aamdc
trade • jubilee
Partners in Advocacy & Business

Rural Connectivity Gap Analysis

Project Summary

January 2010

Written by:
ViTel Consulting Inc.

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

The emergence of new Internet applications such as Voice Over IP (VoIP), video-based services, asset tracking, Twitter©, Facebook©, and e-commerce are changing the way municipalities communicate with and deliver services to rural residents and businesses. It is imperative that rural broadband networks not only be economically feasible but also be scaleable to meet the growing demand for high speed broadband by residents and businesses.

The Rural Connectivity Gap Analysis is the first step in determining the extent of broadband coverage in rural Alberta. The project's objective was to create a map that would identify areas that are served, underserved, or unserved by rural broadband providers. Municipalities and others can use this map to help target broadband development policies in areas that are underserved or unserved, and as a baseline to track improvements in reducing the gap over time. The rural broadband survey excluded urban areas, specifically: Edmonton, Calgary, Lethbridge, Medicine Hat, Red Deer, Grande Prairie and Fort McMurray.

The map displays served and un-served areas around the province. An unserved area is classified as an area where less than 90% of the area does not have broadband access and primarily rely on dial-up services.

Stantec Inc. was contracted to conduct the Rural Connectivity Gap Analysis between June and October 2009. All Alberta-based Internet Service Providers (ISPs) were contacted and asked to complete a survey. Of the 45 fixed wireless providers contacted, only ten completed the survey. Where ISP coverage data was not received, Stantec used public sources, including ISP website data, to complete the engineering work to determine broadband coverage. Analysis of the results suggests that 430,000 people or 34.1% of Albertans who reside outside of the seven major urban centers did not have access to broadband internet. Though 90% of Alberta's land mass has zero broadband coverage according to this report, it is noted that the majority of those areas have no population. While a great deal of useful coverage data was collected, a low response rate is recognized as an issue for interpreting these results. Collecting and maintaining sufficient coverage data from the Internet Service Providers will be a challenge moving forward from this analysis.

As part of the gap analysis, letters were sent to all the rural municipalities, elected officials and Chief Administration (CAO) officers. Thirty-one municipalities responded but provided little or no coverage information. Many of the rural municipalities have not documented broadband coverage as part of the development permit process.

The Rural Connectivity Gap Analysis provides a snapshot of rural broadband coverage in Alberta at a point in time. While a great deal of useful coverage data was collected, a low response from both ISPs and municipalities is recognized as an issue. Collecting and maintaining coverage data from the Internet Service Providers will be a challenge moving forward from this analysis.

The results of the project, including the broadband map of rural Alberta, can be used, along with additional supplementary information, as a useful tool to help municipalities and others target broadband policy and funding decisions.

Alberta Association of Municipal Districts & Counties
2510 Sparrow Drive Nisku, AB T9E 8N5 Phone (780) 955.3639 Fax (780) 955.3615 Web www.aamdc.com

2. KEY STAKEHOLDERS AND BENEFITS

The rural broadband stakeholders include rural households and businesses, rural municipalities, and the Alberta government. The benefits of the Rural Connectivity Gap Analysis will be realized by the stakeholders in the following ways:

1. Rural Households and Businesses

Rural households and businesses currently get broadband coverage information by searching the web and estimating which Internet Service Providers provide coverage in their area. An online interactive map will provide rural households and businesses the ability to quickly complete an assessment of the Internet Service Providers in their area and choose a provider that will provide broadband access at a reasonable cost.

2. Rural Municipalities

Rural municipalities are facing both economic and depopulation issues. The municipalities are beginning to view broadband as one of the key enablers for community building and economic development. Most rural municipalities do not have adequate broadband coverage data to make informed broadband decisions. Typically the first step for these municipalities is to conduct a detailed coverage study. The outcome of this study is a map indicating the unserved and underserved areas and an economic analysis detailing the cost of implementing or improving broadband coverage. The Rural Connectivity Gap Analysis provides a base of knowledge for municipalities to start from when working to solve these rural broadband issues.

