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CONSULTING LIMITED

Northern Alberta Broadband Preparedness Project

Alberta HUB
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Northern Alberta Development Council

REDI
Northwest Alberta
incredible!

GROWTH Alberta
Your Business. Our Future.

Lesser Slave Lake
Economic Alliance

PREDA
PEACE REGION ECONOMIC DEVELOPMENT ALLIANCE

Submitted to Alberta HUB:
By Taylor Warwick Consulting Limited

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1 Executive Summary

1.1 Introduction

Because of the Internet and related technologies, the world is now transitioning to more complex economic systems built around *knowledge*.[1] As a foundational cornerstone of these emerging systems of wealth creation, access to information and communications technology (ICT) has become critical to sustainable economic development in virtually every community and society on the planet.

For only the third time in history, society's system of wealth is changing. In knowledge-based economies, wealth creation is largely independent of place, local resources, and physical assets compared to the previous industrial era where wealth was based on significant physical resources, access to raw materials, manpower, and efficient transportation. Wealth now arises from human ingenuity, intellectual property, and novel business models. With growth and development timeframes in the new economy largely unconstrained by the building of physical infrastructure and the movement of goods and services, knowledge-based businesses often grow exponentially.

The economic impacts of new broadband infrastructure investment on a community's economy and social framework are felt soon after the investment is made and then continue well into the future. In the short-term, direct effects such as changes in employment, economic production, and behavior are generated during the course of the infrastructure deployment, which then begins to increase the region's contribution to the national gross domestic product (GDP). In the medium-term, indirect benefits become apparent. Examples of indirect benefits include cost savings, cost avoidance, productivity gains, and incremental economic activity. Over the longer term, *'induced effects'* develop. These include the transformative impacts on the economy such as the introduction of new industries/industry clusters and new ways of working.[2] Indeed, the ultimate value of a community's investment in high-speed broadband derives not from the infrastructure itself, but from the economic and social ecosystem that grows and evolves around it.[3]

In spite of the foundational nature of the required underlying connectivity infrastructure, Canada has yet to develop meaningful related technology policy and the results show. Canada, for instance, now ranks 14th in Broadband and in Innovation and whereas at most locations in Canada one may have the option of two wireline providers, in Västerås, Sweden, there are over 30.[4]

Accessible, affordable, and reliable high-speed broadband services, provided in a coordinated and interconnected system, is seen as foundational to supporting economic prosperity locally and regionally, enabling greater social connectedness and well-being of the region's population. High-speed broadband services provide foundational infrastructure for community prosperity, resiliency, and quality of life – not

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[1] Toffler, Alvin and Heidi; Revolutionary Wealth; Knopf; 2006-04-25.

[2] *Socioeconomic Effects of Broadband Speed;* Ericsson, Arthur D. Little, and Chalmers University of Technology; 2013-09.

[3] Smith, Steve; *The Economic Development Benefits of Broadband; Broadband Communities;* Broadband Communities Magazine; 2017-05/06.

[4] Lafleur, B. et al; *How Canada Performs – A Report Card on Canada's Innovation Performance*; Conference Board of Canada; 2013-04.

unlike roads, electricity, water and wastewater, and other essential utilities that support economic activity and community life.

Advancing a robust, diversified economy in northern Alberta is highly dependent on having the necessary infrastructure in place to access markets, reduce cost of service delivery, and enhance the quality of life. Realizing this, with the support of Alberta Economic Development and Trade (EDT), the Northern Alberta Development Council (NADC) together with the five Regional Economic Development Alliances (REDAs) spanning northern Alberta partnered to undertake this *Northern Alberta Broadband Preparedness Project*. The study was initiated to quantitatively evaluate the options available to enhance broadband infrastructure within the northern Alberta study area. The overall purpose of this report is to document:

1. Current broadband availability throughout the region (Current State).
2. Where each community would like to be in 3-, 5-, and 10-years (Desired State).
3. Potential benefits that might be realized once a world-class broadband infrastructure became available (Benefits Assessment).
4. The options available to communities and sub-regional areas interested in enhancing the availability of broadband infrastructure within their environs (Opportunities, Options, and Strategy);
5. The potential financials associated with the more do-it-yourself options (Business Cases).

Parts 1, 2, and 3 were completed and the results released in draft form. Each focused on the entire northern Alberta study region including the NADC area – the NADC area encompassing 60% of the Alberta landmass. To facilitate a greater focus on the opportunities, options, and illustrative financials within each region, Parts 4 and 5 were combined and undertaken separately for the regions covered by each REDA and the NADC.

The *Northern Alberta Broadband Preparedness Project* is being led by the Northeast Alberta Information HUB (Alberta HUB), one of five Regional Economic Development Alliances (REDAs) in northern Alberta. Funding for this study is provided by Alberta Economic Development and Trade (EDT), the Northern Alberta Development Council (NADC), and the five northern Alberta REDAs: Alberta HUB, Grizzly Regional Economic Alliance Society (GROWTH Alberta), Lesser Slave Lake Economic Alliance (LSLEA), Peace Region Economic Development Alliance (PREDA), and Regional Economic Development Initiative for Northwest Alberta (REDI). The study is inclusive of all municipalities, First Nations, and Métis Settlements within the area encompassed by the NADC and the five REDAs.

The NADC, along with Alberta HUB, GROWTH Alberta, LSLEA, PREDA, and REDI, focuses on advancing a robust, diversified economy in northern Alberta. Achieving continued economic growth in northern Alberta is highly dependent on having the necessary infrastructure to access global markets as well as providing connectivity for its residents.

The northern Alberta study area, outlined in Figure 1 in blue, is inclusive of the NADC region and the REDA regions. The footprint of the REDA's, collectively, and the NADC's are the same except for the NADC's southern boundary - the red line in Figure 1 shows the distinction and the NADC's southern-most boundary.

There are 32 municipal districts and counties, 2 cities, 35 towns, 23 villages, 24 summer villages, 154 hamlets, 33 First Nations and 8 Métis settlements with a total of 456,811 people in the study area. Approximately 41.9% are urban dwellers while 58.1% live in rural communities. Of the 58.1%, approximately 7.5% live on First Nations reserves or Métis Settlements.

Most northern Alberta communities are a member of a REDA. There are exceptions and for the purposes of this study, those communities that geographically fall within a REDA but are not a member of the REDA are listed and grouped with member communities of that REDA. This is done to facilitate the assessment of broadband opportunities, options, and strategy development at community and regional levels. Specifically, financially viable and operationally sustainable community or regional fibre-based network

builds often require partnering with neighbouring communities to increase scale and efficiency. Also, REDA membership can change over time.

The collection of information and data, and general research documented in this study, took place primarily between October 2016 and May 2017. Attempts were made to contact all communities and Internet Service Providers (ISPs) within the study's scope to provide input for the study. Despite efforts by the report's author, the NADC, and the REDAs, some communities and ISPs did not provide any information or data. Another challenge was keeping abreast of any changes within the communities and ISPs and refreshing the study's databases, analyses, and this report as required. As such, the contents of this report should be viewed as a '*snapshot*' in time, and the reader is reminded that a variety of changes may have occurred since the data was collected.

