Broadband Solutions for Rural Development

Strategy to Expand Broadband Applications in Victoria County

Final

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Victoria County

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EXECUTIVE SUMMARY

With broadband infrastructure now generally available in all areas of Victoria County, the next challenge facing the Municipal Broadband Advisory Council is to sponsor initiatives that will encourage residents and business to engage this resource in a productive way. Improving how the broadband infrastructure is utilized will expand community and corporate opportunities in Victoria County. The challenge now is to identify just what this infrastructure can do, and what services are available that can be used by residents and businesses to their advantage. But even within the scope of the technologies deployed there is room for upgraded broadband performance. Further, one can expect that significant improvements will continue to become available as the technologies evolve to meet ever-expanding demands and opportunities.

In addition to this need to track technology evolution, there is also a need to track the nature of services available via the broadband infrastructure and a need to track just how residents and businesses are using the infrastructure. Therefore, there also is a very real need to identify and track broadband (Internet) services that could be important to residents and businesses, and a need to insure there is training available to residents and businesses ready to engage these applications.

Victoria County has a long history in developing projects and holding conferences to highlight potential benefits, and in this way promote the use of broadband. Two examples are Enriching Tourism with Broadband (2005) and Moving Forward with New Media (2007). Other emerging technologies such as Smart Phones, Mobile Internet Devices and GPS Systems are converging with the information infrastructure around the Internet opening the possibility for new and exciting project activity around many technologies important to the rural community.

For most Internet users, a broadband infrastructure is simply an improvement of the dial-up Internet we used for basic Web browsing, e-mail, and messaging. Users first appreciate the capacity to enhance familiar applications. They learn quickly that these enhancements include access to streaming audio and video services. They are also introduced to new network based services such as on-line file backup and storage, and experience some integration of broadband-based activities into everyday life. It is apparent that there are multiple broadband applications of interest and that some sort of composite of this is likely to typify future broadband use. Bandwidth demand will come from both individuals and devices in the home; people will use networks to communicate with each other and devices will be accessed by other devices or controlled by people. This suggests movement toward more symmetric communication capability, approaching the need for equal upstream and downstream capacity. The expectation for significant outflow as well as inflow of content opens up the possibility of new kinds of connections from the home to points outside.

An enduring and critical part of the Victoria County broadband success story is the role played by the staff and volunteers of VCCAPS. These facilities continue to provide a range of Internet services to their local communities. More importantly the staff

provides for technology transfer to the community through the delivery of training and education modules. The success of these activities is due in large part to the efforts of the volunteers who offer their services to the community. Maintaining this and other community based service and support is an important element in sustaining Victoria County's edge when it comes to access to the Internet.

A sustainable 5-year plan focuses on what is already good in Victoria County. Recommendations generally point to specific activities in the county that should be continued, enhanced or expanded:

- Recommendation 1: Sustain Due Diligence: Encourage use of broadband resources for the betterment of the entire County.
- Recommendation 2: Monitor and Expand Broadband: Ensure that the broadband infrastructure meets the demands of the residents and businesses in Victoria County.
- Recommendation 3: Continue to Assist Community Volunteer Groups: Recognize the vital role played by community groups such as VCCAPS in enabling technology transfer to the residents and Businesses of Victoria County.
- Recommendation 4: Infrastructure Support and Training: Identify relevant action items that support training effort for broadband engagement.
- Recommendation 5: Active Community Engagement: Do strategic projects that help residents and businesses "push" their content onto the Internet and "pull" residents and businesses together to understand how to use new Internet applications and utilities.
- Recommendation 6: Host Targeted Conferences: Continue to implement major conferences aimed at bringing key national, provincial and regional topic leaders into Victoria County so they can interact with our topic leaders, residents and businesses.

Innovative leadership, high-quality teamwork and community commitment makes this challenging plan achievable. This report identified several successful initiatives in Victoria County that serve as excellent models of team needs, resource needs and financial needs. Further, Victoria County has a successful model in place of providing a modest budget to a broadband team under the direction of a steering committee. Although it may sound old hat, staying the course is the best path for Victoria County.

INTRODUCTION

The Municipality of the County of Victoria has completed a three-phase broadband infrastructure program that has made it the most connected rural county in North America in 2009. With broadband infrastructure now generally available in all areas of Victoria County, the next challenge facing the Municipal Broadband Advisory Council is to sponsor initiatives that will encourage residents and business to engage this resource in a productive way. Improving how the broadband infrastructure is utilized will expand community and corporate opportunities in Victoria County. A first step is to develop a multiple-year strategy customized for Victoria County. The prime purpose of this plan is to enhance the excellent broadband infrastructure currently available in the County and to identify benefits that can be realized from the productive use of broadband resources by Victoria County residents and businesses.
In particular, this plan will provide:

- A five year strategy for expanding the use of applications that leverage the broadband infrastructure in Victoria County;
- Examples of broadband applications and what their benefits and uses can be for residents and businesses of Victoria County;
- A broadband applications educational awareness and training program for residents and businesses in Victoria County that will help them identify and engage activities that will take advantage of the broadband infrastructure;
- A strategy and approach designed to engage existing service providers such as Victoria County CAP Sites Association in the implementation of this plan;
- A list of potential activities, programs and events including budget estimates, on how to implement the five year strategy for expanding the productive use of broadband infrastructure in Victoria County.

This plan is a natural extension to the existing broadband strategy being followed by Victoria County over the past six years.

DEFINING BROADBAND for VICTORIA COUNTY

The Council of the Municipality of the County of Victoria is currently engaged in the development of a 2009 community strategic plan, “Shaping Our Future”. The existing broadband infrastructure in Victoria County, the result of a very successful and focused effort over the past six years, offers significant potential for expanded activity by residents and businesses that will directly impact on the future well-being and growth of their community. The Municipality of Victoria County is recognized as one of the most “connected” communities in Canada – that is, nearly everyone in Victoria County has access to a high-speed Internet infrastructure.

An important step in identifying the nature of opportunity offered by this high-speed (broadband) infrastructure is to clearly describe what it can do; more specifically, what it can do for residents and businesses in the Municipality of Victoria County.

What is "Broadband?

In Victoria County "broadband" refers specifically to the high-speed Internet resources installed throughout the County over the past six years. In separate initiatives the County was able to engage primary broadband infrastructure service providers in our region to build and maintain an Internet superhighway throughout the region and to extend service access to this infrastructure to residents and businesses. In separate initiatives Aliant, Eastlink Cable and Seaside Cable built significant telecommunications infrastructures. At this stage residents and businesses in every community in Victoria County can access reliable high-speed Internet.

The challenge now is to identify just what this infrastructure can do, and what services are available that can be used by residents and businesses to their advantage. From a strategic perspective, this means that a more complete understanding of the term "broadband" and of broadband infrastructure is needed. We need to know what a broadband infrastructure can do, and we need to match that with the expectations potential users will have.

Stakeholder groups who stand to benefit from a broadband infrastructure include consumers, service providers, content developers, regulators and public interest groups. Clearly, the meaning of having access to a broadband infrastructure means different things to different groups. From a municipal strategic perspective, the key is to meet the current and future expectations of citizens and businesses (consumers, public interest groups) in Victoria County. This inevitably means that Victoria County will need to keep an ongoing dialogue with the citizens and businesses, those that oversee broadband infrastructure in Canada (regulators) and those who build and maintain broadband services (service providers, content developers).

A basic understanding of several technical elements that describe "broadband" will help us in framing what such an infrastructure can actually do, what uses or services are practical today, and what we need to do to expand this capability in the future.

- Speed: This is the easiest understood and most often referenced characteristic of network capacity. Expressed in Megabits per second (Mps) it is often used to express the relative capacity of a connection. As new broadband services and applications emerge we can expect to see existing speed capacities in Victoria County challenged.
- Latency and Jitter: These elements are measures of how long it takes and how well it manages to deliver a packet of information across the network to its destination. They especially affect applications that depend on real-time interaction, such as voice conversations, on-line games, and other time-sensitive applications.
- Symmetry: The nature of today's broadband infrastructure support services typically found in residential broadband deployment is asymmetric. That is, there is a low-bandwidth upstream connection that carries a user's requests for information (typically Web Pages), and the higher downstream connection that returns the content the user has requested (Typically text, images and video content). Recently peer-to-peer applications have emerged which use many

individual computers instead of a central server to distribute content, requiring significant upstream capacity for every computer on the network. This is at odds with the capabilities of today's networks.

