BROADBAND - AN EFFECTIVE TOOL FOR RURAL DEVELOPMENT

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EXCECUTIVE SUMMARY

This report encompasses information on the importance and development of broadband and a variety of approaches to enhance its usage. Recently, broadband has evolved from being a luxury to an essential type of infrastructure for business development, banking, communication, health care, education, tourism and entertainment. Access to the internet at broadband speeds has now become a necessary tool for engagement in the modern economy and culture.

Across the globe, broadband applications and services are revolutionizing business, prompting economic development and increasing productivity. Many jurisdictions are implementing broadband networks for socio-economic development.

Broadband leaders suggest that the usage and development of broadband among the rural communities can be enhanced by various means. These include creating awareness and educating the community about the benefits of broadband service. The other option is through aggregating demand within the community to make service profitable for broadband providers. Promoting partnerships among community organizations and institutions is also a way of broadband deployment. This could be supplemented through the provision of incentives to local providers, community organizations, nonprofit organizations and co-ops to encourage local and public ownership. Technology training is a necessary component for adoption and deployment of broadband in rural communities.

The findings of various studies have indicated that broadband deployment had a significant impact on rural economies, businesses, consumers and socio-cultural life. A study conducted in 2005 in Churchill, Manitoba and Parrsboro, Nova Scotia showed an overall positive return on investment of broadband. Alberta SuperNet has established an exciting environment for telecommunication and high-speed application business opportunities throughout the province. Moreover, broadband capabilities have provided many rural Alberta businesses with the opportunity to expand their marketing, service and production horizons. The City of Ottawa identified broadband as an economic enabler and adopted a Multi-Pronged Broadband Strategy.

Development of a community of broadband users requires more time, support, and investment than is usually anticipated. Public access sites (e.g., tele-cottages and libraries) demonstrate a growing rather than declining demand in broadband-rich areas. The best community developments are led by the community itself – specifically those local early adopters and champions – and not by outside enthusiasts or technologists. E-learning is a growing market but e-shopping, communications and entertainments are the primary drivers of domestic broadband take-up.

1. INTRODUCTION

Broadband technologies offer the potential to overcome many unique challenges and traditional limitations that characterize the rural economy, particularly those associated with distance and access. Citizens of rural and remote areas have similar needs to those of urban areas, but are disadvantaged in a number of ways. For example, low population density means a lower taxation base to support essential services; geographical remoteness means transportation difficulties; distance from markets can be a disincentive to new business growth; finally, remoteness usually means a lack of access to education, training and professional updating. Economic diversification is considered a key survival mechanism for many rural communities, and high-speed network access offers opportunities for tele-work, call-centre operations, and other distance-neutral applications and services.

In a very short period of time, Broadband has evolved from being a luxury to an essential type of infrastructure for business, effective and fast communication health care, education and government. Access to the Internet at broadband speeds and capabilities
has become a necessary tool for engagement in the modern economy and culture.

Today, all levels of government increasingly consider broadband access to be a virtual necessity – as important to a community's economic and social well-being as roads or electricity. In the absence of broadband access, economic development within the county and the provision of services to residents is seriously impaired. As the private and public sector increasingly move to more self-service, lower-cost solutions, and utilize quick response communication vehicles which provide easier and more transparent access to information, both the Internet and technology has become the cornerstone for such initiatives. The access of Broadband helps promote equal opportunities for everyone. After getting connection, their geographic location becomes less of a barrier to social and economic inclusion. This can make it easier for people to live and work in rural areas– supporting local development, avoiding unnecessary migration and improving national socio-geographic structures.

2. OBJECTIVE OF STUDY

The main objectives of the study are as follows:

- To provide information on why broadband is important;
- Provide insight into how broadband usage can be increased; and
- Research broadband development in other jurisdictions.

3. BACKGROUND

(i) What is broadband?

The term “broadband” refers to any technology that transmits data across at high speed and is “always on” as compared with a dialup system that must be connected each time a user wishes to access. Broadband system has a two-way stream of data: upstream for sending data and downstream for receiving data.

Broadband services are most often delivered by telephone companies on digital subscriber line (DSL) systems using conventional phone lines and by cable television providers over coaxial cable lines in different countries. In some locations, “wired” systems such as fiber optic cable and broadband over power line services are offered. There is increasing competition from “wireless” providers who deliver services either from towers or through satellite system to a receiver at end user locations. Wireless system can be terrestrial or "fixed" which provide broadband to fixed location such as home or business, or mobile for use with handled devices.
Broadband enables new and improved services including enhanced public services, improved business productivity and competitiveness, and new forms of entertainment. These resources, services, and products include, but are not limited to:

a) *Education, Culture, and Entertainment*: Broadband can overcome geographical and financial barriers to provide access to a wide range services. For example, secondary and post secondary educational applications (real-time interaction, shared curriculum and distance learning) cultural and recreational opportunities and resources.