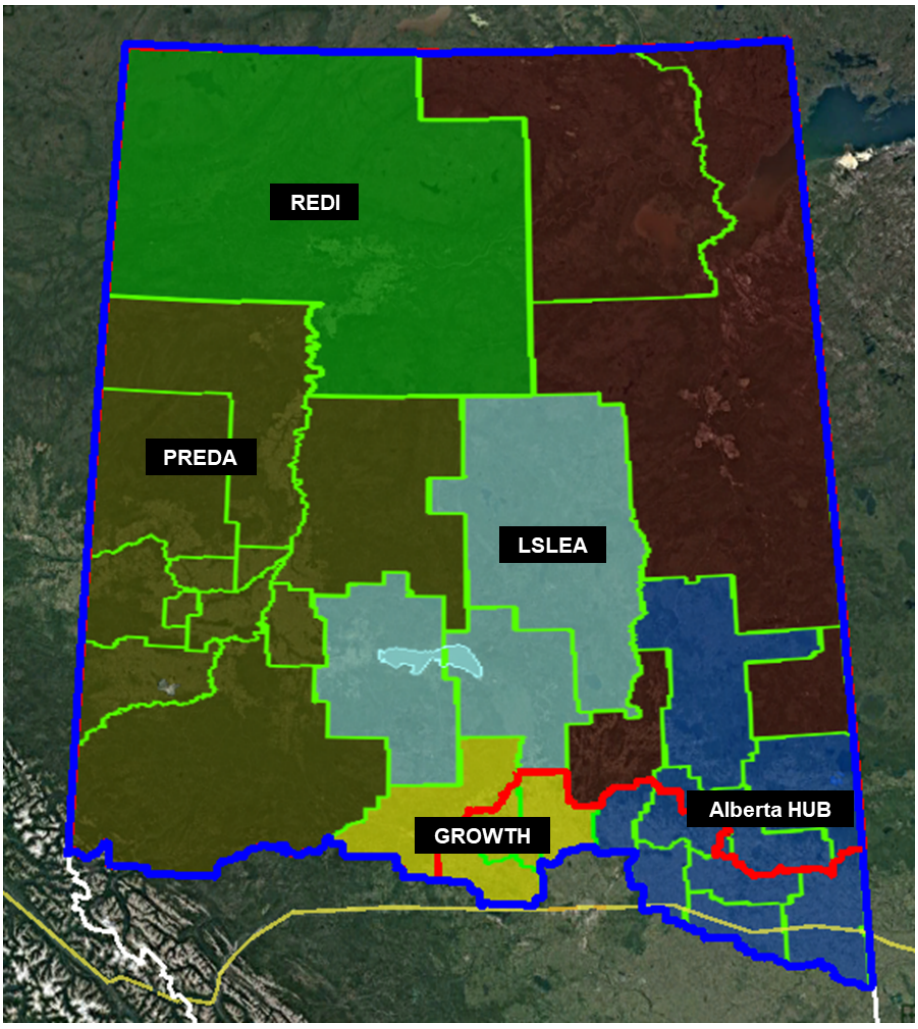


Figure 1 – Northern Alberta study area.

1.2 Landscape

The environment and underlying technologies, together with an ever-widening array of applications and impact areas, continue to evolve quickly. Since the beginning of this project, there have been several new developments that continue to shape the landscape.

Dec. 15, 2016 Federal Innovation, Science, and Economic Development (ISED) Canada announced the *Connect to Innovate Program* to provide up to $500 million in support of new

high-capacity open-access backbone networks; upgrades to existing backbone networks; improving resilience; and last mile access connections by 2021.

Dec. 21, 2016 Canadian Radio-television and Telecommunications Commission (CRTC) declared broadband Internet to be a basic telecommunications service.

Feb. 8, 2017 Statistics Canada released its 2016 Census of Population and Dwelling Counts.

Future Alberta SuperNet 2.0 – Expected changes include potentially a new operator before the original operations contract expires on June 30, 2018, as well as improvements to the terms and conditions for users of the SuperNet services.

1.3 Northern Alberta Development Council

1.3.1 NADC – At a Glance



The NADC region[5] covers approximately 60% of the Alberta's total landmass. The NADC's geographic borders extend north to Alberta's border with the Northwest Territories and east and west to Alberta's borders with Saskatchewan and British Columbia. It reaches south as far as the southern boundaries of the Municipal District (MD) of Greenview, Woodlands County, MD of Lesser Slave River, Athabasca County, Lac La Biche County, County of St. Paul, the Métis Settlements of Buffalo Lake, Kikino, and Fishing Lake, and the First Nations of Whitefish, Saddle Lake and Frog Lake.

Since the geographic footprints of the northern Alberta study area and the NADC region are very similar, it follows that the community compositions are also very similar. The NADC region is slightly smaller geographically – with a smaller population and fewer communities and businesses. There are 24 municipal districts and counties, 2 cities, 23 towns, 9 villages, 11 summer villages, 137 hamlets, 33 First Nations and 8 Métis settlements with a total of 377,000 people in the NADC area. Approximately 41% are urban dwellers while 59% live in rural communities. Of the 59%, approximately 8% live on First Nations reserves or Métis Settlements.

Except for Athabasca County and the Regional Municipality of Wood Buffalo (RMWB), all MD's and counties within the NADC region fall into one of the five REDAs. As REDA membership is at the discretion of the individual municipalities, there are several municipalities (cities, towns, and villages) which are either members of a different REDA than is the MD or county in which the municipality is situated or not a member of any. Though the statistics (population, density, and ISP services) for the latter non-REDA member municipalities are included under the '*Other*' category in this NADC section for completeness, from an analysis perspective, each is included in the analyses done for the MD or counties in which they are situated. To avoid duplication, the analyses in this section will therefore focus only on Athabasca County and the RMWB, as each are '*complete*' from a geographical or potential network deployment perspective.

As shown in Table 1, the non-REDA member NADC communities include 1 Municipal District (MD), 1 county, 2 Improvement Districts, 1 city, 5 towns, 3 villages, 8 summer villages, 19 hamlets, and 8 First Nations. Of the 164,501 residents, half (50.2%) live in municipalities while the remaining 81,857 (49.8%) are dispersed throughout the rural areas of the region.

[5] NADC; *NADC Area Profile: An Economic Description of the Region*; 2016-05.

Table 1 – Non-REDA Member NADC Communities

	Cities	Towns	Villages	Summer Villages	Hamlets	First Nations	Population	% of NADC
Athabasca County		Athabasca	Boyle	Bondiss Island Lake Island Lake South Mewatha Beach South Baptiste Sunset Beach West Baptiste Whispering Hills	Atmore Breynat Caslan Colinton Donatville Ellscott Grassland Meanook Perryvale Rochester Wandering River		12,583	7.6%
Regional Municipality of Wood Buffalo					Anzac Conklin Fort Chipewyan Fort MacKay Fort McMurray Gregoire Lake Estates Janvier South Saprae Creek	Athabasca Chipewyan Chipewyan Prairie Fort McKay Fort McMurray #468 Mikisew Cree Smith's Landing	73,340	44.6%
ID No. 24 - Wood Buffalo National Park							648	0.4%
Improvement District no. 349								
Other Municipalities	Grand Prairie	Slave Lake Beaverlodge Grande Cache Wembly	Donnelly Girouxville			Alexander Salt River #195	77,930	47.4%
80,106 48.7% 5	63,166 38.4% 1	17,168 10.4% 5	1,406 0.9% 3	904 0.5% 8	Population Percent 19	1,751 1.1% 8	164,501 1 49	1

As shown in Figure 2, Internet service levels meeting the new CRTC objective of 50 Mb/s down and 10 Mb/s up are available in only 5 of the 25 municipalities (including hamlets, First Nation, and Métis settlements) appearing in the chart. Of the 5 meeting the CRTC guidelines, 2 – the city of Grande Prairie and the town of Slave Lake – are beneficiaries of both TELUS' 150/150 Mb/s fibre service and Eastlink's 940/10 Mb/s cable service, 2 – Beaver Lodge and Wembly – have Eastlink's 940/10 Mb/s service, and 1– Girouxville – has a copper-based 10/1 Mb/s service from TELUS.

