

# Special Report: **MUNICIPAL TECHNOLOGY**



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# Meet your technology partners

Technology is essential in enabling individuals, businesses and municipalities to function more effectively than ever before. From software programs that integrate financial and municipal functions, to wireless communications that function anywhere, anytime, to mapping systems that are accurate to a centimeter, technology continues to evolve and improve. *The Municipal Leader* has compiled a list of technology partners that have displayed at AMM trade shows and display areas over the past year. They all offer Manitoba municipalities the latest products and services available in their specialty areas.

## COMPUTER SYSTEMS/ SOFTWARE/CONSULTANTS

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### Munisoft

A Canadian company providing specialized software and related services to local governments across the country in the areas of management of tax, assessment, utility billing, finance, payables, receivables, payroll, public works, asset management, GIS and mapping. Visit [www.munisoft.ca](http://www.munisoft.ca).

## WIRELESS TECHNOLOGY & COMMUNICATIONS

### Glentel – Wireless Made Simple

This leading wireless communications company provides voice and data solutions across Canada, featuring proven products from Motorola, MDS and more. Visit [www.glentel.com](http://www.glentel.com).

### I-Netlink Wireless

I-Netlink Wireless provides high-speed wireless Internet to Southwest Manitoba. We partner with rural municipalities, connecting communities, and are expanding into the Parkland region this year. (See separate article in this Special Report.)

### MTS

Telecommunications services – from local and long distance services to next generation services like high-speed Internet and digital wireless communications. (MTCML Official Supplier)

## MAPPING (GPS/GIS SYSTEMS)

### Atlis Geomatics

Photogrammetry – Digital Imaging – Aerial Survey. Visit [www.atlisgeo.com](http://www.atlisgeo.com).

### Cansel Survey Equipment Inc.

Canada's largest distributor of land-based positioning systems, providing sales, rentals, repairs and training for high-end optical survey instruments, GPS, construction lasers, accessories and field supplies. Visit [www.cansel.ca](http://www.cansel.ca).

### DataLink Mapping Technologies Inc.

DataLink Mapping Technologies is Manitoba's only authorized MapInfo reseller and provides complete GIS service including application development, base mapping, printing, training and technical support. Visit <http://www.datalink.ca/>

### Lewis Instruments Ltd.

Surveying equipment and supplies including laser systems for land leveling and GPS receivers for mapping and surveying.

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# GIS technology for local governments



**M**unicipalities face the task of maintaining service levels after right-sizing, downsizing and budget cuts; and are increasingly required to streamline business practices. Information technology, especially GIS (geographic information systems), is playing a key role in helping local governments cope with this environment.

GIS technology offers a flexible set of tools to perform the diverse functions of government, including the data management tools necessary to combine and use geographic-based information from various sources. GIS helps local governments operate as a single enterprise by making data sharing among departments easier.

**Public works** – GIS technology provides accurate mapping tools and helps track the location and condition of assets (water mains, valves, hydrants, meters, storage facilities, roads, sewer mains, manholes, etc.).

**Zoning and planning** – GIS advancements have led to the development of decision support systems that facilitate the community planning process.

**Assessment** – GIS provides the tools to more efficiently collect, convert and improve map data; accurately assess properties; and provide Internet access to this data for the public and the business community.

**Economic development** – GIS is used as a management and decision-support tool by communities' economic development agencies.

**Surveying** – Surveyors use GIS to store and analyze survey information including measurements, orthorectified imagery, GPS

data, LIDAR data, computer aided drafting (CAD) drawings, and survey records. GIS saves surveyors time, reduces cost, and improves their decision-making processes.

**Cadastral records** – GIS helps agencies meet their primary responsibilities of ownership registration, parcel mapping, real property valuation and data access.

## A testimonial

The RM of Woodlands has been using GIS since 2000. Officials have seen improved staff productivity, timely and accurate delivery of information in the management of zoning and development applications, the management of livestock operations, the development of drainage plans for agricultural fields and several other business processes the RM must manage.

The RM started with ESRI Canada's *ArcView 3* software and last year upgraded to *ArcView 9*.

The benefits of the software were immediate. Former Woodlands Development Officer **Wayne Vickers** notes, "The process of determining who was affected by a variance would take about a day when done by hand, and used many paper-based and electronic data sources. With *ArcView*, we are able to review an application and generate notification letters in about 15 minutes."

