"Diversifying Alberta's economy through technology"

ALBERTA RURAL BROADBAND - STATUS REPORT

EMBARGOED UNTIL 12:01 AM TUESDAY JUNE 17, 2008

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Commissioned by:
Alberta Council of Technologies

June 2008

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Preface

The Alberta Government's decision to lead Canada in the installation of "SuperNet," a public information highway for rural Alberta, was done with much fanfare, at considerable expense and with high expectations. The optic fibre network to the Province's rural communities was to enable their public services to access high-speed, broadband service applications. SuperNet was also expected to elevate consumer expectations prompting the formation of new suppliers for bridging the public-private divide. It was also expected to stimulate new applications among suppliers to better serve remote locations. A couple of years later, SuperNet is surrounded in controversy and the anticipated advantages are unrealized: private usage has not materialized and significant gaps in service and questionable service standards are prevalent. And blame is dispersed. We hear of corporate giants not performing, residential and small business usage lagging, a confused rural constituency and a lack of leadership.

The Alberta Council of Technologies (ABCtech) is about Alberta - all of Alberta - and the role of technology in the lives of Albertans, their businesses and institutions. Realizing the promises of Rural Broadband remains one of our top priorities:

- Alberta is prospering, and it is essential that community-building be maintained; that no one be left behind. Rural Broadband is a measure for ensuring that people and enterprises in rural Alberta have access to information, communications and productivity-enhancing Internet-based services.
- Diversification is the safeguard for economic sustainability. Rural Broadband is a stimulant to innovation and supplier productivity, supplier competition and regulatory issues associated with rapid changes in technology. SuperNet should help put - and keep - Alberta and Albertans, their families and enterprises, in the forefront of the knowledge-based economy.

In light of the priority given to Rural Broadband and the associated frustrations, in January 2008 the Alberta Council of Technologies commissioned a Report on the status of Alberta Rural Broadband. The Terms for the working group included preparing a status report and associated recommendations on Alberta Rural Broadband. (See Appendix A)

I have witnessed the frustrations, diverse viewpoints, and concerted efforts of each member of the working group. But persist they did, and for that, on behalf of ABCtech's Board of Directors, I want to personally thank Allan Bly of ViTel Consulting and Gail Robinson of TechCom for their leadership as co-chairs and recognize the overall contributions of the editorial committee:

Trevor Doerksen – MoboVivo
David Antoniuk – TRLabs
Volker Mednritzk – Loyalty Vision
Craig Dobson – Taylor Warwick
James Van Leeuwen – Ventus Development
Mike Hollinshead – Facing the Future
Andy Blundell - Communities without Boundaries

The following Report is illuminating and also disappointing. We were hoping for clarity and we anticipated some provocative recommendations. Indeed, the Report acknowledges that SuperNet has triggered fundamental community and technological issues. But instead of clarity and bold resolutions, the Report alludes to confusion and finger-pointing, symptoms of the challenges of managing change on several fronts simultaneously.

The issues of Rural Broadband are indeed complex and multi-faceted. Their resolution will require time and understanding, plus recognition that the telecommunications industry is in transition. Also, the instruments of government are challenged to accommodate the impact and speed of technological change. The stakeholders are on a frontier, forming new relationships and gaining new understanding. The basic role for government is to ensure "fair play," while encouraging competition for governing standards and costs, and when competition is not evident, to ensure service and protective measures. We remain convinced that Rural Broadband will be a significant contributor to diversifying Alberta's economy – but leadership is lacking!

The Alberta Council of Technologies supports the Report's general conclusion - that Rural Broadband is incomplete, that the issues are many, and that mutual understanding is sorely deficient. The Report recommends that the Alberta Council of Technologies assumes a leadership role as an "honest broker" in an initiative entitled "Communities without Boundaries," for engaging stakeholders in a series of consultations aimed at clarifying issues and deriving mutually-beneficial resolutions.

Perry Kinkaide, President
Alberta Council of Technologies
Edmonton - June 17th, 2008

1. The Advocate – Leadership Is Needed

Alberta's prosperity stems from an abundance of carbon and the integration of rural and urban centres to harvest and mine, process and transport – timber and fibre, wheat and meat, oil and gas. Alberta's ***rural*** communities, are to Alberta's prosperity as roots are to trees. But there is more to the prosperity equation than natural gifts.

Resource management – rural centric. A prosperous Alberta warrants a commitment to fostering resilience and prosperity in its rural communities, communities upon which carbon markets and processors depend. Rarely in human history has this become more apparent than in recent years as the globe struggles to rebalance its dependency on its carbon gifts. Rural communities are central to this challenge, learning to be effective and responsible stewards of 'renewable and non-renewable capital.'

Management processes – information centric. Learning and innovation, enterprise and governance are the primary processes by which society functions. Each of these processes require information and an established and growing dependency on contemporary telecommunications networks – a vital educational and communications infrastructure, especially ***Rural Broadband*** networks.

By advancing the social and economic exchange of information within and between rural and urban populations and public institutions, broadband networks can serve to reverse migration from rural areas, by equalizing access to information that has been historically urban centric.

The Province of Alberta is strongly positioned to lead the world in Rural Broadband development. Rural Alberta offers immense opportunities for balancing Alberta's economy in the 21st century. Several favourable conditions exist throughout most of rural Alberta:

- Diverse and healthy natural environments (an Alberta Advantage)
- Access to rich and varied carbon resources (global relevance)
- Exceptional lifestyle opportunities (recreation and natural/scenic settings)
- Exceptional transportation infrastructure (rural road systems)
- Exceptional telecommunication infrastructure (rural fibre network)

Leadership is key. To capitalize on these advantages, competent and committed leadership is required at all levels. For example, rural/urban cooperation is warranted to address serious urban skilled labour shortages and equally serious labour depletion in rural areas.

- Rural leadership - promoting the role of advanced telecommunications in sustaining rural communities and serving to rally local commitment and investment on the demand side of the 'broadband economy', facilitating regional cooperation, and fostering 'cultures of use.'
- Urban leaders - supporting and encouraging the provincial government to support province-wide broadband applications and development, eliminating the urban-rural 'Digital Divide'.
- Provincial leaders - fostering and supporting community leadership, to stimulate development of ***robust*** (sustainable) broadband networks and services to serve rural communities, and to establish the government as an 'anchor' tenant and service provider on these networks.

