet via online training and web-casts to tourism operators throughout Nunavut. The current level of connection makes this difficult for Nunavut Tourism. Instead, training and professional development takes place two times per year in meetings, and through updates and industry newsletters.

A low cost web-cast could offset the collective spend to bring people together and Nunavut Tourism estimates a savings of between $50K to $100K over a physical meeting. The advantage of the web cast would also be the inclusion of more participants from a broader area of Nunavut. For tourism operators, competitive, reliable, and affordable Internet connection is “absolutely imperative – the Internet is where everyone goes to make travel decisions.”

3.2 General Interview Findings & Themes

Based on the interviews, there is a real sense that the recent work of NBDC and the introduction of Qiniq has been a positive experience for the region. As one person remarked, this has “changed the way the Arctic operates and communicates. Geography is nonexistent in terms of communication.” Broadband has been crucially important in closing geographic barriers among the 25 communities of Nunavut as well as those that had existed between the communities of Nunavut and other regions of Canada and abroad.

Characterizing the Benefits

Quantification of the benefits of broadband was difficult for the interview participants. This is perhaps due to the fact that benefits are considered in terms of productivity (ability to do more
work in the same amount of time\textsuperscript{17}, access to more information and/or broader sources of information, and opportunity costs avoided.

None of these qualitative benefits are easily quantified, particularly if the beneficiary had initially set out to monitor and measure these impacts. Still, it is worth examining how interview participants characterize the benefits of high-speed Internet access.

Some examples follow:

- Participation in regional, national and global networks which allow them to collaborate and share. Access to opportunities that would otherwise not exist.

- The most important impact will be through the increase in disposable income. People will be able to leverage the opportunities through Internet access and develop locally based opportunities to earn income and begin to accumulate wealth locally.

- As well, household benefits also include productivity uses or benefits. These include: education/training; home-based businesses (over 20% of households); teleworking; and access the work place.

- Since everything happens today in real time, access to the speed and efficiency of high-speed Internet can be an important differentiator. Avoidance of delays through fast online commerce and communications helps remove inefficiencies.

- The Internet and broadband will allow all levels of government to deliver more effective programs. Just as the phone and fax machine were advancements in communications in their day, the Internet will be a major change from the limited modes of communications available in Nunavut as recently as five years ago. Greater efficiencies also enable government to extend the reach and range of services, in the context of maintaining services within tight budgets.

**Barriers and Challenges**

From the interviews come several reoccurring themes that relate to barriers and challenges to fully leveraging broadband. The 25 different communities of the region are not connected except by air, and it often takes 2-3 days (for example, 2 days from Iqaluit to Grise Fiord by plane) which makes interaction and business very difficult and costly. Some estimates put board meetings for 5 or so people at between $30,000 and $65,000 per meeting, requiring 1.5 to 5 days of travel and overnight stays to accommodate these meetings. As one person noted, it is “critical that we have broadband” to enable us to connect with each other without having to travel every time.

For some, what impedes this is the reliability of the service. Internet speeds are critical and conferencing over the Internet requires large bandwidth and bandwidth is capped within certain subscriptions so that users have to incur high costs. As one person noted Nunavut residents

\textsuperscript{17} Increased productivity is consistently rated as the top benefit across all our current research, second is customer relations and reach. Revenue and operational cost savings (which are more easily quantified) are third and fourth.
“can’t keep paying these high prices compared to what the rest of Canadians are paying for their Internet.”

One person offered a comparison to an experience they had during a trip to the south. While in Ottawa they were able to download a video in 3 minutes compared to 3 hours in Nunavut which, at that point, would have triggered a cap in allotted bandwidth use per month and resulted in additional charges. They noted that “Nunavut needs to catch up with the rest of the world as this is the 21st century.”

Clearly businesses have the option to purchase more robust Internet packages, but many say that the impact on operational costs is too high. In one case we spoke with an organization that has purchased a package that will allow video-conferencing and they are running a trial to see if this will save funds by avoiding travel\(^{18}\). Obviously the capacity of the organizations to conduct such an experiment will vary, and for some organizations it may be difficult to substitute face-to-face meetings with web-enabled conferences.

Voice teleconferencing or VoIP-based voice teleconferencing are becoming more flexible and affordable and video-conferencing may eventually find its role as a high-end / high cost solution chosen by those that can afford and need it, leaving the less resource demanding and more affordable options to lower-speed users.

**Pace of Change**

Another challenge uncovered through the interviews relates to the pace of change. The Internet brings with it a new challenge to Nunavut in that there is so much information being received so quickly and this may outpace the capacity of some segments of the population to deal with all this information. People recognize and support the need to learn how to make the most effective use of the technology. Others worry about the development of content. One person noted that these conversations about technology, access, and speed are important, but their main concern is the content. They argue that content is critical to engage people to the technology and it has to be culturally appropriate and linguistically important and relevant. This is and will be important at every age group in Nunavut. With the ‘pipes’ get you connected, there has to be investment in content. One interviewee asked, “Is it important that we create a system where kids can watch the Simpsons endlessly, or is it important to see culturally appropriate programming for all age groups?”

**Highest and Best Use**

The point above also relates to discussions on the highest and best use of the Internet. Some interview participants remarked that high-speed is in high demand. They eventually cancelled their home subscription because, while the service is essential in their work place, the coincidence of timing of home use was such that the Internet use was frustrating at home. Their home service was not dependable and clogged by a tendency for everyone to log on at the same time at the end of the day and take up available bandwidth.

It is unclear how much demand entertainment-related uses of available bandwidth impacts

\(^{18}\) So far, using Skype is a challenge because of latency and interview participants will use this service for calls and meetings that are less important and where interruptions are more tolerable among the call participates.
business and or more productive uses of the Internet. This type of comment is not unique to the north. We hear similar comments in many areas with basic cable, fixed wireless and DSL services. This situation seems particularly prevalent in areas with a monopoly ISP.

This sort of highest and best use discussion may be more extreme in Nunavut as bandwidth limitations may be more acute, but the issue is not uncommon. Still, it is also not the role of NBDC to determine the highest and best use of available bandwidth. Arguments can be made that even less economically productive uses of the Internet are meaningful forms of exchange, communications, etc. and provide the opportunity for users to improve their awareness of the technology, their understanding of the Internet, and gain exposure to a vast spectrum of information that would not otherwise be accessible.

**Training Needs**

High-speed Internet is critical for regional development. The North is “a storehouse of energy and base metal resources” and these sectors will play a large part in Nunavut’s future. The region’s ability to leverage the associated employment opportunities will be dependent on the capacity of the labour force to take on the skill development and training needed to participate in these opportunities. High-speed Internet access will be essential in the skills transfer and training that will be required. As one person remarked, “how much will locals be able to participate if they don’t have the skills?”

A number of Internet based training opportunities were identified by interview participants. These included land use planning, various certifications related to mining in particular, flight maintenance, training for various mining and energy jobs, base literacy and ICT literacy, fundamental of shipping, processing payments/online transactions, and other fundamentals of ICT business e-process, among other areas.

All of these skill areas could leverage ICT for remote training, thereby avoid costly trips to central locations, and/or the importation of specialized skills to take on jobs that may otherwise be given to locals with appropriate training. In this way, high-speed access will become a key tool for leveraging local economic benefits and increasing the disposable income of residents of Nunavut. Many in the arctic are already technically very savvy. Typically someone in each community has the technical skills to support this process.

Accordingly, local skills development should be included in development agreements as companies continue to explore the regions rich resource base. Every community has avenues and facilities for training and an effective high-speed adoption strategy will leverage these existing resources and training offerings collaboratively. However, as one person noted “Training service delivery is limited by the Internet connection.”

**Affordability**

Most comments on the affordability of service in Nunavut acknowledge that people are “probably paying way under what the service would probably cost” if one had the “pay the full price”. However, most interview participants felt that “everyone should have equitable access to
things and should not have to pay more because in a smaller community – in fact, we need more
opportunity for communications in smaller communities.” As one person noted, it is “very
important that everyone in all communities have the same level of service – this is essential”.

It is interesting to note that most organizations we spoke with felt that they could pay more,
particularly if the service was better, but some expressed concern for the residential customers.
One business we spoke with believes they would lose clients if the residential price was
increased significantly. Their online market is local and made possible through affordable
Internet access.

3.3 Household and Business data collection and findings

A data collection of households and businesses/organizations was prepared based on a
template used by SNG on past assignments, but customized in consultation with NBDC for
Nunavut. The surveys were made available online and circulated to households and businesses
through a variety of approaches, including:

- A web link e-mailed directly to Internet subscribers of the participating ISP,
- Media who publicised the survey link and the research project as part of their public
  service announcements,
- A press release issued by NBDC,
- A web link directly from NBDC’s web site, and
- Through word of mouth, for example, survey respondents sharing the survey link with
  others organizations and individuals within Nunavut.

The survey was made available from February 10, 2012 and closed on March 21, 2012. Survey
participants self-selected which survey they would complete by indicating they were responding
as a resident of Nunavut or as an owner/manager of an organization. The following summarizes
the major findings from the survey of households and the survey of businesses/organizations in
Nunavut.

3.3.1 Household data collection

A total of 265 households, from a potential 8,661 homes, responded to the Household Survey of
Internet users. Individuals addressed 87 questions and sub-questions on their current and
planned use of Internet, their willingness to pay for Internet services, and the impacts that
Internet connections has had on their household operations, among other questions.

Figure 2 below provides a summary of the regional distribution of responses\textsuperscript{19}.

\textsuperscript{19} Households and businesses combined, that project heard back from all the 25 communities in Nunavut.
A summary of responses follows (a separate confidential statistical summary of findings was provided to NBDC):

**Language and Inuit Culture**

In terms of the preservation and promotion of Inuit language and culture, the Internet seems to be considered an important tool. The majority of the household survey respondents (80%) think that the Internet can help preserve and promote the Inuit language and culture. Furthermore, the majority of the households (60%) think the amount of information online about Nunavut, its communities, and Inuit culture and language is very important (30% think the amount of information is Important). However, communicating in Inuktitut and/or Inuinnaqtun is not
necessarily easy or convenient. Forty-three per cent of household think that that communicating in Inuktitut and/or Inuinnaqtun, when using computers, is Difficult (30%) or Very Difficult (13%). The majority of the household survey respondents (58%) don’t look for Inuktitut and/or Inuinnaqtun language content on the Internet, compared to 42% who do look for Inuktitut and/or Inuinnaqtun language content. This echoes interview comments wherein individuals worry about the development of culturally relevant content so that the Internet can be a system for cultural development, rather than simply a conduit for mainstream content.

Cost of Internet Services
The largest share of respondents (38%) pay between $100 and $150 per month for their Internet service, 34% pay between $60 and $80 per month, and 10% pay between $80 and $100 per month. SNG’s database of Internet subscribers from across North America shows that the largest share of respondents (55.2%) using satellite and wireless connection to access Internet pay less than $60 per month and 28.7% pay between $60 and $79.99 per month. This suggests that the rates in Nunavut are comparable. The $60 a month plan is the most widely used plan across Nunavut so the fact that we find people in the $100 to $150 range indicates some are willing to pay more (i.e., the distribution of respondents not same as distribution of subscribers).

Thoughts on Quality, Speed, and Reliability
Survey responses on speed and quality reflect the themes identified in the interviews. Good quality and reliable Internet connection is valued, however the prevailing thinking is that this is lacking in Nunavut.

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20 Source: Strategic Networks Group, Inc database, 2012. Sample: 1,726 satellite or wireless connection users.
The majority of the household survey respondents (90%) rate the importance of SPEED in choosing high-speed Internet for their household as Very Important.

- 77% rate the importance of Bandwidth (i.e., monthly usage allowance) in choosing high-speed Internet for their household as Very Important.
- 87% rate the importance of RELIABILITY OF CONNECTION in choosing high-speed Internet for their household as Very Important.
- 60% rate the importance of being "ALWAYS ON CONNECTION" in choosing high-speed Internet for their household as Very Important.
- 67% rate the importance of DOES NOT TIE UP PHONE LINE in choosing high-speed Internet for their household as Very Important.
- 58% rate the importance of CONNECTING MULTIPLE HOUSEHOLD COMPUTERS in choosing high-speed Internet for their household as Very Important.
Summary on Internet utilization
The following chart shows the level of Internet utilization for particular e-solutions that have been linked to greater or lesser economic benefits among SMEs.

Use of e-Solutions for online communication
- 91% of the respondents currently use email,
- 78% currently participate in social networks, chat groups or instant messenger,
- 71% currently share Information (e.g. Photos, videos, personal blogs), and
- 33% currently use Voice communications.

![Use of e-solutions for online communication chart]

Use for research and information
- 83% of the respondents currently research consumer goods and services (e.g. Product information, comparing products, etc.).
- 65% of the respondents currently search for government information and services,
- 63% of the respondents currently research community events,
- 52% of the respondents currently research for education, training or school work, 30% currently use educational or training courses, 51% currently search for medical or health related information, and
- 70% of the respondents currently search for travel information.
Use for research and information

- Researching consumer goods and services
- Travel information
- Searching for government information and...
- Researching community events
- Research for education, training or school work
- Searching for medical or health related...
- Researching investments

N = 240

Internet Use / Pct. households
- Currently Use
- Plan to use with existing service
- Plan to use with higher capacity service

Use for personal productivity
- 43% of the respondents currently accessing workplace from home (occasional use),
- 10% telework (formal workplace all or part of normal work hours), and
- 12% own a home-based business (full-time or part-time).

Use for personal productivity

- Accessing workplace from home
- Educational or training courses
- Home-based business
- Teleworking

N = 246

Internet use / Pct. households
- Currently Use
- Plan to use with existing service
- Plan to use with higher capacity service
Use for entertainment and recreation

- 71% currently use high-speed Internet for viewing news or sports
- 36% use high-speed Internet for online games (single or multiplayer)
- 23% use high-speed Internet for listening to the radio over the Internet
- 20% use high-speed Internet for downloading or watching a movie
- 14% use high-speed Internet for downloading or watching television
- 8% use high-speed Internet for online gambling

Use for online transactions

- 85% of the respondents currently use high-speed Internet for buying goods and services online
- 42% use high-speed Internet for selling items online
- 22% use high-speed Internet for Online trading / investment management
- 90% use high-speed Internet for electronic banking
- 87% use high-speed Internet for paying bills
- 55% use high-speed Internet for transactions (e.g. Taxes, licenses) with government agencies
- 62% use high-speed Internet for obtaining or saving music
- 53% use high-speed Internet for obtaining or saving software
- 69% use high-speed Internet for booking travel
Use of communications

- The majority of the respondents (79%) communicate interactively online with family and friends using a high-speed Internet connection at least once a day and 18% at least once a week.
  - 46% of respondents communicate interactively online with work and colleagues using a high-speed Internet connection at least once a day and 26% at least once a week.
  - 20% communicate interactively online with family and friends using a high-speed Internet connection at least once a day and 23% at least once a week.
  - 61% of the respondents communicate interactively online with education professionals using a high-speed Internet connection.
  - 27% communicate interactively online with commercial enterprises using a high-speed Internet connection at least once a day and 32% at least once a week.
  - 78% of the respondents communicate interactively online with community groups using a high-speed Internet connection, 25% at least once a day and 23% at least once a week.

Orders for goods or services

- Thirty per cent (30%) place between 21 and 50 separate orders for goods or services over the Internet during the past 12 months.
- Thirty-three per cent of the respondents (33%) spend more than $5,000 for the goods and services ordered over the Internet during the past 12 months.

Generally, Internet uses in Nunavut are consistent with what one would expect from a community during its ‘early stage’ journey on the Broadband Lifecycle®. The implications of this
are noted elsewhere in the report. Essentially, the trends are that, where more sophisticated (and consequently more difficult to implement) e-solutions are in place, the associated economic impacts are more significant. SNG’s research shows that, while some e-solutions are adopted soon after broadband becomes available, it may take 3 to 5 years to adopt more sophisticated e-solutions. While those early adopted e-solutions contribute to economic impacts, the e-solutions that are adopted more slowly tend to result in more significant impacts for those companies. Additional use summaries are provided in Appendix E.