The current Development Officer, **Lana Cowling-Mason**, says the system is being updated and the staff is undergoing re-training on the system. "We haven't come close to using its full potential," she says. "And that has got us very excited. It appears that the system's only limit is one's imagination." ❧




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# Canadian municipalities embrace hybrid technology

By: AMM Staff with files courtesy the City of Kelowna

In May 2005, Canada's first hybrid bus arrived in Kelowna, BC. BC Transit purchased six hybrid electric buses to replace aging buses in the Kelowna and Greater Victoria regions. In a City of Kelowna news release, former Mayor Walter Gray stated, "The hybrid-buses are an excellent example of using technologies to help address climate change. When using the buses in urban areas, fuel consumption and greenhouse gas emissions are significantly reduced when compared to conventional diesel buses."

Research on hybrid applications encourages the transit industry to move toward this technology. A key advantage is the technology does not impact existing infrastructure or daily business operations, providing a simple step toward improved performance.

The supplier was New Flyer of Winnipeg. New Flyer has recently delivered 235 hybrid electric buses to Seattle, both 40-foot vehicles and 65-foot articulated vehicles. Another fleet order is in production for Philadelphia, PA. The six BC Transit buses delivered to Kelowna and Victoria were the first production-line hybrid buses in Canada.

## HOW THE HYBRID ELECTRIC SYSTEM WORKS

A 'hybrid drive' means there is a combination of more than one type of motive power on the bus. Hybrid electric buses utilize two power sources: a smaller than normal internal combustion engine and an energy storage unit (the battery). The batteries are located on the roof of the bus and weigh approximately 400kg (900lbs).

The engine-generator combination works in parallel with the battery, providing electrical power to keep the battery charged. As a

result, the engine operates only in its most efficient ranges. For example when accelerating from a stop, the electric transmission accelerates the vehicle to a speed of about 12 kmph.

Once the vehicle is underway, the parallel hybrid system blends both the diesel engine and electric motor power to maintain speed. At highway speeds, the vehicle is powered



solely by the diesel engine. During this time, the engine also charges the energy storage system (battery). Significant fuel economy is achieved when the vehicle runs at its optimal speed, offering top engine performance and low exhaust emissions. The vehicle also uses regenerative braking to charge the batteries.

The hybrid electric bus has three major advantages: reduced fuel consumption, reduced emissions, and lower operating and life cycle costs.

## 1. Reduced fuel consumption

Short demonstration tests indicate up to a 58% reduction in fuel consumption depending on the vehicle usage profile. The fuel savings could be as high as 100,000 litres per year for the first order of six buses.

## 2. Reduced emissions

'Greenhouse' gas emissions, believed to contribute to global warming, are reduced up to 60%. Applying this figure to this initial 6-bus fleet, the estimated reduction in greenhouse gas emissions would be 403 tonnes per year and up to 90% fewer particulates.

## 3. Lower costs

The hybrid electric system results in lower operating costs due to reduced stress and maintenance on mechanical components such as brake linings. The hybrid transmission has fewer component parts and therefore requires less maintenance. The hybrid bus option has about a 40% premium on capital. The operating costs savings means the 'break even' point in total expenditures is estimated at 10-12 years dependent upon future petroleum price trends. Buses are typically kept in service for 20 years.

## HOW CLEAN IS THE TECHNOLOGY?

In stop-and-go applications, each year greenhouse gasses are reduced by over four times the weight of a regular bus – that's 60 metric tonnes.

- Particulate Matter (PM) is reduced by up to 90% over the cleanest diesel buses now in BC Transit's fleet
- Carbon Monoxide (CO) reduced by up to 90%
- Hydrocarbons (HC) reduced by up to 90%
- Carbon Dioxide (CO<sub>2</sub>) reduced by up to 40-60%
- Nitrogen Oxide (NO<sub>x</sub>) reduced by up to 50%

## WHAT IS THE COST?

A 40-ft. low floor bus costs \$530,000. The premium cost for the hybrid technology is an additional \$300,000. Based on current fuel costs, the bus should recuperate the additional cost in 10-12 years. The average life span of a transit bus is 20 years.

## ACROSS CANADA

While BC Transit is a leader in adopting hybrid technology in its fleet of buses, other municipalities are moving toward hybrid systems as well.