2. The Economist - Rural Broadband Is a Equalizer

Broadband is a rural economic enabler. Rural communities require broadband to provide access to e-Commerce, e-Government, e-Health, and e-Learning resulting in better jobs, improved health care, and greater educational opportunities. The bridging of the rural/urban "Digital Divide" is not about technology, it is a matter of making information more accessible in rural communities, and this requires communications between interested parties, political will, education, and funds.

Every region in Alberta, rural or urban, must figure out its unique source of competitive advantage. That niche will be defined by pairing a region's distinct economic assets with an insightful analysis of new market opportunities. The region's competitiveness strategy then becomes the path from assets to opportunity. Without access to broadband it is difficult for a rural district to manage and maintain this strategy.

Rural Broadband is a necessary pre-requisite to attract new business or enable existing business to grow. In the global economy it is on par with having phone services, roads, and utilities. Attracting or growing new entrepreneurs is critical to rural economic growth. For early stage entrepreneurs, getting connected to an entrepreneurial network is a critical piece of the success equation, but the public sector's role in Rural Broadband development is ambiguous, hampering its completion.

Noted economist and author Joel Kotkin argues in his book, *The New Geography: How the Digital Revolution Is Reshaping the American Landscape*, that our new technology-driven economy has spurred an "out-migration" of talent from urban regions of the country to more rural areas. Kotkin provides statistical data to support his conclusions and surmises that in the 21st century, there is an opportunity for rural, emerging markets to capitalize on this migration to become new entrepreneurial powerhouses. "Increasingly, wherever intelligence clusters, in a small town or big city, in any geographic location, that is where wealth will accumulate," Kotkin writes.

Economic diversification is considered a key survival mechanism for many rural communities. In order to energize this rural economic revolution ubiquitous Rural Broadband is a basic requirement for all Alberta's rural communities

3. Community Leaders – Resolving Local Issues

Success in Rural Broadband depends most heavily on the effectiveness of community leadership. The highest priority for these leaders must be to support incumbent community members in recognizing and realizing the value of broadband to their own legitimate interests. The best candidates for leadership are residents who are recognized and respected throughout their communities, good communicators, with compelling stories about their own experiences with broadband. The very first step for any community is to bring these candidates together, and encourage them to work together in the application of broadband solutions to local problems/opportunities.

The rural migration scenario introduced above involves varying degrees of disruption to social, cultural and economic status quo in Alberta's rural communities. Traditional and conservative values prevail throughout most of rural Alberta, and some of these values are bound to conflict with values that newcomers will bring with them. To prevent these conflicts from impeding healthy community and economic development, it will be essential to facilitate understanding through effective, ongoing communication among community members old and new.

Among other things, the abundant 'local wisdom' incumbent communities have accumulated over time should be captured, celebrated and made as accessible as possible. This will help to foster respect and understanding for the incumbent community, while empowering newcomers to settle in to the community more effectively. At the same time, it will be helpful to provide convenient means by which old timers and newcomers can introduce themselves and get better acquainted.

The key to achieving these and other preferred outcomes are well-designed, well-supported and well-executed communication programs, involving both traditional and new media (Welcome Wagon programs, open social functions, print media features, community web portals, etc.).

When promoting broadband development, program content must focus on what broadband technology can do for people, not on the technology itself. By way of analogy, the important things about hybrid vehicles are that they save us money and reduce emissions. The important things about laptops are that they help us learn, make money and stay in touch with family and friends.

4. Service Applications – Enhanced Prosperity

Rural broadband provides members of communities with the means to: access specific information, collect the best resources from anywhere in the world, and to collaborate with individuals and groups worldwide. A community's imagination is the only limitation for the applications for Rural Broadband.

Examples:

- A young farmer in the County of Vulcan gets millions of hits a month on the website he runs using a wireless internet connection.
- In Olds, the Community Learning Campus is commissioning the Bell e-Learning Centre which will act as a hub for high-school, college and adult learners.
- A Fort Vermillion high-school student won a scholarship to an Ivy League University in the United States based on his academic success in video-conferenced classes.
- The Alexander First Nation runs a data services business from a reserve north of Edmonton.
- A Sundre businessman consults to U. S. Fortune 500 companies.
- In Red Deer, a surgeon uses video-conferencing so that patients do not have to travel many hours for a brief consultation.
- 24/7 Video tours helps rural businesses provide broadcast-news style content on their websites.

There are three primary Rural Broadband applications that are required to simulate rural economic growth: e-Learning, e-Health and e-Commerce applications.

4.1 e-Learning Applications

Rural learners are disadvantaged due to poor Internet connections. Rural Broadband can have a major impact by providing rural learners access to e-Learning courses. Broadband access to e-Learning courses provide a wide range of benefits to a rural community, including:

- Flexibility in terms of both time and place of study,
- Access to and guidance through Internet resources,
- Engagement with a community of fellow learners and tutors.

The original SuperNet plan called for every school to be connected. Every school has a minimum SuperNet connection paid for by Alberta Education. Five projects were funded by Alberta Education:

- Three (3) Video Conferencing
- One (1) Professional Development
- Two (2) Extended Classroom

Young people continue to leave the rural communities to seek employment and higher education. Rural Broadband offers the potential of new types of education and employment for young people, opportunities which can help them compete is a global marketplace.

4.2 e-Health Applications

Many Albertan rural areas have limited access to health care facilities and suffer from a shortage of doctors, nurses, and technicians. The emergence of e-Health has been shown to reduce the cost of healthcare and increase efficiency through better retention and retrieval of records, better management of chronic diseases, shared health professional staffing, reduced travel times, and fewer

or shorter hospital stays. More directly, broadband helps to address three of the most critical complaints about the Canadian health care system — high administrative costs, discrepancies in geographic coverage, and the high cost of delivery of services.