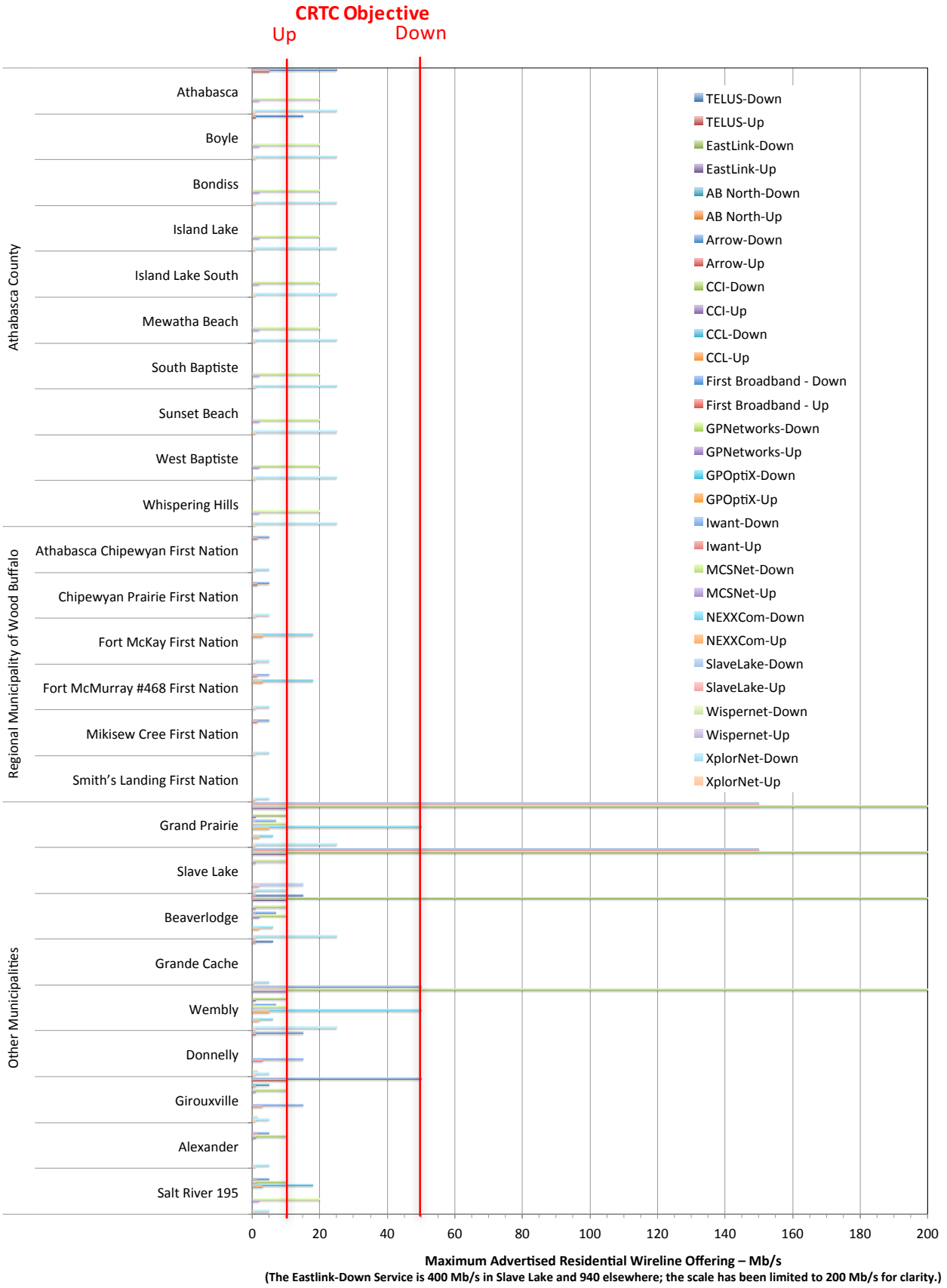


Figure 2 – NADC Internet service levels.

Deployment options and strategies depend on population and density. As is evident in Figure 3, premise densities across the communities appearing in the chart vary widely – from a low of 0.5 homes per square kilometer (or 1 home per 2 km^2) in the Rural Municipality of Wood Buffalo[6] to 293 homes/km^2 in the Summer Village of Sunset Beach. As the cost of providing enhanced broadband services increases substantially as the premise density decreases, the quality and availability of these services does so as well. As shown in Figure 3, the higher the premise density (red squares) relative to the population (top of the blue columns), the better the capital deployment financials will be. Conversely, the lower the density relative to the size of the population, the worse they will be. To be operationally sustainable, in the higher density areas, if the top of the blue column is below, say, 5,000 individuals, partnering with other communities will likely be necessary.

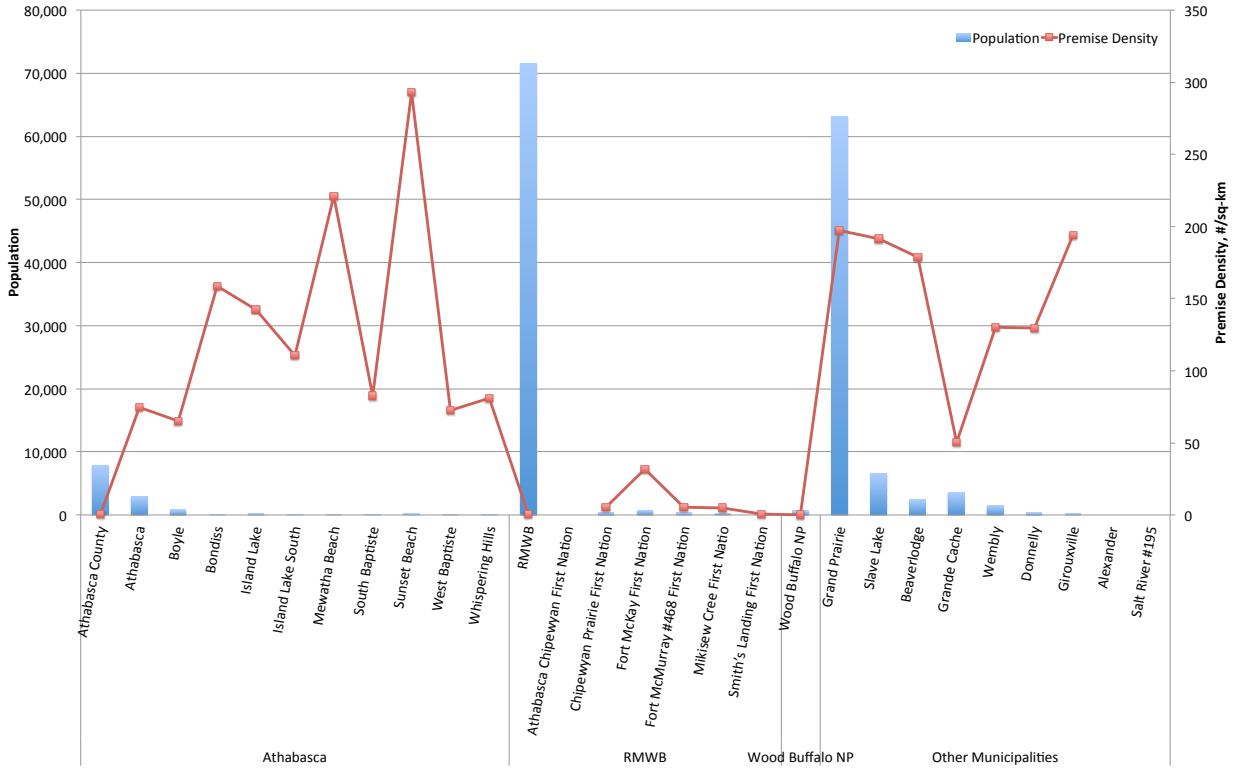


Figure 3 – NADC premise densities.

1.3.2 Plans for Broadband



The Town of Athabasca was in discussions with AxiaConnect last spring and has since been jointly reviewing their options in conjunction with Athabasca County.

The RMWB has been working on broadband for at least five years now and for at least part of that had engaged the services of the IBI Group in Edmonton.

Grande Cache is certainly interested in broadband, but with current financial difficulties is not in a position to move forward.

Slave Lake may participate in the Big Lakes County study.

[6] The rural density will be lower than this as this number includes the population of Fort McMurray. As Fort McMurray is not an incorporated entity, federal statistics include Fort McMurray with the RMWB numbers and the current split is not known.

1.3.3 Utility Networks in Athabasca County and the RMWB

Together, almost 86,000 northern Albertans live in the Athabasca and the RMWB regions.

The Town of Athabasca, the Village of Boyle, and Athabasca County have limited ISP options. TELUS offers bit rates of up to 25 Mb/s in the town (and less in the village). MCSNet also serves these urban areas as well as the summer villages and the rural areas of Athabasca County at bit rates comparable to TELUS' but at higher prices. Challenging terrain (valleys) in the town present issues for MCSNet. Low density is also an factor. Further complicating these issues, MCSNet is experiencing over-capacity on their towers. The Town of Athabasca at the time of the writing, is evaluating an option to have Axia lay fibre in select areas of their town. Athabasca County is also not satisfied with their current levels of Internet service and is seeking alternatives to improve broadband services to their residents.

Pre-conceptual fibre designs have been completed for the town of Athabasca, the village of Boyle, and the county as a whole. Pro-forma financials indicate that an open-access, inclusive, utlity-based fibre network could be deployed throughout the county and operated on a sustainable basis. Details are presented in Sec. 7.8.

The RMWB is comprised of an urban service area and rural communities. With a large population and negligible densities outside the urban service area, the RWMB will have the biggest issue with fibre deployment and unless significant grant funding or novel financing arrangements become available, wireless or hybrid fibre/wireless solutions will be needed. In May 2016, an uncontrolled wildfire swept through parts of the urban service area and the rural communities, forcing the largest wildfire evacuation in Alberta's history. As the damaged areas of Fort McMurray are rebuilt, there is an opportunity to deploy fibre infrastructure. Even without that option, Fort McMurray is large enough to deploy fibre and create a sustainable operation on their own. The remaining centres, however, will need to partner.