- Always-On: This refers to a characteristic of broadband networks that enables network communications to be initiated at any time. Users remain free to connect or not, but new applications and computer devices are being designed to work best when they are always connected, such as health monitoring or security applications.
- Connectivity Sharing and Home Networks: A broadband connection often leads to the installation of Home Networks, thereby leading to several machines in the home or business sharing a single access point. Even for a single computer on a broadband connection, users often have an expectation of being able to run several applications at once. This will certainly lead to a growth in expectations and, in turn, a need to expand the capacity of the connection.
- Addressability: A critical requirement of many new applications is that a user's computer be addressable in some fashion by software running on computers elsewhere on the Internet. This places new expectations on Internet traffic control that will require infrastructure improvements. Addressability is also a double-edged sword; being able to address home computers from other computers attached to the Internet enables powerful new applications, but it carries with it issues of security and privacy that will need to be solved.
- Network Design/Architecture: Increased capabilities of the broadband infrastructure itself carry with it a series of potential impacts on the end user. More sophisticated monitoring and control system on the infrastructure can change the nature of services currently in use – impacting individual behaviour, anonymity, or even security in the process. Additionally and inevitably, the technical capacity of the broadband infrastructure will expand to meet the user demands that will emerge with the introduction of new services.

The existing broadband systems provided by Aliant (DSL), Eastlink (Cable) and Seaside (Cable and Canopy Wireless) provide a very strong infrastructure to meet today's high speed Internet needs. The vast majority of existing uses in Victoria County are serviced quite well with this infrastructure. Given that, however, there remains a requirement to continue monitoring the evolution of broadband technology for two specific reasons:

1. Evolution of Broadband Technologies. Six years ago Victoria County took the initiative to implement a long-range broadband strategy which led to early adoption of that technology and the ultimate success of extending to every resident and business the potential of accessing high speed Internet – thereby making the County one of the most "connected" communities in Canada. In this spirit we recognize that continued diligence in monitoring broadband technologies will insure that Victoria County remains at the forefront of extending to citizens and businesses access to the best broadband infrastructure and services available.
2. Expansion of Existing and Emerging Broadband Uses and Services. As new and more powerful uses and services emerge on the Internet continued engagement with residents and businesses in Victoria County is necessary to highlight new

opportunities that will become possible. Further, there will always be a need for ongoing training and support services for existing and future broadband uses and services.

A Broadband Definition

Broadband will continue to evolve as new technologies and services are introduced and adopted by residents and businesses in Victoria County. So it is more useful to describe broadband in terms of the needs and uses it services, and then identify precisely the infrastructure property that will need to be improved in order to meet new demands.

In Victoria County, then, a successful broadband infrastructure is understood to meet two very real requirements:

1. Local access link performance should not be the limiting factor in a user's capability for running today's applications;
2. Local broadband services should also provide sufficient performance to encourage the introduction of new applications and services.

VICTORIA COUNTY BROADBAND CAPACITY

Broadband Providers in Victoria County

Over the past six years Victoria County has successfully engaged three broadband service providers to provide high speed Internet access to all communities in the county. The technologies engaged included DSL, cable and wireless systems that meet or exceed current expectations in Victoria County for broadband service. The performance capabilities of these technologies and what is currently possible are provided in the following tables:
Table 1A: Aliant DSL Technology;
Table 1B: Eastlink Cable Technology;
Table 1C: Seaside Wireless (Canopy) Technology.

Table 1A: Aliant DSL Technology

Broadband Capability	High Speed	High Speed Ultra	High Speed Max
Available?	Yes	Yes	No
Speed Down (Mbps)	1.5	5.0	10.0
Speed up (Mbps)	0.512	0.514	0.768
Latency (Typical – ms)	5 – 8	5 – 8	5 - 8
Always On	Yes	Yes	Yes

Table 1B: Eastlink Cable Technology

Broadband Capability	Basic	High Speed 5	Extreme 15
Available?	Yes	Yes	Yes
Speed Down (Mbps)	1.5	5.0	15.0
Speed up (Mbps)	0.128	0.768	1.0
Latency (Typical – ms)	5 – 8	5 – 8	5 - 8
Always On	Yes	Yes	Yes

Table 1C: Seaside Wireless (Canopy) Technology

Broadband Capability	Canopy	Canopy Advantage	Canopy 400 Series
Available?	Yes	No	No
Speed Down (Mbps)	1.5	3.0	4.5
Speed up (Mbps)	0.768	1.5	2.3
Latency (Typical – ms)	5 – 8	5 – 8	5 - 8
Always On	Yes	Yes	Yes

These tables illustrate that Victoria County has successfully delivered on the broadband infrastructure needs of the county. With at least one of these services available in all communities in Victoria County, virtually all of the residents and businesses can access reliable high-speed Internet. It should be understood that there are still a limited number of gaps - single homes or small clusters of homes that have difficulty, or cannot connect to the Victoria County broadband infrastructure. These situations will arise when one of these residents seeks connectivity; the Nova Scotia Broadband initiative has recognized this and includes a strategy to connect these "one-of" homes.

Another equally compelling message that is illustrated by the Tables 1A to 1C is the reality that we are not finished! Even within the scope of the technologies deployed there is room for upgraded broadband performance. Further, one can expect that significant improvements will continue to become available as the technologies evolve to meet ever-expanding demands and opportunities.

Continued Due Diligence by Victoria County

An oft used term in education, "life-long learning", can easily be applied to the technology world. Whatever the technology, the only constant is that the technology will improve, leading to a growing demand, which in turn, fuels new technological improvements. This is clearly the case with broadband technologies, and with broadband infrastructure in Victoria County.

There is more than a need to track technology evolution. There is also a need to track the nature of services available via the broadband infrastructure and a need to track just how residents and businesses are using the infrastructure. All of this leads us to review Tables 1A to 1C with a view to identify just what elements in this infrastructure merit attention. First, it should be understood that any improvements in the infrastructure should be driven by user demand. This leads to the conclusion that there also is a very real need to identify and track broadband (Internet) services that could be important to residents and businesses, and a need to insure there is training available to residents and businesses ready to engage these applications.

Connected Community

Victoria County conducted a survey of residents in Victoria County, "Understanding the New Web" to measure the degree of engagement with enhanced applications available on a high-speed Internet. The results were very revealing – and showed Victoria County is indeed a "connected community". The survey revealed that among those who are connected to the broadband infrastructure, their enthusiasm is infectious:

- 90% are generally happy with their Broadband service;
- 80% say they use the Internet more;
- 73% connect to the Internet it from home;
- 71% check for Internet connectivity when travelling;
- 66% would subscribe to a VC Broadband newsletter;
- 58% already have more than 1 computer connected to the Internet;
- 57% said they are interested in getting application training.

Internet users of all ages in Victoria County are using the Internet. An interesting characteristic of this finding is that users in the 51 – 65 year old age group are more active users of the Internet as those under 30 years of age. This is in difference with most other population surveys that consistently show younger users being more active users.

Internet User Age Distribution	
Under 30	25%
30-50	41%
51-65	32%
66 or older	2%

Broadband Applications

Killer Applications

	Killer apps	Future Apps
Home and Work	26%	43%
Music/Video/Games	17%	15%
E-Mail	15%	10%
Browsing/Research	14%	9%
Banking	12%	9%
Education	9%	8%
Travel	7%	6%

The survey also provided an excellent insight into the kinds of applications being accessed by residents in Victoria County. In many ways the kinds of Internet use in Victoria County is similar to other populations in Canada. An interesting pattern emerges, though, when one looks at potential future use of the Internet. The table indicated there is a trend to increased use of applications that can best be described as "Home and Work" uses. These are activities that can be used in the home or at work, or linking the home to work. These uses include:

- Shopping;
- Communication between home and office/remote site;
- Customer or employee services;
- Network storage;
- Voice over IP (VoIP / Make phone calls over the net);
- Teleworking from home;
- Videoconferencing;
- Share net with multiple PCs.

Killer Capabilities	
Fast	47%
Frees Phone	26%
Always on	19%

Indeed these numbers show a trend towards a more practical use of the broadband capacity available. When asked what broadband capability attracted them to the Internet the loudest response, in order, was speed, freeing up the home phone, and the fact that the Internet is "always on". These capabilities are defining elements of a broadband infrastructure. Indeed demand for these capabilities will drive the need for ever-expanding Internet capacity and inevitably to the expansion of that infrastructure.

Victoria County has a long history in developing projects and holding conferences to highlight potential benefits, and in this way promote the use of broadband. Two examples are given in the following sections to illustrate this.