On health systems enabled by the Internet

- Only 4% of the respondents currently use or plan to use emergency call systems enabled by the Internet but 59% are willing to explore it.
- Only 3% of the respondents currently use or plan to use remote health monitoring systems enabled by the Internet but 57% are willing to explore it; 75% of the current users are satisfied or very satisfied with it.
- Only 6% of the respondents currently use or plan to use remote consultation systems enabled by the Internet but 56% are willing to explore it; and 50% of the current users are satisfied or very satisfied with it.
- Only 18% of the respondents currently use or plan to use health research and education systems enabled by the Internet but 52% are willing to explore it; and 71% of the current users are satisfied or very satisfied with it.
- Only 10% of the respondents currently use or plan to use peer support systems enabled by the Internet but 48% are willing to explore it; and 51% of the current users are satisfied or very satisfied with it.

Lifestyle improvements and household benefits from Internet use

The majority (92%) of the respondents agree that not having high-speed Internet would have a negative impact on their lifestyle, 87% think high-speed Internet makes the education opportunities in their community better and 69% think high-speed Internet increases employment opportunities for their community, 76% saying high-speed Internet has a positive effect on the economy of their community.
The Internet offers a number of important benefits (very important or somewhat important) for the household for a majority of the respondents such as:

- Improving access to government services (78%),
- Offering the ability to work from home (73%), and
- Reducing travel time (72%).

As well, the majority of the respondents also indicate that the Internet offers a number of important lifestyle benefits such as:

- Improving knowledge and skills (93%),
- Being more connected with what is happening in the community (92%)
- Enhancing school learning (86%), and
- Offering the ability to earn additional income (59%).

**Education, training and access to information**

The majority of the respondents (78%) declare important the effective access to online remote education and training opportunities for them and their family. That number goes up to 89% when it is about their community. **However, only 14% of the respondents are currently using the Internet for acquiring supplementary courses for skills development, but 45% are planning to do so, 2/3 of them waiting for a higher capacity service. As well, 34% of the respondents believe their current job would be at risk without high-speed Internet at home.**

- 51% say they would not be able to continue with education or training courses without Internet.
- 81% say they would lose access to information and services essential to their household without Internet connectivity.

As for learning preferences, using online information is identified by the respondents as preferred 44% of the time, coming second after “talking with others who have experience” (50%) and before “books and manuals” (27%) and “classroom training courses” (17%). **This indicates a relatively high willingness to receive training through online mediums.** SNG database\(^\text{21}\) shows that online information is still the preferred learning method (56.7%) ahead of “talking with others who have experience” (54.2%) and before “books and manuals” (28.1%) and “classroom training courses” (21.6%).

\(^{21}\) Source: Strategic Networks Group, Inc. database 2012. Sample of 1,600 households using satellite or a wireless type of connection.
Nunavut responses are therefore not really different from the rest of the continent. It is important to note here that those preferences are independent from the type of connection. If we extend the SNG database to all type of connection\textsuperscript{22}, using online information is still the preferred learning method (56.4%) ahead of “talking with others who have experience” (53%) and before “books and manuals” (29.2%) and “classroom training courses” (21.1%).

**On capacity & service**

A majority of respondents are highly interested by being able to use new Internet enabled application thanks to a higher capacity service. The majority (57%) consider to work from home with the same effectiveness as at their work location, and 70% envy those experiencing minimal or no coverage gaps in being able to use their connection when mobile, and 91% would like to use video communication with good motion picture quality. Several of these service needs would require more bandwidth/higher-quality connections than are being reported.

**Teleworking & home business**

Only 10% of the respondents are currently teleworking and most of these individuals telework less than one day per week and only 12% of the respondents are currently operating a home-based business, mainly as part of the “arts production, entertainment & recreation industry”. SNG’s database of Internet subscribers from across North America shows that a larger share of respondents (25%) using satellite and wireless connection to access Internet is teleworking and 27.1% are operating a home-based business\textsuperscript{23}. This suggests that the rates in Nunavut are comparable.

The majority of these respondents (95%) indicate using the Internet has been as very important or somewhat important in enabling them to reach new customers, to increase sales (90%), to improve service to customers (90%) or to lower costs (90%).

\textsuperscript{22} Source: Strategic Networks Group, Inc. database 2012. Sample of 7,263 households.

\textsuperscript{23} Source: Strategic Networks Group, Inc. database, 2012. Sample: 430 and 466 households using satellite or a wireless type of connection.
3.3.2 Business Survey

A total of 76 businesses and organizations responded to the survey, providing over 11,000 data points over 69 questions on their use of the Internet. Figure 3 below provides a summary of the regional distribution of responses.

Appendix E provides further summary information from the business survey\(^{24}\).

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\(^{24}\) Households and businesses combined, that project heard back from all the 25 communities in Nunavut.
Internet Utilization

Business use of the Internet is summarized in figure 3 below.

As noted,

- 82% of the business survey respondents are currently accessing government information (e.g. information, downloads, requests) and 3% plan to do it (another 7% are waiting for a higher capacity service).
- 78% of the business survey respondents are currently using electronic document transfer and 4% plan to do it (another 8% are waiting for a higher capacity service).
- 71% of the business survey respondents are currently using research by staff (e.g. market or technical information) and 1% plan to do it (another 8% are waiting for a higher capacity service).
67% of the business survey respondents are currently using Internet for supplier communication and coordination and 6% plan to do it (another 7% are waiting for a higher capacity service).

65% of the respondents are currently e-banking (online banking and financial services) and 8% plan to do it (another 11% are waiting for a higher capacity service).

56% of the business survey respondents are currently purchasing goods or services with or without on-line payment and 1% plan to do it (another 10% are waiting for a higher capacity service).

51% of the respondents are currently using Internet for government transactions (e.g. payments, form submission) and 7% plan to do it (another 10% are waiting for a higher capacity service).

42% of the business survey respondents are currently using social networking with peer groups and colleagues and 8% plan to do it (another 10% are waiting for a higher capacity service).

40% of the business survey respondents currently have a web site for the organization and 13% plan to have one (another 13% are waiting for a higher capacity service).

38% of the respondents are currently using Internet for staff training and skills development and 11% plan to do it (another 19% are waiting for a higher capacity service).

36% of the business survey respondents currently have a customer service and support and 10% plan to have one (another 14% are waiting for a higher capacity service).

31% of the business survey respondents are currently accessing collaborative tools (e.g. file sharing, shared document editing, wiki pages, blogs) and 10% plan to do it (another 26% are waiting for a higher capacity service).

28% of the business survey respondents are currently advertising and promotion online and 7% plan to do it (another 14% are waiting for a higher capacity service).

24% of the business survey respondents are currently selling goods or services with or without on-line payment and 3% plan to do it (another 8% are waiting for a higher capacity service).

15% of the business survey respondents are currently using rich media or service creation (e.g. multimedia content, interactive tools) and 8% plan to do it (another 22% are waiting for a higher capacity service).

14% of the business survey respondents are currently using telework (employees work from home) and 6% plan to do it (another 15% are waiting for a higher capacity service).

13% of the business survey respondents are currently delivering services and content (e.g. video streaming, digitized products) and 8% plan to do it (another 25% are waiting for a higher capacity service).

19% of businesses and organizations are waiting for higher capacity service to use Internet for staff training and skills development.

26% of businesses and organizations are waiting for higher capacity service to use online collaborative tools.
It is important to note the range of Internet uses that business plan to use (or perhaps would like to employ) with ‘better’ connections. Several of these e-solutions that users would like to more fully employ are those more sophisticated Internet uses that have been linked to higher levels of economic impact in other jurisdictions. As noted, more bandwidth is available at higher cost so this may be a limit based on willingness to pay.

**Barriers**

The main barrier as described by the business survey respondents to effectively using broadband Internet in their organization is the privacy concern (73% of the respondents declare it is a significant barrier), followed by the security concerns (60%), the Cost of development and/or maintenance is too high (46%) and the Lack of internal expertise and knowledge (36%). It appears that these concerns are held in common with the majority of respondents, independently of the type of connection, according the SNG database where the privacy concern (65.7% of the respondents declare it is a significant barrier) and the security concern (62.8%) are the primary barriers, cost of development being third (50%)\(^25\).

**Organizational Benefits**

Organizational benefits are reflected in the following chart.

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\(^{25}\) Source: Strategic Networks Group, Inc. database, 2012. Sample of 12,178 households.
As noted,

- 90% of businesses and organizations say that Internet is providing important benefits to their organization to use existing resources more effectively,
- 87% say it makes day-to-day operations easier,
- 80% say it improves service to customers and clients,
- 79% say the Internet has allowed their organization to adopt new operational processes,
- 74% say it is helping to improve staff skills (training or certification),
- 70% say it helps their organization to lower operating costs,
- 68% say it helps with reaching new customers and clients,
- 68% say it improves coordination with suppliers,
- 62% say it increases revenues,
- 54% say the Internet helps their organization reduce costs of products/services,
- 52% say it is important to keep pace with peers or competitors,
- 51% say the Internet is helpful to introduce new products or services, and
- The largest share of organizations (45%) say that the Internet is providing important benefits to their organization to increase employee teleworking.

**Impact on Travel**

- The largest share of organization (45%) reported no change in travel costs as a result of their use of high-speed Internet,
- Nearly 27% say their travel costs are unaffected,
- 7% did not travel, and
- **17% reported a reduction in expenditures on business travel as a result of Internet connectivity.**

**Without the Internet**

- If high-speed Internet connection was NOT available to businesses,
  - 82% would lose access to information and services essential to their organization,
  - 79% would be forced to look for another option (e.g., dial up),
  - 72% could not offer the same level of services to their customers,
  - 71% would not be able to communicate with employees or suppliers in other communities
  - 65% say the cost of doing business (business costs) would increase,
  - 55% say would significantly reduce their access to markets for their products and services,
  - 54% say that their business’ competitiveness would be negatively impacted,
  - 51% would use public Internet access sites to offset the loss,
  - 44% say that their business’ revenues would be reduced as a result, and
  - 22% believe that they would be forced to relocate their business to a community with high-speed Internet.
See Figure 4 below.

If a high-speed Internet connection was NOT available to your business, please indicate the extent to which you agree with the following statements...

- We would lose access to information and services essential to our business: 82%
- We would be forced to look for another option (e.g., dial up): 79%
- We could not offer the same level of services to our customers: 72%
- We would not be able to communicate with employees or suppliers in other communities: 71%
- The cost of doing business (business costs) would increase: 65%
- It would significantly reduce our access to markets for our products and services: 55%
- Our business’ competitiveness would be impacted: 54%
- We would use public Internet access sites: 51%
- Our business’ revenues would be less: 44%
- We would be forced to relocate our business to a community with high-speed Internet: 22%

N = 64
Organizational Willingness To Pay Summary
If faced with the full cost of high-speed Internet service, 27% said they would continue to subscribe to their service, nearly 50% (48%) said they would not, and almost 1 quarter indicated they were not sure. See Figure 5 below.

![Chart showing willingness to pay for high-speed internet service]

Among those that would continue to maintain their high-speed Internet service at work at a higher rate than you pay currently,
- 88% would need to cut other expenses to pay the higher rate,
- 66% say that the value of high-speed Internet is worth the higher rate,
- 66% say they would have less to spend on other investments, and
- 43% would reduce the number of connections available for their business/organization.

See Figure 5 below.
Willingness to pay for higher capacity Internet connection among businesses is as follows.

- 28% are willing to pay $30 more per month than they are currently paying,
- 28% are willing to pay $60 more per month,
- 25% are willing to pay $90 more per month, and
- 19% are willing to pay $120 more per month.

In terms of barriers to paying more for Internet,

- 42% feel they already pay too much for existing service
- 28% say they cannot afford to pay more
- 25% don’t want to have to cut back on other expenses
- 17% don’t want to cut back on other investments
- 11% don’t see enough value in higher speed Internet, and
- 3% don’t know enough about how I would use the higher capacity of Internet.

*Note: Answers add to more than 100% because respondents could select all that applied.*

**Barriers to obtaining expertise needed to advance e-solutions**

When talking about the importance of issues for organizations obtaining the expertise and knowledge they require for utilizing e-solutions:

- Time and effort required to develop expertise is a critical barrier for 11% and challenging but manageable for 51%,
- Lack of internal resource with necessary skills is a critical barrier for 18% and challenging but manageable for 39%,
- Too much information and not enough time to research options is a critical barrier for 11% and challenging but manageable for 30%,
Lack of local external support resources is a critical barrier for 16% and challenging but manageable for 39%,

Affordability of local external support resources is a critical barrier for 19% and challenging but manageable for 28%, and

Having higher current priorities demanding attention is a critical barrier for 7% and challenging but manageable for 42% or respondents.

Valuing ROI from ICT
In terms of assessing the overall return on investment in e-solutions systems and applications:

- High-speed Internet is seen as a means through which to enable product or service innovation by 37% of respondents,
- High-speed Internet is seen as a means to improve productivity by 31% or respondents, and
- High-speed Internet is seen as a means through which to manage costs by 26% of respondents.

This is show in the following figure 6.

Employment and Job Creation
Thirty-seven (37) survey participants provided information on employment ranges associated with their organizations. As response options were categorical (not continuous values) we averaged given ranges and estimate that the 37 firms represented a total of 1,550 employees. Survey responses indicate that the total employment, by all categories, is 1,725. Based on
labour force estimates, the employers in the sample represent an estimated 13 to 15 per cent of the total labour force in Nunavut. Two (2) positions were reduced because of the efficiencies gained through the Internet and 30 new jobs were created (28 net new jobs attributed to the Internet). Twenty-three (23%) per cent of the respondents were the sole member of their organization (no other employees) while the rest had more than one employee.
4 Estimating the Economic Impact of Internet Connectivity in Nunavut

Estimating Direct Impacts from Revenue Growth

From our sample, 46% of the organizations responding earned revenues though the provision of products and/or services (34% did not, and 20% of those responding did not know if their organization sold its goods and services). Furthermore, 39% of the organizations that earned revenues though the provision of products and/or services were identified as “private sector operators” (the balance of 7% were government organizations).

Among the non-government sector earning positive revenues, 50% indicated that the Internet contributed to their earnings over the past 12 months. However, only 29% of organizations reported gross revenues. Among them, the average annual revenue was $1,535,200 per organizations, with total gross revenue for the sample of $15M (e.g., 10 organizations reported revenues). If the average gross revenues from those providing this data applied to all non-government operators in the sample, the 34 organizations responding would account for $52.2 million in gross revenues. This assumes that the companies in our sample are representative of the population of businesses across Nunavut.

Only 6 of 34 firms (18%) report revenues from the Internet, at an average of $157,000 and a total of just under $1 million for the sample. If the $157,000 average applied to all firms in Nunavut, then Nunavut’s non-government sector would earn $17.4 million through the Internet. Therefore Nunavut businesses and organizations that earn revenue through the Internet, earn an average of 10% of their total revenue through this medium. The ratio is well below what is suggested from other jurisdictions. Based on SNG’s comparative data set, in jurisdictions where satellite users are earning revenue through the Internet, the average share of total revenues earned through this medium is over 32%. Most of these companies are in service-oriented sectors (e.g., Consulting Services, Retail Sales and Services, and other sectors).

This is important to note for several reasons. While Internet net-based revenue as a percentage of total revenue is low compared to other jurisdictions (implying that, Nunavut businesses may be missing out), the fact that these businesses are largely locally based means that the decision makers are local. If this is the case, broadband policy interventions and initiatives can be more easily targeted to locally based businesses, in contrast to targeting broadband policy for, as an example, a locally based branch plant for which all decisions are made at a remotely located head office.

Estimating Direct Impacts from Cost Savings

From the survey of businesses and organizations, thirty (30) % of businesses and organizations reported cost savings. Average annual operating costs avoided due to the Internet was

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26 For comparative purposes, SNG’s database of business deriving revenue from the Internet and have a satellite or a wireless connection, average revenues are in the vicinity of between $500,000 and $830,000. See appendix C for more information.

27 According to the Nunavut Economic Developers association’s web site, there are 616 businesses in Nunavut: http://www.nunavuteda.com/community-profiles
estimated at $27,600 based on the sample. Applying this to the 616 companies across Nunavut, total savings due to the efficiencies and economics afforded by Internet access are estimated at $5,982,044 (total savings due to Internet).