There are six e-Health activities that specifically benefit from Rural Broadband:

- **Electronic Medical Records.** The collection, communication, storage, indexing and access to patient data.
- **Clinical e-Health.** All types of physical and psychological measurements that do not require a patient to travel to a medical person. This involves two distinct areas of clinical service — patient treatment and remote patient monitoring. Patient treatment replaces the traditional visit to a medical facility or office with a broadband consultation using remote videoconferencing or other broadband services. Remote patient monitoring uses devices to remotely collect and send data to a monitoring station for interpretation. Such remote applications might include a specific vital sign, such as blood glucose or heart ECG, or a variety of indicators for homebound patients.
- **Evidence Based Medicine**. Aimed primarily at health care professionals, this service delivers information on appropriate treatment under certain patient conditions so that the professional can determine whether a diagnosis is in line with current scientific research.
- **Consumer medical and health information.** Consumers are able to use the Internet to obtain specialized health information and on-line discussion groups to provide peer-to-peer support.
- **Medical education.** The use of online medical education for health professionals and special medical education seminars for targeted groups in remote locations.
- **Virtual healthcare teams.** The creation of teams of healthcare professionals who collaborate and share information on patients through digital equipment.

4.3 e-Commerce Applications

e-Commerce is broadly defined as any business activity or practice conducted by means of electronic communications. The importance of e-Commerce is widely recognized in the business sector located in urban areas. Not enough has been done to teach rural businesses how to use e-Commerce strategies to strengthen their economic health and stability, improve their market share and catapult the efficiency of their products and services.

Rural businesses use the Internet for various activities including e-mail communication, on-line banking, payment processing and bill-paying; customs clearance; market research; product promotion; document delivery; on-line sales; industry promotion and support; business-to-business trading; and supply chain management. For many, e-mail has become an integral part of business operations, quickly supplanting traditional forms of communications, expanding their market reach and generating substantial cost-savings.

The barriers to rural e-Commerce applications are:

- Do rural areas need to have the technology in place to embrace e-Commerce?
- Do rural based businesses understand how e-Commerce can benefit their operations?

Access to broadband is a basic requirement for rural businesses to use e-Commerce to grow and enhance their business activities.

4.4 Pilot Projects and Research

Pilot projects and research in the e-Learning, e-Health and e-Commerce areas will help to generate both urban and rural community interest. These projects should be followed by ongoing discussions between communities. The outcome of these projects should be measurable and relevant to the community's needs.

Examples:

- Bell Canada, the prime contractor in building the SuperNet, is now shifting its focus to developing applications such as video conferencing. Utilizing video conferencing for distance learning and remote medical instruction and monitoring.
- TRLabs proposes a collaborative research program for *Next-Generation Networks for e-Health Applications* that will address innovative delivery of healthcare and health related applications from two distinct yet complementary themes that require solution-seeking. One theme poses the question - "What are the network requirements for a Next-Generation Networks (NGN) that will be necessary to deliver 'mission critical' e-Health services?" A second theme poses the question - "What new and innovative e-Health services could be offered on more advanced network infrastructures. (See Appendix B)
- Alberta's aboriginal communities represent a special situation with jurisdictional challenges. However, inclusion is fundamental and initiatives are evident that should be capitalized upon such as the Alexander First Nation west of Edmonton <http://www.alexanderinternet.com/index.php?pt=news&id=9> Others have shown initiative and struggle - the The Kainai First Nation. And the Piikani First Nation tried to build and operate their own broadband network using second-tier freeband equipment available through an INAC program. Of interest are the lessons learned by the First Nations Technology Council in BC <http://www.fntc.info/>

5. Stakeholder Consultation - Communities without Boundaries

"Communities without Boundaries" originated as a collaborative initiative between Olds Community Learning Campus and the University of Calgary. Communities without Boundaries 2007 Conference attracted a broad cross section of about 135 SuperNet stakeholders. The conclusions from round table discussions were remarkably consistent. Rural Alberta's public agencies have access to SuperNet, but the rest of the community lags behind. The difficulties in gaining access to the SuperNet and the Internet were consistently cited as an urgent issue for rural communities. In addition, the round tables identified needed applications in education, health, economic development and community capacity building, as the most important.

Two initiatives were organized to address these concerns. The first was a Round Table on Rural Connectivity organized by the Van Horne Institute. The second is the virtual conference planned for 31st October, 2008. The applications that community members identified exactly matched the 'pillars' of Alberta's Rural Development Strategy published in 2005. The initiatives demonstrate how Albertans can use rural connectivity to further rural development.

Although the Alberta SuperNet is a superb technological achievement, little attention has been paid to realizing the benefits from this investment. The network runs well-below its capacity, and yet rural residents express frustration with the lack of private access to SuperNet. In order to realize the benefits, we need to:

- Establish the physical infrastructure for enabling all Albertans to be full participants in the global economy and society powered by the Internet. Complete the private/public Network for ensuring access for all of rural Alberta.
- Establish a stakeholder network that will identify and address the complex, multi-dimensional issues. Identify community champions and technology practitioners including librarians, educators, health workers, entrepreneurs, and established businesses.
- Develop the human capital of digital skills and literacy and stimulate development of applications that will provide locally relevant, made-in-Alberta content.

6. Counties and Municipal Districts Perspective - Poor Broadband Access

Counties and municipal districts of Alberta are administrative subdivisions of the province. They include counties, municipal districts, specialized municipalities, special areas, regional municipalities, improvement districts, and metropolitan areas.

The Alberta Association of Municipal Districts & Counties (AAMDC) is an association of elected rural councils representing the interests of rural Albertans. AAMDC carries forward the critical issues to both provincial and federal decision makers. The AAMDC works to encourage policy and legislation that address and meet the issues and concerns of rural Albertans. The AAMDC has created a rural task force. The task force asked municipalities to identify barriers to broadband access.

These include:

- Lack of Information
- Uncertainty about the Benefits
- Interconnection Costs Too High
- Rural Topography requires Line-of-Sight
- Population Distribution
- Lack of Tower Infrastructure

The AAMDC is currently drafting a SuperNet awareness campaign and encouraging ISPs to service rural areas. The AAMDC has developed a broadband toolkit for its members. The AAMDC believes that the Government of Alberta needs to develop a policy on rural connectivity to provide broadband access to all Albertans.