*b) Tele-health and Tele-medicine**:*** Broadband can facilitate provision of medical care to unserved and underserved populations through remote diagnosis, treatment, real-time patient monitoring, consultations with specialists and e-records.

c) Economic Development/E-Commerce: Broadband can promote economic development and revitalization through electronic commerce. (e-commerce) by creating new jobs and attracting new industries as well as providing access to regional, national, and worldwide markets.

d) Electronic Government (E-Government): Electronic government can help streamline people’s interaction with government agencies, and provide information about government policies, procedures, benefits, and programs.

e) Public Safety and Homeland Security: Broadband can help protect the public by facilitating and promoting public safety information and procedures, including, early warning/public alert systems and disaster preparation programs, remote security monitoring and real time security background checks.

f) Innovative Applications: Broadband provides easier access to newer telecommunications technologies such as video conferencing, Voice over Internet Protocol (VoIP), which allows voice communication using the Internet.

(ii) Usage of broadband in rural areas?

As more and more transactions (social as well as business; dealings with statutory bodies along with commercial transactions) become internet-based, broadband presents a wide range of opportunities for rural areas. Recent surveys of broadband usage identified the following as some of the more common uses of the internet:

- Social benefits
- Business
- Sharing files (including photographs)
- Online banking
- developing own website
- Shopping
- Blogging
- Education (secondary and post secondary)
- Paying bills
- Joining/participating in an online community
- Entertainment – games, surfing, sports results, music and live broadcasts
- research (a job, a product, a homework exercise, work opportunities, education, family history/genealogy, etc)
- accessing information on rights and entitlements or information on statutory services

Some of the areas in which broadband and internet-based services could have an impact in remote rural areas include the following:

a) Goods and Services

At a basic level, access to many goods and services is greatly facilitated by having broadband access. The range of goods and services that can be accessed is greatly increased. Furthermore the price paid for such goods and services is often much more competitive when on-line channels are used for purchases (e.g. booking flights online). Some goods and services (such as low-cost flights) can only be accessed through broadband. In the context of services such as banking being withdrawn from more remote areas and with post office services continually under threat, the availability of online banking and bill-paying to people living in remote areas becomes a necessity rather than an optional extra.

b) Social benefits

Outward migration has always been a feature of remote rural communities. Staying in touch with friends and family can be greatly facilitated by internet access. Email is just one option here. Others include facilities for online chat, and Voice-Over-Internet Protocol (VOIP). Sharing of content-rich material (photographs, video images) necessitates good internet bandwidth at reasonable cost.

c) Care and the aged

In the context of the older age profile of many rural areas, it is interesting to note that the EU program (A European Information Society for growth and employment) identifies a flagship initiative entitled “Caring for people in an ageing society”. The aim of this initiative is to explore solutions for “Ambient Assisted Living”, to extend the time older people can live independently

in their homes (supporting their daily activities, health and security). "Always-on" internet connection is a key tool necessary for this initiative. Studies
have shown that the elderly, people with less education, and lower income groups, all over represented in rural areas, tend to subscribe less often to broadband services at home.

d) Tourism

Tourism is one of the big success stories of the broadband. Broadband gives communities the means to set up and maintain a website promoting their area. A simple description of an area, along with a bit about its history, photographs of community and contact details, for local amenities can be a tremendously effective way of encouraging visitors. It could also promote local businesses to community members.

Although there is inadequate information on broadband availability to rural consumers, the data is available on adoption and use in USA. The National Telecommunication and Information Administration (NTIA) in its recent Network Nation Report estimated that 38.3 % of rural households subscribe to broadband services, compared to 58.3 % of urban households.

(iii) What can increase the usage rate among rural communities?

Many rural people lack basic knowledge about computers and the Internet. A broadband network serves the community best when all residents understand the necessity of computer literacy in today's society as well as the ways in which broadband access will open the doors to increased opportunities. It has been recognized that education and training efforts can involve increased costs of the broadband network, but that training programs can themselves generate economic opportunities and growth.