3. Alberta Government

The Rural Connectivity Gap Analysis is first step to acquire accurate broadband coverage data to help identify the extent of rural broadband gap and help to target efforts to reduce the gap in unserved areas.

.

Alberta Association of Municipal Districts & Counties
2510 Sparrow Drive Nisku, AB T9E 8N5 Phone (780) 955.3639 Fax (780) 955.3615 Web www.aamdc.com

3. INTERACTIVE MAP

The primary objective of the project was to create a custom Geographical Information System (GIS) database that would be used to create a web based interactive map. Using the interactive map users could create queries (user created searches) and create custom coverage maps for each rural municipality or area of the province that they are interested in.

3.1 Hexagon grid

A key step in creating a coverage map is to organize the data collected in the survey. To do this, a hexagon grid system was adopted from Industry Canada. This grid system is part of a larger national grid that was developed to locate and identify specific geographic service areas. Each hexagon represents approximately 25 km^2 and is assigned a unique hexagon identification code (hexagon ID). Broadband coverage data was then allocated to the Alberta hexagon that corresponded with the geographic location identified in the survey. The Alberta hexagon IDs and corresponding coverage data make up the GIS database.

The use of Industry Canada hexagon IDs allows correlation with national Industry Canada data and future analysis or feature enhancements.

There are a total of 26512 hexagons in Alberta. The broadband coverage for each of the hexagons was defined as:

- > 90% coverage
- 50% to 89% coverage
- 25% to 49% coverage
- 1% to 24% coverage
- 0% coverage

3.2 ArcGIS

ArcGIS Server 9.31 was used as the development platform for the interactive map application. ArcGIS is an integrated family of software products that consists of Desktop GIS, Server GIS, Mobile GIS, and Online GIS. Online GIS will allow remote users to access the coverage data from anywhere at anytime. This model also allows the sharing geographic information, such as maps, layers, and tools.

Stakeholders such as end users, rural municipalities, Internet Service Providers, and the Alberta Government could use this coverage data to make informed decisions when using, deploying, or funding rural broadband projects. Appendix A: Example Coverage Map

Alberta Association of Municipal Districts & Counties
2510 Sparrow Drive Nisku, AB T9E 8N5 Phone (780) 955.3639 Fax (780) 955.3615 Web www.aamdc.com

4. COVERAGE DATA COLLECTION

Prior to the beginning of the project it was determined that the best source for the coverage data would be Internet Service Providers and the rural municipalities. Each of these prime information sources was contacted via numerous e-mail messages and phone calls.

4.1 Internet Service Providers

A survey was sent to all the Alberta-based Internet Service Providers. The survey explained the project objectives and included detailed instructions for how to fill out the survey. In addition, a web site was created with a high resolution Alberta hexagon map to support the ISPs in completing the surveys.

A low participation rate from the ISPs was experienced throughout the data collection phase. Some ISPs refused to participate citing time, resource constraints, and low confidence levels in the process. Specifically, they claimed to have completed numerous surveys over the last few years with minimal positive outcome. Many also seemed concerned about the confidentiality of the information provided and access to the interactive map. In most cases, Stantec requested the “raw coverage maps” or obtained the information from public sources and completed the engineering work to determine the coverage on their behalf. Appendix B provides a list of the ISPs that were contacted during the survey.

4.2 Rural Municipalities

Stantec sent letters to elected officials and Chief Administrative Officers (CAOs) in all rural municipalities explaining the project and its objectives. In each letter, Stantec requested that municipalities provide any information in their possession which could support the project. Overall, rural municipalities provide very little additional coverage information, for reasons outlined below.

In Canada, all telecommunication systems are governed by federal regulations. Industry Canada (IC) is the licensing body for wireless towers. But IC does not have the final say on the placement of communication towers, but recommends that the local land use authorities be consulted as part of the licensing process. Most rural municipalities require Internet Service Providers apply and obtain a development permit to erect a tower. The permit process may require the Internet Service Provider to:

- Provide tower location and height information
- Identify co-location requirements / opportunities
- Undertake a community consultation process

Most rural municipalities do not require that the Internet Service Providers disclose coverage information as part of the development permit process. As this information was not generally collected by municipalities, it consequently was not available as requested by Stantec.