Rural communities today face difficult choices as their economies evolve from dependence on agriculture and natural-resource-based industries to dependence on less traditional sources of income and employment such as light manufacturing and service-oriented businesses. In addition to these economic changes, local government in rural areas often finds itself sandwiched between the growing demands for government services and continuous reductions in government funding. Through a series of development decisions, these communities must create new ways to provide essential public services and secure a strong economic base.

7. Alberta Ministries and Agencies – Broadband Champion Lacking

There are many government ministries and agencies that have an interest in Rural Broadband. It has been our observation that these ministries and agencies operate independently, and there appears to be no central authority responsible for identifying and resolving Rural Broadband issues.

7.1 Government Ministries

The Government of Alberta Ministries most closely concerned are Service Alberta and Agriculture and Rural Development but many others – including Health, Education and Municipal Affairs - have direct or indirect interests in Rural Broadband issues.

a. **Service Alberta**
www.servicealberta.gov.ab.ca
Minister: Heather Klimchuk
Service Alberta provides financial and technology services to government ministries. This integrated approach allows the government to operate as a single entity. Service Alberta is responsible for leveraging the SuperNet to connect Albertans with government services such as such as learning and health services.

b. **Alberta Agriculture and Rural Development**
www.agric.gov.ab.ca
Minister: George Groeneveld
Ministry consists of the Department of Agriculture and Rural Development and Agriculture Financial Services Corporation (AFSC). The Ministry is also responsible for the Office of the Farmers' Advocate; Irrigation Council; Agricultural Products Marketing Council; and Alberta Grain Commission. The Alberta Agriculture and Rural Development supports economic initiatives in rural Alberta.

c. **Alberta Advanced Education & Technology**
www.advancededucation.gov.ab.ca
Minister: Doug Horner
Alberta Advanced Education and Technology is committed to fostering excellence in ICT research that contributes to the continued prosperity of this province. AET funds research projects and organizations such as NEWT which may have a direct impact Rural Broadband access technologies.

Government of Canada

www.rural.gc.ca
The Rural Secretariat, within Agriculture and Agri-Food Canada, provides the overall leadership for rural issues in the Government of Canada. The Rural Secretariat is an interdepartmental working, consisting of federal departments and agencies, and rural teams working in each province and territory. The Rural Team in each province and territory is made up of representatives from different levels of government and key stakeholders.

7.2 Government Agencies

A government agency is permanent or semi-permanent organization in the government that is responsible for the oversight and administration of a specific function.

a. Rural Alberta's Development Fund

www.ruralalbertasfund.com

Rural Alberta's Development Fund is an independent not-for-profit company that wants to work with groups, organizations and communities that care about growing rural Alberta. The Fund's Board of Directors administer a $100 million fund which is used to fund innovative projects that are community-supported, collaborative, and will have a positive, sustained impact on rural Alberta. The agency has funded the following Rural Broadband projects:

1. **Rural Information Services Initiative ($3.7m)**

   The Rural Information Services Initiative (RISE) is a partnership between Chinook Arch, Shortgrass and Marigold library systems in southern Alberta. The project's goal is to establish, for the first time, virtual meeting rooms with high speed video internet access at 80 rural libraries and other public locations. This will give rural residents more opportunities for on-line learning and skill development and increased access to public services such as Service Canada and Service Alberta.

2. **Finishing the Dream ($2.5m)**

   This project will resulted in 12 south central Alberta communities gaining access to Alberta's SuperNet through Community Engagement Sites (CES). These sites will enable local residents to access broadband technologies, learning applications and support close to home. The project is being implemented by the South Central Rural Alliance, which is composed of area municipalities and educational institutions.

3. **Cooperation, Learning, Innovation and Community ($1.5m)**

   Grant for a new Virtual Learning and Business Centre and a rural oriented web-based portal known as ClicSite.ca It will use SuperNet connectivity to better serve the needs of rural Albertans. The ClicSite.ca project is also the physical facility, programs, technology and other related resources that will offer new opportunities for economic growth, expanded learning and skills development, increased capacity and quality of life and potential for enhanced health delivery in rural Alberta. (www.clicsite.ca)

b. Access to the Future Fund

http://alberta.ca/acn

The Innovation Fund awarded $2m to the Community Learning Network, Literacy Alberta and Volunteer Alberta to give more than 160 organizations access to the SuperNet and videoconferencing technology.

8. CRTC – Two Prime Regulatory Issues

The CRTC (Canadian Radio-Television and Telecommunications Commission) regulates local access in Canada. The regulation is intended to protect consumers with respect to matters such as price, quality of service, and terms of such as privacy, disconnection and billing. The CRTC must forbear (refrain) from regulating a telecommunication service when it finds that a service will be subject to competition sufficient to protect the interests of the users. There are two CRTC directives that impact the deployment of Rural Broadband.

8.1 CRTC Deferral Accounts

In 2002, the Commission set out its price cap framework. Price cap regulation places a ceiling on prices a company can charge its customers. At the same time, in order to avoid an adverse impact on local competition as a result of mandated rate reductions under the price cap framework, the Commission required each major local telephone company to create a deferral account. The companies were requested to place into those accounts amounts equal to the revenue reductions that would otherwise have resulted from an application of the price cap formula. It is estimated that over $650 million has accumulated in the deferral accounts since they were created in 2002.

In January 17, 2008 the Commission approved the use of deferral account funds by incumbent local exchange carriers for certain initiatives to improve access to telecommunications services for persons with disabilities and to expand broadband services to certain rural communities in British Columbia, Alberta, Manitoba, Ontario, and Quebec. The Commission also directs that any balance remaining in the deferral accounts be rebated to residential subscribers in non-high-cost serving areas.

Rural communities that qualify are located in High Cost Serving Areas. High Cost Serving Areas meet the following criteria:

- No ILECS provide or plan to provide broadband services to the community under their commercial broadband expansion programs;
- No funding for broadband expansion, or approval for such funding, has been received by the community from a government-funded broadband expansion program,
- No broadband services equivalent to those proposed are currently offered or planned for the community by another service provider.