Five years ago, the Oil Sands Leadership Initiative funded a review of broadband infrastructure upgrade options for the municipalities of Anzac, Conklin, Fort Chipewyan, Fort MacKay, Gregoire Lake Estates, and Janvier. Though the capital estimates are now somewhat dated, the options and approaches remain valid and will be made available in Section 7.9.

1.4 Northern Alberta Information HUB Ltd. (Alberta HUB)

1.4.1 Alberta HUB – At a Glance



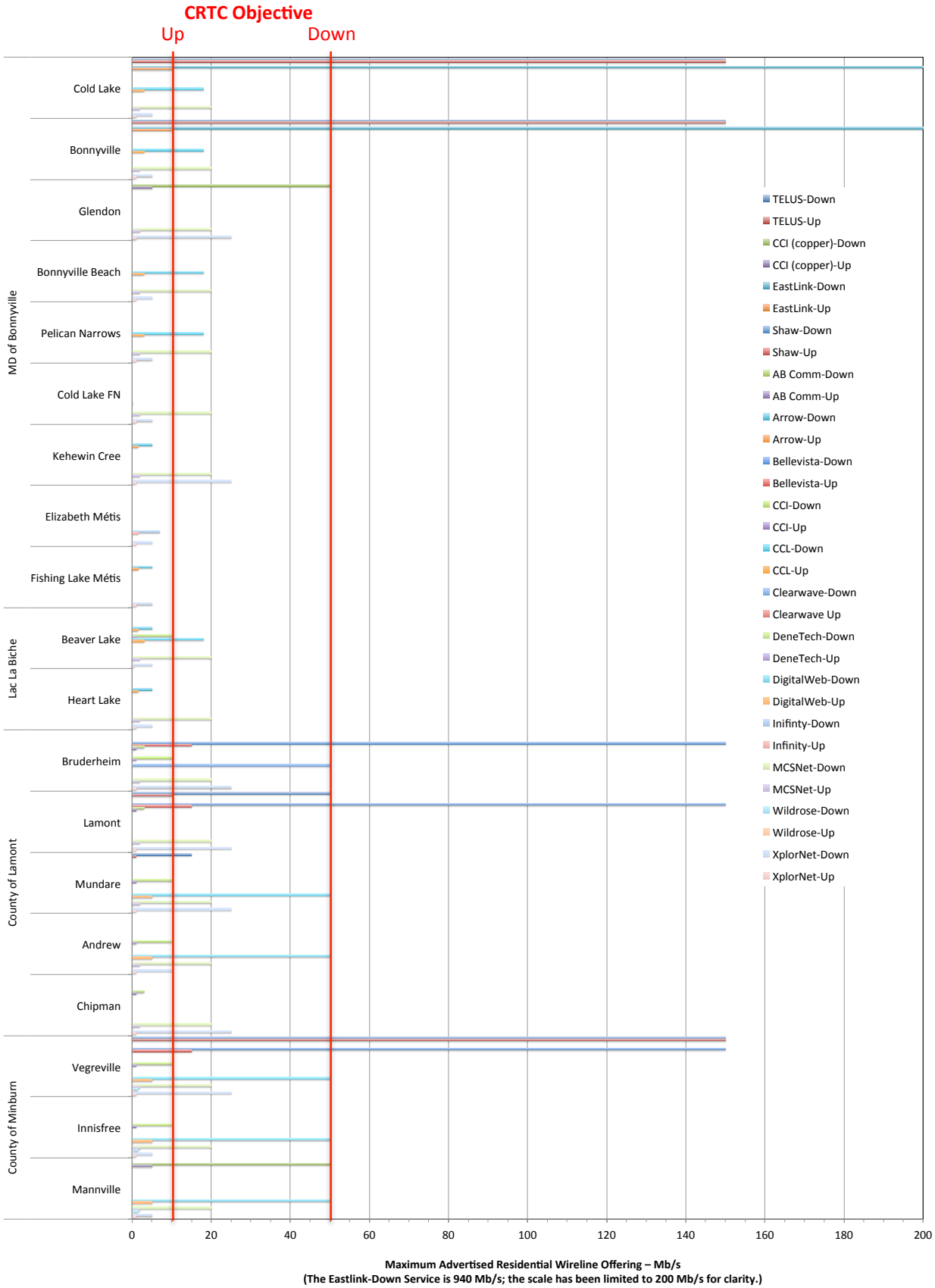
With a 2016 population of approximately 135,000 (including approximately 20,000 for the Alberta portion of the City of Lloydminster), the Alberta HUB region hosts a diverse economy with 4,860 businesses. It is strategically located - its transportation corridors connect Edmonton, the Saskatchewan border area, and the resource rich areas of northeastern Alberta. Some communities within Alberta HUB have completed their own population census subsequent to the Federal census. Therefore, the population figures provided in this report are subject to change.

As shown in Table 2, Alberta HUB includes 1 Municipal District (MD), 8 counties, 1 city, 10 towns, 13 villages, 55 hamlets, 7 First Nations, and 4 Métis Settlements. Of the 115,048 residents, under half (43.6%) live in municipalities while the remaining 65,864 (56.4%) are dispersed throughout the rural areas of the region.

Table 2 – Alberta HUB Communities

	Cities	Towns	Villages	Summer	Hamlets		First Nations	Métis	Population	% of HUB
MD of Bonnyville	Cold Lake	Bonnyville	Glendon	Bonnyville Beach Pelican Narrows	Ardmore Beaver Crossing Beaverdam Cherry Grove	Fort Kent La Corey Therien	Cold Lake Kehewin Cree	Elizabeth Fishing Lk.	37,630	32.7%
Lac La Biche County					Beaver Lake Hylo Lac La Biche	Plamondon Venice	Beaver Lake Heart Lake		8,928	7.8%
Lamont County		Bruderheim Lamont Mundare	Andrew Chipman		Hilliard St. Michael Star	Whitford Wostok			8,532	7.4%
County of Minburn		Vegreville	Innisfree Mannville		Lavoy Minburn	Ranfurly			9,917	8.6%
Smoky Lake County		Smoky Lake	Vina Wasketenau		Bellis Edwand	Spedden Warspite	Saddle Lake Whitefish (Goodfish)	Buffalo Lake Kikino	13,355	11.6%
County of St. Paul		Elk Point St. Paul		Horseshoe Bay	Ashmont Heinsburg Lafond Lindbergh Lottie Lake	Mallaig Riverview St. Edouard St. Lina St. Vincent	Frog Lake		13,895	12.1%
Thorhild County					Abee Egremont Long Lake Newbrook	Opal Radway Thorhild			3,254	2.8%
County of Two Hills		Two Hills	Myrnam Willingdon		Beauvallon Brosseau Derwent Duvernay	Hairy Hill Morecambe Musidora			5,332	4.6%
County of Vermilion River		Vermilion	Dewberry Kitscoty Marwayne Paradise Valley		Blackfoot Clandonald Islay McLaughlin	Rivercourse Streamstown Tulliby Lake			14,205	12.3%
52,330 45.5% 9	14,961 13.0% 1	28,738 25.0% 10	5,201 4.5% 13	284 0.2% 3	Population Percent of Alberta HUB 55		10,789 9.4% 7	2,745 2.4% 4	115,048 1 102	1

As shown in Figure 4, service level chart on the next two pages, Internet service levels meeting the new CRTC objective of 50 Mb/s down and 10 Mb/s up are available in only 7 of the 102 municipalities (including hamlets, First Nation, and Métis settlements) in the region. Of the 10 towns in Alberta HUB, four – Bonnyville, Cold Lake, St. Paul, and Vegreville – are beneficiaries of TELUS' generational fibre investment and the towns of Bruderheim and Lamont have 150/15 Mb/s service from Shaw Communications (Shaw). The Town of Vermilion has asymmetric 940/10 Mb/s service from Eastlink.


CRTC Objective
Up
Down
MD of Bonnyville
Cold Lake
Bonnyville
Glendon
Bonnyville Beach
Pelican Narrows
Cold Lake FN
Kehewin Cree
Elizabeth Métis
Fishing Lake Métis
Lac La Biche
Beaver Lake
Heart Lake
County of Lamont
Bruderheim
Lamont
Mundare
Andrew
Chipman
County of Minburn
Vegreville
Innisfree
Mannville
TELUS-Down
TELUS-Up
CCI (copper)-Down
CCI (copper)-Up
EastLink-Down
EastLink-Up
Shaw-Down
Shaw-Up
AB Comm-Down
AB Comm-Up
Arrow-Down
Arrow-Up
Bellevista-Down
Bellevista-Up
CCI-Down
CCI-Up
CCL-Down
CCL-Up
Clearwave-Down
Clearwave Up
DeneTech-Down
DeneTech-Up
DigitalWeb-Down
DigitalWeb-Up
Inifinty-Down
Infinity-Up
MCSNet-Down
MCSNet-Up
Wildrose-Down
Wildrose-Up
XplorNet-Down
XplorNet-Up
0
20
40
60
80
100
120
140
160
180
200
Maximum Advertised Residential Wireline Offering – Mb/s
(The Eastlink-Down Service is 940 Mb/s; the scale has been limited to 200 Mb/s for clarity.)