The following steps can increase broadband usage:

- Engage existing government and nonprofit organizations that are prepared and/or willing to provide training, such as senior's centers, youth centers, schools/adult education facilities, and libraries.
- Taking full advantage of an area's technology resources and incorporate volunteers, whenever possible.
- Utilizing Municipal-business partnerships, including technology companies, technology entrepreneurs, and students, into neighborhoods, schools, and community organizations where they can educate and assist underserved communities.

Whenever possible, training programs should emphasize small group instruction and peer-to-peer teaching methods.

4. Approaches

One of the great challenges of broadband is to provide service to potential customers such as farmers, ranchers, low population density areas, and small towns with topographical barriers and greater geographical distances. In attempting to address these challenges, some rural communities have found it helpful to develop a strategic plan for broadband deployment that includes creating a comprehensive business proposal to broadband providers. Such a plan, for example, could demonstrate to broadband providers that deployment is a sound business decision that would benefit both the providers and the community. This strategic planning process may include, but is not limited to, the following elements and approaches:

- Systematic assessment and prioritization of the community's needs for broadband service.
- Creating awareness and educating the community about the potential benefits of broadband service.
- Aggregating (consolidating) demand within the community to make service profitable for broadband providers. Participants may include, but are not limited to, individual consumers, businesses, educational institutions, health care facilities, and government agencies.
- Promoting partnerships among community organizations and institutions that might benefit from broadband deployment.
- Providing incentives to local providers, community organizations, nonprofit organizations and co-ops to encourage local and public ownership.
- Integrating development and capacity building for extending broadband infrastructure to the rural areas.

5. BROADBAND AND THE PRODUCTIVITY OF RURAL BUSINESSES

The positive economic impacts of broadband deployment on rural businesses, consumers, and th e wider economy have been noted by Ericsson in a study, the impact of broadband access in Indonesia, Rwanda and South Africa. This study found positive effects from the roll-out of broadband access in three broad aspects of society: development, resource management and networking.

i) Development effects

After introducing Broadband into a region, new businesses emerge, creating employment opportunities. Existing businesses benefit from the entrepreneurial opportunities that the broadband provides in expanding both the number and reach of channels to market. For example, the ability to create a homepage for marketing and to use e-mail for fast communication broadens the market for small entrepreneurs. In this way, the broadband opens up access to national and international markets and enables production to be more closely tied to actual demand.

Broadband also provides even the smallest businesses with access to market information and trends – helping them to refine their product development and production activities and their competitive positioning. For many service businesses, such as travel agencies, broadband access has become a prerequisite for efficient operations.

For individuals, broadband opens up a vast pool of knowledge and information that can help them set up a business, run their existing businesses better, enhances their learning and find employment. With improved access to news, current affairs and political developments, individuals feel more involved and can have a greater voice in regional and national affairs. The greater sense of involvement and engagement with social, economic and political life helps ensure a stable environment for development.

ii) Resource management effects

With broadband access, organizations can make more efficient use of resources through faster, more efficient communication, information handling and administration. By using the internet and e-mail, there is less need to travel to deliver or collect documents. Time is freed up to develop a business or public services, and the decision-making process is speeded up. Overall, businesses become more competitive and service to customers and citizens is improved.

Broadband enables individuals to manage their lives more efficiently. They can access information without having to visit libraries, send e-mails instantly instead of having to wait for the mail to be delivered – particularly useful where formal postal addresses are uncommon – shop online, perform financial transactions and look for work without having to travel. People enjoy greater convenience and control over their finances and the prices they pay for goods and services.

Rural people are using broadband to save fuel in Newzeland. They are increasingly turning to the broadband options in response to rising fuel costs. The Farmside Contact Centre experienced a 97 % increase in rural broadband according to report of rural broadband provider. They realized that they can save money by using the broadband for errands that have traditionally required a personal trip, like banking, shopping, vehicle registration, study or even doing tax returns.

iii) Networking effects

Broadband has the potential to help people with a common interest or purpose to find, build and maintain social networks, whether they are entrepreneurs, co-workers, villagers, school children or simply friends. People are quick to learn how to use the internet to spread knowledge and share inspiration for business and personal development.

6. WHAT'S BEING DONE NATIONWIDE (CANADA)?

Canada's Broadband Policies

The Canadian government established the National Broadband Task Force in January 2001. The task force was to map out a strategy with the goal of ensuring that broadband services are available to businesses and residents in every Canadian community by 2004. Given that Canada was already a world leader in the provision of broadband technology, the task force decided that their focus could be best spent on developing strategies to make broadband services available to regional and remote geographical communities.