In 2003, **Toronto's** City Council approved a Green Fleet Transition Plan pioneering a significant increase in the use of hybrid-electric vehicles and biodiesel fuel in a major municipal fleet. The Toronto forecast is a reduction in CO<sub>2</sub> by 23% or between 10,000 and 15,000 tonnes over three years.

In 2004, the **City of Hamilton** directed staff to prepare a Central Fleet Strategic Plan with the objective of providing an affordable way to use new vehicle and fuel technology. New technologies, such as hybrid electric vehicles and biodiesel are incorporated into the Green Fleet Implementation Plan.

In 2005, the **City of Edmonton** announced a \$3.2M investment to evaluate new technologies that could lead to energy savings and reduced pollution, including purchasing more fuel-efficient vehicles (buses and trucks), and eventually using hybrid or fuel cell vehicles.

Recently, Alberta's Climate Change Central launched *Hail a Hybrid*, a pilot program that encourages **Calgary and Edmonton** cab drivers to switch to fuel-saving, environmentally friendly hybrid vehicles. Under the pilot program, up to four cab drivers in each of Calgary and Edmonton will receive a \$5,000 incentive for purchasing a hybrid taxi.

In Manitoba, the **City of Brandon** replaced two of its older pickup trucks with two Honda Civic hybrids. More hybrids may be added to the fleet as the city looks to replace other vehicles, especially if the cost of gasoline remains high. ♻

## Sources:

Climate Change Central: [http://www.climatechange-central.com/default.asp?V\\_DOC\\_ID=2112&V\\_LANG\\_ID=5](http://www.climatechange-central.com/default.asp?V_DOC_ID=2112&V_LANG_ID=5)

Green Car Congress: [http://www.greencarcongress.com/2005/12/ottawa\\_delays\\_c.html](http://www.greencarcongress.com/2005/12/ottawa_delays_c.html)

City of Ottawa Hybrid Bus Feasibility Study Report <http://www.ottawa.ca/calendar/ottawa/citycouncil/occ/2005/11-30/trc/ACS2005-PWS-FLT-0001.htm>

Kelowna Regional Transit System: [http://www.bctransit.com/regions/kel/news/hybrid\\_electric.cfm#backgrounder](http://www.bctransit.com/regions/kel/news/hybrid_electric.cfm#backgrounder)

Federation of Canadian Municipalities: <http://www.fcm.ca/english/media/stories/april122005.html>

City of Hamilton Green Fleet Implementation Plan <http://www.repairourair.org/pdfs/Green-FleetPlan-Hamilton.pdf>

While the environmental benefits of hybrid technology isn't disputed, some municipalities question estimated cost savings. Ottawa's Fleet Emissions Reduction Strategy called for the purchase of 226 diesel-electric hybrid buses in a move to a zero emission transit fleet. However, Council put the planned \$536M purchase on hold while the City studies natural gas options. The City of Ottawa Hybrid Bus Feasibility Study Report concludes: "Hybrid systems will not provide sufficient fuel savings on low-stop frequency and high-speed routes...or rural routes to offset initial cost."



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# Harnessing the wind

## Using modern technology to create efficient, economical and emission-free electricity

By Rachel Philippe, AMM Senior Policy Analyst



Seeking a cleaner environment often leads to a consideration of energy resources and the potential for more environmentally responsible alternatives. In 2002, the majority of energy produced in Canada was generated from large hydroelectric facilities. However coal, nuclear power, natural gas and oil still accounted for 38% of Canada's energy production. Advancing technology has created new opportunities to supplement existing energy sources with cleaner generation methods. Wind energy is a prime example of this trend. With its increasing usage, the costs of generating wind power are steadily declining, making it one of the most effective ways to generate emission-free electricity.

The basic concept of generating energy from the wind is hardly new. The fundamental principle remains the same as wind currents are harnessed to rotate the turbine's blades and capture energy. Advancing technology allows the motion of the blades to turn a generator and produce electricity that can ultimately be transferred to the electricity utility's transmission grid. Today's wind energy generation relies on modern technology that allows manufacturers to design and produce machines larger in capacity and higher in efficiency than ever before. Taller towers and more efficient turbines are now possible because of lighter blades as well as improved towers and foundations. Taking advantage of this technology allows more energy to be created by less wind at a lower per kilowatt hour cost. The Canadian Wind Energy Association (CanWEA) indicates that wind energy is one of the most economical sources of new large-scale electricity generation.