Enriching Tourism with Broadband (2005)

This project had the following objectives:

- To re-develop the Web site - www.visitvictoriacounty.com;
- To add goggle maps to the website with the aim to add Victoria County businesses and attractions;
- To add GPS mapping coordinates to tourism businesses in Victoria County and add this access to network based maps;
- To assist in the organization of a Broadband conference and a Tourism Conference for Victoria County;
- To experiment with and to learn more about video and video applications on the Web;
- To add activities, “things to do”, and “rainy day activities” content for all tourism regions in Victoria County.

Moving Forward with New Media (2007)

This project had the following objectives:

- To produce 5 videos promoting Victoria County Attractions;
- Develop video tutorials for training purposes;
- Conduct research into podcasts and create 5 podcasts about local stories and Victoria County tourism attractions;
- Conduct research into blogs and develop example blogs focused on Victoria County content;
- Investigate RSS Feeds;
- Update Visit Victoria County GIS Maps
- Conduct a Broadband Survey on what applications are being used by residents and businesses;
- Assist in the organization of the 2007 Victoria County Tourism;
- Host at least one Conference on Tourism.

Internet Use in Victoria County (2009)

It would be interesting to see real examples of Internet use in a rural community – in particular Victoria County. After 5 short years, during the actual deployment of broadband in Victoria County implementation leaders in the municipality and VCCAPS worked hard to introduce the Internet and Internet applications to residents and businesses. The impact of that focused community engagement is clearly evident. The “Moving Forward” study clearly shows a high degree of engagement by Internet users in the County. The following is a number of anecdotal stories to illustrate this.

Since the beginning, Tom Wilson and the Municipality of Victoria County have continuously provided up-to-date information about the deployment of broadband in the county by maintaining their Web Site, www.visitvictoriacounty.com. One example, the “Interactive Map”, provides an efficient access to communities in the county.

Tony MacNeil has a consulting business, BarraMac Incorporated, where he provides remote business software and development to businesses across the United States via a client in New York. The introduction of Broadband infrastructure to rural areas of the county made it possible for Tony to move his family and his business to Big Baddeck where he is now able to efficiently provide his on-line services.

St. Ann's Harbour Area Community Portal, http://www.stanns.ca/, provides access to and information about local community activity. For example Marie Montgomery, http://www.stanns.ca/eventsnew.htm , provides up to date information about community activity.

Bay St. Lawrence Community Centre, http://www.baystlawrence.org/, provides on-line support to social, health and recreational needs of the Bay St Lawrence and area.

Brig O'Doon Cottages & Heritage House maintains an active Web presence to promote their business in St. Ann's Bay: http://www.capebretonisland.com/stanns/brigodoon/.

South Haven Guild of Weavers, Spinners and Dyers tell their story and keep interested people in their community up to date at http://www.stanns.ca/SHW/index.htm.

The Wagmatcook Culture and Heritage Centre, http://www.wagmatcook.com/, provides a glimpse into the history of the Mi'kmaq People and offers an interpretive learning experience for children and adults alike.

These are but a few examples of how residents and businesses in Victoria County are engaging high-speed Internet access to advertise their business, promote their community, and generally reach out over the Web to tell their story.

Related Wireless Technologies

There are a variety of other wireless services emerging that, although not directly an Internet service, significantly impacts on the way we might configure our own Internet content. Two examples following highlight this relationship.

Smart Phones and Mobile Internet Devices (MID)
A smart phone is a mobile phone offering advanced capabilities, often with PC-like functionality. Mobile Internet Device (MID) is a term used by several vendors to describe a multimedia-capable handheld computer providing wireless Internet access. The device has been described as filling a consumer niche between smart phones and Tablet PCs. These devices access the High Speed Mobile Network (Third generation or "3G") service on the cellular telephone system to access Web content. Although 3G accesses are slower than your home Internet connection (Typically 384 Kbps to 2 Mbps when stationary; 128 Kbps to 384 Kbps in a moving car), it is ample for accessing E-Mail and properly formatted web content. These relatively small viewing platforms and limited connection speed present a new challenge to Web developers – the need to provide content that can be viewed easily by these devices.

A related issue in Victoria County is the cellular telephone coverage. There is a continuing need to expand cellular coverage to more rural areas in the county. As use of mobile hand-held devices such as Smart Phones and Mobile Internet Devices increases, this need for cellular coverage will grow into a strategic necessity.

GPS Systems

The Global Positioning System (GPS) is a global navigation satellite system that is commonly used by many residents and businesses in Victoria County. Most fishermen use GPS navigation either as a supplement to or even a replacement of their Lorain C navigation system when going offshore.

When installed in a car, a GPS unit can provide useful information about the car's position and the best travel routes to a given destination by linking itself to a built-in digital map. A monitor in the car shows the relevant portion of the map. The driver can enter the target location, and the computer will calculate the optimal route and display it instantly. If the map is detailed enough, it will also provide the locations of the nearest gas station, supermarket, restaurant, hotel, and ATM machine.

The challenge here is for local communities, Victoria County in this case, to provide strategically important map-based information to GPS services providers, Garmin and TomTom being two of the most common. In this case we need to insure that key information about services available is provided on these commercial Garmin and TomTom maps – information that shows the location of gas stations, supermarkets, restaurants, hotels, and tourist points of interest.

CURRENT AND EMERGING BROADBAND APPLICATIONS

Ongoing Growth of Broadband Capabilities

For most Internet users, a broadband infrastructure is simply an improvement of the dial-up Internet we used for basic Web browsing, e-mail, and messaging. Users first appreciate the capacity to enhance familiar applications. They learn quickly that these enhancements include access to streaming audio and video services. They are also introduced to new network based services such as on-line file backup and storage, and experience some integration of broadband-based activities into everyday life. More pervasive broadband services, such as high quality video-on-demand or selective high-quality video and audio feeds remain in the consumer electronics and television network world.

TABLE 2A: Broadband Capability Mapped to Application Class

Broadband Capability	Application Class
Large downstream bandwidth	Streaming content (e.g., video)
Large upstream bandwidth	Home publishing
Always-on	Information appliances
Low latency	Interactive games

Following the analysis in the previous section, specific points of interest emerge where continued due diligence by the Victoria County Broadband Committee is necessary:

- Monitoring of the “one-of” instances of no-access to broadband infrastructure to ensure they are connected;
- Identifying Internet based services that could be useful or present an opportunity to residences and businesses in Victoria County;
- Track demand for broadband services and how that demand might drive need for infrastructure upgrade. Specific characteristics of interest include:
    - Downstream speed: This is the most commonly understood feature of a broadband connection. As new services lead to larger and larger data volumes there will be demand for higher speeds. However, it is more likely that multiple instances of low-band activity will get there first – multiple computers on a home network attached to a single broadband connection, or a computer with several services accessing the Internet at the same time are just two common circumstances that will drive demand for higher connection speeds.
    - Upstream speed: With the emergence of peer-to-peer Internet services, this is emerging as a key bottleneck in the broadband infrastructure. Put simply, as users of broadband infrastructures become more adept at using the asset, expectations to send information will grow. Current infrastructures are still a long way to the ideal – Symmetry between upstream and downstream speeds.

- Latency. This is a characteristic that measures the time delay a signal encounters as it travels over the Internet. It is becoming critically important for many real-time services emerging on the Internet including telephony and on-line games. For the most part the broadband infrastructure in Victoria County (the local loop) will not be a significant contributor to this problem. More likely is the possibility that the Wide Area will introduce unwanted delays, or router equipment in the user's location with poor latency characteristics.
- Always On. From an infrastructure perspective, this is a reality. However, from a user perspective, this is still uncertain. There are a wide variety of applications that take advantage of this "always on" feature and their use depends as much on the user's willingness to leave their computer on.

As users gain more comfort with a broadband environment expectations will grow, and upward pressure on the capabilities of the broadband infrastructure will certainly grow. This effect will multiply, as users will expect to access several Internet based services at the same time. Table 2B, following illustrate how growing expectations of service capability raises the demand for a more capable broadband infrastructure.