Alberta Association of Municipal Districts & Counties
2510 Sparrow Drive Nisku, AB T9E 8N5 Phone (780) 955.3639 Fax (780) 955.3615 Web www.aamdc.com

5. COVERAGE DATA ACCURACY

Internet or web-based surveys are increasingly used to collect information for the population, housing, or broadband coverage. In this case, the accuracy of coverage data may be impacted by the following parameters:

1) Industry Canada population statistics were from the 2006 census.

2) Internet Service Provider coverage data was not validated. This may result in coverage data being inaccurate in some areas.

3) The accuracy and currency of public coverage data available from ISP websites is unknown. When ISP coverage data was not received, coverage data was obtained from the ISP's web site. This is identified in the database as "Public".

4) Internet Service Provider's service levels cannot be validated because of the many variables that impact network throughput. Service levels can only be validated from the subscriber's premises. Factors impacting subscribers' service levels include: number of users on the network, time of day, temperature, humidity, topographic conditions, and physical distance from the provider's Point-of-Presence (PoP).

5) Stantec completed the survey and data capture over the course of six weeks in the summer of 2009. Some ISPs stated that their service levels and coverage will be enhanced later in the fall of 2009 as more towers and better technology is deployed in certain coverage areas. Consequently, the coverage data obtained is a snapshot in time. The database will require continuous updating to reflect changes in broadband coverage and improve accuracy of the data.

To accurately estimate the coverage area of a wireless tower, the tower's GPS coordinates, height, spectrum used, manufacturers' equipment, and the topography of the serving area is required. An example of a detailed coverage map is shown in Appendix C: Detailed Coverage Map.

Internet Service Providers may not use RF analysis equipment required in order to produce accurate coverage maps, and rely instead on quality of service at subscriber premises to estimate coverage areas.

6. DATA ANALYSIS

This section provides an overview of the data collected and analysis for:

- Rural Municipalities
- Internet Service Providers
- Coverage Data Analysis
- Population Data Analysis

6.1 Rural Municipalities

As part of the gap analysis letters were sent to all the elected officials and Chief Administration (CAO) officers.

a. Elected Officials

1. Letters sent: 440
2. Responses: 31
3. Response Rate: 7.05%

b. Chief Administrator Officer (CAO)

1. Letters sent: 366
2. Responses: 31
3. Response Rate: 8.47%

Analysis

There was a low response rate from the rural municipalities.

The primary reasons for this response rate may be due to:

1. Rural municipalities do not require that the Internet Service Provider give coverage data as part of their development permit process.
2. Rural municipalities may not consider responding to the survey a priority.

Alberta Association of Municipal Districts & Counties
2510 Sparrow Drive Nisku, AB T9E 8N5 Phone (780) 955.3639 Fax (780) 955.3615 Web www.aamdc.com

6.2 Internet Service Providers (ISPs)

Seventy one (71) Internet Service Providers were contacted initially via e-mail, sent a survey package, and then followed-up with a minimum of three phone calls.

a. Internet Service Provider (ISP) Types

1.	Fixed Wireless	45	63.4%
2.	Digital Subscribers Line (DSL)	17	23.9%
3.	Satellite	5	7.1%
4.	Cable	4	5.6%
	Total:	**71**	

b. Overall Results

1.	Provided Coverage Data	17
2.	Coverage Data Available Online	14
3.	Did Not Respond	17
4.	Responded (No Coverage Data)	1
5.	Does Not Want to Participate	10

c. Provided Coverage Data

1.	Fixed Wireless	10
2.	Digital Subscribers Line (DSL)	3
3.	Cable	3
4.	Satellite	1

Analysis

- Fixed wireless providers comprise 63.4% of the Internet Service Providers.
- Ten out of 45 or approximately 29% provided coverage data.
- Most fixed wireless providers are reluctant to share their coverage data due to the competitive marketplace.

To estimate the percentage of unserved and underserved rural areas it is critical that coverage data be obtained from the remaining 35 fixed wireless providers and the current coverage data be validated.