Sophisticated technology is also required for the operation of wind farms. Remote computer monitoring systems are commonly used to control the angle of each rotor blade and to ensure that the rotor blades face into the wind. The ongoing operation of the turbines is also monitored in a similar fashion.

Utility-scale land-based turbines range in size from less than one megawatt to more than three megawatts (MW). A one MW turbine with a 30% capacity factor<sup>1</sup> produces about 2,600 megawatt hours (MWh) per year; enough to power about 320 homes. Since winds fluctuate on a daily basis, turbines typically begin to operate when wind speeds are approximately 8-13 km/h and maximum power is reached with wind speeds ranging from 30-40 km/h. To determine the generation potential of a particular site, technicians will study

long-term historical wind patterns. These and other site-specific measurements are used to forecast average monthly and annual potential energy production that will inform the site assessment. Such calculations have estimated a significant potential for wind power development in Canada and Manitoba.

Canada is predicted to be among the countries with the fastest growth rates for wind energy capacity. Many Federal and Provincial incentives are now available and CanWEA estimates that these measures could lead to the installation of at least 8,000 MW of wind energy in Canada by 2015 – a significant increase of Canada's April 2006 capacity of 944 MW. Estimates suggest Canada could eventually meet 20% of its total electricity needs with wind power (50,000 MW).

Opportunities for wind energy development in Canada offer key environmental benefits. Using wind to power over 200 homes instead of burning coal has the same positive impact as taking 417 cars off the road or planting 10,000 trees. Wind energy generation

“There are substantial economic benefits available at the local level.”

avoids the production of harmful substances such as greenhouse gases, heavy metals and particulate matter. Using wind energy in place of conventional energy reduces the generation of smog and acid rain. As one of the cleanest generation methods available, wind energy will help meet environmental objectives across Manitoba and Canada.

With the majority of wind energy projects being located in rural areas, there are substantial economic benefits available at the local level. Rural landowners can profit from lease payments and rural municipalities will experience increased tax revenues. (For a Manitoba example visit [www.canwea.ca/en/CanadianResources.html](http://www.canwea.ca/en/CanadianResources.html)). Tourism and employment benefits can also have a significant impact on rural community economic development. Such benefits are already apparent in Manitoba's own St. Leon wind farm.

### So what's happening in Manitoba?

Earlier this year, construction was completed on Manitoba's first wind farm. The community of St. Leon is home to the 63 turbines that make up this 99 MW project. The energy generated from St. Leon is enough to power approximately 41,000 homes. Local landowners will benefit from \$9 million in revenue over the next 25 years and the project is expected to generate 300 direct or indirect jobs and \$100 million in operating expenditures.

Manitoba is well-positioned to further capitalize on its wind generation potential. In order to stimulate development of wind farms, the Province of Manitoba announced its intention to procure 1,000 MW of wind energy by 2014. To meet this mandate, the Province conducted an Expression of Interest process and received 36 submissions from 43 proponents including wind developers, First Nations, communities, turbine manufacturers and consultants. Combined, these projects proposed more than 10,000 MW of wind energy projects and identified 75 sites for wind farms in Manitoba. The next step in developing additional wind farms is for the Province to issue a Request For Proposals related to specific wind generation projects. Their intention is to develop 1,000 MW of wind energy generation in Manitoba over the next eight years.

There is a tremendous opportunity for wind power to contribute to Manitoba's energy resources and provide environmental and economic benefits. The advantages of using wind energy will certainly make this technology more prevalent in the near future. ♪

**Sources:**

- AirSource Power: [www.airsourcepower.com](http://www.airsourcepower.com)
- Canadian Wind Energy Association: [www.canwea.ca](http://www.canwea.ca)
- Canadian Wind Energy Atlas: [www.windatlas.ca](http://www.windatlas.ca)
- Manitoba Energy, Science & Technology, Energy Development Initiative: [www.gov.mb.ca/est/energy/initiatives/index.html](http://www.gov.mb.ca/est/energy/initiatives/index.html)
- Taxing Wind in Canada – Property Tax Assessment Policies and Practices in Canada: [www.canwea.ca/en/CanadianResources.html](http://www.canwea.ca/en/CanadianResources.html)
- Windustry: [www.windustry.org](http://www.windustry.org)

<sup>1</sup>Capacity factor is defined as the percentage of electricity that the wind turbines are expected to produce relative to a maximum theoretical production in given period of time (based on the amount of time the wind is actually blowing).