Table 2B: Minimum Bandwidths for Broadband Applications

Application	Required Up Load Speed	Required Down Load Speed
Web Browsing	200 Kbps	500 Kbps
Video Downloads	200 Kbps	1.5 Mbps
Hospitals to HealthNet	50 Mbps	50 Mbps
Video Conferencing and Web-Casting	386 Kbps	386 Kbps
E-Learning	386 Kbps	386 Kbps
Small Health Care Facility	384Kbps	384Kbps
Video On Demand	100 Kbps	1.5 Mbps
Tele-Working	1 Mbps	1 Mbps
File Sharing - Residential	1.5 Mbps	1.5 Mbps

Notes:

1. The speeds here are shown as estimated minimums. Higher speeds are preferable, as efficiency will be enhanced.
2. 1 Kbps = one kilobit (one thousand bits of information per second)
3. 1 Mbps = one megabit (one million bits of information per second)

Broadband Uses and Capabilities

Browsing and Related Activities

The primary motivation today for residential broadband access is simply to improve the performance of the overall Web browsing experience. There are several Web based services that can be identified:

Messaging

Messaging is not demanding in terms of bandwidth (dial-up bandwidths are sufficient), but broadband enhances messaging because it is always on.

Fast File Downloading

Many new applications become practical if one can move music files in a few seconds, videos in a minute or two, or an entire newspaper or book in a minute. With the availability of cheap large-capacity storage capacity (hard drives) units, downloading is of particular value.

Games

Multiplayer games are of considerable interest because they connect growing numbers of people in a shared activity ("massively-multiplayer role-playing games"). One example Everquest, involves up to 100,000 simultaneous users out of more than 300,000 paying subscribers. This makes availability and reliability key network requirements. Network delays (latency) though less important in type of game, becomes more critical in the shooter variety games.

Speed and Response-Time-Sensitive Internet Applications

A number of Internet-based applications are particularly sensitive to connection speed, latency, and response time. Two prominent examples are day trading and some forms of multi-player games (in which delays of as little as 50 milliseconds can impair game play). These activities are not generally done through Web browsers, but rather through special-purpose interface software. Both of these call for functionality not easily achievable through any other means, suggesting they will continue to drive interest in improved broadband service.

Network Storage

Access to broadband speeds makes it possible for users to access network storage applications as an alternative to storing data on local hard drives. One application has people using network-based storage to do such things as sharing photos rather than run their own local servers. Second, network-based storage provides redundant off-site

storage. This is likely to be attractive to small and home businesses and to people who require reliable disaster recovery.

Static Image Delivery

Several interesting video applications depend on the ability to deliver still photos or short video clips.

Telemetry

Telemetry applications involve primarily numerical data streams. Sensors and controls are being developed for a variety of functions in a household, such as temperature and energy management, utility monitoring, appliance operation, and security. More sophisticated health-monitoring systems are also being developed.

Audio Applications

All of the currently deployed broadband technologies are fast enough to support the key audio applications that have emerged to date. These include conventional voice similar to telephony; voice as a complement to games and other interactive applications.

A file can be downloaded to a local computer and then played, or the data can be streamed from a remote computer to the local computer, played more or less as it is received. In the file download model, the key question is how long the user is willing to wait to receive the file. Streaming audio requires an end-to-end network connection that is fast enough to handle the actual encoded size of the audio file on a second-by-second basis. Still, network delay and jitter must be kept within bounds so that the buffered data are sufficient to imperceptibly smooth over these delays.

Playback of Music

Music-playback applications are convenient for playing music on computers, accessing free music via peer-to-peer applications, and for connecting to radio stations that do not broadcast in the local geographic region
.

Listening to the Radio over the Net

Radio is more likely to be streamed from the source rather than stored locally in the home in an audio storage server. Radio service software involves selecting channels rather than individual pieces of music.

Network-Based Voice Telephony.

With the expansion of broadband infrastructures, there has been growing interest in running telephony over the Internet instead of over the public telephone network, largely

because it arose as a less expensive alternative to conventional telephony. With growth of residential broadband, which offers much greater bandwidth and always-on connectivity, IP telephony has the potential to expand to a mass-market application.

Voice telephony applications do not require especially high bandwidth, with 64 kbps—or less with compression—in each direction being sufficient to provide the quality that people are used to from the conventional phone system. But these applications are much more sensitive than the pure "listening" applications in terms of network delay, jitter, and packet loss. Multi-way conference calling raises additional architectural and performance issues.

Audio Filtering and Searching

One can use a computer program to "listen" for certain keywords in one or more audio streams using speech recognition technology as a part of searching for specific content.

Video Applications

For many video applications are the primary consumer applications for broadband. In practice, most of the video that is available over the Internet is relatively small images at low and often uneven quality. Expectations for higher quality video display are expanding with the introduction of inexpensive flat panel displays, low cost digital cameras and in-home capabilities for storing and manipulating video. This, along with the growth and multiplication of new video applications will continue to drive demand for improved bandwidth capacities.

Video can be delivered through two models: streamed video and download-and-play (file transfer). Latency and jitter—and packet loss rates—are much more serious issues for streaming video than audio because of the enormously higher data rates involved. Any kind of delay or packet loss snowballs rapidly into a very visible problem.

Interactive Video

Another trend is toward interactivity—transforming video from a passive experience into an active one. Interactive television is providing exposure to consumer options for, say, selecting a camera at a sporting event.

Another possibility is the combination of traditional entertainment with social communication. The scenario is that people are watching a sporting event, with the traditional live broadcast coming into the home—but also sharing live video with friends who are watching the same game at the same time in different cities or simply different homes. This implies fairly high bandwidth peer-to-peer video communication in conjunction with passive video delivery. It is a very different concept—implying very different behaviour—from today's scheduled videoconferences.

Home and Community Video

Developments in video capture and editing technology enable new options for user-generated video. One obvious application is home movies. Another is further decreasing the technical barriers to community access-type video production and delivery.

Large Numbers of Simultaneous Video Streams

People can interact with video content quite differently from how they interact with audio. With enough display screens, a room or an individual can make use of many video signals at once. People can divide their attention by simply looking from one screen to another. With the always-on capabilities of broadband and an in-home network, one can easily see these evolving into video portals that look out on favourite scenes, into the homes of family and friends—perhaps at fairly high resolution, but with a relatively low frame rate.

Telepresence

When video is considered as a personal communications medium, most people probably think of teleconferencing. However, widespread broadband may also make practical a more general capability of telepresence—having a continuous video window open into another space. For example, in a business setting it may enable casual interactions between lab spaces that could permit easier collaborations. In a personal setting, telepresence may enable a parent to have a continuous window on a child at a day care facility, thus enabling a closer ongoing relationship, even with working parents.

An interesting attribute of telepresence is that it potentially poses higher bandwidth demands than one might expect from videoconferencing applications. The bandwidth requirements for telepresence are not limited by the number of people actively engaged in watching the video stream at any given moment. There is also the possibility for the need for more video streams than the number of users at that location. Ultimately, such casual real-time applications may drive much higher bandwidth requirements.

New Kinds of Publishing

Peer-to-Peer Applications

The Internet growth is based on central Web servers providing the bulk of Internet content. New peer-to-peer communications among end systems on the Internet has emerged by shifting the file transfer to exchanges between individual computers. The result is much less dependence on third-party servers and a shift to sharing content between end users.

There are additional compelling arguments for peer-to-peer applications. By their nature, they do not require the installation of servers or arrangements with businesses

that offer hosting services but depend only on software running on the individual computers and adequate network performance.

"Local Interest" Content, Including Video

Local-interest video programming requires high bandwidth within a community, suggesting that it will most likely to be linked to community-wide fibre networks.

Home Content Hosting

Content-hosting activity still requires upstream capacity, but it involves the transfer of content only once each time it is modified, streaming it to one or more third-party servers located somewhere in the Internet.

Push Content

Always-on connectivity would enable vendors to transmit content into homes on a variety of schedules. Some of these arrangements would be highly functional—updates to device software, regular and automatic updates to databases maintained in the home, diagnostic probes (which would trigger responses), and so on.

Multiplexing Applications Demand in Homes

It is apparent that there are multiple broadband applications of interest and that some sort of composite of this is likely to typify future broadband use. Bandwidth demand will come from both individuals and devices in the home; people will use networks to communicate with each other and devices will be accessed by other devices or controlled by people. This suggests movement toward more symmetric communication capability, approaching the need for equal upstream and downstream capacity. The expectation for significant outflow as well as inflow of content opens up the possibility of new kinds of connections from the home to points outside.

Internet Appliances

One element of network demand will increase because of the number of information appliances in the home—devices that rely on the always-on capabilities of a broadband connection to exchange content.

Distributed Work and Education

Expectations are growing to include personal use and multi-point conferencing of multiple media (e.g., enabling simultaneous transmission of data and voice or of at least two streams of data), including video and audio links. Distributed education, like distributed work, involves remote access to information and communications. Discussions of distributed education are more likely to involve use of still and moving images with broadband as well as conferencing for interaction among multiple students.