It was decided that market forces alone would not be able to achieve coverage in these areas by 2004. The combined efforts of governments, the private sector and the communities themselves would be required to achieve this goal. The work of task force resulted in 'Broadband for Rural and Northern Development Pilot Program' and the 'National Satellite Initiative'. This pilot program was designed to assist communities without broadband access. Towns without access to DSL or cable modems were eligible to receive funding with preference given to First Nation, northern, rural and remote communities.

Following are some examples of broadband projects that are being implemented in various provinces of Canada:

SuperNet in Rural Alberta: Going Where Others Don't

Alberta SuperNet, one of the largest Internet Protocol networks in the world, is an ultra high speed performance network connecting over 429 communities in both urban and rural Alberta. It provides direct connectivity to 4,200 Alberta provincial government, learning, health, library and municipal facilities. The most popular method of doing this is wireless high speed Internet which provides access over a large area without the need to trench cables. More importantly, SuperNet was primarily a rural Alberta community initiative.

GOA initiated a proposal to make global connectivity available to all rural or urban community in Alberta in 2001. Two companies were contracted to build this network: Bell West built the southern half and Axia Supernet built the northern half. This plan uses an open access model which creates a competitive environment for service providers who want to deliver ultra high-speed services, including Internet access, to their retail and business customers especially those who reside in rural areas.

Generally, telecommunications service providers have been unable to provide services in rural communities, for economic reasons. The potential number of broadband users in a small centre usually isn't enough to justify installing costly broadband telecommunications infrastructure. Eliminating the "digital divide" that separates urban high-speed-users from rural users, and providing all Albertans with the opportunity to participate in and prosper from the knowledge economy was a priority of the Alberta government.

Service providers completed an agreement to provide access to high-speed internet for rural residents and small businesses and they connected 1,300 healthcare facilities, 2,300 schools, 311 libraries, 200+ small urban municipalities. Furthermore, First Nations, Treaty 6, 7 and 8 have also connected 157 education facilities, 95 schools and 44 Federal Health Care Facilities and 8 Metis Settlements.

Alberta SuperNet is designed to be self-sustaining, Revenue generated by SuperNet customers including government offices, schools, health facilities, libraries and municipal government offices, as well as Internet service providers (ISPs) and application service providers (ASPs) will be applied to the operation and maintenance of the network.

Opportunities offered by Alberta SuperNet

Alberta SuperNet is a pathway that lets government, educators and health care workers share and deliver information and services province-wide, faster than ever before. Moreover, broadband capabilities have provided many rural Alberta businesses with the opportunity to expand their marketing, service and production horizons. High-speed applications - such as videoconferencing, VPNs (Virtual Private Networks) and data services, including backup services, distributed databases, office and financial applications are helping businesses function more efficiently and profitably, from anywhere in the province.

Rural Benefits

Rural Albertans are experiencing the benefits of the Alberta SuperNet:

a) by their children participating in interactive learning experiences at schools.
b) at the local government office, where programs and services are delivered more efficiently and economically.
c) at the community clinic, where a real-time records transfer saves a tedious, possibly dangerous delay.
d) at the town library, where a quick web surf answers those difficult questions, or puts you instantly in touch with an old friend.

Churchill, Manitoba and Parrsboro, Nova Scotia

A study conducted in Churchill, Manitoba and Parrsboro, Nova Scotia from June - August 2005 by researchers from Brandon University, Dalhousie University, Mount Allison University and Strategic Networks Group Inc., provided information on the economic impacts of broadband access and usage.

Overall, the return on investment of broadband in Churchill and Parrsboro was positive. The critical impact identified in the research in Churchill and Parrsboro was employee, employer and community resident retention. Whether it was the family farm operator that could not deal with e-government files and forms or the Bed and Breakfast operator that lost customers because there

was no broadband access for them or the tour or theatre company that could not sell efficiently without the Internet, all saw positive gain once broadband was made available.

Rural Ottawa Goes Wireless:

Rural residents of Ottawa will soon be hooked up to the information superhighway. Like most rural areas, Ottawa's rural regions have a low population density, increasing the cost of providing DSL or cable broadband services due to large capital infrastructure costs. A Motorola-based fixed wireless broadband platform has been selected to cover the entire rural Ottawa market. The City of Ottawa identified broadband as an economic enabler in 2002 and adopted the following Multi-Pronged Broadband Strategy to:

- Increase broadband availability / through demand aggregation
- Build awareness of broadband benefits and availability
- Aggregate demand to encourage providers to invest in required broadband Infrastructure
- Support for grassroots organizations, community by community
- Facilitate groups, public meetings & liaison with broadband providers
- Building awareness of both the availability and the benefits of high speed Internet, Website, etc.