TELUS has $163 million in its deferral account. TELUS proposed spending the fund on the delivery of broadband to 334 rural communities in BC, Albert and Quebec. Based on the above qualifications, the CRTC has ruled that TELUS can connect to 234 communities including 59 First Nations communities. The remaining funds of approximately $50 million, is to be distributed among customers who have been TELUS customers since 2002. In April 2008, TELUS petitioned the CRTC to change its ruling to allow them to use the remaining funds to provide Rural Broadband to an additional 100 rural communities.

The CRTC deferral account will have a major impact on Alberta's High Cost Serving Areas. The fund will ensure Rural Broadband is provided to communities that may have not been able to get broadband due to economic reasons.

8.2 Local Loop Unbundling

Local loop unbundling was introduced by the CRTC in 1997. Unbundling the local loop, as a policy, is built on the recognition that incumbent carriers have a dominant position in the provision of local access by virtue of their control over the local loop which can not be economically replicated by alternative providers. This position of dominance has resulted from many years during which incumbents had a monopoly in the provision of voice services in rural Alberta. The requirement of unbundling loops in lower cost areas, such as large urban areas, was put in place for a period of five years starting from May 1997. A decision was made in 2001 subjecting local loops in rural areas to unbundling requirements on an indefinite basis.

Local loop unbundling can be classified into two types:

1. **Full unbundling.** The copper pairs are leased by the new provider. The new provider takes complete control over the copper pair and can provide subscribers with services including voice and broadband. The incumbent owns and maintains the copper pair.
2. **Line sharing.** Line sharing allows the incumbent to maintain control of the copper pair and continue to provide some services to the subscriber such as voice services. The new provider leases part of the pair and provides broadband services. The CRTC has not mandated line sharing.

In order to interconnect the copper pair to the new provider's equipment the incumbent must provide access to a collocation facility. There are two ways to provide collocation:

1. **Caged Collocation.** A physically separate space from the rest of the incumbents exchange by a wire mesh or partition.
2. **Co-Mingling.** Cageless collocation where the new provider's equipment is placed together with that of the incumbent.

The Internet Centre (www.incentre.net) has a filed a complaint with the CRTC stating that TELUS is not complying with the local loop unbundling regulations. TELUS will provide access to local loops if the Internet Centre co-locates in a TELUS central office. The Internet Centre claims that the TELUS's co-location rates are cost prohibitive including, a $68 million dollar insurance policy for each central office, and the current co-location services are not cost effective, because it does not allow them to multiplex customers onto a single SuperNet port. The Internet Centre wants TELUS to connect two or more local loops to their equipment located outside the central office and remove the necessity for co-location. TELUS has refused to comply, and the Internet Centre states that this is a contravention of CRTC Tariff 522.2.

9. Alberta SuperNet – The Technology and the Infrastructure

The Alberta SuperNet is an IP-based transport network that interconnects 429 communities and 4200 learning centers, health facilities and government offices. SuperNet now has the capacity to bring high-speed access to more than 86 per cent of Alberta's population, making SuperNet a key factor in rural Alberta's social and economic development. An estimated 91 Internet Service Providers (ISPs) provide the "first mile" access to the SuperNet Point-of-Presence (POP) within these communities.

Axia NetMedia is responsible for maintaining and managing Alberta's SuperNet. Axia uses an open access model which means any service provider in the province can use the SuperNet to deliver ultra-high speed services. There is an open Point-Of-Presence (POP) in every community. Service providers install and manage the first mile access to the POP.

9.1 Point-of-Presence Access

Service providers can use different access technologies from the home or business to the SuperNet POP including:

a. **Terrestrial Access**
   - Copper Based
   - Coaxial Cable Based
   - Fibre to the Home (FTTH)

b. **Wireless Access**
   - WiFi (IEEE 802.11g)
   - WiMAX (IEEE 802.16)

9.2 Service Pricing

Axia provides two types of services:

- Layer 2 VPN Services
- Layer 3 VPN Services

Each of these services has different service pricing.

For a complete description of the Alberta SuperNet, POP access and service pricing see Appendix C.

10. Structural Separation – An Economic Paradigm Shift?

The common assumption that there is no sustainable business case for the provisioning of ubiquitous broadband access to rural communities arises from the traditional telecom business model in which the incumbents deploy service specific network infrastructure and recoup their capital expenditures through the sale of services – historically voice – that their networks support. As open, symmetric, high bandwidth (100+ Mb/s) networks that stimulate innovation and regional economic development break this network/service relationship, with fibre networks, a variety of alternatives become available. Indeed, the underlying issues here are not unique to Alberta – they have been recognized throughout the developed world and, as such, a wide variety of solutions are now in various stages of being developed and deployed.

The key is to 'structurally' separate the underlying network infrastructure from the services deployed so that the network can be funded as a long-term investment. The network is then operated on an open nondiscriminatory basis that enables full competition at the services level. Analogously, the power grid is provisioned on a utility (structurally separated) basis that enables full competition among the appliance providers. Though not exactly rural, this approach in the 60,000 home community of Vasteras, Sweden yielded true broadband infrastructure with 20 service providers offering 60 different service sets and take-rates close to 100%.

Certainly the economics of the network build become more challenging as population density decreases, but unlike fixed wireless solutions with expected life-times in the 5-year range, passive fibre infrastructure in a home-run architecture can be expected to have life-times in excess of 30 years and can therefore be funded on that basis. Funding arrangements can be tailored to community circumstances and range from more conventional pure government funding, to private-public partnerships, to private ventures, and to more novel arrangements based on, say, carbon credit offsets. Ownership and governance structures vary similarly and can also be matched to the unique needs of each community.

Going forward, structural separation ensures that the host communities will benefit from unrestricted innovation and the economic development that ensues as a host of companies and upstarts develop and offer unique services over the network on a level playing field. Should a Healthcare or Education provider, for instance, wish to offer either specialized or community centric services, they are indeed free to do so.

Achieving the paradigm shift outlined above will take time and the concerted collaborative efforts of many players. Indeed, while the destination may be clear, the path forward is not. Regardless of the path selected, success will critically depend upon the deep involvement and commitment of each individual community.