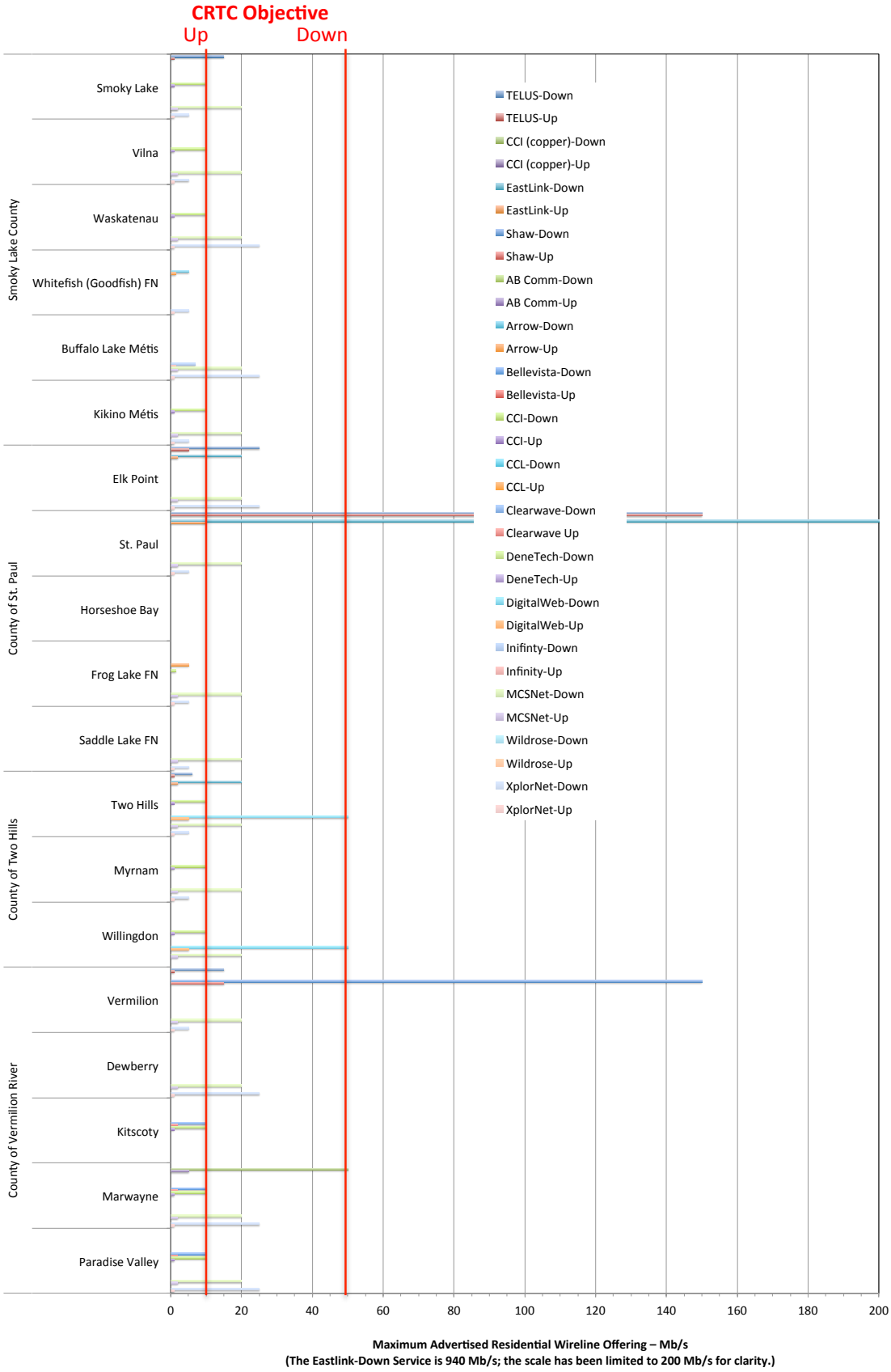


Figure 4 – Alberta HUB Internet service levels.

Deployment options and strategies depend on population and density. As is evident in Figure 5, premise densities across the Alberta HUB region vary widely – from a low of 0.32 homes per square kilometer (or 1 home per 3.125 km^2) in Lac La Biche County to 412 homes/km^2 in the Summer Village of Bonnyville Beach. As the cost of providing enhanced broadband services increases substantially as the premise density decreases, the quality and availability of these services does so as well. As shown in Figure 5, the higher the premise density (red squares) relative to the population (top of the blue columns), the better the capital deployment financials will be. Conversely, the lower the density relative to the size of the population, the worse they will be. To be operationally sustainable, in the higher density areas, if the top of the blue column is below, say, 5,000 individuals, partnering with other communities will likely be necessary.

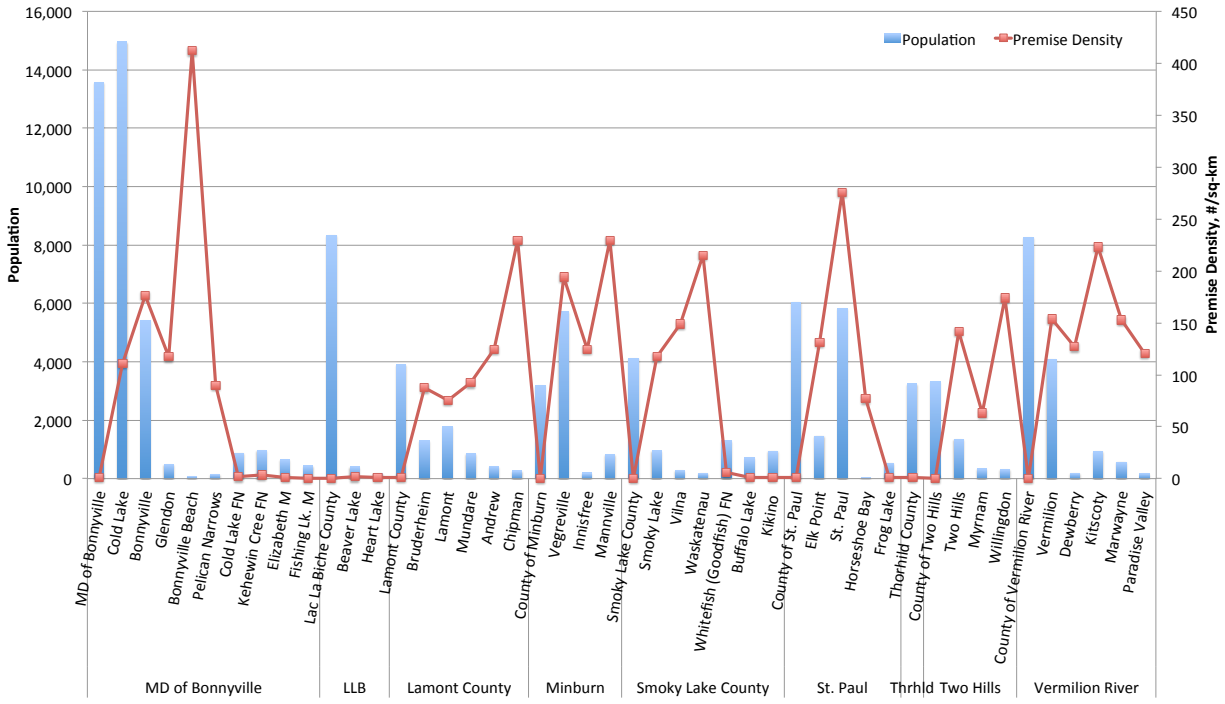


Figure 5 – Alberta HUB premise densities.

With large populations and negligible densities, the MDs and counties will have the biggest issue with fibre deployment and unless significant grant funding or novel financing arrangements become available, wireless or hybrid fibre/wireless solutions will be needed. The larger municipalities such as the City of Cold Lake, Bonnyville, Vegreville, and St. Paul could likely deploy fibre on their own. The remaining municipalities, possibly together with the counties will need to partner.