Alberta Association of Municipal Districts & Counties
2510 Sparrow Drive Nisku, AB T9E 8N5 Phone (780) 955.3639 Fax (780) 955.3615 Web www.aamdc.com

6.3 Coverage Analysis

The following coverage analysis was separated into two groups:

1. 26,512 hexagons (Including all areas in the province)

2. 26,388 hexagons (Excluding the seven major populated centers, Edmonton, Calgary, Lethbridge, Medicine Hat, Red Deer, Grande Prairie, and Fort McMurray.

Table 1: Coverage Analysis (Including the 7 Major Centers)

Coverage	Total Hexagons	Coverage Hexagons	Percentage
> 90%	26512	1875	7.1%
50% to 89%	26512	350	1.3%
25% to 49%	26512	265	1.0%
1% to 24%	26512	225	.8%
0%	26512	23796	89.8%

Table 2: Coverage Analysis (Excluding the 7 Major Centers)

Coverage	Total Hexagons	Coverage Hexagons	Percentage
> 90%	26388	1749	6.6%
50% to 89%	26388	350	1.3%
25% to 49%	26388	265	1.0%
1% to 24%	26388	225	.9%
0%	26388	23796	90.2%

Analysis

44 out of 26512 hexagons are located in the seven major populated areas as result excluding these areas from the analysis had very little impact on the outcome of study.

Only 10 out of 45 fixed wireless providers completed the survey which implies that they only provide broadband coverage to 10% of the rural areas resulting in approximately 90% of the rural areas having zero broadband coverage. It can be assumed that the remaining 35 fixed wireless providers provide broadband coverage to a percentage less than the 90%.

Collecting accurate coverage data from the remaining 35 fixed wireless providers will significantly improve the coverage data and analysis.

6.4 Population Analysis

The following population analysis was separated into two groups:

1. Total Population (Including all areas in the province)

2. Rural Population (Excluding the seven major populated centers, Edmonton, Calgary, Lethbridge, Medicine Hat, Red Deer, Grande Prairie, and Fort McMurray.

Table 3: Population Analysis (Including the seven major urban centres)

Coverage	Total Population	Coverage Population	Percentage
> 90%	3,290,093	2,793,970	84.9%
50% to 89%	3,290,093	30,328	.9%
25% to 49%	3,290,093	21,347	.6%
1% to 24%	3,290,093	14,427	.4%
0%	3,290,093	430,021	13.1%

Table 4: Population Analysis (Excluding seven major urban centres)

Coverage	Total Population	Coverage Population	Percentage
> 90%	1,260,967	764,844	60.7%
50% to 89%	1,260,967	30,328	2.4%
25% to 49%	1,260,967	21,347	1.7%
1% to 24%	1,260,967	14,427	1.1%
0%	1,260,967	430,021	34.1%

Analysis

This data indicates a significant drop between the two tables indicating that overall, approximately 2.8M people in Alberta, including the seven major urban areas, have access to some level of broadband access. However, a significant drop between the two tables indicating that overall , approximately 40% of rural Albertans are without broadband service capabilities. This represents a sizable deficit and challenge.

Also, of significant importance is the “0%’ coverage figure which highlights 430,000 (34.1%) rural Albertan’s without any level of broadband services.

Alberta Association of Municipal Districts & Counties
2510 Sparrow Drive Nisku, AB T9E 8N5 Phone (780) 955.3639 Fax (780) 955.3615 Web www.aamdc.com

7. Stantec's Key Observations

This section provides a list of Stantec's key observations during the Rural Connectivity Gap Analysis:

1) The interactive map and database were initially developed using public information.

2) The public information was then validated by contacting all the ISPs requesting participation in the survey.

3) The data information source was identified and recorded in the database for each ISP.

4) If ISP contact was successful and service coverage information obtained, then the source data entry was registered as "ISP". After a minimum of three failed attempts at reaching the ISP, the public information was left in the database and the information source marked as "Public".

5) Many ISPs indicated their interest in responding during our first follow-up calls; however their participation and low response rates continued.

6) All ISP survey response information was assumed to be accurate.