New Brunswick

Broadband access offers many possibilities for rural New Brunswick. Impacts of its adoption and use depend on how individuals decide to use this tool. Rural areas of the province have many development challenges including high rates of out migration, lower levels of education, lower income, higher percentages of older citizens as compared to urban areas, as well as the presence of single industry communities.

In March 2006, the NB Universities Broadband Research Consortium completed a preliminary study of broadband adoption, use, and impacts in rural New Brunswick. The purpose of the study was to advance understanding of the current state of broadband use in rural New Brunswick. The main objectives of the research with respect to social aspects were:

- to identify and measure (where possible) the social transformational changes that can be attributed to the uptake of broadband technologies within communities;
- to increase Canadian research capacity and expertise in the area of measuring impacts of broadband infrastructure in communities;
- to develop a body of knowledge which will guide and support future policy and program decisions and directions; and
- to develop accessible, relevant, and useful research results for the communities as well as other key stakeholders.

The study showed that 51% of respondents had Internet at work and most have high speed. 41% use the Internet "most days" at work. 90% respondents used their high-speed connection at home

chiefly for personal use. Other uses also include educational ones, paid work, accessing office networks and files, and much more.

42% respondents who have high-speed Internet use their connection to search for a variety of information including hobbies and interests, for information about events in and out of their local area, health concerns, jobs, educational opportunities, travel and tourism information, professional services, government services and real estate values.

Following are some other aspects of broadband use:

On-line Purchases

Since subscribing to high-speed Internet, some respondents have purchased a digital camera (47%), a web cam (35%), a new computer (33%), a USB key (29%), a photo printer (28%), a wired or wireless router / switch / hub (22%), an iPod or an MP3 player (14%), an LCD computer Screen (12%), a telephony headset (11%), a digital video camera (11%), a scanner (11%), and a wireless network card (9%). Four respondents indicated that they have a home based business with only one launching a home-based business since subscribing to broadband services. Furthermore, two respondents indicated that subscribing to broadband had a positive financial impact on their home based-business.

Positive Changes

Respondents of the household survey enumerated the positive changes in their lives. Their answers mainly show the importance of the high speed in performing operations and saving time from traveling to the bank, library, travel agency, as well as keeping contact and communicating with relatives and friends. Their answers are summarized in the following list.

- Fast access to the information
- Access to online newspapers
- Online payment
- Entertainment
- Telephone line is always free
- Trip savings
- Online banking services
- Online purchases
- Fast downloading of music and documents
- Working from home
- Communication using in addition to the traditional way, email, webcam, videoconferencing
- E-Learning, research for kids school projects, no need to go to the library
- Rapidity to do multi-purpose tasks at a time

British Columbia

NetWork BC – Connecting Communities is described as a digital divide initiative by the British Columbia provincial government. It is designed to leverage the purchase of telecommunications services by the public sector, to bring services to rural and remote communities. Telecommunications vendors that wish to sell telecommunications services to the provincial government are required to include solutions for under-served communities. A community engagement strategy has been developed by NetWork BC. Network BC staff

members are available to work with TELUS and community champions to make sure that communities are ready to benefit from broadband when it arrives in their community.

Alberta has a Memorandum of Understanding on Rural Development with BC. Possible adoption/evolution approaches could be facilitated through that agreement.

7. WHAT'S BEING DONE IN OTHER COUNTRIES?

Australia

Broadband is improving the economic and social opportunities for rural Australia. It is enhancing communications, providing better access to government and health services, and giving new educational and business opportunities to residents. Australian Government programs have enabled the rollout of enhanced broadband infrastructure necessary for delivering essential services in rural Australia and opening up new markets.

The bulk of the Australian population lives in large cities and towns where a variety of broadband delivery mechanisms is or could be made available. While Australia's rural and remote population is relatively small in number, it is distributed over vast areas. Coupled with sometimes challenging terrain and hostile natural environments, this vast area restricts the use of wire-based technologies, to the customer's premises, and predisposes the solution to one that is wireless based.

The Australian Government committed $1.1 billion in July 2006 for the Connect Australia package. Their goals are: the rollout of affordable broadband to people living in regional, rural and remote areas; extend mobile phone coverage; build new regional communications networks; and set up telecommunications services for remote Indigenous communities.