**Avoiding Travel Costs**

The potential impact of high-speed Internet as a tool to avoid travel costs is significant but until reliability and connection speed improve, for most organizations the potential will be out of reach. Travel costs in Nunavut are significant, measured both in terms of the financial cost of the travel itself, and for the opportunity cost associated with the time it takes to travel across the region. Organizations gave us estimate for the out-of-pocket cost of quarterly board meetings, for example, at between $30,000 and $65,000. Other travel costs are regularly incurred for participation in professional development and training.

In another example, an organization regularly incurs travel costs of between $30,000 to 50,000 for 5 to 6 people who travel for 1 to 2 days to participate in training. This cost covers their flights, accommodation, per diem, and other expenses. As a result of download times, the Internet is not appropriate to offer these courses and deliver the training. If done online, however, the interviewee estimated it would cost approximately $5,000 which would pay for the instructor, webhosting, and the associated video-conferencing.

While some travel costs will never be avoided, most interview participants agreed that a lot of travel could be avoided if video conferencing could be arranged more reliably than is currently possible. In one case, an organization is experimenting with the cost of a higher level of Internet service to test if the higher subscription cost provides them with sufficient Internet connectivity to be able to reduce travel costs.

It is clear that travel costs are a very large budgetary item for businesses, residents, and the territorial government. It is also clear that even with better Internet connections that would allow for more affordable video conferencing, not all travel would be replaced by this. From Statistics Canada, Iqaluit has the highest ratio of enplaned and deplaned passengers per capita than any other region in Canada (Statistics Canada, 2008, Table 1.1, *Air Carrier Traffic at Canadian Airports 2006*, Catalogue no. 51-203-X).

**Avoiding Other Costs**

Another example of how high-speed Internet has been saving operating costs relates to the communications with suppliers. With the use of the Internet, photos and audio exchanges are more efficient so that ordering equipment can be more precise. This has helped minimize the impact of incorrect orders/shipments and helps avoid costly delays. As one person noted, these costs and delays can be “a very important element – don’t underplay” this issue.

**Summary of Economic Impacts**

The resulting Input-Output (I-O) modelling identifies the following economic impacts:

- **Gross Production** – The total value of all economic transactions caused by the Internet as identified by our research. In this case it is the sum of the revenues gained and the costs avoided (which we have assumed are re-invested in the company’s production activity).
- **Employment** – The impact on employment is measured in person years (where a person year is equal to 2,000 hours and defined as a full-time equivalent position - FTE).
• Household Income – The impact on wages and salaries associated with the person years of employment.
• Gross Domestic Product (GDP) – Changes in GDP at market prices.
• Tax Effects – Estimated changes in federal and provincial taxation, as a result of the economic activity.

The I-O results provided in this report allow us to provide economic impacts for Nunavut.

4.1 Summary of Economic Impacts in Nunavut

We used a proprietary inter-regional input-output impact models to estimate the Nunavut and total Canada impacts of Internet revenues and operating cost savings attributed to the Internet. The inter-regional input-output impact model is based on Statistics Canada’s national accounting framework and is able to measure the economic impact effects caused by inter-provincial trade flows. For example, the inter-regional impact model allowed us to trace the economic impacts of a purchased Nunavut media company back to the source of technological supplies in other parts of Canada.

There are no equations in any existing economic impact models that uniquely models high-speed Internet impacts. We used data collected to estimate total spending by sector. The inter-regional input-output impact model provides facilities to insert financial impacts into underlying structure of the economy.

The following impacts are so calculated, leveraging the cost savings and revenue gains reported by Nunavut businesses through their use of the Internet.

### Employment (Person-Years)

<table>
<thead>
<tr>
<th></th>
<th>Nunavut</th>
<th>Rest of Canada</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIRECT</td>
<td>153</td>
<td>-</td>
<td>153</td>
</tr>
<tr>
<td>INDIRECT</td>
<td>18</td>
<td>87</td>
<td>106</td>
</tr>
<tr>
<td>INDUCED</td>
<td>18</td>
<td>88</td>
<td>106</td>
</tr>
<tr>
<td>TOTAL</td>
<td>189</td>
<td>175</td>
<td>364</td>
</tr>
</tbody>
</table>

### Gross Domestic Product

<table>
<thead>
<tr>
<th></th>
<th>Nunavut</th>
<th>Rest of Canada</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIRECT</td>
<td>$10,967,840</td>
<td>$0</td>
<td>$10,967,840</td>
</tr>
<tr>
<td>INDIRECT</td>
<td>$1,872,073</td>
<td>$8,110,522</td>
<td>$9,982,595</td>
</tr>
<tr>
<td>INDUCED</td>
<td>$2,389,276</td>
<td>$8,898,646</td>
<td>$11,287,922</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$15,229,189</td>
<td>$17,009,168</td>
<td>$32,238,357</td>
</tr>
</tbody>
</table>
Overall, the impact of high-speed Internet access in Nunavut will generate the following direct and spin-off economic impacts on an annual basis:

- $15.2 million in GDP at market prices,
- $9.9 million in direct and spin-off wages and salaries (household income),
- 198 person years of direct and spin-off employment,
- $1 million in direct and spin-off federal tax revenues, and
- $530,000 in direct and spin-off other tax revenues.

The major sectors impacted include: Retail Trade; Outfitters, accommodation and food services; Administrative and Support Services; Health Care Services (except Hospitals) and Social Assistance; Grant-Making, Civic, and Professional and Similar Organizations; Wholesale Trade; Scenic and Sightseeing Transportation and Support Activities for Transportation; among others.

Sectors not present in the analysis include the Industrial aggregate including unclassified businesses which accounts for nearly 60 percent of employment across Nunavut. Organizations representing mining and resource development did not participate in the survey.

It is also important to look at Canada-wide impacts as a result of investments in and use of high-speed Internet in Nunavut. Like other remote or less populated regions of the country, Nunavut is supplied by other regions of the country though inter-provincial trade (as well as international trade). The economic impact that occurs in Nunavut, therefore, has an impact on the rest of Canada.

- $32.2 million in GDP at market prices,
- $18.7 million in direct and spin-off wages and salaries (household income),
- 364 person years of direct and spin-off employment,

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28 Total taxes include applicable federal, provincial sales taxes, other indirect taxes, and local taxes.
• $2.9 million in direct and spin-off federal tax revenues,
• $1.4 million in direct and spin-off provincial tax revenues, and
• $400,000 in direct and spin-off municipal tax revenues.

Limitations
The surveys and interviews identified a number of areas where the economic impact of high-speed Internet in Nunavut is demonstrated. These included time savings as a result of more efficient means of conducting business and household processes, travel avoidance that for some companies can be a very significant annual operating costs, as well as markets that have been expanded due to Internet connectivity, and in some cases (as informed by the interviews) organizations that could not exist without Internet connectivity. The challenge is, however, focusing the economic impact analysis on what can be measured from our sample of an area of Canada for which, by all accounts, data is quite limited.

For this reason, we focused on financial impacts of broadband adoption on individual businesses through surveying the quantifiable financial benefits generated in the areas of cost savings, new revenue growth, new employment, and new capital investment. We also compared this to over 18,000 records SNG collects and maintains from other jurisdictions that have responded to similar usage and impact questions.

Other considerations and limitations include:

• **Recency of the Impacts**: Cost savings and revenue increases are observable to the organization that reports these through comparison they are able to make to conditions that prevailed before change that triggered the savings or revenue growth. As business practices innovate, change is easiest to observe closer to the point that the change is implemented. The more time that has elapsed between the survey and the point at which an organization has made a significant change, the more difficult it is to separate the incremental adjustment from what becomes ‘normal’ business practice over time.

• **Period of the Impacts**: Input-Output modeling cannot distinguish between impacts that occur in one period of time from those that occurs over several periods of time. In the case of broadband economics, we know from past research that it can take several years for organizations to full and effectively apply e-solutions to their maximum potential within the context of the sector and the scale of the organization. In the case of Nunavut, the comparatively low share of Internet related revenues suggest strongly that business and organizations across Nunavut are not yet fully realizing the potential. This is probably related to the limitations on available high-speed Internet service.

• **Incrementality**: Input-Output results are often interpreted as though all of the impacts that have been calculated are attributed to the event being measured. In this case, we did take steps to separate what impacts are legitimately attributed to the Internet, in terms of costs saved and revenue gained, based on information provided by businesses and organizations surveyed. Furthermore, we have interview testimony that suggests that several companies could not exist without the Internet. While it is likely that those companies deriving revenues from the Internet would lose some of this if Internet were not available, it is also likely that they would find some means to replace some share of this loss.
Finally, from an economic impact and productivity use perspective, there is little in the household survey to offer quantitative discussions of gains and savings due to the Internet. This is not a deficiency, rather, a purpose for which the household survey is not designed. There is a lot within the household survey that indicates in a qualitative way that says such gains are occurring, as noted in section 3 above. As well, many social objectives are clearly being supported through the wide-spread availability of high-speed Internet.

4.2 Assessment of Broadband Demand to 2020

According to the 2010 Canadian Internet Use Survey (CIUS), nearly 80% of Canadian households (79%) had access to the Internet and more than 50% of connected households used more than one type of device to go online. Comparing urban and rural areas, 81% of households located in census metropolitan areas and 76% of households located in census agglomerations had home Internet access, compared with 71% of households in more rural locations. Table 7 below provides a summary of the rates of access across Canada (Source: Canadian Internet Use Survey).

<table>
<thead>
<tr>
<th>Region</th>
<th>2010 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newfoundland and Labrador</td>
<td>74</td>
</tr>
<tr>
<td>Prince Edward Island</td>
<td>73</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>77</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>70</td>
</tr>
<tr>
<td>Quebec</td>
<td>73</td>
</tr>
<tr>
<td>Ontario</td>
<td>81</td>
</tr>
<tr>
<td>Manitoba</td>
<td>73</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>76</td>
</tr>
<tr>
<td>Alberta</td>
<td>83</td>
</tr>
<tr>
<td>British Columbia</td>
<td>84</td>
</tr>
<tr>
<td>Canada</td>
<td>79</td>
</tr>
</tbody>
</table>

Access rates were highest in British Columbia (84%) and Alberta (83%), followed by Ontario (81%). Twenty-one per cent of Canadian households without home Internet access in 2010, say they have no need for or interest in it (56%), find it too costly for the service or equipment (20%), lack of a device such as a computer (15%), or lacked confidence, knowledge or skills necessary to use the technology (12%). The cost implication was cited more often by lower income households as a reason (24%).

According to the Nunavut Bureau of Statistics, about 5,000 households or 6 out of 10 in Nunavut had access to the Internet from within their dwelling (2010). This is about 20 points below the Canadian average and 10 points below the average for rural Canada. Within this, community level connectivity varies widely between a low of 36% in Sanikiluaq, and a high of 76% in Resolute. Larger populations in Nunavut have connected households shares on par with rural/remote areas of Canada (i.e., in the vicinity of 70%). Figure 8 provides a summary of the number and percentage of households with Internet access from within the dwellings across Nunavut29.

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Anecdotally, we heard estimates for the current level of subscription in the vicinity of 6,500. As it is unclear if this figure includes businesses and residential customers, we rely on the Nunavut Bureau of Statistics and Statistics Canada January 2011 report on the 2009/2010 Nunavut Housing Needs Survey and the number and percentage of households with Internet access from within the dwelling for the following demand analysis.

Assuming that Internet use continues to hold at the same per-household rate for the three regions of Nunavut (Baffin Region 59%, Keewatin/Kivalliq Region 62%, and Kitikmeot Region 52%) and assuming that rate of household formation (number of persons per household) stays constant, then the population forecast provided by Nunavut Bureau of Statistics (Prepared August 16, 2010) provide a foundation for estimating the demand to 2020.
Figure 9 below provides this estimate.

Under this fairly modest scenario, the number of residential subscribers will increase by almost 600 households. This is modest considering that regionally the level of household subscriptions is 10 points lower in comparison to other rural and remote areas of Canada. As well, there are a number of ‘plan-to-use’ activities that had been identified by both business users and residential users that, considered in light of many comments about the limitations on present services, suggest that demand would be even more robust if services could be improved.

Unmet demand is signalled when we consider that among the businesses and organizations surveyed:

- 26% are waiting for a higher capacity service to be able for accessing collaborative tools (e.g. file sharing, shared document editing, wiki pages, blogs),
- 25% are waiting for a higher capacity service to be able to delivering services and content (e.g. video streaming, digitized products),
- 22% are waiting for a higher capacity service to be able to use rich media or service creation (e.g. multimedia content, interactive tools),
- 19% are waiting for a higher capacity service to be able to for staff training and skills development,
- 15% are waiting for a higher capacity service to be able to telework (employees work from home),
- 14% are waiting for a higher capacity service to be able to have a customer service and support system,
- 14% are waiting for a higher capacity service to be able to advertise and promote online, and
- 13% are waiting for a higher capacity service to be able to have a web site for the organization.
With the exception of banking and financial services, smaller organizations have lower utilization in all categories. In some cases the utilization levels are already high, such as using the Internet for research by staff. However, even currently high utilization categories such as using websites, collaborative tools, and supplier communication provide opportunities for even higher utilization.

Many utilizations are more complex and sophisticated in nature making them slower to be adopted by organizations in general and by smaller organizations in particular. Those with lower utilization adopt the easier to use applications first while more sophisticated and difficult applications tend to be adopted later, especially by organizations that already have high utilization.

It should be noted that the “slow to adopt” uses are those most closely tied to revenue generation, while the easier to adopt are more closely linked to efficiency and productivity.
Among households asked about how they would use higher capacity service,

- 40% would use Voice communications (VoIP using the computer or VoIP phone),
- 28% would pursue educational or training courses (remote learning or supplemental courses from home),
- 19% would do more sharing Information (e.g. photos, videos, personal blogs),
- 19% would access their workplace from home (occasional use),
- 19% would telework (formal workplace all or part of normal work hours),
- 18% would create a personal web presence (e.g. Facebook and similar sites),
- 18% would engage in a home-based business (full-time or part-time),
- 16% would conduct research for education, training or school work,
- 12% would research investments (financial, real estate, etc.),
- 12% would search for government information and services,
- 12% would researching community events,
- 12% would searching for medical or health related information, and
- 10% would research travel information.

While household surveyed use many of these common e-solutions, the pent-up plan to use VoIP, course training, among other uses, also provides some evidence of service limitations and if these were addressed, subscription may accelerate beyond the levels used for the projection above.

<table>
<thead>
<tr>
<th>Quick to adopt</th>
<th>Slow to adopt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access government information</td>
<td>Teleworking</td>
</tr>
<tr>
<td>Electronic document transfer</td>
<td>Rich media or service creation</td>
</tr>
<tr>
<td>Accessing collaborative tools</td>
<td>Social networking</td>
</tr>
<tr>
<td>Research by staff</td>
<td>Selling goods or services</td>
</tr>
<tr>
<td>Web site</td>
<td>Deliver services or content</td>
</tr>
</tbody>
</table>

### 4.3 Investment Scenarios

Of course, the level of willingness to pay among Internet subscribers is an important dimension of the level of demand discussed above. The survey results and the interviews indicate that few are willing to pay for the full cost of Internet connectivity at the service level they currently experience. Only 22% of the household respondents say they would continue with their high-speed Internet service if they had to pay the true cost (without the subsidies), with 68% saying it is unlikely or very unlikely that they will continue with their service. Almost one quarter (24%) of the household respondents would consider relocating to a community with more affordable...
high-speed Internet and 60% say they would be forced to cut other expenses to pay the higher rate for the full cost of Internet service.

In terms of willingness to pay for various thresholds of price increases associated with better Internet service, 60% of the household respondents say they would likely pay an additional $30 more per month for a higher capacity service high-speed Internet. That number drops to 34% for $60 more per month, 19% for $90 more per month and 12% for $120 more per month. While residents say they will pay more for better service, they are clearly price sensitive.

In terms of business and organizational sensitivity to price increases, there is less sensitivity, with nearly ¾ of the sample willing to spend up to $90 more per month, albeit for a higher capacity service. The interviews with businesses confirm the essential nature of high-speed to Nunavut business. The interviews also illuminate the importance of affordable broadband for the local markets wherein many of these Nunavut businesses operate.