1.4.2 Plans for Broadband in Alberta HUB

Plans to improve broadband services in the region are at an early stage. The towns of Elk Point and Smoky Lake as well as the County of Vermilion River are '*Enthusiastic*' in their pursuit of enhanced and expanded broadband for their communities. Elk Point favours an Axia solution, Smoky Lake County is looking to Corridor Communications (CCI), and the County of Vermilion River, together with its urban centres is leveraging the Vermilion River Regional Alliance (VRRA) to evaluate the options to provide capable broadband infrastructure on an open-access utility basis.

(1) MD of Bonnyville

With the two largest centres in the MD of Bonnyville – Cold Lake and Bonnyville – happy with current service levels, enhancing broadband services throughout both the MD and the remaining communities will be challenging. Fibre is not yet on the MD's agenda and, courtesy of the downturn in the oil patch, capital is scarce. Given their small size, the remaining communities, including the First Nations and Métis Settlements, will need to partner to make a difference.

(2) Lac La Biche County

With a population of 8,330, an '*anchor*' hamlet (Lac La Biche) of 2,314 people, and the lowest premise density in the Alberta HUB region, improving broadband will involve improving fixed wireless services. The County of Lac La Biche would like to complete a broadband strategy within three years and improve services in their hamlets within five years.

(3) Lamont County

Within Lamont County, Bruderheim is the only community anxious to move forward with broadband. At 26% aerial fibre deployment (i.e., on poles), it would cost about $1 million dollars to pass every home and business with fibre. The issue is operational scale, but targetting the downtown business core first would afford them time to work out the operations details and complete a town-wide deployment within five years.

(4) County of Minburn

The County of Minburn is looking to the Internet Service Provider (ISP) community to improve wireless coverage and capacity across the County. More towers and fibre to those towers will be required.

Vegreville is a TELUS fibre community and Mannville is participating in the VRRA initiative.

(5) Smoky Lake County

Enhancing broadband service availability is very much on the County and the municipality's agenda. To date, their preference is to work with private providers.

The County has an equity position in CCI and sees fibre connected towers as the best approach and then the addition of a number of micro-tower sites to extend coverage to the remaining 2% of their rural population.

The Town of Smoky Lake is actively looking for and evaluating solutions to attain town-wide broadband connectivity. Fibre is the preferred option, and discussions with incumbent service providers are occurring. A wireless solution, which the Town would deploy itself, is also being considered.

Waskatenau is very interested and would like to see fibre in their village within three years, however, operational scale is a hurdle. Vilna did not respond, but appears to be interested.

(6) County of St. Paul

While the County of St. Paul is well aware of the value of enhanced broadband infrastructure, they have other infrastructure in need of upgrades and are facing some financial uncertainty due to changes in the assessment and collaboration costs. Leveraging the higher density areas of St. Paul and Elk Point is not likely as St. Paul has TELUS fibre and Elk Point is looking to Axia. On the plus-side, the average premise density in their rural areas is just over one premise/km.

(7) Thorhild County

Although Thorhild County recognizes the need for enhanced broadband services, options to make it so are not yet on their agenda.

(8) County of Two Hills

Unfortunately, neither the County of Two Hills, nor the Village of Myrnam responded to project inquiries relative to their vision or plans for enhancing broadband. As Willingdon is in the process of becoming a hamlet, that leaves the Town of Two Hills.

While the Town of Two Hills is interested in enhanced broadband services, it is not currently on their Council's agenda.

(9) County of Vermilion River

Under the auspices of the VRRA, the Town of Vermilion has applied for funding to undertake a comprehensive evaluation of their options to provide enhanced digital connectivity infrastructure across the Alliance, inclusive of all its members. The high-level financials for this initiative are outlined later in this report and will help serve as a guide to other Alberta HUB counties that are interested in the potential costs to move forward.

1.4.3 Utility Networks in Alberta HUB

Though representative financials are only provided for Bruderheim – a town with just over 600 premises – financials for urban centres both larger and smaller are available for consideration later sections of this report. As outlined in Table 7, comparative results for communities ranging in size from 4,250 premises down to 725 are available in both the GROWTH Alberta and NADC sections. Whereas financials for centres with in excess of some 2,000 premises are sustainable out of the gate, to reduce risk and improve sustainability, urban centres with less than 2,000 premises will need to collaborate with other communities, obtain grant funding, increase penetration rates, etc., to reduce risk and make the financials work.

Results for Lac La Biche County show that even though the urban centres there are concentrated in the southern half of Lac La Biche and an intercommunity network could be deployed for $4.17M, the densities are too low to establish a sustainable business case for fibre. Hence, either grant funding, a cash infusion, or a staged rollout over many years will be needed. Other options to improve the financials include cost sharing with local ISPs, leveraging linear infrastructure projects, and/or moving some of the cost to the tax roll, as is done for road and water infrastructure. Many MDs and counties within Alberta HUB will face the same issue.

Within the Alberta HUB, the Vermilion River Regional Alliance (VRRA) and its partner communities are the most advanced in recognizing the importance of broadband and looking for solutions to move forward. Indeed, the VRRA took the initiative to apply for CARES funding for a detailed study for the region, inclusive of the municipalities within its boundaries – specifically Town of Vermilion (lead), Dewberry, Kitscoty, Mannville, Marwayne, and Paradise Valley. The study – *VRRA Broadband Research Project* – will leverage the results of this work and then develop more detailed financials to evaluate the options of most interest to the region. As the more detailed financials have already been developed, they will be used in the analyses presented – thereby increasing both the accuracy and credibility of the financial results presented.

Even with worst-case deployment assumptions and no leverage from other linear infrastructure projects, the increased population numbers for the VRRA area help ensure that the financials for an extensive, inclusive, open-access fibre network in the VRRA area, 'work'. The result is very encouraging and bodes well for other MDs and counties within the Alberta HUB region.

1.5 Grizzly Regional Economic Alliance Society (GROWTH Alberta)

1.5.1 GROWTH Alberta – At a Glance



With a 2016 population of approximately 57,000, the GROWTH Alberta region hosts a diverse economy with 2,949 businesses. The region offers convenient access to the major energy centres in the North and is well positioned near major corridors for access to other parts of North America.

As shown in Table 3, GROWTH Alberta includes 4 counties, 7 towns, 2 villages, 13 summer villages, and 23 hamlets. Of the 56,407 residents, approximately half (48%) live in municipalities while the remaining 29,161 (52%) are dispersed throughout the rural areas of the region.

Table 3 – GROWTH Alberta Communities

	Towns	Villages	Summer Villages	Hamlets	Population	% of GROWTH
County of Barrhead	Barrhead			Campsie Manola Neerlandia Thunder Lake	10,867	19.3%
Lac Ste. Anne County	Mayerthorpe Onoway	Alberta Beach	Birch Cove Castle Island Nakamum Park Ross Haven Sandy Beach Silver Sands South View Sunrise Beach Sunset Point Val Quentin West Cove Yellowstone	Cherhill Glenevis Green Court Gunn Rich Valley Rochfort Bridge Sangudo	15,804	28.0%
Westlock County	Westlock	Clyde	Larkspur	Busby Dapp Fawcett Jarvie Nestow Pibroch Pickardville Tawatinaw Vimy	12,795	22.7%
Woodlands County	Whitecourt			Blue Ridge Fort Assiniboine Goose Lake	15,713	27.9%
Other	Legal (Sturgeon) Swan Hills (Big Lakes)				1,983	3.5%
29,161 51.7% 5	24,216 42.9% 7	1,448 2.6% 2	1,582 2.8% 13	Population Percent of Growth Alberta 23	56,407 1 50	1

According to the service level chart in Figure 6, Internet service levels meeting the new CRTC objective of 50 Mb/s down and 10 Mb/s up are available in only four of the 50 municipalities in the region. Mayerthorpe and Whitecourt have an asymmetric 940/10 Mb/s service from Eastlink, Alberta Beach has a 50/10 Mb/s copper-based service from TELUS, and Westlock boasts a symmetric 150/150 Mb/s service on TELUS fibre.