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Winnipeg's Provencher Bridge

# Wise up with 'smart' bridges

By Terry Ross



With cash-strapped municipalities suffering from deteriorating infrastructure that must be replaced, officials are always on the lookout for new technology that will save them money. That is where 'smart bridge' technology comes into play.

Officials concerned only with the immediate bottom line may claim that the new technology is more costly and, in the short term, they are correct – by about 20%. However, the longevity of smart bridges more than compensates for the extra cost.

'Smart' structures incorporate sensors in the building materials that allow the monitoring of the structure via computers. The

application of smart structure for bridges provides the following benefits:

- Less time and expenses required for inspections.
- The response of the structure can be monitored remotely in real time.
- Performance of new advanced composite materials can be monitored.
- The long-term performance of composite materials can be compared to conventional girders, also outfitted with fibre optic sensors.

Confederation Bridge, connecting Prince Edward Island and New Brunswick, utilizes

smart technology to monitor the long-term effects of wind, ice and traffic loads.

In October 1998, the Taylor Bridge in Headingley was opened and deemed the 'smartest bridge in the world.' It was built as a demonstration project by ISIS Canada using new-age materials that are lighter than steel, yet 10-times stronger. It also houses 111 sensors (65 fibre optic sensors, 26 electric foil strain gauges and 20 temperature sensors).

The two-lane, 165.1-metre-long span has four out of 40 pre-cast girders reinforced with carbon fibre reinforced polymers (FRP) stirrups. These girders are pre-stressed with carbon FRP cables and bars. Glass FRP reinforces portions of the barrier walls. The instrumentation will allow officials to monitor the behaviour of the bridge structure and the new advanced materials over time. It will also allow the real time, dynamic sensing of singular overweight events (when special permission is granted to overweight loads).

ISIS Canada is a non-profit network of 15 universities based at the University of Manitoba's Faculty of Engineering. Its mandate is, in partnership with the private sector, to develop Canadian Civil Engineering and construction capability through the development and application of advanced composite materials (ACMs) and integrated Intelligent Fibre Optic Sensing technologies.

More recently, Winnipeg's Provencher Paired Bridges joined the line-up of smart bridges. These structures, a pedestrian bridge and a vehicular bridge, strengthen the connection between The Forks and St. Boniface's French Quarter. They've become a symbolic gateway between two of Winnipeg's most historically significant areas, while promoting commerce and tourism. The system measures movement, traffic flow, wind speed and direction, stay cable forces and strains, ambient temperature, temperature gradient, and 3-D acceleration of the deck and pylon. ISIS Canada installed 20 fibre optic sensors, lead wires, and a fibre Bragg grating strain indicator. §

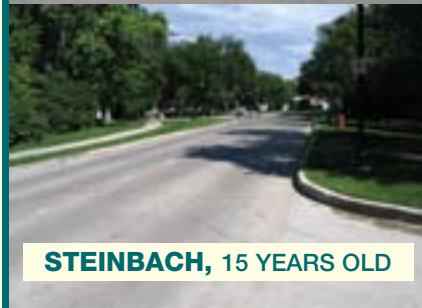
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# From dream to reality

## - bringing high-speed Internet to rural Manitoba

Submitted by I-NetLink Wireless

It began with a dream when **Charlie Clark**, President and CEO of I-NetLink Wireless, saw the desperate need for high-speed Internet in rural Manitoba. In the fall of 2001, I-NetLink began with one experimental tower. When asked if Clark would have envisioned that I-NetLink would have such a strong presence in rural Manitoba he replied: "I underestimated the capability of this technology back in 2001. I recall thinking that we could perhaps reach out to Kemnay and Forrest, but certainly didn't anticipate that in five short years we would be covering over 100 communities." Through strong partnerships with Manitoba's rural municipalities, Clark and the I-NetLink team have been able to provide a valuable tool to rural Manitoba; the Internet.