“Tele-webbing”

Television watching and Web access are becoming interrelated – described by a new term – “Tele-webbing”. For example, many sports Web sites now provide real-time Web applications that feed game statistics to a browser. Having such a site open while watching a televised sports event provides a deeper experience of the event. A more real-time experience include Web sites providing several real-time information streams following a particular event, which allows a measure of user selectivity for support information. For example, making racecar telemetry information available concurrently with a race broadcast enhances how the race is experienced, since the user can focus attention on a particular driver.
All of these ideas involve taking advantage of a second screen that the user can selectively use for added experiences. This class of applications may be another example of where the total bandwidth demand to a home may exceed what the user can consume at any instant because the value of these applications lies at least in part in the user’s ability to instantly shift attention from one video feed to another screen full of information.

Communities and Community Networks

A large part of the Internet functionality is focused on providing access to information on a decidedly local basis. It is illustrated by the various Web sites established by local governments, schools, libraries, athletic consortia, religious institutions, and so on—that target their local communities. In some communities, special centers have been established that offer broadband capabilities together with the hardware and software to take advantage of them—a physical portal. These communications centers (CAP Sites) complement the concentrations of demand in such public-interest (and often publicly supported) facilities as medical and education centers of different kinds. Thus, it is important to recognize that community networks have both infrastructural and content dimensions.

SERVICE AND EDUCATIONAL SUPPORT FOR BROADBAND APPLICATIONS

Inventory of Existing Service and Support Groups in Victoria County.

The following CAP Sites are in operation:

- Baddeck Library
- Boulardarie School
- Bay St Lawrence
- Ingonish Public Library
- Middle River Consolidated School
- North Shore Learning and Enterprise Centre
- Iona- Rankin School of the Narrows
- St Ann's Community Education and Enterprise Centre
- North Highlands Community Museum

In addition there are two Employment Resource Centres that are also CAP Sites:

- Ingonish Outreach Centre
- Baddeck IT Centre

Service Centres (CAP) and Technology Transfer

The above 11 facilities continue to provide a range of Internet services to their local communities. More importantly the staff provides for technology transfer to the community through the delivery of training and education modules. The success of these activities is due in large part through the efforts of the volunteers who offer their services to the community. The details of all these activities are may be viewed by visiting the individual CAP sites.

The following extract is from the VCCAPS website and deals with projects that are currently underway.

Web Optimization Project

The Victoria County CAP Sites Association has the broad objectives of:

- Increasing the skill levels of CAP site staff, youth and volunteers;
- Optimizing web material for VCCAPS, CAP sites, small businesses, and community organizations in our area;
- Making use of GPS technology, Google Earth, Wikipedia, and other Web production tools;
- Producing manuals and training material for future training and to disseminate to other sites;
- Increasing usage at the sites for training, broadband usage and web optimization tools.

The overall outcomes of the Web Optimization Project will be

- The production of a Web Optimization Training PowerPoint Presentation on CD and the Web;
- Training manuals for using Web resources including GPS tools, Google Earth, Wikipedia, Facebook and other Web services;
- Acquiring knowledge of related devices including GPS units, servers, and other Web interface tools;
- Knowledge of new technologies and applications and increased CAP Site usage.

Training sessions involve a step-by-step, interactive presentation and a knowledgeable instructor to guide you through the training.

As can be seen from the above example the VCCAPS is an important element in the delivery of services and in the technology transfer process in Victoria County. There are eleven active CAP sites in the County, many of whom provide innovative community leadership.

Bay St. Lawrence Community Centre

The Mission of the Community Center is to serve the social, health and recreational needs of the Bay St Lawrence (and area) Community by providing a Center for activities promoting physical, mental and social well-being. The facility is multi-purpose, including: tearoom, Laundromat, preschool center, public washrooms, health and wellness room, gym facilities, teen center, CAPSITE (public internet access), and library.

Our Services:
The Bay St. Lawrence Community Centre serves the needs of the Bay St Lawrence (and area) Community by providing a Center for activities promoting physical, mental and social well-being.

Courses:

- GED Preparation Courses;
- Department of Fisheries Mandatory Training Courses
- Boating Course
- Health and Safety Courses
- Crisis Intervention and Prevention Courses
- Hunter Safety and Fire Arms Training Course
- All Level Reading Literacy Program
- Seniors Literacy Program.

Health and Wellness:

- Well Women's Clinics (including PAP Smear Clinics)
- Well Teen's Clinic
- Well Men's Clinic

- Women Only Addiction Services Programs
- Stop Smoking Programs
- Hearing Testing
- Flu Shot Clinics.

:

Nutrition:
Menus emphasizing healthy food choices, which support local producers (fishermen and farmers)

Physical Fitness:

- *Seniors Fitness Programs*
- *Gym Facilities*
- *Diabetic Clinics*

Youth:

- *Teen activities such as role modeling through Participatory Approach Activities (modeled from Heartwood)*
- *Peer Tutoring (these youth have been chosen as Municipal Youth Volunteers of the Year)*
- *Senior Youth Mentoring Programs*
- *Correction Services use facility to meet and council their Youth Clients.*

Children:

- *Preschool programs (offered through Family Resources)*
- *Preschool Programs (offered by parents)*
- *Soccer camp*
- *Boxing Club Training*
- *Minor Baseball*
- *Book bag programs*

Culture:
We are proud to say that our Center have been one of the initiators in our area of Northern Cape Breton of the revitalization of culture through workshops, festivals and events, and ongoing training, including:

- *Annual Feis's (Gaelic Festival)*
- *Cabot Day Enactments*
- *Gaelic Language and Song Workshops*
- *Festivals*
- *Family fun days*
- *Music lessons*

Community Photographic Archive:
We have a photographic display of people and activities from our Community's past.

Employment Resource Services:

- *Outreach Employee Assistance Program Base with the local Officer meets clients in our facility on a biweekly basis.*
- *Employability Skills and Job Creation Partnership Programs sponsored by HRSDC are sponsored at the Center Job Placement Facility for Community Services Clientele.*
- *Summer Student Job Positions available through our Centre.*
- *Canada Revenue Agency Voluntary Income Tax Program Administrators.*

Middle River Portal

Middle River Community - Working Together:

Middle River is a small, rural community, situated in Victoria County, Nova Scotia, Canada, approximately 16kms from Baddeck - home of Alexander Graham Bell. Population is approximately 450. We have a Community Hall, an Elementary School, two Churches, a Volunteer Fire Department, a Car Dealership, a Ski-Doo + ATV +Motorcycle sales & service, wood working shops, farms, an auto repair + tire shop, a plumbing & heating engineer, a hot tub & spa business, a bushcraft instructor, excellent trout and salmon fishing, upland bird & big game hunting (seasonal), state of the art wireless & high speed internet service, a mobile library service & holiday chalets.

Updated Equipment now at the CAP Site
(Posted Mar 4, 2009 10:54 AM by Lisa Holt-Jones; Updated Mar 12, 2009 10:53 AM by Michael Riegner)
Come & print off all your photographs on our new HP C8180 printer. Its easy to use & you can print off 4"x 6" from its own paper tray or full A4 size photographs. Paper & Ink is provided at cost (or you can bring your own paper), 4" x 6" 50c each. Pop in & see

how easy it is to use - save money on printing & save on gas & you don't have to queue at Wal-Mart / Staples!

Wanted Details of Middle River Clubs & Societies
(Posted Mar 4, 2009 10:47 AM by Lisa Holt-Jones; Updated Mar 4, 2009 10:51 AM)
If you would like your club or society mentioned on our website - please contact Mike on 295 2951 or email lisa.holtjones@gmail.com Please provide the name of the club, details of when & where you meet and a point of contact.

Wanted - Local Photos for Gallery
(Posted Mar 4, 2009 10:45 AM by Lisa Holt-Jones; Updated Mar 4, 2009 10:53 AM)
Attention budding photographers... we are holding a competition for the best photograph taken in/around Middle River by a local resident (Junior U16 & Adult sections). See our Photo Gallery page for more details.

Looking for Volunteers
(Posted Mar 3, 2009 12:00 PM by Michael Riegner, Updated Mar 4, 2009 10:53 AM by Lisa Holt-Jones)
The CAP site in Middle River is looking for volunteers to keep the site open starting April. The site is open 2.30pm - 7.30pm Tuesday, Wednesday & Thursday. If you can help - please contact Mike at 295 2951.

There are similar examples at other CAP sites throughout Victoria County. It is evident that the CAP sites are an important, some would say vital, component in the communities that they serve. The continuation of existing capabilities, the enhancement of infrastructure, and the expansion of services that are offered at the CAP sites are essential for the overall well being of the rural communities of Victoria County.