In light of the above, there are three government investment scenarios to consider:

- **Scenario 1** – No Government Investment
- **Scenario 2** – Minimal Government Investment
- **Scenario 3** – Ideal Government Investment

From the demand analysis set out at Section 4.2 above, there are at least 600 new customers to be signed up by 2020. If Nunavut achieves closer to the Canadian average of 80% of households connected, there may be as many as 2,600 new residential customers and nearly 100 new business customers (linearly extrapolating from current levels on the basis of predicted growth across Nunavut).

In consideration of CRTC’s target for connectivity speed for Internet subscribers, it is difficult to imagine that current service standards will satisfy the demand. From this study there is already evidence to suggest that Nunavut is well behind the service standards that are enjoyed by Internet users in other parts of Canada.

### 4.3.1 Scenario 1 – No Government Investment

Remote Northern communities present truly unique challenges and opportunities for broadband by virtue of their demographic and geographical characteristics. In many cases, remote and Northern communities are small in terms of population and lack sufficient internal market demand to sustain a broadband network purely on the financial business case.

Their distance from larger population centres with existing broadband infrastructure compounds the challenge of broadband infrastructure economics. However, due to their remoteness, such communities have more to gain from broadband and are more disadvantaged by its absence. Additionally, Aboriginal communities possess a unique culture and heritage that they desire to preserve which can present a challenge for delivering broadband content and services relevant to their constituents.
There will be areas where at one extreme, a good business case exists for ISPs and service needs will be addressed by free market competitive forces. At the other extreme there are areas that will never be sustainable for an ISP on the business case alone. These areas require sustained government investment (assuming high-speed Internet/broadband availability is a government policy priority). The following figure outlines the two rationales for investment: one being economic wherein the business case exists, the other being social wherein government policy may drive investment through cost-sharing and/or operating subsidies.

Without knowing the parameters of the business case applied by ISPs to trigger their ‘natural’ investment in providing coverage, it is clear that Nunavut not only lacks population over which to spread the cost of infrastructure and servings, its remoteness also requires relatively costly solutions for the provision of services. Simply put, in markets that are under-served because the business case is limited or non-existent, the socio-economic case provides the rationale for investment. Such is the case for Nunavut.

We view this scenario as akin to the loss of the current government subsidy that makes Internet affordable, particularly for the residential group. In this case, carriers will be left with no incentive to maintain or expand current coverage area. Prices will surpass what residential customers have indicated they would be willing to pay and may rise beyond what commercial users have indicated they would be willing to pay for better services, let alone existing service levels. Under this scenario, the economic benefits of high-speed Internet connectivity, as well as the social benefits to residents of Nunavut, are lost.
4.3.2 Scenario 2 – Minimal Government Investment

The scenario of minimal government investment is effectively the continuation of the level of services that are available at present. The main impact of this investment strategy will be stagnancy of the North and a widening gap between the level of connectivity in the south and Nunavut.

One interview candidate recalled being invited to the first fax being used in their community and how this “had a huge impact on the locals – it was like magic.” High-speed Internet access has been a similar revelation and it will, no doubt, take some time for the full benefits of this technology to be fully leveraged by the communities that are taking advantage of this access. Affordability, quality, and capacity emerge as ongoing challenges to the progress. Nunavut “cannot fully benefit from what’s on the Internet because of speed, reliability and cost.”

Balancing this view, others contend that the “region is fairly well connected for what we have” and that it is much better in the smaller communities as far as coverage goes. The prevailing theme however, is that economic development requires faster, more reliable connection. As one person noted, “without this, the region will be stuck in its current state of economic development, having maxed out on the connection we have and as the rest of the world advances and moves quicker, we will be left further and further behind”. “If we want the economy to grow, we need to be able to connect with other economic hubs.”

Essentially, good progress has been made, but what is in place is not yet sufficient for a globally competitive level of Internet connectivity and the service is nowhere near the current service targets being set by developed nations. Over time, Scenario 2 will have the effect to destabilize the progress that has been made to date. In the short term, supporting the current level of investment will sustain current levels of connectivity. However, the connectivity in the rest of the develop world will continue to evolve. For example, the CRTC sets the 5Mbps target for Canada. According to this policy, by 2015 every household in Canada should be able to buy Internet access with a minimum of 5 megabits per second download and 1 Mpbs upload speeds. The CRTC estimates that 80% of the Canada already has access to at least 1.5 Mbps broadband, and about 5% in remote and rural areas can still be limited to dialup. Continuation of the status quo will see Nunavut fall behind the level of connectivity targeted by the CRTC.

4.3.3 Scenario 3 – Ideal Government Investment

Ideal government investment would see sufficient investment to address the service quality issues that had been raised in the report, and to do so within the parameters of affordability as indicated by both households and businesses/organizational feedback on their willingness to pay. As revealed from the literature and lessons learned, the ideal investment would also include strategies that increase the ICT capacity of the region and, in particular, encourage business adoption of e-solutions appropriate to individual business circumstances.

Without an assessment of the technological requirements to meet the demand, it is difficult to predict within this study the scale of the investment that would be required. It is, however, possible to suggest a target for the ideal investment as being one that allows commercial enterprises to achieve a share of Internet revenues on par with southern based rural/remote areas and to measure the impact of that change on the resulting economic impacts.
As noted earlier in the report, businesses who are leveraging revenues from the Internet are earning revenues to the degree of 3.2 times less than satellite users from other rural areas throughout North America.

Corroborating this information, we calculated the Digital Economy index (DEi) for Nunavut. The DEi is calculated from research of actual uses of Internet-enabled applications by individual organizations across 17 utilization categories. The Internet uses are weighted based on factors of complexity in terms of technical implementation and internal process impacts. More complex uses such as online customer service are given greater emphasis in the DEi than easier-to-implement activities such as buying goods and service online. Using data collected directly from individual organizations, the DEi is calculated from weighting individual organizations’ uses across the 17 categories and normalizing the DEi on a scale of 0 to 10. DEi values can be aggregated across a group of organizations of similar characteristics to derive the range of DEis and the average or median DEi for that grouping.

Table 10 below shows the DEi for Nunavut.

<table>
<thead>
<tr>
<th>Region</th>
<th>Average DEi score by region</th>
<th>Planned DEi score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iqaluit*</td>
<td>4.70</td>
<td>6.67</td>
</tr>
<tr>
<td>Other communities in NU**</td>
<td>3.67</td>
<td>5.87</td>
</tr>
<tr>
<td>Nunavut***</td>
<td>3.96</td>
<td>6.09</td>
</tr>
<tr>
<td>SNG database****</td>
<td>5.61</td>
<td>N/A</td>
</tr>
</tbody>
</table>

*Iqaluit: sample of 20 businesses and organizations  
**Other communities in Nunavut: sample of 52 businesses and organizations  
***Nunavut: sample of 72 businesses and organizations  
****SNG database: sample of 154 businesses and organizations from rural areas in North America using satellite or wireless connections to access the Internet

The average DEi for Iqaluit business survey respondents is 4.7, while respondents from outside Iqaluit post an average DEi of 3.67. For comparison purposes, we calculated the DEi for satellite users from other region of North America which yields an average DEi of 5.61.

Finally, we calculated the DEi for business survey respondents on the bases of e-solutions that respondents indicated they planned to use or would use if connection speed/service was improved. This would mean an increase in the DEi of 2 points for both users within Iqaluit and those from outside Iqaluit. The conclusion from this is that the DEi in Nunavut is low relative to other regions and relative to what it could be if businesses were to apply e-solutions in the way they hope to.

What constitutes the ideal investment can be considered one that allows Nunavut to improve its DEi – shift from the level of impacts associated with current Internet uses toward those e-solutions that would be adopted if businesses have the service to allow then to expand their use the Internet in a way that they would find more suited to their operations (e.g., moving Iqaluit
An Assessment of the Socioeconomic Impact of Internet connectivity in Nunavut

from a DEi of 4.70 to a DEi of 6.67). Similarly, but measured in different terms, an ideal investment would be one that allows businesses in Nunavut to move from earning 10% of their revenues through the Internet to earning as much as other satellite users in other justifications (32% of revenues from the Internet).

If this shift took place, Nunavut’s impact from Internet access could reach between $30 and $50 million in GDP (at market prices), create between $20 and $30 million in direct and spin-off wages and salaries (household income), support between 390 and 630 jobs, and generate between $3 and 5 million in direct and spin-off federal, provincial, and municipal tax revenues.

The scale of the impacts reported in this report is modest in comparison to the impacts that are potential from other jurisdictions. Below are two examples of significant potential gains for businesses in Nunavut:

- In Nunavut, only 18% of companies surveyed earn revenues from the Internet, at an average of $157,000. Looking at other jurisdictions across North America, 49% of companies earn revenues from the Internet, at an average of $832,000 per company, regardless of the type of Internet connection, and $500,000 for those connected via satellite and wireless.
- Only 15% of companies in Nunavut report savings from the Internet, at an average of $27,600 per company. The average savings per company in North America, for those with savings from the Internet, ranges between $90,000 and $100,000.

SNG’s data for North America show that revenue attributed to using the Internet grows non-linearly relative to DEi. We attribute this to higher DEi, representing more uses of the Internet, creating a critical mass of utilization that results in greater revenue impact.

Consider that as the average DEi increases, there will be a distribution around the average, with a higher proportion of businesses moving into the higher DEi ranges. As you move all businesses “up the curve” some increasing proportion will start to deliver the economic impacts. Therefore, increasing DEi and increasing revenue impacts from Internet use are related.

Clearly there is a time lag between when investment is made and improvements are realized. Over time, e-solutions utilization increases: the longer you have high-speed/broadband Internet, the more it is used. The more it is used, the greater the impact on revenue. The most effective uses of the Internet among businesses occur between 3 to 5 years after they have access to the Internet: the time lag is owed to the time it takes businesses, on average, to adopt and apply more effective uses of the Internet into their business activities.
The following figure illustrates the impact of time on the DEi. This shows the average DEi score for all establishments in SNG’s data base who reported their time of using broadband in the ranges shown. The average DEi score is useful for comparing the relative utilization levels of each “time of use” category. As an index of utilization of the Internet, the DEi increase with increasing Internet utilization and increases Internet utilization increases over time.

In a way, the three scenarios can be qualitatively expressed in terms of DEi, with scenario 1 causing an overall reduction in average DEi due to more constraints on utilization. Scenario 2 causing at best modest growth as businesses find ways to use what they have more effectively, and scenario 3 enabling growth of DEi closer to potential shown by users less constrained by connectivity. However, we cannot predict the average DEi numbers for each scenario, but we can distinguish between going down, minimal rise, and significant rise. The implications for revenue growth, increased productivity and improved competitiveness would move similarly.

The following table provides a qualitative summary of the three scenarios.
### Investment Scenario Implications

<table>
<thead>
<tr>
<th>Impact Dimensions</th>
<th>Scenario 1 – No Government Investment: viewed as a retrenchment of the current situation</th>
<th>Scenario 2 – Minimal Government Investment: considered to be maintenance of the status quo, which will, overtime, allow for a widening digital divide between Nunavut and other regions of Canada</th>
<th>Scenario 3 – Ideal Government Investment: viewed as an investment that improves service, and actively accelerates effective adoption of e-solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-speed/Broadband subscription rates - Business</td>
<td>Reduced subscriptions Reduction in number of connections used</td>
<td>Slow growth based on business population increase Shrinking number of users over time</td>
<td>Increased adoption of higher capacity connections</td>
</tr>
<tr>
<td>High-speed/Broadband subscription rates - households</td>
<td>Significantly reduced. Higher percentage of households without broadband</td>
<td>Slow growth based on household population increase Shrinking number of users over time</td>
<td>Increased adoption of higher capacity connections</td>
</tr>
<tr>
<td>Service provider viability</td>
<td>Reduced revenues without corresponding operating cost reductions impacts business viability</td>
<td>Maintain current viability with moderate growth from new subscriptions Contraction over time</td>
<td>Increased revenues and profitability due to higher subscription rates and higher value subscriptions</td>
</tr>
<tr>
<td>Individual utilization levels</td>
<td>No change for remaining users. Possible reduction if connection quality decreases.</td>
<td>Moderate growth for some users as they learn to creatively get more from existing connection capabilities</td>
<td>Increased utilization, especially in more sophisticated applications once confidence is established in sufficient speed and reliability</td>
</tr>
<tr>
<td>Aggregate utilization levels</td>
<td>No change or potential decrease in average DEi</td>
<td>Slow growth in DEi from moderate increase in utilization</td>
<td>Significant increase in average DEi with a higher proportion of businesses moving into more sophisticated e-solutions</td>
</tr>
<tr>
<td>Economic impacts - general</td>
<td>Reduced impacts due to loss of business and some small businesses no longer viable</td>
<td>Continued level of impact or possible reduction due to decreasing competitiveness with businesses outside of Nunavut</td>
<td>Increased impacts from higher utilization levels and increased competitiveness with the rest of the world</td>
</tr>
</tbody>
</table>
An Assessment of the Socioeconomic Impact of Internet connectivity in Nunavut

<table>
<thead>
<tr>
<th>Impact Dimensions</th>
<th>Scenario 1 – No Government Investment: viewed as a retrenchment of the current situation</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Employment</td>
<td>Loss of jobs due to decreasing competitiveness and potential small business closures</td>
<td>Potential loss of jobs as existing businesses lose ground in competing globally</td>
<td>Increase in employment spurred by business growth</td>
</tr>
<tr>
<td>Quality of Employment Opportunities for Local residents</td>
<td>Lower-level employment opportunities/little opportunity in emerging sectors</td>
<td>More opportunity in emerging sectors, but risk that this level will not be sustained</td>
<td>Greatest opportunity for higher-level employment / and highest opportunity in emerging sectors</td>
</tr>
<tr>
<td>GDP impacts</td>
<td>Reducing due to decreasing competitiveness</td>
<td>Current levels or potentially reducing due to decreasing competitiveness</td>
<td>Significant growth potential from increased utilization and global competitiveness</td>
</tr>
<tr>
<td>Tax impacts</td>
<td>Reducing due to decreasing competitiveness</td>
<td>Current levels or potentially reducing due to decreasing competitiveness</td>
<td>Significant growth potential from increased utilization and global competitiveness</td>
</tr>
<tr>
<td>Local content and services</td>
<td>Low incentive for innovation and development of new content and services relevant to Nunavut</td>
<td>Low incentive for innovation and development of new content and services relevant to Nunavut</td>
<td>Potential increase in content and services relevant to Nunavut enabled by increased capacity and increasing subscription rates</td>
</tr>
<tr>
<td>Home business opportunities</td>
<td>Existing home businesses at risk and constrains new business starts</td>
<td>Potential slow growth from existing levels</td>
<td>Potential for significant growth and new entrepreneurial opportunities are seen for doing business outside Nunavut</td>
</tr>
<tr>
<td>Teleworking</td>
<td>Low levels due to impracticality of current technologies</td>
<td>Low levels due to impracticality of current technologies</td>
<td>Potentially increased levels with sufficient broadband speed and reliability (subject to other factors such as workforce skills, etc.)</td>
</tr>
<tr>
<td>Potential DEi range</td>
<td>Lowest levels (below current levels)</td>
<td>Current levels, with a risk these will fall</td>
<td>Current levels + 2 or more</td>
</tr>
</tbody>
</table>
This comparative matrix provides a qualitative summary of how each investment scenario will affect the socio-economic impact of high-speed Internet connectivity in Nunavut. As the investment scenarios reveal, more investment is needed to ensure that what has been accomplished is not lost and that access to and use of high-speed Internet continues to evolve through further investment to ensure the growing community of users is able to more fully leverage connectivity.
5 Conclusions & Recommendations

The Nunavut Broadband Development Corporation (NBDC) was created by the members of the Nunavut Broadband Task Force and now works to ensure that communities, companies, organizations and individuals can gain affordable access to broadband.

NBDC is a not-for-profit corporation, controlled by Nunavut residents, with membership from the general public, private sector companies, Inuit organizations, community organizations, and hamlets. NBDC goal is to ensure that the people and organizations throughout Nunavut have access to reliable, affordable broadband services, in every single community within Nunavut.

NBDC has recognized that making better use of broadband is critical for the economic success of the region, and access is a critical underpinning of social equality. By researching and articulating the positive impacts of broadband access for Nunavut, NBDC seeks the objective evidence to the gains that have been made and some measures of the potential that can be reached through continued investment. Providing a case for better capacity has to be founded on detailed understanding of the economic and social use of broadband; now and into the future.