7) Stantec completed the work for wireless ISPs who provided information or maps regarding their coverage areas but were not able to or willing to do the hexagon map translations.

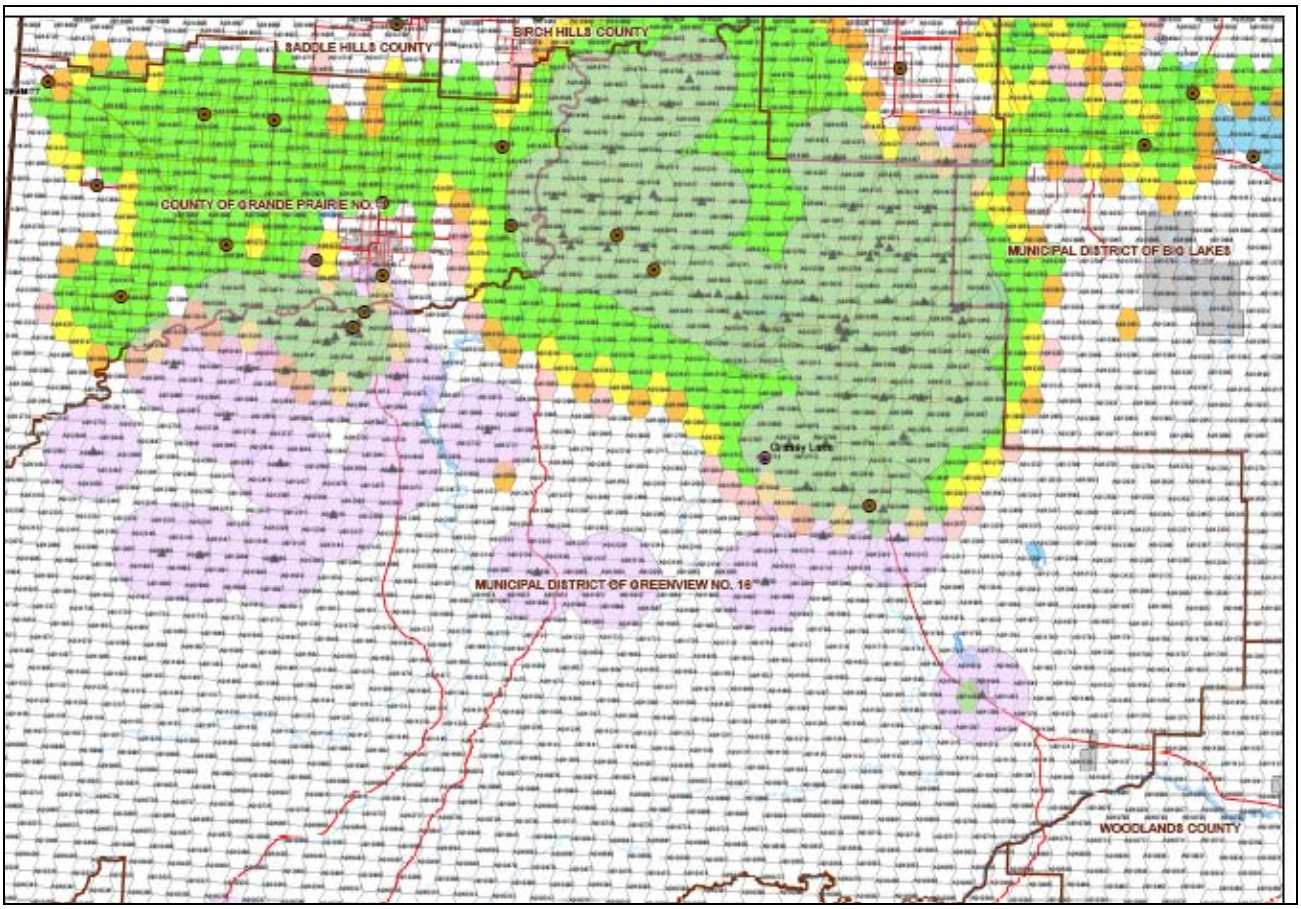
8) As the interactive map application has met the requirements of the Alberta Association of Municipal Districts and Counties (AAMDC) and the supporting database has been provisioned for future data capacity.