In addition, the Australian Government announced a new National Broadband Network plan in April 2009. According to plan the Australian Government will establish a company that will invest up to $43 billion over the next eight years to build and operate a wholesale-only, open access National Broadband Network. The new network will provide fibre optic to the home and workplace, supplemented with next generation wireless and satellite technologies to deliver superfast broadband services. This new super fast National Broadband Network, built in partnership with the private sector, will be the single largest nation building infrastructure project in Australian history.

Specifications:

This new National Broadband Network will:

- Connect 90 percent of all Australian homes, schools and workplaces with optical fibre (FTTP), providing broadband services to Australians in urban and regional towns with speeds of 100 megabits per second - 100 times faster than those currently used by many households and businesses.

- Use next generation wireless and satellite technologies that will be able to deliver 12 megabits per second or more to people living in more remote parts of rural Australia.
- Be able to provide high quality voice, data and video services including symmetric services such as *high definition video-conferencing*.
- Have a uniform pricing structure, regardless of customer location
- Directly support up to 25,000 local jobs every year, on average, over the 8 year life of the project. At its peak, it will support 37,000 jobs.

To facilitate the roll-out of the National Broadband Network, the Government will establish a company to build and operate the National Broadband Network on a commercial basis. The Government will introduce legislation for governance, ownership and operating arrangements for the wholesale-only National Broadband Network Company, and the access regime to facilitate open access to the National Broadband Network for retail level telecommunications service providers. Furthermore, the Government will introduce legislation to expedite the deployment of fibre optic networks to the home and workplace, including:

- requiring that greenfield estates that receive planning approval from 1 July 2010 include fibre optic networks to the home and workplace.
- simplifying and expediting land access arrangements for fibre optic roll-outs to the home and workplace, and improving access to poles, ducts and other essential infrastructure for fibre optic roll-outs to the home and workplace.

The Government will also seek to reduce the costs of deploying fibre optic networks to the home and workplace by:

- allowing optical fiber to be rolled out overhead on existing poles.
- allowing tele-communications carriers access to poles, ducts and pipes of other utilities, where technically feasible, for installing fibre optic infrastructure, and
- improving access to information about the location and availability of poles, ducts and pipes.

Plan of action:

To turn its vision into action the Government of Australia will immediately:

- Commence an implementation study to determine the operating arrangements, detailed network design, ways to attract private sector investment—for roll-out early 2010, and ways to provide procurement opportunities for local businesses.
- Implement measures to address 'black spots' through the timely rollout of fibre optic transmission links connecting cities, major regional centres and rural towns - delivering improvements to telecommunication services in the short term.
- Commence a consultative process on necessary changes to the existing telecommunications regulatory regime.

USA and Broadband

Currently, the United States ranks 17th in broadband penetration and its penetration rate is 47 percent. While rural America lags the rest of the nation in broadband penetration. A 2008 study by the Pew Internet & American Life Project shows that less than a third of rural Americans have broadband in the home. The current market driven policies for the build out of broadband do not adequately serve rural communities.

Rural America is vast and diverse and about 20 percent of the population lives in the countryside on 80 percent of the nation's land. Rural areas are by definition geographically dispersed and less densely populated than urban areas, making delivery of public services like broadband more challenging. Resultantly, as many of their fellow citizens in more densely populated parts of the country go online for work, education, entertainment, healthcare, civic participation, and much more, too many rural Americans are being left behind. Rural governments and businesses are missing opportunities to function more efficiently and effectively.

US Government Programs

The Rural Utilities Service, under the United States Department of Agriculture (USDA), runs "Rural Development Telecommunications Program" to increase broadband for rural residents and businesses. The program provides loans to companies that are willing to provide broadband to rural communities. Since the beginning of this program in 2003, over $658 million in loans have been allocated for rural broadband development. According to the Department of Agriculture, communication is a very important tool for farmers. The ability to share information concerning a new strain of a disease could save crops and money. The aim of the Agriculture program is to foster growth, create business, and develop critical community infrastructure such as fire, health, and police services.

A Universal Service Fund of nearly $7 billion was created in 2007 that supports four different programs as follows:

i. *High Cost Program* to assist customers in high cost rural or insular areas through financial support to telephone carriers, thereby lowering rates for local and long-distance service.

ii. *Schools and Libraries Program* commonly called the e-rate Program to assists schools and libraries through discounted telecommunications services.

iii. *Low-Income Program* assists qualifying low income customers through discounted installation and monthly telephone services and free toll limitation service.

iv. *Rural Health Care Program* assists health care providers located in rural areas through discounts for telecommunications and Internet access services. The discounts are intended to make rural rates comparable to those in urban areas.