Background

With its 2011 Census population of 33,387 residents spread over 25 communities in 1.9 million km2 area of land, most of Nunavut lacks the market density to justify business investment in telecommunications infrastructure with today’s technology and cost structure, without government supporting the ISP’s business case to enter into the market place.

Much progress has been made since 2003. As one interview candidate recalled the marvel of being invited to first fax being used in their community and how this “had a huge impact on the locals – it was like magic.” High-speed Internet access has been a similar revelation. However, it will, no doubt, take some time for the full benefits of this technology to be fully leveraged by the communities that are taking advantage of this access. Affordability, quality, and capacity emerge as ongoing challenges to the progress. Nunavut “cannot fully benefit from what’s on the Internet because of speed, reliability and cost.”

The prevailing theme is that economy development requires faster, more reliable connection. As one person noted, without this, the region will be stuck in its current state of economic development, having maxed out on the connection we have and as the rest of the world advances and moves quicker, Nunavut will be left further and further behind. “If we want the economy to grow, we need to be able to connect with other economic hubs.” Essentially, good progress has been made, but what is in place is not yet sufficient for a globally competitive level of Internet connectivity and the service is not at the current service needed for effective participation in the digital economy.

Nunavut Connectivity

Relative to other jurisdictions highlighted in the literature review Nunavut is at a disadvantage. Although being connected to the Internet is a significant step forward from other methods of communications and connectivity (e.g., dial-up and fax as indicated by key informant interviews), current technological and cost barriers need to be overcome.
Communities, who have been able to begin their evolution and journey along the Broadband Lifecycle, fortified with relatively better quality and higher speed connections, are effectively leapfrogging Nunavut out of the gate. This may mean that ‘early wins’ for other communities who are igniting their broadband lifecycle come sooner for those communities than they would for Nunavut. Furthermore, because there is an upper limit to the capacity of broadband in Nunavut for those at the base subscription (and by all accounts, Nunavut residents and businesses’ need more bandwidth as it stands), communities that have access to affordable and faster “high-speed” are able to take progress further and faster along their lifecycle than is possible in the Nunavut context.

Study Findings
The goal of this study was to research, measure and quantify the social and economic benefits of broadband infrastructure as it relates to Nunavut’s communities. The study aimed to measure progress to date, and though the assessment of demand and various investment scenarios, to outline what could be the future of high-speed Internet in for Nunavut.

Overall, the impact of high-speed Internet access in Nunavut has generated the following direct and spin-off economic impacts, on an annual basis:

- $15.2 million in GDP at market prices,
- $9.9 million in direct and spin-off wages and salaries (household income),
- 198 person years of direct and spin-off employment,
- $1 million in direct and spin-off federal tax revenues, and
- $530,000 in direct and spin-off other tax revenues.

Even with these important economic impacts, there is unmet demand for connectivity. Stakeholder interviews and measurement of uptake across Nunavut compared to other jurisdictions indicate that organizations and individuals are waiting for a higher capacity service in order to be able to effectively implement and use the appropriate e-solutions that will support and accelerate local socio-economic development.

Broadband as an Enabler
Broadband has been an enabler for higher-level use of the Internet because of the bandwidth required and the ‘always-on’ requirements of these activities. Our research shows that if Nunavut were able to leverage high-speed Internet with the same degree of success as rural and remote communities in the south are able to, the current level of impact from Internet access could balloon between 2 and 3.2 times their current levels, to between $30 and $50 million in GDP (at market prices), between $20 and $30 million in direct and spin-off wages and salaries (household income), between 390 and 630 jobs, and between $3 and 5 million in direct and spin-off tax revenues.

The potential take-up rate for broadband services and applications is high in Northern communities, but the initial investment costs must first be overcome – a role for which government has been looked upon for assistance.

It is clear that various service packages are available to businesses and residents and that these would allow users to employ more e-solutions that would move them toward greater economic impact. It is also clear that the willingness of, if not the capacity of, users to afford these higher level services is limited.
Broadband Scenario Analysis

Our scenario testing suggest that, in the absence of support for broadband in Nunavut, there will be a widening gap between the level of broadband service in Nunavut relative to other regions of Canada.

In order to maximize socio-economic benefits locally for Nunavut, Internet connectivity must continue to evolve and improve beyond basic ‘high-speed Internet’ – this includes addressing: improving speed and quality of connection, as well as promoting meaningful use of the Internet and e-solutions. This requires further investment in broadband infrastructure, as well as initiatives that promote awareness and support effective utilization of e-solutions with Nunavut businesses, organizations, and residents.

In this regard, Nunavut has significant challenges relative to the “single community” examples of an investment initiative that characterize the literature (Appendix A). Most comparable examples have only one community within which to organize focused support for broadband development. Within each community-based project, champions of broadband development typically faced common socio-economic circumstances, common objectives, common capacities, and common needs, all of which can be more or less addressed through a common set of solutions. Nunavut has 25 distinct communities, distinct micro-economies, differing socio-economic circumstances, and all of them are spread over 1.9 million square kilometers of land in Canada’s physically isolated north. Nunavut is truly unique in that we found no case study offering characteristics that are perfectly analogous to the remoteness and isolated nature of Nunavut to other regions, and indeed, within Nunavut and the relative remoteness of communities from each other.

From a social services perspective, more and more government services (e.g. health, education, governance) are being provided online. If all citizens have equal rights to government services and their social benefits, then it is important to understand where market forces cannot provide affordable access to broadband services. In such cases there is not just an economic argument for government intervention in broadband deployment, but also a social equity argument (e.g. an essential services like the telephone). What defines the boundaries between those two cases is an important follow-on to this study. As well, the findings and criteria from this study need to be tested in communities to ascertain whether thresholds and factors can be developed for policymakers to incorporate into planning and interventions for broadband deployment.

Government interventions to promote broadband deployment should continue to promote community-based approaches and for local grass-roots organizations to take leadership and leverage local resources.

A broadband initiative can be successful in remote communities by focusing on the unique characteristics of the community environment to deliver value and defining strategies that leverage their strengths. For example, communities have utilized broadband access to:

- Significantly reduce telecommunications costs enabling freer intra-cultural interchange with those outside their community; and
- Create opportunities to bring business into the community (e.g. call centers) which creates employment while allowing citizens to remain in their community of choice.
Government policy also has a unique role to play in such communities as the offices of government departments and agencies can become “anchor tenants” for the broadband initiative. Local government, health providers and especially schools, must be part of any broadband initiative. Youth are eager, open to new technology and are already in the mode of learning, which influences the older generation (parents, teachers, etc.).

Quite simply, there is a need for better coordination of efforts: a holistic long-term strategy to the development of broadband across Nunavut. The business case will require government investment and with this investment, there needs to be oversight so that single company service providers do not abuse their position when competition cannot exists or when it would deteriorate the business case for the operator to a point that they cannot justify their investment. The approach needs all stakeholders to contribute to identifying how best to leverage infrastructure investment for the benefit of the community, the operator(s), and the government investors.

Moreover, focus on creating an environment for training and experience needs to become a fundamental component of broadband activities in all communities. Sharing stories and experiences of other projects and what they have learned is a key enabler to supporting new initiatives. This report provides three examples of those stories that offer, in many ways, a glimpse of the impact of high-speed Internet that is more profound than that which is more readily quantified.

The literature also clearly demonstrates that a higher level of impact is achieved (or achieved sooner) if the broadband rollout includes an accompanying strategy to match the deployment with the needs, opportunities, and constraints of the community for which the broadband program is being deployed. Nunavut needs to develop a strategy to address the 'essential skills' that they will need to improve their use of ICT. Up until now, the focus has been on the service. Connectivity is a minimum condition for productive use of the Internet, but it is not a sufficient condition. This can be addressed in part by training and support. Anchor institutions (municipal, local health, education) will need the bandwidth to help facilitate the transfer of essential skills, businesses will need the bandwidth to implement more e-solutions across more business activities, and local residents will need the bandwidth to consumer services from government and businesses, to participate in social exchanges, and to leverage learning and communications opportunities as Nunavut economy continues to evolve and develop.
Appendix

Appendix A: Detailed Literature Review
Appendix B: Nunavut Profile
Appendix C: Assumptions concerning Impacts of Internet on revenues and cost savings
Appendix D: The Broadband Lifecycle
Appendix E: Additional Data Collection Findings
Appendix A: Detailed Literature Review

Academic Research

In the late 1988, Robert Pepper of the office of plans and policy in federal communications commission (currently known as the office of strategic planning & policy analysis), mentioned in a report that the network infrastructure of the time is not "sufficient to meet growing user demand" and that fibre optic network "promises soon to become the technology of choice".

Delivering high definition television programs for home use, video content for personal computers, video conferencing and document delivery were viewed as some of the primary applications for broadband networks in the late 1980s (Pepper, 1988).

Fast forwarding to the second decade of the 21st century, the broadband Internet – also discussed as broadband communications in the late 20th century research and publications—becomes the Information and Telecommunication Technology (ICT) of choice. Yet, today it continues to remains inaccessible in parts of many developing and developed countries.

This is despite the fact that effective and efficient access to the Internet is not just necessary for e-commerce, but also, it is vital for the communities to “remain economically viable” (Hollifield, and Donnermeyer, 2003).

Several challenges and concerns have been considered since the early days of planning for broadband development. These challenges and concerns range from policy and regulatory issues to access gaps and adoption, and are presented in Table 1 based on the review of some mostly cited works.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Concerns &amp; Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pepper, 1988</td>
<td>Regulatory body and policies, required substantial investment</td>
</tr>
<tr>
<td>Gonet, 1986</td>
<td>Concerns for the principles governing integrated broadband communication network</td>
</tr>
<tr>
<td>Coustel, 1986; McGregor, 1994</td>
<td>Competitive environment for service delivery</td>
</tr>
<tr>
<td>Solomon and Walker, 1995</td>
<td>Significance of “separation of network provision from service provision”</td>
</tr>
<tr>
<td>Higham and Lee, 1996; Hausman, Sidak, Singer, 2001</td>
<td>Consequences of vertical integration of content, service network infrastructure and end user equipment</td>
</tr>
<tr>
<td>Edmonds, 1999; Hausman et al. 2001</td>
<td>Accessibility and pricing</td>
</tr>
<tr>
<td>Lessig, 1999</td>
<td>Accessibility in light of technological and legal developments</td>
</tr>
</tbody>
</table>

32 Defined by Federal Communications Commission as a connection with 200 kbps or higher.
<table>
<thead>
<tr>
<th>Authors</th>
<th>Concerns &amp; Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frieden, 2002</td>
<td>Regulatory dichotomies related to small Internet service providers vs. Large telephone companies—which are main players in information communications and entertainment marketplace—</td>
</tr>
<tr>
<td>Lee, Sawyer, and Choudrie, 2003</td>
<td>Broadband adoption by households and small and medium size businesses</td>
</tr>
<tr>
<td>Grimes (2003)</td>
<td>Development and deployment of broadband in rural areas</td>
</tr>
<tr>
<td>Hollifield, and Donnermeyer, 2003; van Gorp, Maitland, and Hanekop, 2006</td>
<td>Geographic (low population density), demographic, and policy Strategies of service providers remain the major challenge of providing broadband access in rural areas</td>
</tr>
<tr>
<td>Stanton (2004)</td>
<td>Slow broadband adoption in the United States</td>
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<tr>
<td>Foros (2004)</td>
<td>Pricing regulations</td>
</tr>
<tr>
<td>Warren (2004)</td>
<td>Broadband in agriculture sector: infrastructure, human capital, farm ownership structure, and complexity underlying the adoption process</td>
</tr>
<tr>
<td>Pociask (2005)</td>
<td>Digital divide of small businesses in rural broadband Internet utilization as a result of demand-side factors (demographic, wealth and education) and supply-side factors</td>
</tr>
<tr>
<td>Dwivedi, and Choudrie, 2006</td>
<td>Adoption and socioeconomic factors</td>
</tr>
<tr>
<td>Maitland, and Hanekop, 2006</td>
<td>Implementation of open access policies</td>
</tr>
<tr>
<td>Mitchell, 2007</td>
<td>Challenges of deployment in rural areas</td>
</tr>
<tr>
<td>Flamm and Chaudhuri, 2007; Crandail Lehr, W., and Litan, 2007</td>
<td>Understanding the impact of broadband Internet</td>
</tr>
<tr>
<td>Kruger, and Gilroy (2008)</td>
<td>Broadband provision in the last mile</td>
</tr>
<tr>
<td>Mack and Grubesic (2009); Badasyan, Shideler, and Silva (2011)</td>
<td>Broadband provision versus broadband adoption or diffusion</td>
</tr>
<tr>
<td>Grubesic (2010)</td>
<td>Price discrimination in absence of local broadband service provided</td>
</tr>
<tr>
<td>Given (2010), Oyana (2011)</td>
<td>Partnership among all stakeholders; affordability</td>
</tr>
<tr>
<td>Rao, Barry, Indrit, 2011</td>
<td>Promoting broadband adoption</td>
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</tbody>
</table>

**SOURCE:** Broadband Internet: How to Implement Uncovered, 2012, by Kayvan Miri Lavassani, PhD, and Bahar Movahedi, PhD.
Limited access to broadband caused by challenges of access (affordable access), adoption, etc. seriously curtails a community’s ability to remain competitive in the global knowledge economy (Hollifield, and Donnermeyer, 2003).

A universal finding is that broadband access is more limited in rural areas, even in developed nations. Based on our research, the first report on Internet access and its economic impact on businesses was delivered by Congressman Mike Pence in 2001. Within this Pence argued that a lack of access to such an infrastructure “severely undermines” the ability of small business to compete in rural America.” (Celli and Dreifach, 2002)

In absence of government support and the viability of a clear business case for service providers the reasonability of broadband expansion to some rural areas falls on the shoulders of local municipalities and non-profit organizations (LaRose, et al., 2007). Development of public-private partnerships has been successful in facilitating the broadband development in rural areas (Mitchell, 2007; Sadowski, Nucciarelli and Achard, 2010).

Theme of access, adoption, and the impact of the digital divide have dominated the literature. Broadband is well established in the literature as a key component of economic development and has long been at the stage of minimally necessary for competitive businesses. It is increasingly minimally necessary to receive basic government services. The solution has been government support for broadband coverage, infrastructure investment, and less frequently strategies targeting e-literacy, adoption, and application of e-business and e-solutions.

**Broadband Internet & Economic Development**

Adoption of the broadband Internet by both individuals and businesses—in particular small and medium size businesses, has been a topic of interest since the early 2000s (Lee, Sawyer and Choudrie, 2003).

Perhaps the first study that measured the economic impact of broadband Internet was published in 2005 by Lehr, Osorio, Gillett and Sirbu. Based on their analysis of broadband Internet access in America during the period of 1999-2002 Lehr, et al. (2005), concluded that communities with sufficient access to broadband Internet were doing significantly better economically.

More recent studies in this area include the work of:

- Thompson and Garbacz (2008) who explored the impact of broadband on GDP at the state-level in America,
- Katz’s (2009) on the impact of broadband on the Latin American economy,
- Majumdar, Carare and Chang’s (2010) study on the effect of broadband on firm productivity,
- Rao, Barry and Indrit (2011) study of the impact of broadband adoption in rural Australia and
- Czernich, and Falck, Kretschmer, and Woessmann (2011) who provided further evidence for the positive effect of broadband penetration on per capita growth.

While there seems to be significant supporting evidence as well as consensus for the positive role of broadband Internet in economic development, some argue that there could be a speed
and application limit on the positive correlation of broadband speed and economic deployment. Kenny and Kenny (2011) argue that where superfast fibre (50 Mbps and above) is deployed in fibre to the home (FTTH) the benefits may not be necessarily more than the benefits of lower speed broadband access. This suggests that for most applications, once broadband is fast enough, super-fast is excessive. We know from past experience, however, that e-solutions tend to push technology demands and not remain static.