11. Summary – Barriers to Rural Broadband

When trying to identify and categorise the barriers to Rural Broadband, it is helpful to consider the circumstances of three blind men who happen upon an elephant in their journeys. The first man touches the elephant's trunk and determines that he has stumbled upon a serpent. The second man touches one of the elephant's massive legs and determines that the object is a large tree. The third man touches one of the elephant's ears and determines that he has stumbled upon a huge bird. All three of the men envision different things, because each man is examining only a small part of the elephant. In this case, think of the elephant as the barriers to Rural Broadband. Different people see different barriers. People have a natural tendency to adapt an ambiguous set of concepts to a single paradigm that encompasses just their particular set of problems.

The first step in solving the "Digital Divide" problem is acknowledging and defining the barriers to Rural Broadband. There are several inter-related barriers that are limiting the deployment of Rural Broadband in Alberta including:

11.1 Rural Demographics Undermine Business Economics

Rural demographics play a key role in determining the business viability of implementing Rural Broadband. Districts can be divided into urban, suburban, exurban, and rural areas. The low population density of most rural areas makes cost effective broadband network deployment very difficult and expensive. Rural Internet Service Providers deploy a specific network infrastructure and attempt to recoup their capital expenditures through the sale of services. There is no sustainable business case for Internet Service Providers to provide ubiquitous broadband access to rural communities such as farms, villages, and acreages. In low populated areas the capital expenditures exceed the potential future revenues. If this same model was used to build Alberta's highways they would not exist today. Bundling of the services and infrastructure slows down economic development.

The key is to 'structurally' separate the underlying network infrastructure from the services deployed so that the network can be funded as a long-term investment. The network is then operated on an open nondiscriminatory basis that enables full competition at the services level. This economic model would require a public/private partnership, where the network infrastructure would be managed by a public organization, such as a county or municipality, and the services provided by independent service providers.

Proactive, government policies are needed in order to facilitate this new economic model. Government policy makers must realize that the traditional market driven cost model is not sufficient enough to ensure that all of rural Alberta will have the same social and economic opportunities as major metropolitan areas.

11.2 Relevant Content Missing

Between 1990 and 1995, the governor of North Carolina, put forward a mandate to create an Information Highway that would be used connect schools, libraries, health care facilities, and businesses. A government official stated: "The state-wide high-speed network would give people in rural areas equal access to information and many services enjoyed by people in cities. By 1995 most education institutions had disconnected from the Information Highway because of interconnection costs, and the lack of relevant content.

In 1995 in North Carolina, the primary application for the Information Highway was video conferencing. Video conferencing is a means to deliver content, but does not provide content. The content is provided by the users of the video conferencing network. It is critical that the builders of the network not only focus on the network infrastructure, and video conferencing, but also in the development of relevant content in the e-Learning, e-Health, and e-Commerce areas. Relevant content gives rural Albertans a reason to access the network. The Alberta SuperNet is only as good as the applications that use it.

11.3 Community Involvement Lacking

The return-on-investment for Rural Broadband is social and economic development. Broadband services offer a huge opportunity to rural areas with a significant payback in terms of economic development and community revitalization.

Alberta is strongly positioned to become a global leader in the development and application of Rural Broadband. Competent and committed leadership at community and government levels will be essential to realizing this opportunity. Without effective community leaders in particular, and effective communication programs to support them, Alberta's rural communities will continue to struggle in realizing the vast potential of broadband networks. Leadership in Alberta's provincial government must focus primarily on fostering and supporting effective community leadership.

Rural communities have the most to gain from broadband, because it mitigates or eliminates many of the social and economic limitations of geographic isolation. Rural Albertans owe it to themselves to make the most of broadband, and to all other Albertans owe it to themselves to help out.

12. Recommendation – Integrate ABCtech and CWB as a Networks of Networks

The Communities without Boundaries (CWB) organization is an ad hoc collaboration between rural and urban stakeholders that originated in the planning of a conference in Olds, Alberta in November 2007. The conference attracted 135 SuperNet stakeholders. CWB's core values are action and focus on delivering real-life practical benefits to broadband users and their suppliers…the objective is to create an action plan including local projects that address the different 'pillars' of: connectivity, education, economic development, health and community capacity and, where possible, produce tangible mutual benefits that resolves the fragmentation and isolation of practitioners in different fields.

The Alberta Council of Technologies (ABCtech) should join forces with Communities without Boundaries (CWB) for the purpose of clarifying and educating stakeholders on the barriers to Rural Broadband and creating joint initiatives to remove or reduce the barriers. CWB and ABCtech have complimentary goals and values. Both need to grow their organizational capacity and assist each other in doing so. ABCtech can provide the legal and corporate structure as a not-for-profit that CWB lacks. CWB can attract the rural stakeholders who can assist in stimulating local ABCtech Councils. Together including other stakeholders, they can stimulate additional partnerships and initiatives for relieving the frustration of Albertans seeking entrance into the emerging digital society.

The goals for this joint initiative are the same goals proposed by the province when it developed the SuperNet:

- Eliminate the digital divide between rural and urban Albertans
- Better integrate Alberta's educational and research infrastructure with community enterprise
- Raise the level of public services to all Albertans
- Allow Alberta-based enterprises to lead in the development of new IP services
- Drive Alberta's future growth and prosperity.

In order to achieve these goals, at least two activities need to be completed. One is removal of structural barriers to SuperNet, that will enable all Albertans to participate in the global economy and community. The second is development of a stakeholder network for identifying and addressing complex, multi-dimensional issues identified in this report. The network of local technology Councils requires community representatives and technology practitioners to sort through and devise approaches and solutions that best fit their situation as librarians, educators, health workers, entrepreneurs and business leaders, the voluntary sector and many others.

ABCtech has evolved as a Society to anticipate and prepare for the impact of technology on things that we value. This was he rationale for commissioning our 2007 Access to Capital report and this report on the status of Alberta Rural Broadband. ABCtech is not about technology for its own sake, but rather to ensure that technology is employed for the betterment of people, our environment, families and communities. The deployment of Rural Broadband has brought with it many promises, but to realize the promises means change at many levels – change that has triggered resistance in some and learning in others.