9) Through observations during this project, Stantec suggests that improved communication with ISPs would benefit the image of government programs for the ISP community. Giving them access to this interactive map could ultimately empower them to help keep it up-to-date and strengthen the ISPs ownership and cooperation with future initiatives to improve the rural broadband coverage in Alberta.

10) With respect to the interactive map and database, we believe there are a number of simple query features that can strengthen its value. Agriculture and Rural Development staff members were involved in the map development process and could easily add such queries in the future.

Alberta Association of Municipal Districts & Counties
2510 Sparrow Drive Nisku, AB T9E 8N5 Phone (780) 955.3639 Fax (780) 955.3615 Web www.aamdc.com

Appendix A: Example Coverage Map



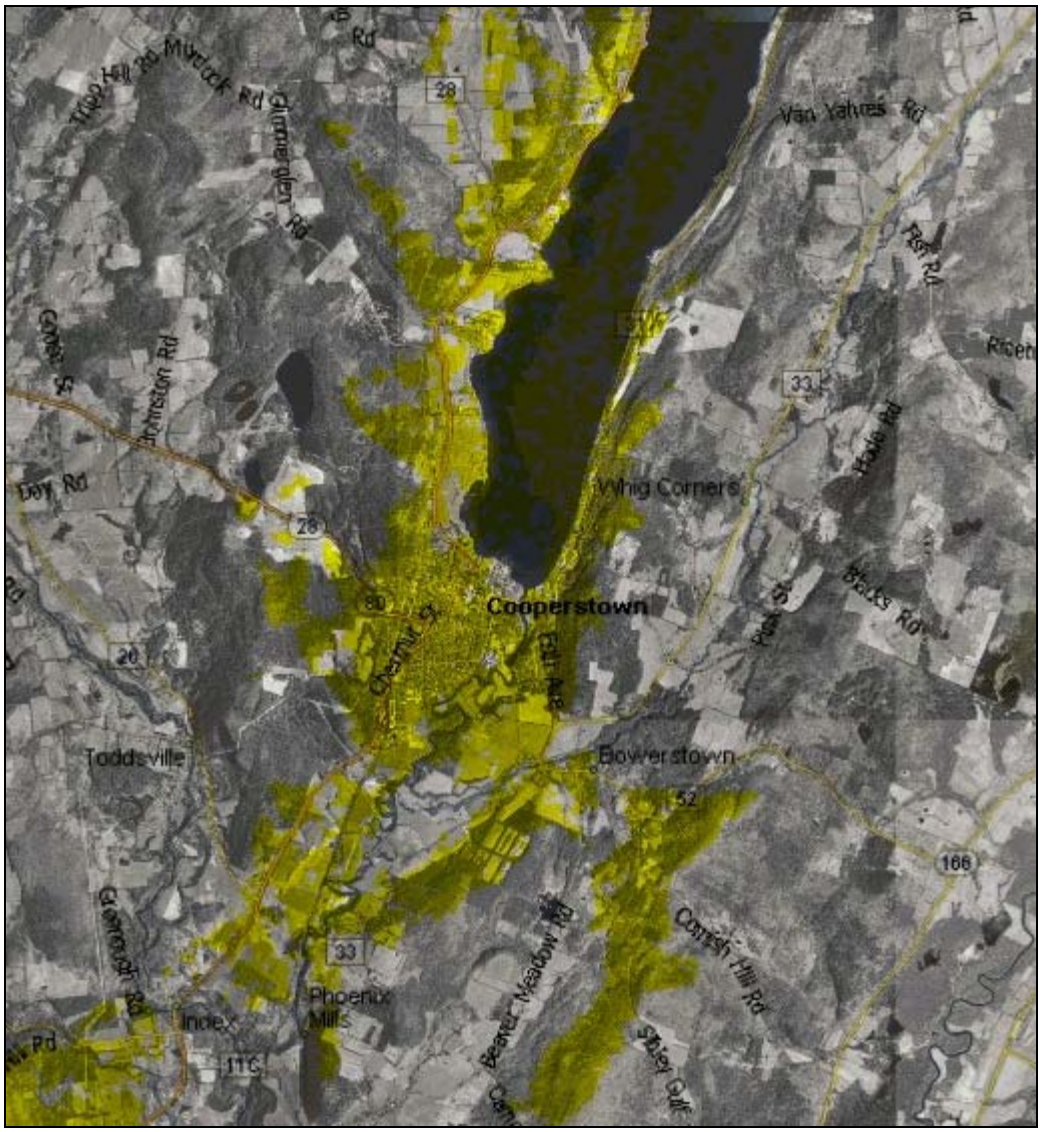
Alberta Association of Municipal Districts & Counties
2510 Sparrow Drive Nisku, AB T9E 8N5 Phone (780) 955.3639 Fax (780) 955.3615 Web www.aamdc.com