Broadband Internet Use in Rural Pennsylvania
This research, conducted in 2005-2006 by Amy K. Glasmeier, Ph.D., Chris Benner and Chandrani Ohdedar33, employed case studies to provide a qualitative description of how four sectors, specifically healthcare, local government, education and business, in rural Pennsylvania are using broadband Internet technology. The research was interested in determining whether these sectors were engaging in transactional or transformational uses of the Internet. The essences of the findings were:

- Proactive governments are critical to the successful uptake of broadband technologies,
- Broadband use by businesses is growing through time,
- Business use of broadband services varies significantly by industry. In the powdered metal industry case study, small businesses were using the Internet primarily to identify new market opportunities, reduce the cost of supplies, and communicate more effectively within supply-chain networks. Occasionally, new uses developed in response to a change in the market or regulatory environment,
- Across the sectors studied, transactional use was the most frequently noted capability enabled by the availability of broadband. It is making search processes easier and more efficient, reducing the need for face transactions and, in many instances, reducing the need for travel. Far less frequently observed is the use of broadband for transformative purposes,
- In each sector studied, transformative use is clearly tied to empowering broadband Internet use in rural Pennsylvania and enabling users to undertake an action not otherwise possible with other known technology,
- Access to the Internet, as made available through broadband, has a enormous capacity to transform the learning experience, opening up the educational system to greater involvement of students and parents in curriculum development and other realms of community learning, and
- Healthcare offers a compelling context in which to deploy broadband services. Configured correctly with the help of broadband services, IT infrastructure can provide patients and other users of healthcare access to huge amounts of information, treatment management services, and direct engagement with medical personnel.

Broadband Access: Are we there yet?
To take advantage of the benefits we should note that broadband Internet accessibility is not a goal but a tool, for transactional as well as transformational changes. The ultimate goal should

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focus on utilizing the Internet to increase the performance of the existing works as well as finding new ways of doing things and finding new business opportunities to stay competitive (Glasmeier, Benner and Ohdedar, 2008).

Access is not the end destination – adoption, application, and productive use of e-solutions are essential to fully leveraging broadband in the business world as well as for households. For communities that lack the basics of connectivity, however, progression along the Broadband Lifecycle will continue to be stymied.

**Community-Wide Case Studies**

Community-wide case studies were identified to help illustrate the transformative effect of broadband at the community level. Case studies presented in this section include:

- **Parrsboro, Nova Scotia** – Conducted in 2005 in a community of approximately 2,000 people who had been on a dial-up service until broadband was deployed by one ISP, prompting the competitive investment of a second ISP that subsequently offered broadband service;

- **Churchill, Manitoba** – Conducted in 2005 in a community of fewer than 1,000 people who had been introduced to broadband as a result of federal investment, and subsequently lost broadband as a result of the cessation of the funding as the program ended and the lack of an economic case for the incumbent to continue to provide service; and

- **Tillsonburg, Ontario** – Conducted in 2003 in a community of 15,000 people who had been introduced to broadband through a county level initiative that was followed a year after by a community Strategic Technology Plan.

**Parrsboro & Churchill**

At the time of broadband deployment in the Town of Parrsboro, Nova Scotia, the population was 1,529. The Town is the largest community on the Minas Basin and a major tourist center for the area, leveraging the Bay of Fundy’s highest tides in the world, as well as the geological and paleontological richness of the region.

The Town had faced (and continues to face) a declining population attributed to outmigration of youth, difficulty in attracting new residents, and aging of the population that remains. Employment in the area has focused largely on primary industries, such as fishing, lumber and mining (Keefe and Side, 2003). The Town and area around Parrsboro had two large employment-based industries/sectors: Sales and Services, consisting mostly of government services, tourism employment, health services employment, and education service employment; and Trades, Transportation and Equipment Operators, dominated by Kerr Heating Products, a local manufacture of energy and heating systems.

The development of broadband in the Town came through the assistance from Industry Canada’s BRAND program and local Town Council financial contributions ($20,000). SNG had profiled the impact of deployment in Parrsboro as part of a 2006 study for Industry Canada.
Lacking any form of broadband, Parrsboro was first connected with broadband Internet services in November 2004. This was seen as a major step up from having had dial-up service for several years before that.

The impact on the community was significant and ‘measured’ by the local tourism service providers who were able to elevate their stature in the Canada Select Program (connectivity was part of the rating), to land developers who were able to move property more quickly in coverage areas. Broadband services in Parrsboro were provided through Aliant Inc. within a radius of approximately 4 kilometres from the Aliant Inc. transmission tower.

The limited radius disappointed some Parrsboro residents, according to local media. However, the incentive which brought Aliant Inc. into the region triggered a second communications company to make broadband Internet services available to Parrsboro, motivated more from a competitive interest.

The following table provides a summary of the impacts associated with this community deployment based on a survey of business in the area (Note: households were not surveyed in this study).

<table>
<thead>
<tr>
<th>Broadband Impacts</th>
<th>Parrsboro – Year 1 Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue Impacts</td>
<td>$58,000 from Internet sales and reservations by businesses using broadband</td>
</tr>
<tr>
<td>Cost Impacts</td>
<td>$37,100 cost savings from reduced travel, reduced postage, and new markets (JA)</td>
</tr>
<tr>
<td>Employment Impacts</td>
<td>0.5 Full-time equivalent (FTE) jobs retained</td>
</tr>
</tbody>
</table>

From a more qualitative perspective, businesses were also asked to report on several other characteristics of their experiences with broadband. The following benefits were expressed:

- 89% reported that broadband “makes day-to-day operations easier”,
- 68% said that broadband improves customer service,
- 47% indicated that broadband allowed them to reaches new customers,
- 47% of all businesses reported an increased sales attributed to broadband, and
- 37% reported lower operating costs.

The Town of Parrsboro continues to face challenges in outmigration, youth retention, and business/resident attraction. In more recent years the region has solidified its footing as a recreational corridor and does well in terms of attracting seasonal visitors and residents. Broadband service, however, is no longer an issue and in fact, the example provides an interesting dimension to the ISPs decision to invest. One operator chose to invest on the basis of an incentive, while the other (who initially was able to provide more coverage earlier than the incumbent) chose to invest as a result of a competitive strategy.

**Churchill**

The town of Churchill, Manitoba, is situated on the southwest shore of the Hudson’s Bay approximately 1,000 kilometres north of Winnipeg, Manitoba (by air) and 1,700 kilometres by rail. Churchill is one of the northern most communities in Manitoba, and as such, the
community is a hub for medical services, transportation services and tourism in northern Manitoba and Nunavut. The local economy is centered on transportation, tourism and service industries.

At the time of their initial broadband deployment (again, under the Industry Canada’s BRAND program), the community was enduring a declining population.

Up until 1996, the community of Churchill did not have an Internet service provider. A group of residents mobilized to form the Churchill Community Network (CCNet) to address a lack of connectivity. They worked to secure affordable high speed Internet access.

In 1996, Churchill received dial-up Internet access through an Internet service provider in southern Ontario. A year later, CCNet started their own dial-up service (Manitoba Energy, Science, and Technology, 2002).

Through the encouragement of its members/clients, CCNet began exploring the options for high-speed Internet in 2001. In 2002, Churchill received broadband Internet through a new wireless technology developed by Global Wireless Satellite Networks.

The technology was made available to CCNet below market cost, as Churchill would be a test site for the technology (Annis et al., 2005). CCNet was able to finance the broadband development through loans from North Central Community Futures Development Corporation and the Hydro Mitigation Trust Fund.

Difficulties for CCNet were compounded in 2003 when Manitoba Telecom Services, Canada’s third largest communications provider, began offering a dial-up Internet service. This dial-up service drew away some broadband subscribers due to a less expensive monthly package, adding to the financial pressure.

Other events, such as the crash of converters on the satellite communication equipment, forced CCNet to change their connection from the satellite connection over to MTS’ land based fibre optic link. The conversion to the land based fibre option link resulted in a faster broadband connection.

In May 2005, CCNet dissolved due to low member support and unreliability of their broadband network. Since 1997, when CCNet first offered dial-up Internet services, the non-profit organization had not hired any staff members. Instead, the volunteer board took on responsibility for installations, repairs and maintenance.

Prior to terminating broadband Internet service, members of the community indicated the value of having broadband as being: support for education, support for Arctic research and online information about the Town and its operations (Cameron et al., 2005).

With CCNet’s volunteer group dissolved, broadband service clients had no option but to switch to dial-up service provided through MTS.

The following table provides a summary of the impacts associated with this community deployment based on a survey of business in the area (Note: households were not surveyed in this study).
An Assessment of the Socioeconomic Impact of Internet connectivity in Nunavut

<table>
<thead>
<tr>
<th>Broadband Impacts</th>
<th>Churchill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue Impacts</td>
<td>• $769,000 in revenue generated online by businesses using broadband.</td>
</tr>
<tr>
<td></td>
<td>• $4,200 decrease in revenue as a result of the lack of broadband</td>
</tr>
</tbody>
</table>

| Cost Impacts              | • $32,000 decreased printing and postage                                   |
|                           | • $32,400 increase to re-establishing high-speed connection                |

| Employment Impacts        | • 2.7 FTE jobs retained                                                   |
|                           | • 4.0 FTE jobs outsourced as a result of loss of broadband                |

Businesses also reported on other benefits as follows:
- 86% reported that broadband “makes day-to-day operations easier”,
- 79% said that broadband improves customer service,
- 64% indicated that broadband allowed them to reach new customers,
- 50% of all businesses reported an increase in sales attributed to broadband, and
- 50% reported lower operating costs.

Businesses interviewed indicated that revenue was generated through the use of broadband service, through online reservations, online retail sales, and online tour bookings. This increase would not have been possible without broadband for some businesses (e.g., accommodations providers in Parrsboro were able to increase market presence as well as increase rooms sold though provided broadband to business customers).

Businesses also indicated their revenues and costs have been positively impacted by broadband through their ability to conduct banking online and increased productivity in the office (e-mail, downloading, program updates). Businesses stressed the importance of this function of broadband for accessing potential clients, some instances indicating up to 75% of sales or reservations/bookings were obtained through their websites.

In the case of Churchill, access to broadband and its subsequent loss provided an example of a community that worked to obtain the service, began to evolve and improve their use of broadband, and then lost the service. As a case study, Churchill illustrates the barriers from a lack of broadband, demonstrated through the loss of the service. The loss meant that businesses were no longer able to provide a suite of services to their clients that they had begun to provide via the Internet. Select education courses/training programs that require broadband and e-commerce development at a retail service had to be stopped. Other businesses reported a measureable reduction in revenue as a result of the lack of broadband and other businesses reported a loss of employment due to the loss of broadband.

**Town of Tillsonburg**
The Town of Tillsonburg is located in Southwestern Ontario. At the time of their broadband project the Town had been witness to steady annual growth. The Town of Tillsonburg had a population of 15,000 (today slightly less than 15,000) and is well connected to major roads, air,
rail, and port connections. These linkages provide the Town with opportunity to attract businesses and encourage the expansion of existing commercial enterprises.

The Town serves as the regional centre for industry, commerce, healthcare and recreation and also is home to a wide variety of businesses and industries that export products globally. Areas of industrial concentration include distribution, agriculture, food processing, manufacturing, forestry, construction, research, automotive and textiles.

The Town Of Tillsonburg began its IT initiatives in early 1998 by participating in the County of Oxford Integrated Network (COIN). COIN provided an opportunity to build the broadband communications infrastructure across the entire County. Availability of high-speed bandwidth was the critical foundation enabling the Town to move forward with future IT initiatives. The COIN Broadband network provided the ability to link municipal governments, county departments, libraries and community organizations via a fast, reliable network.

In the spring of 1999, the Town of Tillsonburg conducted an Organizational and Operational Review of the Corporation. The Town’s administrators had recognized rising expectations and an increasing level of demand for services from citizens and businesses. In addition, there was ongoing budgetary pressure to deliver these services as cost effectively as possible.

The sequence of these critical success factors was important because they built upon each other and because of the time required for each to be implemented. For example, an organizational and operational review and a strategic technology plan determine the need for technology solutions and therefore are prerequisites. Although the need for a broadband network would be determined by such planning, building such a network is a long-term project that needs to be started well in advance in order to get stakeholder buy-in, funding and the system built. Tillsonburg benefited from having a broadband network already available, which allowed them to expeditiously move forward with other steps: creating synergies by integrating restructuring with IT implementation. The Tillsonburg example shows us that the significant cost savings and efficiency gains can be realized from the integration of restructuring and IT implementation.

The measureable results of Tillsonburg investment included:

- More modest changes in new revenue to the Town from outsourcing contracts leveraging connectivity,
- A high Level of satisfaction with the quality of municipal service provided by the Town,
- 58% increase in available customer service hours,

As well, the investment changed the perception of the business community. The majority of the citizens and businesses surveyed thought the IT investment was worthwhile and that Tillsonburg is a better place to do business because of the implementation of the Town’s Strategic Technology Plan.
Industry Specific Example: Hotel Ullensvang, Norway

Hotel Ullensvang in Norway is a 300 bed hotel located just between mountain and sea. The site is a two-hour drive by car to the nearest railway station, and a three-hour drive to the nearest airport. Broadband, introduced in the area in 2004, allows the hotel to use the Internet to link with their clients and suppliers, on a daily basis. Broadband makes Internet access fast enough to be useful and the hotel engaged in a process to increase and improve their adoption of broadband usage into many facets of the enterprise.

The concerted effort to improve broadband adoption enables the hotel to host international seminars on a regular basis, in a place where delegates can now relax and do business, and despite the remoteness, connect with the office.

Every step the hotel took in the ongoing process of broadband utilization improvement was made in the contexts of the remote location of the hotel and its need to be connected in order to thrive. Computer systems, booking systems, TV-systems, ventilation and air conditioning systems etc. can be checked and maintained/serviced by ‘remote control’. Up until a few years ago, service personnel had to make a six-hour drive to do what now takes 15 minutes via a remote connection.

Credit card terminals were configured to use broadband instead of the telephone lines. This enables full integration with the booking and accounting software. Sales staff can also connect to their server when they are out travelling, to check availability and make bookings online from wherever they are. Accounting services are now managed remotely, by a company in Stavanger, 170 kilometres away. Broadband has enabled the hotel and its finance team to be in contact online all day long, as needed.

Other benefits broadband brings:

- Quality of service for hotel patrons, teleworking availability,
- Online marketing capabilities via Facebook, YouTube, and 360° webcams,
- The ability to tele-interview prospective staff members,
- Online training for seasonal staff before they arrive at the hotel, and
- Increased quality of life for staff as they are able to communicate with their families and watch television from their home country.

“Broadband is our connection to the rest of the world. We consider broadband one of the primary reasons we are able to do business the way that we do. A large hotel in a small rural village, remote and “exotic,” but still connected to the world. The Internet today is just as important to his business as roads were to his predecessor 100 years ago.” Hans Edmund Utne (hotel’s managing director)

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34 SNG’s project in partnership with the Norwegian University of Science and Technology of Trondheim, on the hospitality sector of the Hardanger Fjord area in Norway, an area extremely dependent on tourism.
Program Investment Specific Examples

While the previous examinations reveal the benefits and the impacts, the following case studies provide examples of the “how” in terms of government policy examples wherein a government invested in supporting broadband development. Programs examined include:

- **Connect Ontario: Broadband Regional Access** (COBRA) – In 2003, the Ontario Government invested $2.2 M in expanding rural broadband and leveraged over $4.5 M from other public and private partners. The result of these investments has been to make broadband within reach of approximately 75,000 citizens in Ontario, and

- **FedNor Initiatives** - Between 2001 and 2003, FedNor funded a number of broadband and ICT initiatives in Northern Ontario, one in the Cochrane District centred on Timmins. The investments in Timmins and Cochrane District provided an example of the economic impacts resulting from broadband from a program investment point of view, as well as a community-wide perspective.

These are discussed below.

**COBRA (Connect Ontario Broadband Regional Access)**

COBRA was initiated in 2003 as a quick win by the Connect Ontario: Broadband Regional Access (COBRA) program. A contribution of $1.2 Million was provided by the Ontario government to kick start this program. Our team studied six projects.

- **ElginConnects** was a project in the County of Elgin in southwestern Ontario. The provider was a local independent telephone company that expanded their existing fibre network by installing three wireless distribution service points.

- **CEONET** was a project in United Counties of Prescott-Russell and United Counties of Stormont, Dundas and Glengarry in eastern Ontario. This project was focused on deploying broadband to many small towns and villages across the regions. Much of the area lacked any kind of service delivery mechanism and was in need of services. The provider was Bell Canada who deployed 21 DSL service points into the two counties.