The Rural Broadband issues that this report reveals are a reflection of some of the challenges and frustrations unique to a portion of the Province – sensing that it is being left behind, sensing that the revolutions in advanced technologies are about an urban centric, knowledge economy. ABCtech and its intent to become a Network of networks, a Society of local technology Councils across the Province,

is logically positioned to help communities help themselves by gathering together leaders and technology interests to find the ways and the means to accommodate new technologies. ABCtech is already working with several communities that have formed local Networks for expediting the commercialization of technology. Communities without Boundaries has begun doing the same, but with specific interest in one issue – Rural Broadband. Shared values and shared objectives make for a logical partnership.

A province-wide network of local technology Councils will strength the capacity of communities to resolve and capitalize on the benefits of Rural Broadband. At the Provincial level, ABCtech should continue to forge relationships with organizations also striving to accommodate rapid technological change – colleges and technical institutes, WiTec and TRLabs, the Community Futures Network, the ICT Council and agencies in other jurisdictions sharing, promoting and fostering best practices in broadband development and application, especially community capacity building such as Intelligent Community Forum http://www.intelligentcommunity.org/

Funding for the Communities without Boundaries could be obtained through the Rural Partnership Development Program. The Rural Partnership Development Program is a program which offers a limited amount of funding in two categories: "Community Development Support" and "Reinforcing Capacities & Building Knowledge". (For additional information on the Rural Partnership Development Program see Appendix D)

Appendix. Terms of Reference

SEIZING THE OPPORTUNITY

The National Broadband strategy, developed by the Government of Canada during the 1990s, promised to bring broadband to urban, suburban, and rural communities. Many Canadians and Canadian businesses are becoming dependent on broadband to communicate and access information. As Canadian Internet use continues to expand, there is however, a discrepancy between urban and rural users. There currently exists large areas or "gaps" that are not serviced with broadband connectivity. These gaps are known as the Rural Digital Divide.

Rural communities require broadband to provide access to e-commerce, e-government, telemedicine, and distance learning – resulting in better jobs, improved health care, and greater educational opportunities. The bridging of the rural digital divide is not all about technology, it is a matter of making information more accessible, and this requires communications between interested parties, political will, education, and funds.

WORKING GROUP APPROACH

To help bridge this Rural Digital Divide, ABCtech has created a working group. The Rural Broadband committee will interface with collaborative partners throughout the province. The Working Group will prepare a status report on the current and potential use of broadband in rural Alberta, having particular regard to the following:

- The availability and performance of different broadband technologies in Alberta including: Fixed and Mobile wireless, xDSL, Fiber, Coax, and Satellite;
- Likely future national and international trends in the development and use of Rural Broadband technologies;
- The inter-relationship between the various types of wireless broadband technologies;
- The benefits and limitations on the use of broadband technologies in rural Alberta;
- The effect of the telecommunications regulatory regime;
- Recommendations for improving economic and social benefits accruing from the availability and use of Rural Broadband technologies, may include technology and regulatory measures;

Propose measures (e.g., a Balanced Scorecard) for conducting an annual status report and recommendations on the availability of Rural Broadband in Alberta.

The Working Group will report to the Board of the Alberta Council of Technologies. Based on approval of the preliminary scoping stage by the Board of ABCtech, a draft status report will be submitted to the Board with a proposed date of June 10, 2008.

Appendix B. Next Generation Networks for e-Health Applications

Canada spends $130 billion a year (2004) on healthcare. With today's per capita health expenditures held constant, health expenditure in Canada can be expected to increase by 30% in the next 30 years from the impact of aging alone.*

The economic and social opportunity associated with deployment of information and communications technologies (ICT) in the health sector is growing in magnitude and importance. An aging population, projected significant health sector expenditure increases, and ICT's fundamental role as a productivity tool in all sectors of the economy, are among key factors that underline a growth curve in health sector interest and investment from government, industry, and academia. ICT innovation, compared to technology innovation elsewhere, is uniquely positioned to improve health sector productivity, provide new and expanded domestic and export markets for industry, and deliver both bottom line financial efficiencies and quality of care improvement for governments, and Canadians.

TRLabs proposes a collaborative research program for ***Next-Generation Networks for eHealth Applications*** that will address innovative delivery of healthcare and health related applications from two distinct yet complementary themes that require solution-seeking. One theme poses the question - "What are the network requirements for a Next-Generation Networks (NGN) that will be necessary to deliver 'mission critical' eHealth services?" A second theme poses the question - "What new and innovative eHealth services could be offered on more advanced network infrastructures?"

The vision of the Next-Generation Network is one in which the network cooperates with the applications in the allocation and access of network resources (bandwidth, quality of service, redundancy, availability, security, time-of-day scheduling, etc.) without any manual intervention by network administrators and operators. Some current eHealth applications, and a myriad of potentially useful eHealth applications, are poorly served by today's disparate networks that inter-connect hospitals, clinics, health regions, rural/remote communities and mobile clients. NGN research will seek to make the network agile, adaptive, ubiquitous, and responsive to the applications, rather than making the applications adapt to the limitations of the network.

The TRLabs B-NCE will research and develop Next Generation Network technologies and architectures that enable delivery of innovative eHealth services that:

- Promote and facilitate wellness (e.g. home screening systems, portal systems, risk prevention systems);
- Manage health information (e.g. data mining systems, data integration and interface systems, health surveillance systems);
- Enhance delivery of care (e.g. collaboration tools systems, self-care systems, disease remote management systems, home device systems); and
- Manage health events (e.g. scheduling systems, wait list systems, e-referral systems, remote automated data acquisition, analysis and reporting systems).

As a collaborative consortium representing industry, government, and academia, TRLabs is uniquely positioned to leverage the health sector innovation opportunity, and bridge innovation barriers: it's technology neutral; it represents the cross-section of interests required to make significant innovation gains (i.e. collaboration between technology users and developers promotes solution seeking and the potential for new forms of public-private partnerships within a public health care system); it has a track record in the health sector; and it is focused on eHealth technologies, services, and applications within its core research program.