FIVE YEAR STRATEGIC PLAN

Introduction:

Many sources were used in compiling this strategic plan. One source in particular was very valuable and has been used as a check to ensure that the broader findings and recommendations of this report were tailored, where appropriate, to the more specific situation that pertains to Victoria County. A summary of the findings and recommendations of that report, from the National Research Council, is included in Appendix 1.

Strategic Objectives

The overall objective is to ensure that Victoria County retains its prominence as a well-connected community in comparison with other counties in Nova Scotia. Specific objectives are:

1. Increase the quantity, quality and variety of uses of the Internet in Victoria County.
2. Continue to recognize the strategically vital role community engagement activity, such as the mentoring and training efforts by VCCAPS, plays in engaging the promise brought by connecting to broadband infrastructure.
3. Monitor the evolution of the emerging technologies and applications on the Internet.
4. Exchange success stories in Victoria County with other regions in Nova Scotia and Canada.

Recommendations To Support Broadband Engagement

Recommendation 1: Sustain Due Diligence

Victoria County Municipal Council continue to support activities related to sustaining and expanding the Broadband infrastructure and to encourage use of this resource for the betterment of the entire County. When the opportunity presents itself:

- Tell good-news stories of residents and businesses who benefited from the accessibility to broadband infrastructure;
- Project Victoria County onto the provincial or national scene by recognizing the effort to establish and sustain Victoria County as one of the most connected regions in Canada;
- Continue to provide financial support to worthy broadband engagement projects at levels similar to that provided over the past 6 years.

Recommendation 2: Monitor and Expand Broadband

The Municipal Broadband Committee continue to monitor and expand the Broadband infrastructure to ensure that it meets the demands of the residents and businesses in Victoria County. Specific examples include:

- Champion a community broadband fibre network linking key public institutions in the village of Baddeck (hospital, schools, municipal offices, RCMP, IT Resource Centre, Bell Museum, hotels and the Golf Course).
- Establish wireless hotspots in selected community centres

Recommendation 3: Continue to Assist Community Volunteer Groups
The Municipal Broadband Committee recognize the vital role played by community groups such as VCCAPS in enabling technology transfer to the residents and Businesses of Victoria County.

- Provide direction and encouragement to VCCAPS to establish a sustainability fund that will ensure there is up-to-date equipment, adequate staff and operating resources throughout the county;
- Encourage the formation of partnerships that will seek to establish projects over a reasonable time period, preferably three to five years.

Recommendation 4: Infrastructure Support and Training
Identify relevant action items that can form a part of an ongoing infrastructure support and training effort for broadband engagement. Important elements of such a plan includes:

- Deliver national and regional training and education initiatives such as GED and Distance Education programs;
- Conduct community focussed workshops and forums aimed at enabling and improving the use of high-speed services.
    - Small business applications;
    - Access to procurement networks;
    - Multi-media and marketing;
    - Empowering businesses for rural Broadband (e.g., Bed and Breakfast);
- Implement projects that will sustain a knowledge workforce that is necessary to encourage technology transfer to the community. Examples include:
    - The web optimization program;
    - GPS applications;
    - Tea and Tech seminars:
        - Computers for seniors;
        - Unemployed and seasonal residents;
        - Youth;
        - Persons with differing abilities;
        - Personal income tax assistance for low income residents;
- Continue to utilize CAP resources for community engagement initiatives such as:
    - Literacy groups;
    - Historical research;
    - Genealogy research.

Recommendation 5: Active Community Engagement
The Broadband Advisory Committee continue implementing community engagement initiatives similar to two examples provided:

- A series of projects focused on a “push” strategy – Helping residents and businesses understand how to “push” their content onto key Web-based utilities such as Google Earth, Google Maps, and GPS maps such as Garmin or TomTom. This initiative can be implemented in a way similar to the 2005 “Enriching Tourism with Broadband” project

- A series of projects focused on a "pull" strategy - Helping residents and businesses understand how to use new Internet applications and utilities. This initiative can be implemented in a way similar to the 2007 "Moving Forward with New Media" project.
- Continue to actively engage residents and businesses in Victoria County through surveys, discussion groups and feedback mechanisms to ensure resources are focused on their needs and demands.

Recommendation 6: Host Targeted Conferences

The Broadband Advisory Committee continue to implement major conferences aimed at bringing key national, provincial and regional topic leaders into Victoria County so they can interact with our topic leaders, residents and businesses. The key change in philosophy suggested here is that such conferences ought to be centred on a particular topic area or profession rather than on technology itself. This will target a particular population group in the county that needs to come together with their counterparts throughout Canada. The broadband topics can emerge as relevant sub-topics in the conference. For example, Victoria County host a conference focused on issues related to:

- Tourism. Elements of accessing broadband infrastructure can emerge in a technology focus workshop during the conference addressing relevant issues such as:
  - What new Web-based capabilities would offer advantages to tourism operators;
  - How do we use new Web services such as Google Maps and video streaming to promote local tourism;
  - How can we engage new wireless communications technologies such as Cellular based Web access and GPS tools to engage tourists travelling in our county.
- Recreation. In a similar way, relevant treatment of broadband and wireless technologies can be an important part of the conference offering. For example, implementation of efficient wireless support systems and applications of GPS technologies are critical elements to implementing and supporting outdoor activities related to eco-tourism and hiking activities.

These recommendations points to a wide array of workshops, projects and conferences aimed at expanding engagement of broadband resources in Victoria County. Although it seems impossible, innovative leadership, high-quality teamwork and community commitment makes this challenging plan achievable. Because of the high degree of community involvement and volunteerism prevalent at all of these activities making a cost projection at this stage is not productive. However, this report identified several successful initiatives in Victoria County that serve as excellent models of team and resource needs in addition to the financial dimension. Further, Victoria County has a successful model in place of providing a modest budget to a broadband team under the direction of a steering committee. Although it may sound old hat, staying the course is the best path for Victoria County.

INQUIRIES AND FOLLOW-UP

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Appendix 1: Broadband: Bringing Home the Bits (2002)

Computer Science and Telecommunications Board (CSTB)

FINDINGS

- Finding 1. Broadband Is a Convergent Platform Capable of Supporting a Multitude of Applications and Services.
- Finding 2. Broadband Should Be Defined in a Dynamic and Multidimensional Fashion.
- Finding 3. Demand for Broadband Is Evident.
- Finding 4. Deployment as a National and Local Imperative
- Finding 5. Many Factors Pace Deployment.
  - Finding 5.1. Broadband deployment will not occur overnight.
  - Finding 5.2. The investment rate depends critically on the perspective and time horizon of the would-be investor.
- Finding 6. The Shape of Broadband Deployment
  - Finding 6.1. The broadband vision is rapidly evolving and is linked to the Internet and computing.
  - Finding 6.2. Current trends appear to be able to sustain deployment over the next several years, but beyond that point the outcome is less evident.
  - Finding 6.3. Broadband is not a horse race among technologies.
  - Finding 6.4. There will be substantial geographical variation in the nature of competition.
  - Finding 6.5. The vitality of the Competitive Local Exchange Carriers (CLEC) industry is in doubt, but the source of apparent troubles is uncertain.
  - Finding 6.6. Unlike the underlying communications technologies, the capabilities of deployed broadband are not on a Moore's law-like curve.
- Finding 7. The Relationship Between Broadband and Content and Applications Businesses Is Critical and Is in Flux.