- **Chatham-Kent** was a project focused on creating a broadband network that would cover the United County of Chatham-Kent with focus mainly on ensuring public accessibility. The provider was a local Internet Service Provider (ISP) that deployed five wireless service points capable of servicing 90% of the area that did not have access to other service capabilities.

- **Arden, Apsley and Kinmount** were three Broadband Deployment Pilot Projects in small towns (with a base of about 300 homes) where the deployment of the network was localized to the town and did not cover a larger, county area. These pilots focused on delivering a Public Access Terminal (which requires broadband service to function) to aid in delivering government services to rural communities. The projects leveraged the implementation of broadband connection for the Public Access Terminal by extending broadband services for public access as none of these towns had broadband services available.
The intent of COBRA was to provide broadband communications infrastructure to core public buildings in the defined territory. The key program objectives outlined by COBRA are as follows:

- To provide affordable broadband connectivity to core public institutions (e.g. schools, libraries, municipal offices, health and other community organizations) in regions currently without access to broadband telecommunications services.
- To stimulate improved access for homes, businesses and regions without access to high-speed telecommunication services.
- To encourage competition and reduce telecommunication costs in rural and small communities and regions across Ontario.
- To enable rural and small communities to benefit from new and improved business and community services, increase investment opportunities and to provide access to government services in such areas as education, skills development and e-government.

There have been numerous benefits to these communities as the result of broadband services being widely available at a reasonable cost. Some of the benefits accrued are social in nature and others are economic.

- Majority of SMEs indicated that broadband is now an essential component to their businesses (need to deal with suppliers and other agents to transact business successfully, deal with customers in a much more productive manner using the Internet, using broadband for ordering, purchasing and invoicing).
- One small business owner has implemented a voice over IP line to augment existing telephone usage for the tourist population.
- The building material supply firm has also developed a Website so customers can find them and then place orders via e-mail. This is a particularly useful service for seasonal residents (80% of their business) - they can have building materials ready when they arrive at their properties. The high-speed access to the Internet also allows businesses to check promotions on an hourly basis, as well as access online information about special customer requests so they can service the customer immediately. According to the owner of the building material supply firm, with 14 people currently employed, the number of employees would only have been 8 without broadband or ICT.
- Broadband has enhanced real estate more than any other sector by incorporating Web tools and ICT solutions (real estate Web site, marketing e-mails, access to “secret” or non-public listings, Web pages of new listings, etc.).
- By enabling the Township office to reach a broader set of information more quickly, they can better serve their citizens in making new policies and bylaws. In addition, work can be completed at a faster rate, offering better service to the citizens.
- The library has applied for a grant to aid in having their entire catalogue become available online.
- In addition, the library is a CAP site. This location is very busy (1,200 people per year) since broadband has been added. Use of the library has increased since the announcement of available broadband. There is a $2 charge for using the computers/network for personal use. Many people use the network to update their emails and connect to work. In many cases this is the only means for school children to access the Internet to assist in their homework and studies.
- For the local Community Access Centre, there has been a 176% increase in usage of the co-located Youth Program which staff attributes to broadband and the increased ease of
use that high-speed Internet brings. This has translated into increased overall revenue and sustainability to their services.

**FEDNOR**
FedNor has funded a number of broadband and ICT initiatives in Northern Ontario, one in the Cochrane District centred on Timmins between 2001 and 2003. The investments in Timmins and Cochrane District include:

- Timmins Economic Development Corporation: funding to establish and manage the local/ regional community-based network NEOnet.
- Timmins & District Hospital: funding to install server hardware and software as well as a radiology Picture Archiving and Communications System (NORrad-P.A.C.S.) to enable region-based patient care.
- Northern College: funding to install video-conferencing equipment to deliver educational services to remote communities with limited capacity to help overcome distance and isolation barriers for students and teachers.
- NEOnet: funding to provide Common Channel Signalling service to the entire Northern Telephone Limited (NTL) service area and thus permit development of call centre business using an “intelligent” switching system which allows a major call centre to route a particular call to a secondary call centre operator in another, smaller municipality, or a remote location, such as a farm house.

Economic information gathered during the study showed the following economic impacts can be directly attributed to FedNor investments in Timmins and the Cochrane District region:

- 805 new full-time jobs and 1 part-time job - 805.7 full-time equivalents (FTEs).
- 8 full-time and 13 part-time jobs retained that would have been lost without the investment - 11.4 FTEs.

These numbers were then entered into an Input-Output (I-O) model, which estimated the direct, indirect and induced impacts that these changes would have on the local, regional and provincial economy. I-O results showed that over two to four years broadband would have the following impacts:

- $28.64 million increase in GDP for Cochrane District\(^{35}\) and $9.75 million increase for the Province of Ontario,
- 928 person years of employment for Cochrane District and 125.6 for the rest of Ontario, and
- $3.21 million increase in provincial tax revenues and $5 million increase in federal tax revenues.

These results can be viewed as a return on the approximately $2 million investment made to date by FedNor.

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\(^{35}\) Cochrane District is the region in which Timmins is located and is the footprint for the Input-Output modeling.
Benefits also accrued in several other ways. For example, broadband allowed the Northern Radiology Picture Archiving and Communication System (NORrad-P.A.C.S.) and its nine medical centres throughout Cochrane District to transmit x-ray images, MRIs and medical reports over high-speed connections to physicians and radiologists throughout the region as well as to specialists located throughout the province. The accelerated the rate at which time sensitive information needed for diagnostic and treatment programs were shared, improving patient care and reducing costs.

The education system provides another example of significant benefits though improvements to the video-conferencing system. Broadband allowed for greater access to courses and a greater variety of courses could be offered. Without the system, the 55 courses offered via video-conferencing would likely have been cancelled, affecting 150 – 200 students, 40 of whom were taking all of their courses via video-conferencing.
## Appendix B: Nunavut Profile

### Households Profile

<table>
<thead>
<tr>
<th>Population Counts for Nunavut Communities, 2011 and 2006&lt;sup&gt;36&lt;/sup&gt;</th>
<th>2011</th>
<th>2006</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nunavut</td>
<td>31,906</td>
<td>29,474</td>
<td>8.3%</td>
</tr>
<tr>
<td>Arctic Bay</td>
<td>823</td>
<td>690</td>
<td>19.3%</td>
</tr>
<tr>
<td>Arviat</td>
<td>2,318</td>
<td>2,060</td>
<td>12.5%</td>
</tr>
<tr>
<td>Baker Lake</td>
<td>1,872</td>
<td>1,728</td>
<td>8.3%</td>
</tr>
<tr>
<td>Cambridge Bay</td>
<td>1,608</td>
<td>1,477</td>
<td>8.9%</td>
</tr>
<tr>
<td>Cape Dorset</td>
<td>1,363</td>
<td>1,236</td>
<td>10.3%</td>
</tr>
<tr>
<td>Chesterfield Inlet</td>
<td>313</td>
<td>332</td>
<td>-5.7%</td>
</tr>
<tr>
<td>Clyde River</td>
<td>934</td>
<td>820</td>
<td>13.9%</td>
</tr>
<tr>
<td>Coral Harbour</td>
<td>834</td>
<td>769</td>
<td>8.5%</td>
</tr>
<tr>
<td>Gjoa Haven</td>
<td>1,279</td>
<td>1,064</td>
<td>20.2%</td>
</tr>
<tr>
<td>Grise Fiord</td>
<td>130</td>
<td>141</td>
<td>-7.8%</td>
</tr>
<tr>
<td>Hall Beach</td>
<td>546</td>
<td>654</td>
<td>-16.5%</td>
</tr>
<tr>
<td>Igloolik</td>
<td>1,454</td>
<td>1,538</td>
<td>-5.5%</td>
</tr>
<tr>
<td>Iqaluit</td>
<td>6,699</td>
<td>6,184</td>
<td>8.3%</td>
</tr>
<tr>
<td>Kimmirut</td>
<td>455</td>
<td>411</td>
<td>10.7%</td>
</tr>
<tr>
<td>Kugaaruk</td>
<td>771</td>
<td>688</td>
<td>12.1%</td>
</tr>
<tr>
<td>Kugluktuk</td>
<td>1,450</td>
<td>1,302</td>
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</tr>
<tr>
<td>Pangnirtung</td>
<td>1,425</td>
<td>1,325</td>
<td>7.5%</td>
</tr>
<tr>
<td>Pond Inlet</td>
<td>1,549</td>
<td>1,315</td>
<td>17.8%</td>
</tr>
<tr>
<td>Qikiqtarjuaq</td>
<td>520</td>
<td>473</td>
<td>9.9%</td>
</tr>
<tr>
<td>Rankin Inlet</td>
<td>2,266</td>
<td>2,358</td>
<td>-3.9%</td>
</tr>
<tr>
<td>Repulse Bay</td>
<td>945</td>
<td>748</td>
<td>26.3%</td>
</tr>
<tr>
<td>Resolute</td>
<td>214</td>
<td>229</td>
<td>-6.6%</td>
</tr>
<tr>
<td>Sanikiluaq</td>
<td>812</td>
<td>744</td>
<td>9.1%</td>
</tr>
<tr>
<td>Taloyoak</td>
<td>899</td>
<td>809</td>
<td>11.1%</td>
</tr>
<tr>
<td>Whale Cove</td>
<td>407</td>
<td>353</td>
<td>15.3%</td>
</tr>
<tr>
<td>Other Areas1</td>
<td>20</td>
<td>26</td>
<td>-23.1%</td>
</tr>
</tbody>
</table>

## An Assessment of the Socioeconomic Impact of Internet Connectivity in Nunavut

<table>
<thead>
<tr>
<th>Response</th>
<th>Data collected by SNG</th>
<th>Nunavut[^37]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>Percent of Total</td>
</tr>
<tr>
<td>Arctic Bay</td>
<td>5</td>
<td>2%</td>
</tr>
<tr>
<td>Arviat</td>
<td>9</td>
<td>3%</td>
</tr>
<tr>
<td>Baker Lake</td>
<td>7</td>
<td>3%</td>
</tr>
<tr>
<td>Cambridge Bay</td>
<td>34</td>
<td>13%</td>
</tr>
<tr>
<td>Cape Dorset</td>
<td>7</td>
<td>3%</td>
</tr>
<tr>
<td>Chesterfield Inlet</td>
<td>9</td>
<td>3%</td>
</tr>
<tr>
<td>Clyde River</td>
<td>3</td>
<td>1%</td>
</tr>
<tr>
<td>Coral Harbour</td>
<td>1</td>
<td>0%</td>
</tr>
<tr>
<td>Gjoa Haven</td>
<td>12</td>
<td>5%</td>
</tr>
<tr>
<td>Grise Fiord</td>
<td>3</td>
<td>1%</td>
</tr>
<tr>
<td>Hall Beach</td>
<td>3</td>
<td>1%</td>
</tr>
<tr>
<td>Igloolik</td>
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<td>Iqaluit</td>
<td>81</td>
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<td>Kimmirut</td>
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</tr>
<tr>
<td>Kugaaruk</td>
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<td>2%</td>
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<tr>
<td>Kugluktuk</td>
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<td>5%</td>
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<tr>
<td>Pangnirtung</td>
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<td>5%</td>
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<td>Pond Inlet</td>
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<td>4%</td>
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<tr>
<td>Qikiqtarjuaq</td>
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<td>0%</td>
</tr>
<tr>
<td>Rankin Inlet</td>
<td>24</td>
<td>9%</td>
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<tr>
<td>Repulse Bay</td>
<td>1</td>
<td>0%</td>
</tr>
<tr>
<td>Resolute</td>
<td>6</td>
<td>2%</td>
</tr>
<tr>
<td>Sanikiluaq</td>
<td>4</td>
<td>2%</td>
</tr>
<tr>
<td>Taloyoak</td>
<td>4</td>
<td>2%</td>
</tr>
<tr>
<td>Whale Cove</td>
<td>1</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>265</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

**Average income in Nunavut**

<table>
<thead>
<tr>
<th>Response</th>
<th>Count</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than $10,000</td>
<td>4</td>
<td>2%</td>
</tr>
<tr>
<td>$10,000 to $19,999</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>$20,000 to $29,999</td>
<td>6</td>
<td>3%</td>
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<tr>
<td>$30,000 to $49,999</td>
<td>15</td>
<td>8%</td>
</tr>
<tr>
<td>$50,000 to $100,000</td>
<td>67</td>
<td>37%</td>
</tr>
<tr>
<td>More than $100,000</td>
<td>89</td>
<td>49%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>182</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

SNG Average Income: $50,000 to $100,000

**Nunavut Average Income total private households**\(^{38}\): $60,221

**Age residing in the household**

<table>
<thead>
<tr>
<th>Response</th>
<th>Data collected by SNG</th>
<th>Nunavut(^{39})</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>Percent of Total</td>
</tr>
<tr>
<td>Less than 4 years</td>
<td>44</td>
<td>9%</td>
</tr>
<tr>
<td>5 to 17 years</td>
<td>88</td>
<td>18%</td>
</tr>
<tr>
<td>18 to 34 years</td>
<td>148</td>
<td>30%</td>
</tr>
<tr>
<td>35 to 54 years</td>
<td>142</td>
<td>29%</td>
</tr>
<tr>
<td>55 to 64 years</td>
<td>59</td>
<td>12%</td>
</tr>
<tr>
<td>65 years +</td>
<td>14</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>495</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

---

\(^{38}\) Source: Statistics Canada, 2006 Census of Population, Catalogue #97-563-XCB2006052

\(^{39}\) Sources: Statistics Canada, Demography Division, Cansim table #051-0001 and Special tabulations
Educational attainment

<table>
<thead>
<tr>
<th>Response</th>
<th>Data collected by SNG</th>
<th>Nunavut[^40]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>Percent of Total</td>
</tr>
<tr>
<td>Some secondary school</td>
<td>80</td>
<td>45%</td>
</tr>
<tr>
<td>Secondary school graduate / GED</td>
<td>26</td>
<td>15%</td>
</tr>
<tr>
<td>Some post-secondary</td>
<td>18</td>
<td>10%</td>
</tr>
<tr>
<td>College/university degree</td>
<td>16</td>
<td>9%</td>
</tr>
<tr>
<td>Post-graduate degree</td>
<td>36</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>176</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Businesses and Organizations Profile

Major industry, measured in real GDP[^41]

<table>
<thead>
<tr>
<th>Industry</th>
<th>Real GDP in 2010 (Millions of dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public administration</td>
<td>280.7</td>
</tr>
<tr>
<td>Finance and insurance, real estate and renting and leasing and management of companies and enterprises</td>
<td>175.7</td>
</tr>
<tr>
<td>Construction</td>
<td>175.4</td>
</tr>
<tr>
<td>Metal ore mining</td>
<td>163.1</td>
</tr>
<tr>
<td>Provincial and territorial public administration</td>
<td>158.2</td>
</tr>
<tr>
<td>Educational services</td>
<td>119.1</td>
</tr>
</tbody>
</table>

[^40]: Source: Statistics Canada, 2006 Census of Population, Catalogues # 94-579-XCB2006001 and # 97-560-X2006031

[^41]: Source: Statistics Canada, System of National Accounts, CANSIM table # 379-0025, Released on November 08, 2011
Growth areas in Nunavut

<table>
<thead>
<tr>
<th>Industry</th>
<th>Real GDP 2009 (Millions of dollars)</th>
<th>Real GDP 2010 (Millions of dollars)</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal ore mining</td>
<td>N/A</td>
<td>163.1</td>
<td>100%</td>
</tr>
<tr>
<td>Mining and oil and gas extraction</td>
<td>10.5</td>
<td>55.3</td>
<td>81%</td>
</tr>
<tr>
<td>Transportation engineering construction</td>
<td>4.2</td>
<td>5.7</td>
<td>26%</td>
</tr>
<tr>
<td>Support activities for mining and oil and gas extraction</td>
<td>12.1</td>
<td>15.8</td>
<td>23%</td>
</tr>
<tr>
<td>Non-residential building construction</td>
<td>43.9</td>
<td>57.2</td>
<td>23%</td>
</tr>
<tr>
<td>Wholesale trade</td>
<td>11.0</td>
<td>12.6</td>
<td>13%</td>
</tr>
</tbody>
</table>