Through an American Recovery and Reinvestment Act of 2009 known as the stimulus package, Congress appropriated $7.2 billion for broadband grants, loans, and loan guarantees to be administered by the USDA's Rural Utilities Service (RUS) and the Department of Commerce's National Telecommunications and Information Administration (NTIA).

The Federal Communications Commission (FCC) and United States Department of Agriculture (USDA) recently announced the launch of a new web site for those in rural America looking to bring the benefits of broadband services to their communities; called the *"Broadband Opportunities for Rural America"*. The new web site combines the expertise and resources of the FCC and USDA into a single, user-friendly site — providing information on the different technology platforms that can be used to provide broadband services, government funding for broadband services, relevant FCC and USDA proceedings and initiatives, and data on broadband deployment. In addition, the site provides instructions on how to locate companies already licensed to provide wireless services in or near specific rural communities, as well as helpful links to other government and private resources related to encouraging broadband opportunities in rural America.

State Programs

A number of states have implemented programs designed to spread broadband access to rural areas, including Mississippi, Kentucky, Virginia, Michigan and Maryland**.**

ConnectKentucky

The most impressive increases in broadband adoption have been achieved by Connect Kentucky. ConnectKentucky was launched to organize a systematic process to identify prospective users and aggregate demand to drive infrastructure deployment. ConnectKentucky maps the existence of technology county by county and then mobilizes eCommunity Leadership Teams to identify opportunities for demand in specific sectors (business, local government, education, healthcare, libraries, tourism, community organizations, and agriculture) to attract broadband providers to compete for customers. ConnectKentucky is working community by community, provider by provider to ensure:

- Broadband availability for all Kentuckians, businesses and local governments;
- Dramatically improved usage (adoption) of computers and the Internet;
- Meaningful online applications for local government, businesses, educators, etc;
- Establishment of local technology leadership teams in every county promoting technology growth for: local government, business and industry, education, healthcare, agriculture, libraries, tourism, and community-based organizations; and
- ConnectKentucky works closely and frequently with teams of leaders in each of its 120 counties.

The demand creation side of ConnectKentucky is led by the e-leadership team. In each county, ConnectKentucky has established an e-community leadership team comprised of nine sectors,

such as health care, schools, libraries, etc. Finally, a ConnectKentucky shows each sector how to reach their goals. Each county and each sector in Kentucky has their own unique plan on how to reach their broadband goals. Doing this at the local level is critical because "solutions are as local as the problem".

UK

In 2001 the UK government established its national broadband strategy through its white paper: "Opportunity for All in a World of Change," with a target "for the UK to have the most extensive and competitive broadband market in the G7 by 2005. The UK national and local governments both support broadband infrastructure development in rural areas, and also focus on helping public entities to build networks and aggregate demand–thus guaranteeing a subscriber base for broadband providers. Specifically, the government spent more than $2 billion on building public sector networks from 2003 to 2006. The funding was made available via the Broadband Aggregation Project (BAP), which was focused on providing key public services with broadband connectivity, including primary and secondary schools and National Health Service clinics.

In addition, from 2001 to 2005, via the Broadband Fund the UK government gave grants of around $127 million to more than 13 projects. In England, the municipalities of Cornwall, Hampshire, and Yorkshire have set up broadband initiatives. Shropshire is among the one of rural county which took Broadband initiative in 2005.

Shropshire is a rural county, and the smallest county council in England in terms of population (280,000). In January 2004, the take-up of broadband in the county stood at 1%. Low demand, coupled with the county's rural nature, and low-density population, meant that broadband providers were reluctant to invest in infrastructure. The Switch on Shropshire project Phase 1 was initially designed to address this issue. However, broadband infrastructure was rolled out to the whole of Shropshire in June 2005.

Phase 1

Raising awareness of the benefits of broadband, support packages (including grant aid to enable businesses to match fund the purchase of broadband connections and training) and 'Broadplaces' were identified as the main objectives of Phase 1. The term 'Broadplaces', is defined as a facility within the heart of rural communities, such as village halls, community centres, or even the local pub, where everyone could access computers and a broadband connection".