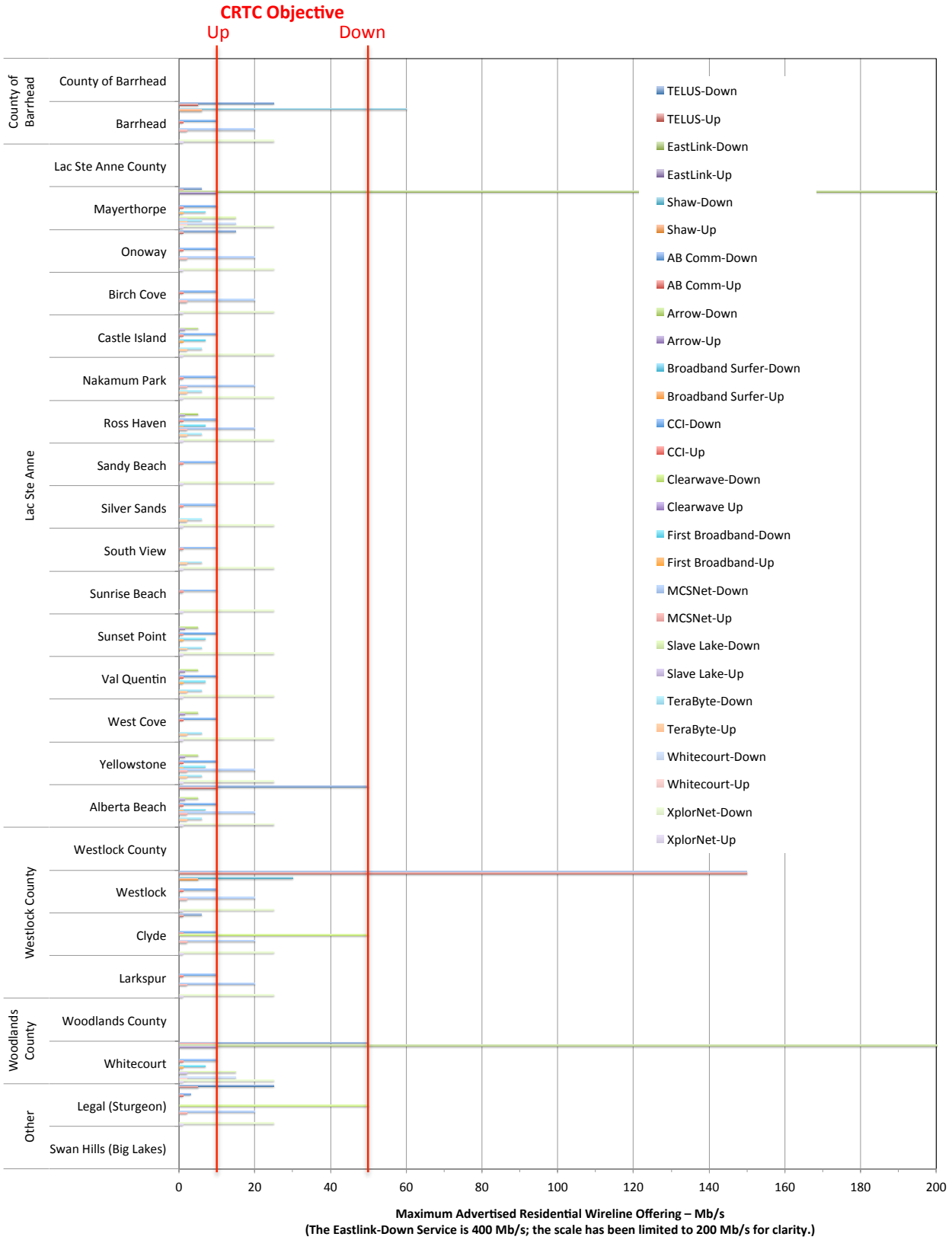


Figure 6 – GROWTH Alberta Internet service levels.

Deployment options and strategies depend on population and density. As is evident in Figure 7, premise densities across the GROWTH Alberta region vary widely – from a low of 0.25 homes per square kilometer (or 1 home per 4 km^2) in Woodlands County to 370 homes/km^2 in the hamlet of Alberta Beach (excluding summer villages).

As the cost of providing enhanced broadband services increases substantially as the premise density decreases, the quality and availability of these services does so as well. The higher the premise density (red squares) relative to the population (top of the blue columns), the better the capital deployment financials will be. Conversely, the lower the density relative to the size of the population, the worse they will be. To be operationally sustainable, in the higher density areas, if the top of the blue column is below, say, 5,000 individuals, partnering with other communities will likely be necessary.

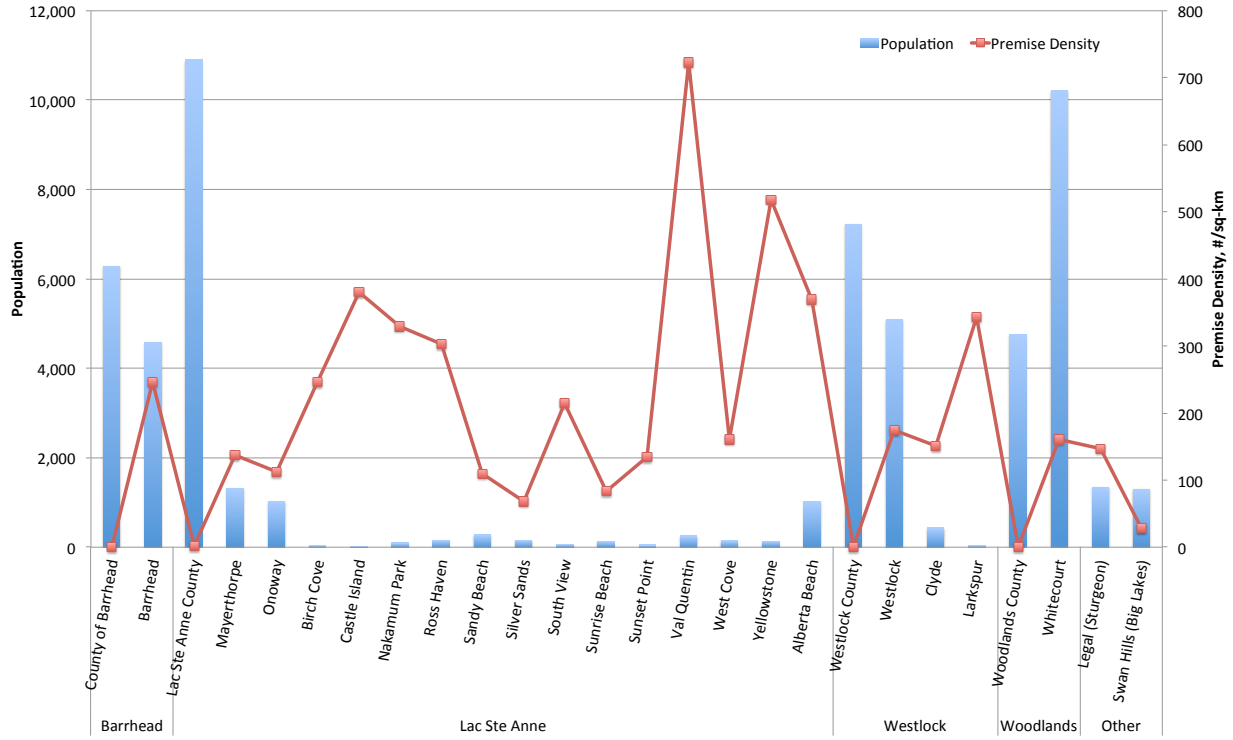


Figure 7 – GROWTH Alberta premise densities.

The large number of high density summer villages in GROWTH Alberta is somewhat unique. Given their density, fibre connections to the homes there would be straightforward. The small number of homes in each summer village, though, creates a financial sustainability issue due to the high cost of backhaul and the seasonal nature of the occupancy.

1.5.2 Plans for Broadband in GROWTH Alberta

The communities demonstrating the most interest in broadband in GROWTH Alberta and where near-term action is likely are the following:

Town of Swan Hills – The Town of Swan Hills is a partner in the Big Lakes County *Inter-Municipal Broadband Discovery Project*, which is being led by Big Lakes and recently received funding from the *Alberta Community Partnership (APC) Program*. The project will assess the options available to enhance broadband in the region. With several oil and gas operations located in the Swan Hills area, Swan Hills is home to a number of industry field offices. The presence of high-speed Internet is a factor in retaining those offices and company bases within and near Swan Hills. Within three years the Town of Swan Hills

envisions the initial deployment of broadband infrastructure and within a decade access to high-speed broadband would be assumed.

Barrhead County – Barrhead County would like to secure consistent Internet service levels and pricing for their residents and businesses – affordable is an important criterion as well. Recognizing their small size and their need to prioritize and align broadband capital expenditures with other infrastructure projects, the county is interested in devising a strategy and plan to achieve Internet access to all citizens and businesses within three years. The County is interested in learning what role especially rural municipalities should assume in achieving the CRTC's targets of 50 Mb/s download and 10 Mb/s upload, with deployment targets of 90% of Canadian households by 2021 and 100% by 2031. They also welcome guidance on how to achieve these targets.