Employment numbers in Nunavut

<table>
<thead>
<tr>
<th>Response</th>
<th>Data collected by SNG</th>
<th></th>
<th></th>
<th>Nunavut[^3]</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>Percent of Total</td>
<td>Count</td>
<td>Percent of Total</td>
<td></td>
</tr>
<tr>
<td>Employed Full-time</td>
<td>187</td>
<td>92%</td>
<td>11,500</td>
<td>55%</td>
<td></td>
</tr>
<tr>
<td>Not employed</td>
<td>4</td>
<td>2%</td>
<td>2,100</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Not in the Labour force</td>
<td>12</td>
<td>6%</td>
<td>7,400</td>
<td>35%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>203</td>
<td>100%</td>
<td>21,000</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

[^3]: Source: Statistics Canada, Labour Force Survey, CANSIM table # 282-0055 and special tabulations
### Employment by industry sector in Nunavut

<table>
<thead>
<tr>
<th>Industry</th>
<th>Employment</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial aggregate including unclassified businesses</td>
<td>11,103</td>
<td>57%</td>
</tr>
<tr>
<td>Public administration</td>
<td>3,253</td>
<td>17%</td>
</tr>
<tr>
<td>Retail trade</td>
<td>1,400</td>
<td>7%</td>
</tr>
<tr>
<td>Transportation and warehousing</td>
<td>695</td>
<td>4%</td>
</tr>
<tr>
<td>Administrative and support, waste management and remediation services</td>
<td>552</td>
<td>3%</td>
</tr>
<tr>
<td>Health care and social assistance</td>
<td>622</td>
<td>3%</td>
</tr>
<tr>
<td>Construction</td>
<td>442</td>
<td>2%</td>
</tr>
<tr>
<td>Accommodation and food services</td>
<td>462</td>
<td>2%</td>
</tr>
<tr>
<td>Other services (except public administration)</td>
<td>382</td>
<td>2%</td>
</tr>
<tr>
<td>Wholesale trade</td>
<td>264</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>19,335</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

### Employment by size

<table>
<thead>
<tr>
<th>Response</th>
<th>Count</th>
<th>Percent of Total</th>
<th>Count</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 4</td>
<td>12</td>
<td>32%</td>
<td>253</td>
<td>3%</td>
</tr>
<tr>
<td>5 - 19</td>
<td>12</td>
<td>32%</td>
<td>1,547</td>
<td>21%</td>
</tr>
<tr>
<td>20 - 49</td>
<td>6</td>
<td>16%</td>
<td>2,019</td>
<td>28%</td>
</tr>
<tr>
<td>50 - 99</td>
<td>4</td>
<td>11%</td>
<td>2,271</td>
<td>31%</td>
</tr>
<tr>
<td>100 - 249</td>
<td>1</td>
<td>3%</td>
<td>1,213</td>
<td>17%</td>
</tr>
<tr>
<td>250 - 499</td>
<td>2</td>
<td>5%</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>500 or more</td>
<td>0</td>
<td>0%</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>37</strong></td>
<td><strong>100%</strong></td>
<td><strong>7,303</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

---


45 Statistics Canada. Table 281-0042 - Employment by enterprise size of employment (SEPH) for all employees, for selected industries classified using the North American Industry Classification System (NAICS), annual (persons)
Number of private businesses by community in Nunavut\textsuperscript{46}

<table>
<thead>
<tr>
<th>Community</th>
<th>Number of businesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arctic Bay</td>
<td>28</td>
</tr>
<tr>
<td>Arviat</td>
<td>14</td>
</tr>
<tr>
<td>Baker Lake</td>
<td>47</td>
</tr>
<tr>
<td>Cambridge Bay</td>
<td>49</td>
</tr>
<tr>
<td>Cape Dorset</td>
<td>16</td>
</tr>
<tr>
<td>Chesterfield Inlet</td>
<td>13</td>
</tr>
<tr>
<td>Clyde River</td>
<td>1</td>
</tr>
<tr>
<td>Coral Harbour</td>
<td>5</td>
</tr>
<tr>
<td>Gjoa Haven</td>
<td>5</td>
</tr>
<tr>
<td>Grise Fiord</td>
<td>2</td>
</tr>
<tr>
<td>Hall Beach</td>
<td>2</td>
</tr>
<tr>
<td>Igloolik</td>
<td>3</td>
</tr>
<tr>
<td>Iqaluit</td>
<td>322</td>
</tr>
<tr>
<td>Kimmirut</td>
<td>3</td>
</tr>
<tr>
<td>Kugaaruk</td>
<td>5</td>
</tr>
<tr>
<td>Kugluktuk</td>
<td>7</td>
</tr>
<tr>
<td>Pangnirtung</td>
<td>3</td>
</tr>
<tr>
<td>Pond Inlet</td>
<td>27</td>
</tr>
<tr>
<td>Qikiqtarjuaq</td>
<td>8</td>
</tr>
<tr>
<td>Rankin Inlet</td>
<td>41</td>
</tr>
<tr>
<td>Repulse Bay</td>
<td>1</td>
</tr>
<tr>
<td>Resolute</td>
<td>2</td>
</tr>
<tr>
<td>Sanikiluaq</td>
<td>2</td>
</tr>
<tr>
<td>Taloyoak</td>
<td>9</td>
</tr>
<tr>
<td>Whale Cove</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>616</strong></td>
</tr>
</tbody>
</table>

\textsuperscript{46} Nunavut Economic Developers association http://www.nunavuteda.com/community-profiles
Appendix C: Assumptions concerning Impacts of Internet on revenues and cost savings

Assumptions:
- $1,535,200 in average revenues per organization
- 18% of organizations reporting Internet revenues
- $157,000 in average Internet revenues among those with this revenue
- 616 non-government companies in Nunavut, and 111 companies with Internet revenues
- $17,408,160 total Internet revenues, 10% share of Internet revenue from total revenue
- $170,222,976 in total revenues for Internet earning companies

Assumptions:
- $1,677,250 in average total operating costs for the sample
- 616 non-government companies in Nunavut, and 216 companies with savings due to Internet

The following defines the types of impacts discussed in this report. We use a construction project as an example to help illuminate the impacts and their relationship to each other:

- **Direct Impacts** – are production, income, employment, taxes, and spending on goods and services associated with the direct spending on those contractors, designers, engineers, etc. who are directly involved in the associated project. This would include wages and salaries paid to construction workers, building suppliers and engineers in activities from site preparation to commissioning of the facilities;

- **Indirect Effects** – are production, income, employment, tax, resource or environmental changes in backward linked industries. For example, these are the impacts associated with the suppliers to the building contractors, and in turn, suppliers of these suppliers. Examples of indirect effects would be the impacts associated with the transactions between an excavation/site preparation contractor and a company that services this contractor’s heavy equipment during the course of the Project; and,

- **Induced Effects** – are the changes in household spending caused by changes in household income. These are the impact from contractor employees and/or their supplier employees spending their wages and salaries on goods and services. As an example, it is the engineer who spends the wages they earned during their project work on the personal operation of their household.
Appendix D: The Broadband Lifecycle

To understand broadband evolution in Nunavut, we need to explore the seven elements of the Broadband Lifecycle. These include:

1. **Identify needs, gap, and demand**: This is where a community works to understand its current socio-economic situation through investigation and introspection. This includes: Do we need (more) broadband? Is our current infrastructure meeting the needs of businesses/households? How can the community maximize the outcomes from broadband investments?

2. **Planning and Capacity Building**: Understanding not just what it would take to build the network, but what is required for a successful broadband deployment that drives innovation. This includes uncovering the leadership and partners needed to achieve community goals and the components needed to be in broadband deployment.

3. **Decision to invest (and e-Strategy)**: Before a community invests, it needs to ascertain if it has the funds not only to build, but to drive utilization and help foster new, creative broadband applications that will help fund the investment. This influences the technology that is leveraged, the outreach that can be mobilized, as well as the reach that is possible.

4. **Build/expand network capacity**: Often the primary focus of any broadband deployment – the build – is routine. By developing sound technical and business plans to ensure a
An Assessment of the Socioeconomic Impact of Internet connectivity in Nunavut

smooth implementation with the right provider – a community can be sure its requirements are met.

5. **Promote awareness & drive utilization:** The most important, most often overlooked stage of every failing community network is invariably a lack of adoption and utilization. Involve technology professionals to help develop creative solutions that will get users on the network. Turn to marketing professionals to develop compelling communications to get businesses and households to utilize and leverage broadband to its fullest extent. Interview results from Nunavut stakeholders indicate that there is more opportunity to drive this part of the process but that limitations on the system will impact the success of accelerating adoption among some segments of the community.

6. **Assess impacts and outcomes:** Make sure to measure outcomes to ascertain how the network is being used to drive and promote economic development. Once understood, a community can make course corrections and enhancements to fully develop a community’s platform for innovation. Measurement is essential to recognizing the achievements, assessing the shortfalls, knowing when to intervene and in what area.

7. **Identify needs, gap and demand:** Once through the process, identify and shore-up any gaps, resulting in continuing development, effectiveness and impact. As with any infrastructure, a broadband network is an evolving community resource.
Appendix E: Additional Data Collection Findings

Households

Respondent's characteristics

- The primary type of Internet connection used by organizations is fixed wireless (65%), followed by satellite (13%), DLS, 12%, and other types of connections (5%). Two per cent of respondents were not sure what type of connection they had.
- The majority of the respondents (50%) have been using high-speed Internet for more than 5 years. Only 8% of respondents have been using broadband for less than a year.
- The majority of the respondents (75%) have been using Internet of any type for more than 5 years. Only 7% have been using broadband/high-speed for less than a year.

Thoughts on Quality, Speed, and Reliability

- The majority of households (66%) characterized their Internet SPEED as "Not Fast Enough, 20% of households were neutral on the topic, and 14% thought their connection was very fast or fast enough for their purposes.
- The majority of households (62%) characterized their Internet RELIABILITY as problematic ("Frequent problems - 19% or Occasional problems - 43%), 34% said it was very good most of the time and 4% said it was always excellent.
- In terms of value for money, the majority of households (83%) characterized their Internet VALUE as not acceptable (Below expectations - 34% and Poor value - 49%), while 15% felt it was acceptable for the rates they are paying and 2% said it was 'worth every penny.'

Use of mobile web-enabled devices

- 88% of the respondents currently use laptop computers. 45% use web-enable mobile phones. 62% use other handheld devices (e.g. Tablets, e-readers)

On telehealth services enabled by the Internet

- 70% of the respondents declare the speed of assistance response was a very important or somewhat important factor to implement telehealth services in their household.
- 75% of the respondents declare the opportunity to access services not available in local area was a very important or somewhat important factor to adopt telehealth services in their household.
- 66% of the respondents declare the increased comfort or control over service experience was a very important or somewhat important factor to adopt telehealth services in their household.
- 70% of the respondents declare reducing costs and financial burden was a very important or somewhat important factor to adopt telehealth services in their household.
- The biggest barrier to adopting telehealth services (70%) is a slow or unreliable Internet. 65% of the respondents declare they are unsure of the quality of telehealth services.
Businesses and Organizations

Business Characteristics

- The majority of business survey respondents (89%) indicated their organization been operating in its current location for more than 5 years. Three per cent had been in their current location for between 3 and 4 years, 8% had been in their current location for less than 3 years.

- The primary type of Internet connection used by organizations is fixed wireless (62%), followed by satellite (11%), DLS, 9%, and other types of connections (8%). Nine per cent of respondents were not sure what type of connection they had.
  - We also asked current Dial-up Internet subscriber if their organization planned to subscribe to high-speed Internet within the next 12 months. Three organizations indicated they would be switching.

- The majority of the business survey respondents have had high-speed Internet access for more than 5 years (56%), 15% have had it for between 4 and 5 years, 22% have had it for between 2 and 4 years, and 5% have had high-speed Internet for less than 2 years.

- The majority of organizations (70%) spend less than $200 per month on their Internet subscription, 18% spend between $200 and $500, while 12% spend more than $500.

- The majority of organizations (53%) characterized their Internet SPEED as "Not Fast Enough, 21% of organizations were neutral on the topic, and 26% thought their connection was very fast or fast enough for their purposes.

- The majority of organizations (59%) characterized their Internet RELIABILITY as problematic ("Frequent problems - 11% or Occasional problems - 48%), 37% said it was very good most of the time and 4% said it was always excellent.

- In terms of value for money, the majority of businesses (68%) characterized their Internet VALUE as not acceptable (Below expectations - 45% and Poor value - 24%), while 23% felt it was acceptable for the rates they are paying and 8% said it was 'worth every penny.'

- The majority of organizations (63%) felt that the availability of high-speed Internet access in selecting their location was very important or essential. Availability was only somewhat important in location selection for 3% of the organizations and not important for 8%. Twenty-seven per cent indicated that they were not sure (7%) or that the question was not applicable (20%).

- In terms of remaining in their current location, 69% of businesses thought that the availability of high-speed Internet access was very important or essential, 8% thought it was somewhat important, and 4% thought that access was not important to their remaining in their location. The balance (19%) was not sure or believed the question was not applicable to their circumstances.

- When asked about the importance of using of web-enabled mobile devices for increasing productivity and efficiency for their organization, 57% felt that it was essential or very important, 21% thought that it was somewhat important, and 16% thought it was not important (6% were not sure).
Preference for acquiring the needed expertise and knowledge

Please identify your preference for acquiring the needed expertise and knowledge in the following areas.

<table>
<thead>
<tr>
<th>Area</th>
<th>In-house</th>
<th>Outsource</th>
<th>Internal with external support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding e-solutions and their benefits</td>
<td>40%</td>
<td>27%</td>
<td>33%</td>
</tr>
<tr>
<td>Assessing the range of e-solutions available</td>
<td>38%</td>
<td>29%</td>
<td>33%</td>
</tr>
<tr>
<td>Implementing e-solutions</td>
<td>36%</td>
<td>25%</td>
<td>39%</td>
</tr>
<tr>
<td>Maintaining e-solutions</td>
<td>36%</td>
<td>24%</td>
<td>40%</td>
</tr>
</tbody>
</table>

N = 55

Preferences for developing needed expertise

The preference for learning is tilted towards internal expertise with some outsourcing.

- In terms of methods likely to use to develop internal knowledge and expertise for researching, planning or implementing e-solutions,
  - 67% or respondents will use online reference materials (e.g. tutorials, case studies),
  - 58% will use direct research with service vendors,
  - 43% will participate in formal training (online courses),
  - 43% will participate one-on-one support (at your location),
  - 39% say they will take part in live webinars with experts,
  - 37% will use in-person information sessions (e.g. seminars, workshops), and
  - 26% will pursue formal training (classroom courses).

Recent Approaches to Address Training

- In terms recent methods (past 12 months) to actively acquired the expertise and knowledge require to implement e-solutions:
  - 47% or organizations said that NO additional skills were required,
  - 23% trained existing employees for the needed skills,
  - 23% said they brought in external contractors for the needed skills,
  - 21% said the hired employees with the needed skills, and
11% relied on volunteers for the needed skills.

- In terms of skill types,
  - 32% pursued technical skills (e.g. IT systems and applications, technical support),
  - 21% pursued project management skill development,
  - 19% looked to development of organizational processes that use the Internet,
  - 18% invested in customer support training, and
  - 11% in managing the change process, and 5% pursued “other skills”.

- Forty-six per cent of organizations surveyed indicated that they generate revenue through ongoing operational activities (such as the provision of products or services to clients), while 33% did not and 20% did not know if they generated revenues.

  - Of those that did generate revenues, 76% of organizations said that use of the Internet contributed to their organization’s revenue in the past 12 months, either through direct online transactions or through ability to reach clients and promote products or services. Eight percent were not sure or did not know and 16% indicated that use of the Internet did not contribute to revenues.

### Plan to hire

<table>
<thead>
<tr>
<th>Plans to Hire</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan to hire full-time employees</td>
<td>33%</td>
</tr>
<tr>
<td>Plan to hire part-time employees</td>
<td>20%</td>
</tr>
<tr>
<td>Plan to hire temporary or seasonal employees</td>
<td>15%</td>
</tr>
<tr>
<td>No plan to hire</td>
<td>33%</td>
</tr>
<tr>
<td>Undecided</td>
<td>9%</td>
</tr>
<tr>
<td>Don't know</td>
<td>17%</td>
</tr>
</tbody>
</table>

N = 25