Phase 2 evolved from raising awareness, about the benefits of connectivity, to providing support. It aimed to encourage rural businesses to take advantage of the opportunities afforded by broadband access, and address the digital access divide within rural communities. For small businesses, free advice and grants were offered to exploit web-based development opportunities. Support grants were made available for ICT equipment, including PCs, laptops, servers and printers. Financial assistance was also offered for developing online services, e-commerce strategies or larger-scale commercial activities.

Over the two phases, 35 Broadplaces were created. Each was equipped with a basic package of laptops, software and broadband connection, with further equipment (e.g. digital video camera) and software options available. The Broadplaces also offered formal learning classes in partnership with local colleges or training organizations, and ran drop-in sessions with volunteers to help local residents use the technology.

The Impact

Switch on Shropshire is regarded as a major success story, with a community element that captured the imagination of everyone involved. “Shropshire has bridged the broadband gap, from lagging behind regional and national averages in 2003, to take a leading position by 2007.

By January 2007, over 420 active volunteers were involved in providing support across the network. In 2006, 15% of the eligible population of Shropshire used a Broadplace, equating to over 25,000 visits. Businesses also responded strongly – 480 were advised about ICT (7% of eligible businesses), and 250 businesses connected to broadband. Support in the form of ICT equipment was offered to 120 businesses. The work of the Switch on Shropshire project has continued, in relation to both businesses and the community.

New Zealand

New Zealand is a land of just over 4 million people. Of these, nearly three quarters live on the North Island, with over half of the inhabitants living in the five major cities of Auckland, Wellington, Christchurch, Hamilton and Dunedin. Auckland alone now accommodates nearly a third of the country’s population. With this mix of densely populated areas and scattered rural communities, the arrival of broadband Internet connectivity created a major economic challenge for the incumbent operators of wired networks.

The New Zealand government has implemented several initiatives to help develop a knowledge society, encourage innovation, build up regional economic development, and improve usage and access to ICT. The most important of these is the Growth and Innovation Framework, which aims to enhance the existing innovation framework, develop people’s innovation skills, increase global connectedness, and focus initiatives in areas which can have maximum impact.

Spain

Spain’s rural Basque County is leading the way in rural broadband access — with almost all its more than 2.1 million residents with access to broadband connectivity. An innovative government program called KZ@Banda Zabala provides broadband infrastructure throughout the Basque region, covering more than 4,500 square miles. The government venture utilizes a public-private partnership approach. The government provides the communications network, land space, and the customer premise equipment; while the operational maintenance of the project is run by a private telecom company. KZ@Banda Zabala has proven to be a success —

many rural schools now have access to broadband; small and medium-sized companies have extended their businesses; new startup businesses have emerged; and tourism is up.

Denmark

In Denmark, Djursland is a rural region located in the middle of Denmark and home to a successful, affordable rural wireless Internet Network — DjurslandS.net — one of the biggest non-commercial rural wireless Internet networks in the world, according to Government Technology. DjurslandS.net could be the answer to leveling the play field and providing affordable broadband deployment in rural areas across the world. What makes DjurslandS.net different is, it is run solely by volunteers — they are passionate about sharing their experience and knowledge to help rural communities around the world build their own wireless networks and bridge the growing digital divide. The group has set up the Djursland International Institute of Rural Wireless Broadband (DIIRWB) to teach the lessons they have learned in building a successful rural wireless community network.

8. Key Findings

The domestic and international initiatives highlighted in this report provide valuable information and longitudinal evaluations of the use of broadband in rural areas. The most notable findings from these initiatives are:

- Broadband helps improve economic and social opportunities in the rural and remote areas. Various studies indicate that broadband has a positive impact on the rural economies, businesses, consumers and socio-cultural life.

- A study conducted in 2005 showed an overall positive return on investment of broadband in Churchill, Manitoba and Parrsboro, Nova Scotia.

- Broadband is widely used to get information on events, jobs, businesses, tourism, educational opportunities and government services.

- Broadband has been identified as an economic enabler by the City of Ottawa. A Motorola-based fixed wireless broadband platform has been selected to cover the entire rural Ottawa market.

- The broadband technologies have been adopted in USA, Australia, New Zealand, Denmark and UK for improving the economic and social opportunities in the rural areas.

- Development of a community of broadband users requires more time, support, and investment than is usually anticipated.

- Technology training is a necessary component for adoption and deployment of broadband in rural communities

- The best community developments are led by the community itself – specifically those local early adopters and champions – and not by outside enthusiasts or technologists.

- E-learning is a growing market but e-shopping, communications and entertainment are the primary drivers of domestic broadband take-up.

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