RECOMMENDATIONS

- Recommendation 1. Prioritize Widespread Deployment and Defer New Regulation in the Early Stages
  - Recommendation 1.1. Avoid present-day policy making that is based on presumptions about the final form of broadband markets.
  - Recommendation 1.2. Complementary to favoring policies facilitating rapid deployment over intervention, develop and implement enhanced monitoring of deployment, investment, and market outcomes and develop metrics to permit independent evaluation and rating of performance.
- Recommendation 2. Structure Regulation to Emphasize Facilities-Based Competition and to Encourage New Entrants.
  - Recommendation 2.1. In the long term and in the case of investment in new

facilities, policies should favor facilities-based competition over mandated unbundling.
    - Recommendation 2.2. Favor alternatives to physical unbundling.
    - Recommendation 2.3. Anticipate that facilities-based competition will not occur in all places, and fashion appropriate policies to address these gaps.
    - Recommendation 2.4. Ensure appropriate radio spectrum for broadband and associated capabilities.
- Recommendation 3. Reflect the Convergent Nature of Broadband and Target Policy at the Appropriate Layer.
    - Recommendation 3.1. Move toward a more coherent, consistent policy framework for broadband.
    - Recommendation 3.2. If regulation of a broadband-delivered service is contemplated, it should be done in a service- rather than a technology-centric fashion.
- Recommendation 4. Take Active Steps to Promote Increased or Accelerated Deployment, Including at the Local Level.
    - Recommendation 4.1. Establish a federal and state policy framework supportive of local initiatives that ease market entry and foster competition.
    - Recommendation 4.2. Explore public sector initiatives that foster market entry.
    - Recommendation 4.3. Relax federal, state, and local rules to ease market entry or to stimulate investment.
    - Recommendation 4.4. Provide financial incentives for investment in underserved and high-cost areas.
- Recommendation 5. Increase Local Capacity to Promote Broadband Deployment.
    - Recommendation 5.1. Support planning grants for localities to explore options.
    - Recommendation 5.2. Provide cost sharing for field trials, including local-government-sponsored initiatives.
    - Recommendation 5.3. Establish a national clearinghouse to raise awareness, provide technical assistance, and disseminate best practices for local and regional efforts to accelerate broadband deployment.
- Recommendation 6. Defer Development of a Universal Service Policy for Broadband Until the Nature of Broadband Services, Pace of Deployment, Distribution of Access, and Social Significance Become Clearer.
- Recommendation 7. Support Research and Experimentation.
    - Recommendation 7.1. Support research and development on access technologies, especially targeting the needs of nonincumbent players and other areas that are not targets of stable, private sector funding.
    - Recommendation 7.2. Support research on economic, social, and regulatory factors.
    - Recommendation 7.3. Support development of alternative broadband content and services.

Appendix 2: Examples of Broadband Uses and Capabilities

This section provides a sampling of Internet-based services that are available. Some of these services may have an impact on the capacity of the broadband infrastructure. More likely, is that as demand increases the combination of several of these services being activated simultaneously will directly affect the performance of a broadband connection and lead to demand for higher capabilities.

The samples are arranged in a series of tables similar to this one.

Title: Municipality of Victoria County	Broadband Capability:			
Reference: ***http://www.victoriacounty.com/index.html***	Large Downstream:	Yes	Large Upstream:	No
Description:	Always on:	No	Low Latency:	No
Provides news and updates of activities and events in the County.				

Table terminology:

- **Title**: The name of a specific Web service provider, or an indication of the type of service.
- **Reference**: Usually a Web link; occasionally when the service is widely available the class of Web service is indicated.
- **Description**: A brief description of the Web service.
- **Broadband Capability:** An indication of the type of capability this service will expect from the broadband connection *to the users computer*;
    - **Large Downstream**: The user will need a high-speed link coming into the home computer. The current broadband deployment is generally able to deliver high-speed downstream capability.
    - **Large Upstream**: The user will need a high-speed link from their home computer to the network. The current broadband deployment has limited capability to deliver high-speed upstream capability.
    - **Always on**: The service requires both the network connection and the user's computer to be on at all times. This is generally the case with the broadband infrastructure currently in place. The change implied by having this feature is that the user will need to keep their computer on and connected to the Internet.
    - **Low Latency**: The Internet connection between the user and the service provider is sensitive to time delays. The current broadband deployment has very good capability in this regard, so this is an indicator of potential issues arising that is caused by either the Wide Area network (The Internet beyond the local infrastructure) or by the user's own home network.

Browsing and Related Activities

Title: On-Line Banking	Broadband Capability:			
Reference: Most Canadian Banks	Large Downstream:	Yes	Large Upstream:	No
Description:	Always on:	No	Low Latency:	No
Provides secure access to personal and business bank accounts. The efficiency and reliability of banking services is enhanced by higher speed connections.				

Title: On-Line Shopping	Broadband Capability:			
Reference: Sears Catalogue and Sales Fliers http://www.sears.ca/gp/home.html Canadian Tire http://www.canuckabroad.com/canadian-tire/canadian-tire-store.php E-Bay http://www.ebay.ca/?keyword=e.bay-&crlp=3464880649_54&tt_encode=raw&MT_ID=17	Large Downstream:	Yes	Large Upstream:	No
Description:	Always on:	No	Low Latency:	No
There are a wide variety of commercial sited that offer catalogue shopping to consumers. This service often use other Web-based services such as credit card security verification and web-based personal accounts (PayPal).				

Title: Travel Booking (Air Canada)	Broadband Capability:			
*Reference: **http://www.aircanada.com/en/travelinfo/before/eticket/index.html***	Large Downstream:	Yes	Large Upstream:	No
Description:	Always on:	No	Low Latency:	No
This is one example of on-line travel booking service.				

Title: On-Line Merchant Account	Broadband Capability:			
Reference: PayPal https://www.paypal.com/ca/cgi-bin/webscr?cmd=_home&country_lang.x=true	Large Downstream:	Yes	Large Upstream:	No
Description:	Always on:	No	Low Latency:	No

This is an example of a variety of secure on-line Merchant accounts where subscribers can deposit funds into the account and:

- **Send Money: Send money to anyone with an email address.**
- **Request Money: Collect money for a group gift, invoice for services.**
- **Track Your Online Spending: Monitoring your spending, or tracking donations.**

Title: Credit Card Security	Broadband Capability:			
Reference: MasterCard SecureCode http://www.mastercard.com/us/personal/en/cardholderservices/securecode/index.html	Large Downstream:	Yes	Large Upstream:	No
Description:	Always on:	No	Low Latency:	No

An example of a simple and secure way to pay at online stores. A private code known only to you and your bank, your SecureCode, enhances your existing MasterCard account by protecting you against unauthorized use of your card when shopping online at participating online retailers.

Title: On-Line News	Broadband Capability:			
Reference: Cape Breton Post http://www.capebretonpost.com/ Halifax Chronicle Herald http://thechronicleherald.ca/	Large Downstream:	Yes	Large Upstream:	No
Description:	Always on:	No	Low Latency:	No

Subscriptions for regular newsstand papers is available on-line.

Messaging

Broadband enhances messaging because it is always on.

Title: E-Mail	Broadband Capability:			
Reference: ***www.gmail.com***	Large Downstream:	No	Large Upstream:	No
	Always on:	No	Low Latency:	No

Description:

There are a number of private mail account vendors available on the Internet. Usual sources include the Internet Service Provider (ISP) itself (Aliant, Eastlink, Seaside), but there are also independent mail services available like this one from Google. E-mail accounts can be set up as a "POP" account, where all your messages are downloaded from the Internet onto your computer, where you can read and store them. E-mail service can also be Web-based where your messages are stored on the E-mail provider server, and you are able to read them on a Web page. This option has become very popular because it allows you to access the E-mail messages from any computer.

Title: Facebook	Broadband Capability:			
Reference: ***www.facebook.com***	Large Downstream:	Yes	Large Upstream:	No
	Always on:	No	Low Latency:	No

Description:

In many ways this is the new E-mail service. This presents an environment where you can set up dialogue with a limited number of friends, share pictures and short videos, and generally "keep in touch", even if you are not an active participant. The important feature is that the information you post is shared with all your "friends", so the challenge is to keep that group to a small, controlled group. If you want to dialogue with others, it is advisable to establish a second (or third) Facebook identity for that group.

Fast File Downloading

Title: Canadian Telework Scene	Broadband Capability:			
Reference: ***http://www.ivc.ca/canadianscene.html***	Large Downstream:	Yes	Large Upstream:	Yes
Description:	Always on:	No	Low Latency:	No

There is significant growth of teleworking all over North America. One local example includes a Software Developer/Support person in Big Baddeck providing services to clients across the United States via New York City. This was made possible because of the availability of broadband service in that area.

Title: Wikipedia, the free encyclopedia	Broadband Capability:			
Reference: ***http://en.wikipedia.org/wiki/Wikipedia:About***	Large Downstream:	Yes	Large Upstream:	No
Description:	Always on:	No	Low Latency:	No

This is a multilingual, Web-based, free-content encyclopaedia project. Volunteers write Wikipedia collaboratively from all around the world; anyone can edit it. Since its creation in 2001, Wikipedia has grown rapidly into one of the largest reference Web sites.

Title: Download Accelerator (DAP)	Broadband Capability:			
Reference: ***http://www.speedbit.com/***	Large Downstream:	Yes	Large Upstream:	No
Description:	Always on:	No	Low Latency:	No

This is one of many data acceleration products for the Internet. DAP is a popular download manager, with over 166 million users to date. Features include: downloading of web videos, converting videos to run on numerous devices such as iPod, PSP, iPhone, a choice of Internet Explorer style, multi antivirus download security, and enhanced download acceleration and usability. You set up a download request and this service manages the file transfer for you.