Appendix B: Internet Service Providers

Internet Service Provider	Wireless	Satellite	DSL	Cable	Completed Survey	Coverage Available Online	Did Not Respond	Responded (No Coverage Data)	Responded (Does Not Want to Participate)
Abnorth	1				1				
Accelerated Connections	1								
Airenet Internet Solutions	1								
AlbertaHighSpeed	1				1	1			
Auracom Internet Services	1								
Barrett Xplore / Xplornet Internet Services	1	1						1	
BasicISP	1								
Bell Canada			1						
Bike Networks Ltd.	1				1				
Broadband Surfer Canada Inc.	1				1	1			
BYTESurfer Internet Services	1					1			
Caylix Internet Inc	1		1		1				
Clearwave Broadband Networks	1				1	1			
Community Networks Inc	1					1			
Comtech		1							1
Corridor Communications	1							1	
Coppernet Inc.		1	1				1		
Davinci Broadband Inc.	1				1				
Fat Banana Broadband Inc.	1						1		
Figment Cablesystems Inc.	1		1				1		
Galaxy Broadband Communications		1			1				
Gentech Wireless	1								1
GPN Wireless Network Solutions Ltd.	1		1			1			
Harewaves Wireless	1				1	1			
HMS-Inet	1						1		
HotLink Wireless	1					1			
I Want Wireless. Ca Ltd	1				1	1			
Internet LIGHTSPEED Communications			1	1			1		
IP Plus	1						1		
Lesser Slave Lake Indian Regional Council	1				1				
LOGIX Data Products Inc.	1		1						1
MCSNet	1						1		
Milk River Cable Company	1			1			1		
Montreal-DSL			1		1				
Mustang Technologies inc			1						1
Mycanopy	1				1				
Navigata			1		1				
NETAGO Wireless	1					1			
NINA-IT International			1				1		
Pathcom Wireless Inc.	1	1					1		
PeaceCom Ltd.	1						1		
Persona Communications Corp				1	1				
Platinum Communications	1						1		
Prairiewireless	1					1			
Primus Canada			1						
Rigstar	1								1
SERBERNET	1								1
SHAW Cable				1					
SIS Systems	1				1				
SkyRyder Networks Ltd.	1								1
Slamhang			1		1				
Sniper Communications	1						1		
TekSavvy Solutions Inc			1						
Telus Communications Ltd.			1						
Tera-byte Dot Com Inc	1								1
The Internet Centre			1						1
VM Systems / DigitalWeb Internet Services	1		1			1			
WiBand Communications Corp.	1						1		
Wild Rose Internet	1					1			
wispernet.ca ltd. Internet Services	1								1
Wy-Com Ltd.	1					1			
Total:	**45**	**5**	**17**	**4**	**17**	**14**	**14**	**2**	**10**

Alberta Association of Municipal Districts & Counties
2510 Sparrow Drive Nisku, AB T9E 8N5 Phone (780) 955.3639 Fax (780) 955.3615 Web www.aamdc.com

Appendix C: Detailed Coverage Map



Alberta Association of Municipal Districts & Counties
2510 Sparrow Drive Nisku, AB T9E 8N5 Phone (780) 955.3639 Fax (780) 955.3615 Web www.aamdc.com