High-speed Internet has become a necessity in the lives of Manitobans. Not only has it enriched economic and community development, but it also offers rural communities the same opportunities as urban areas. Broadband not only extends local employment opportunities, access to healthcare and makes communication easier; but also creates advancements in education and agriculture. "In the last five years, I have watched the borders come down and have seen communities grow and prosper and never realized what talent we have hidden in our rural communities. I am very proud and honoured to be part of this growth and to be a fellow Manitoban," said **Tami Clements**, Vice-President of I-NetLink Wireless.

How does wireless broadband technology work? The network operates through radio frequencies from towers that communicate through line of site. These towers are networked and receive a signal from a fiber connection in Brandon. Each tower extends from 100'-150' covering up to a 15 km radius.

What does the future hold for wireless broadband in rural Manitoba? When asked this question, **Mike Clark**, (Research and Development), replied that wireless broadband offers "new opportunities for the rural municipalities to be on the leading edge of technology. There is so much that can now be accomplished that even a few years ago was simply impossible or not feasible such as VOIP (voice over IP), remote backups, video monitoring, security/automations systems and, and Emergency/Event Notification (EEN) and the list goes on." Through our continued partnership with InfoMetrics incor-



Charlie Clark, I-Netlink's President and CEO with VP Tami-Rae Clements.

porated, I-NetLink will ensure that these types of technologies become a reality.

What do these technologies mean for rural Manitoba? VOIP is the transmission of voice traffic over Internet protocol networks. Implementing a VOIP system over a wireless network can have huge cost savings and increase the features of a present phone system. **Tom Mollard**, CAO of the Town and RM of Hamiota commented about their recent implementation of a VOIP system, "it has provided us the dependability in addition to significantly lowered costs. The system reduced operating costs by 50%." Remote backups are an online system for backing up and storing computer files. Remote video monitoring can be used for a wide variety of applications; everything from monitoring pig barns to gas pumps from any computer connected to a high-speed Internet connection.

IP enabled security/automation systems can be adapted to secure just about anything. "Imagine calling your cabin to turn up the heat; or getting an email while you are working, saying that your hot water tank has started to leak. This technology really takes security to a whole new level," said Mike Clark.

With an EEN system, you can setup automatic event notification for everything from fire and rescue to road closures. For example, in the event of a fire, the EEN system would call everyone on the volunteer fire department. If the system could not reach the individuals by phone it will try to email and text message. As soon as crew members respond, the site is updated to include who has been

I-NetLink is committed to giving back to the rural communities. Revenue sharing programs have been established with municipalities who were involved in the BRAND (Broadband for Rural and Northern Development) project and those who are a part of the Parkland Telecommunications Network (PTN). The company further supports the community through educational scholarships and athletic grants in addition to recruiting local resellers and installers.

notified and when they should arrive. The future of municipal technology is endless. Mike Clark comments, "These are just a few examples of how new technologies built on the wireless infrastructure can really make a difference in these [rural Manitoban] communities."

With time, technology changes and improves. Clark supports this fact by adding, "I-NetLink is dedicated to the wireless world. We will continue to expand our knowledge base and share the benefits of this technology to our clients." One major technological advance is the creation of the WIMAX standard. Clark quotes that "WIMAX is an industry standard, meaning that the major manufacturers of the product will all be producing products that will interoperate. I-NetLink is partnered with the leaders of this technology and is already deploying WIMAX radio links for selected clients."

Through the Industry Canada BRAND program, I-NetLink grew as they brought wireless broadband to over 40 communities. The company currently continues its expansion with the Parkland Telecommunications Network (PTN) project, where services will be provided to 33 Parkland communities. This project received a \$4 million investment from the Municipal Rural Infrastructure Fund (see story on p. 14) and includes 16 RMs, a town, a village and eight Aboriginal & Northern Affairs communities. The project completion deadline is March 2007, but I-NetLink will be providing service in the fall of 2006.

Five short years ago, Charlie Clark never envisioned his dream becoming as real as it is today. When asked his opinion on how wireless broadband has impacted rural Manitoba his answer came quickly. Clark said "I am particularly proud of this [wireless] achievement as we are constantly being thanked by our clients for making their lives simpler and more productive. It is especially rewarding to know that we have played a small part in keeping rural Manitoba vibrant".

For more information, please visit [www.inetlink.ca](http://www.inetlink.ca).



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