Games

Title: On-Line Games	Broadband Capability:			
Reference: *Outspark* *http://corp.outspark.com/*	Large Downstream:	Yes	Large Upstream:	No
Description:	Always on:	No	Low Latency:	No
One example of a variety of Web-based game providers by subscription.				

Speed and Response-Time-Sensitive Internet Applications

Title: Day Trading (Stocks)	Broadband Capability:			
Reference: *http://www.daytraders.com/*	Large Downstream:	Yes	Large Upstream:	No
Description:	Always on:	Yes	Low Latency:	Yes
Day trading refers to the practice of buying and selling financial instruments (stocks, currencies, commodity futures) within the same trading day such that all positions are usually closed before the market close of the trading day. Traders that participate in day trading are called active traders or day traders. **With the advent of electronic trading and margin trading, day trading has become increasingly popular among casual, at home traders.**				

Title: MMORPG	Broadband Capability:			
Reference: Ultima Online: ***http://pc.ign.com/*** *Cryptic Studios:* http://www.crypticstudios.com http://en.wikipedia.org/wiki/Comparison_of_MMORPGs	Large Downstream:	Yes	Large Upstream:	Yes
Description:	Always on:	No	Low Latency:	Yes
A massively multiplayer online role-playing game (MMORPG) is a genre of computer role-playing games (CRPGs) in which a large number of players interact with one another in a virtual world.				

Network Storage

Network storage applications provide users with an alternative to storing data on local hard drives

Title: Internet Virtual Storage	Broadband Capability:			
Reference: Drive Headquarters www.drivehq.com Comparison of services: http://www.cryer.co.uk/resources/virtual_storage.htm	Large Downstream:	Yes	Large Upstream:	Yes
Description:	Always on:	Yes	Low Latency:	No
Internet based storage is a simple means of sharing files (for example between home and work or with friends) and for off site backups. Features users look for include: maximum amount of storage space; free service is provided on a trial basis only; the ability to share files with others; initial amount of storage space; maximum amount of storage space; maximum size of any individual file; and whether FTP or SFTP access to the storage space is provided. All provide a browser interface.				

Static Image Delivery

Title: Wal Mart Canada Photo Centre	Broadband Capability:			
Reference: ***http://www.walmartphotocentre.ca/home_splash.aspx***	Large Downstream:	Yes	Large Upstream:	No
Description:	Always on:	No	Low Latency:	No
This is one example of an online photo-finishing service. Once a user establishes an on-line account they can upload and store photos; they can edit their photos; they can place orders to develop prints; and they can assign the printing and to point of pick-up to a local Wal Mart in their area.				

Audio

Playback of Music.

Title: iTunes	Broadband Capability:			
Reference: ***http://www.apple.com/ca/itunes/whatson/music.html***	Large Downstream:	Yes	Large Upstream:	No
Description:	Always on:	No	Low Latency:	No
You can get music from CDs, purchase songs online, listen to podcasts, and many other things with iTunes. With iTunes you can access songs to play, shows to watch, and movies to rent or to own.				

Listening to the Radio over the Net.

Title: CBC Radio	Broadband Capability:			
Reference: ***http://www.cbc.ca/listen/index.html***	Large Downstream:	Yes	Large Upstream:	No
Description:	Always on:	No	Low Latency:	No
CBC Radio is one example of many network radio service available on the Internet.				

Network-Based Voice Telephony.

Title: Skype	Broadband Capability:			
Reference: ***http://www.skype.com/***	Large Downstream:	Yes	Large Upstream:	No
Description:	Always on:	Yes	Low Latency:	No
This is software that allows users to make telephone calls over the Internet. Calls to other users of the service and to free-of-charge numbers are free, while calls to other landlines and mobile phones can be made for a fee. Additional features include instant messaging, file transfer and video conferencing.				

Audio Filtering and Searching

Title: Easy Audio Editor	Broadband Capability:			
Reference: ***http://www.bestshareware.net/easy-audio-editor.htm***	Large Downstream:	Yes	Large Upstream:	No
Description:	Always on:	No	Low Latency:	No
An audio filter is a type of filter used for processing sound signals. Many types of filters exist for applications including graphic equalizers, synthesizers, sound effects, CD players and virtual reality systems.				

Video

Video Chat

Title: Webcam Chat	Broadband Capability:			
Reference: ***www.gmail.com***	Large Downstream:	Yes	Large Upstream:	Yes
Description:	Always on:	No	Low Latency:	No
Many Web-based e-mail services have expanded their offering by providing person-to-person chat capability – These services include voice chat and Webcam-based video chat. A Broadband connection makes this possible because even the limited bandwidth available on most broadband services is a significant improvement over dial-up.				

TV Video feeds.

Title: PCTV4ME	Broadband Capability:			
Reference: ***http://www.pctv4me.com/***	Large Downstream:	Yes	Large Upstream:	No
Description:	Always on:	No	Low Latency:	Yes
Watch Sports, News, Game Shows, Documentaries, and hundreds of other programs from around the US and the world!				

Home and community video.

Title: YouTube	Broadband Capability:			
Reference: ***http://www.youtube.com/***	Large Downstream:	Yes	Large Upstream:	No
Description:	Always on:	No	Low Latency:	No
YouTube is a video sharing website where users can upload, view and share video clips.				

Large numbers of simultaneous video streams.

Title: Telus QMJHL Games	Broadband Capability:			
Reference: ***http://qmjhl.mytelus.com/archive_games.asp***	Large Downstream:	Yes	Large Upstream:	No
Description:	Always on:	N0	Low Latency:	Yes
Telus provides a video archive of Quebec Major Junior Hockey League games. One can stream several of these streams as an illustration of multiple video feeds *downstream*. However, these only places emphasis on the need for higher *upstream* bandwidth should one wish to send multiple real-time video streams from the home. Examples: security video feeds, family video feeds, community content.				

Telepresence

Title: Edge Vision	Broadband Capability:			
Reference: ***http://www.edgevision.co.uk/teleprescence.html***	Large Downstream:	Yes	Large Upstream:	Yes
Description:	Always on:	No	Low Latency:	Yes
This brings people in remote locations together with a life-size, full motion cinematic view. When these technologies are combined, they allow remote meetings to be created with a "so real" impression that participants feel as if they are actually in the same room together!				

Telemetry

Title:ComTech M2M	Broadband Capability:			
Reference: ***http://www.comtechm2m.com/m2m-telemetry-system/m2m-telemetry-system.htm***	Large Downstream:	No	Large Upstream:	No
Description:	Always on:	Yes	Low Latency:	No
Remote monitoring solution "Out of the box" enables companies to monitor, control, manage and network machines via wireless Internet telemetry. This telemetry system offers monitoring and management of machines and assets via the Web. It can be quickly configured to report, alarm and manage any equipment; enabling companies to reduce costs, increase revenues & improve service.				

New Kinds of Publishing

Peer-to-Peer Applications

Title: BitTorrent	Broadband Capability:			
Reference: ***http://www.bittorrent.com/***	Large Downstream:	Yes	Large Upstream:	No
	Always on:	Yes	Low Latency:	No

Description:

BitTorrent is a peer-to-peer file sharing protocol used for distributing large amounts of data. BitTorrent is one of the most common protocols for transferring large files, and by some estimates it accounts for about 35% of all traffic on the entire Internet. Relative to standard Internet hosting, this provides a significant reduction in the original distributor's hardware and bandwidth resource costs. It also provides redundancy against system problems and reduces dependence on the original distributor.

"Local Interest" Content, Including Video

Title: Medicine Hat and Brooks Library Catalogue	Broadband Capability:			
Reference: ***http://www.mhc.ab.ca/library/webbysubject/Local%20Interest.html***	Large Downstream:	Yes	Large Upstream:	No
	Always on:	Yes	Low Latency:	No

Description:

Library provides access to local interest content. Some local content could be at any local site, including homes. This service, at its full implementation could increase the bandwidth demand in both the upstream and downstream bandwidths.

Push Content

Title: Microsoft Windows Update	Broadband Capability:			
Reference: ***http://update.microsoft.com/windowsupdate/***	Large Downstream:	Yes	Large Upstream:	No
	Always on:	Yes	Low Latency:	No

Description:

Many software vendors provide automatic updates and fixes to their software (Push) provided computer is on and connected to the Internet.