The proposed TRLabs B-NCE represents a TRLabs vision of a 'Million Little Hospitals' – a more distributed, individualized health system that weaves hospital, home, and the individual together with an enabling network backbone that in turn enables imaginative new services and applications. The work is mission critical as the nation's aging population quickly reaches a threshold level of new demands on a system that will be required to respond with quality of care focused decentralization, innovation, and efficiency.

Appendix C. Alberta SuperNet

1. Point-of-Presence Access

Service providers can use different access technologies from the home or business to the SuperNet POP including:

a. Terrestrial Access

1. Copper Based

- Digital Subscriber Line (DSL) including: ADSL2, ADSL2+ and, VDSL2
- Bandwidth up to 8Mbps, 24Mbps and 100Mbps per location

2. Coaxial Cable Based

- Hybrid Fibre/Coaxial based on DOCSIS 1.0/1.2/2.0/3.0
- Bandwidth up to 30Mbps per location

Data Over Cable Service Interface Specification (DOCSIS) is a standard developed by Cable Labs. There are four DOCSIS versions: 1.0, 1.1, 2, and 3.0. SHAW began the upgrade to DOCSIS 2.0 in Alberta and BC in July of 2003.

3. Fibre to the Home (FTTH)

- Passive Optical Networks (PON)
- Bandwidth up to 50Mbps per location

TELUS is currently trialing GPON (Gigibit Passive Optical Network) in Edmonton and Calgary.

b. Wireless Access

1. WiFi (IEEE 802.11g)

- Spectrum: 2.4GHz (Unlicensed)
- Distance: Indoors: 25 – 30 meters/Outdoors: Up to 300 meters
- Bandwidth: 54Mbps to 100Mbps per channel (Shared)

Rural Wireless Internet Service Providers use 802.11g to provide limited access to the SuperNet POPs. Industry Canada defines the maximum output power, called the Equivalent Isotropically Radiated Power (EIRP), that 802.11 access points can transmit. 802.11 has a low EIRP limiting its coverage area to 300 meters. WiFI has proven to be an impractical technology to provide wireless access to the SuperNET POPs.

2. WiMAX (IEEE 802.16)

- Spectrum: Unlicensed: 2.4GHz and 5.8GHz
  Licensed: 2.3GHz and 3.5GHz
- Distance: 6 to 8 km (Non-Line-of-Sight)
  Up to 16Km (Line-of-Sight)
- Bandwidth: Up to 40Mbps per channel (Shared)

There are two WiMAX standards: 802.16d-2004 (fixed) and 802.16e-2005 (mobile). WIMAX profiles have been standardized for use with both unlicensed and licensed spectrum. Industry Canada held a Fixed Wireless Access (FWA), auction in 2004, which included both the 2.3GHz and 3.5GHz bands. There were five FWA licenses available in each rural community including:

- One at 15MHz + 15MHz at 2.3Ghz
- Three at 25MHz + 25MHz at 3.5Ghz
- One at 25MHz at 3.5GHz

2. Axia Service Pricing

Axia has two different pricing models:

a. Layer3 VPN Pricing

Service providers can choose between Real-Time, Interactive, and Standard Class-of-Service (COS).

Real-time	Tuned to meet the performance requirements of delay intolerant voice and video applications - Receives highest priority over every other traffic class
Interactive	Tuned for interactive applications (such as client/server or financial transactions) that require a low latency for fast response times - Receives priority over Standard traffic
Standard	Tuned as the default class for all other non-mission critical applications (such as basic Internet) - This best-effort class may be dropped in lieu of higher priority traffic

Service Level Objectives (SLOs) are provided for each COS.

Specification	Units	Real-time		Interactive		Standard	
		MASL	Target	MASL	Target	SLO	Target
Latency	ms	50	15-30	100	15-50	200	50-100
Packet Loss	%	0.3	0.0-0.25	0.5	0.0-0.25	2.0	0.25-0.5
Jitter	ms	15	0-10	20	0-10	20	0-10
Service Availability	%	99.90	99.95	99.90	99.95	99.90	99.95

Axia charges a monthly rate for each Class-of-Service.

Real-time CAR	$150 per Mbps per month per VPN access point
Interactive CAR	$125 per Mbps per month per VPN access point
Standard CAR	$50 per Mbps per month per VPN access point

b. Layer 2 VPN Pricing

At each POP location, Axia charges a monthly for committed access rate and for L2VPN membership access points at the following rates:

CAR (Committed Access Rate)	$50 per Mbps per month per access point
L2VPN membership	$50 per access point per month (VPN = 2 points)
Standard co-location (4U, 10 AMP)	Included

Appendix D: Rural Partnership Development Program

The Rural Partnership Development Program is described on the Rural Secretariat website (http://www.rural.gc.ca/programs/part_e.phtml). The following excerpts describe key features. It offers a limited amount of funding in two categories: "Community Development Support" and "Reinforcing Capacities & Building Knowledge".

The Rural Partnership Development Program objective is to engage stakeholders to develop collaborative activities that enhance developmental capacity in rural, northern or remote communities and regions.

Eligible recipients may include non-profit organizations, associations, educational institutions, co-operative associations, non-governmental organizations (NGO's), and local, provincial, and territorial governments.

Proposals must be approved prior to the commencement of any work. You are encouraged to submit your proposal as early as possible as it could take up to 60 days to obtain approval to proceed.

The final deadline date for applications is November 30, 2008. All activities must be completed no later than March 31, 2009.

Applications will be evaluated against the primary objective of the Rural Partnership Development Program; i.e., engaging stakeholders to develop collaborative activities that enhance developmental capacity in rural, northern, or remote communities and regions.

Workshops & Conferences:

Available funding will cover up to one half (50%) of eligible project costs to a maximum of $15,000.

Partnership Development

Partnership Development initiatives support developing new partnerships aimed at increasing the accessibility of tools that enable rural communities/regions to engage in collaborative activities that enhance developmental capacity.
Available funding will cover up to one half (50%) of eligible project costs, to a maximum of $60,000.

Reinforcing Capacities & Building Knowledge

This category supports regionally-based organizations and academic institutions working with community members, associations and organizations to increase their understanding, awareness and accessibility of available tools in support of rural development and identifying gaps.
Available funding will cover up to one half (50%) of eligible project costs to a maximum of $100,000.