Lac Ste. Anne County – When people move to Lac Ste. Anne County (often from urban centres), they expect available broadband services to be comparable to the urban service levels they may have become accustomed to. Since 2010, the county Council has adopted a utility model for broadband expansion. Since that time, the county's fixed wireless tower deployment has been funded through grant programs. It is anticipated that a similar strategy would be executed to fund fibre/broadband service to all unserved areas within five years.

1.5.3 Utility Networks in GROWTH Alberta

Comparative financial results for communities ranging in size from 4,250 premises (Whitecourt) to 2,000 premises (Barrhead) to 725 premises (Swan Hills) are provided. Whereas financials for centres with in excess of some 2,000 premises are sustainable out of the gate, to reduce risk and improve sustainability, urban centres with less than 2,000 premises will need to collaborate with other communities, obtain grant funding, increase penetration rates, etc., to reduce risk and make the numbers work.

With significant populations and negligible densities, the counties will have the biggest issue with fibre deployment and unless significant grant funding or novel financing arrangements become available, wireless or hybrid fibre/wireless solutions will be needed. Woodlands County could benefit from the presence of the region's largest centre and the County of Barrhead with Barrhead, but with TELUS fibre in Westlock and mostly smaller communities in Lac Ste. Anne, the financials will be a challenge throughout the region.

Taken individually, the financials for Barrhead, Swan Hills, and Woodlands County are challenging. However, should these three centres, together with Whitecourt, combine resources, a very positive business case could be had by all.

1.6 Lesser Slave Lake Economic Alliance (LSLEA)

1.6.1 LSLEA – At a Glance

There are approximately 30,000 residents and 1,230 businesses in the LSLEA region. Twenty-six percent of the region's residents live in First Nations reserves and Métis Settlements. The region is spread over a vast geographic area comprised of boreal forest, lakes, and plains in the south.[7]



As REDA membership is voluntary, affiliation changes over time, and is often geographically inconsistent. In the summary table for LSLEA below, Big Lakes County is now officially a member of PREDA, not LSLEA. However, High Prairie is not and remains a member of LSLEA.

[7] LSLEA; 2017-02-15.

Swan Hills, is a member of GROWTH Alberta. From a network and study perspective, Big Lakes County is best looked at from a geographical perspective wherein Big Lakes County is studied together with High Prairie and Swan Hills. To accommodate these discrepancies, in the Current State sections of this document, the inclusions are based on REDA membership. In both this and the analyses sections of the report, however, the inclusions are geographical – with the results duplicated for each REDA. In the case of Big Lakes County, the analyses are presented in both the LSLEA and the PREDA documents. The analysis for Swan Hills, appears in all three – GROWTH Alberta, LSLEA, and PREDA.

As shown in Table 4, from the analysis perspective, LSLEA includes 2 municipal districts (MDs), 1 county, 3 towns, 16 hamlets, 9 First Nations, and 3 Métis Settlements. Of the 30,114 residents, approximately a third (35%) live in municipalities while the remaining 19,598 (65%) are dispersed throughout the rural areas of the region.

Table 4 – LSLEA Communities

	Towns	Hamlets		First Nations	Métis Settlements	Population	% of LSLEA
Big Lakes County	High Prairie Swan Hills	Enilda Faust Grouard Joussard Kinuso		Driftpile Cree Nation Kapawe'no First Nation Sucker Creek First Nation Swan River First Nation Whitefish Lake First Nation	East Prairie Gift Lake Peavine	14,045	46.6%
MD of Lesser Slave River	Slave Lake	Canyon Creek Chisholm Flatbush Marten Beach	Smith Wagner Widewater	Sawridge First Nation		9,484	31.5%
MD of Opportunity		Calling Lake Red Earth Creek Sandy Lake /Pelican Mtn	Wabasca	Bigstone Cree Nation Loon River Cree First Nation Peerless Trout First Nation		6,585	21.9%
11,656 38.7% 3	10,516 34.9% 3	Population Percent of SLEA 16		6,373 21.2% 9	1,569 5.2% 3	30,114 1 34	1

According to the service level chart in Figure 8, Internet service levels meeting the new CRTC objective of 50 Mb/s down and 10 Mb/s up are available in only one of the 34 municipalities (including hamlets, First Nation, and Métis settlements) in the region. The Town of Slave Lake has an asymmetric 940/10 Mb/s service from Eastlink and, in the areas rebuilt after the fire, a symmetric 150 Mb/s fibre-based from TELUS.

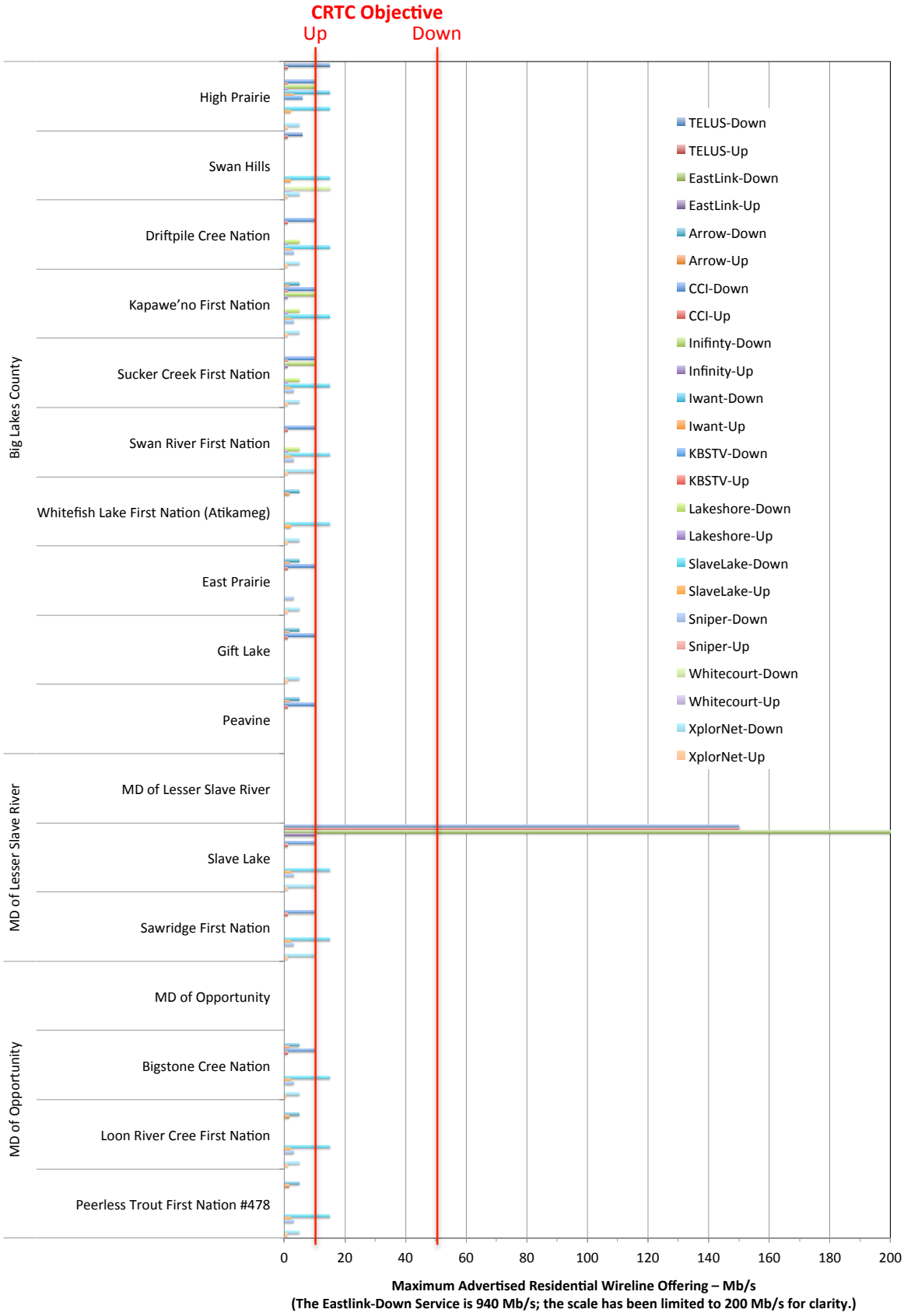


Figure 8 – LSLEA Internet service levels.

Deployment options and strategies depend on population and density. As is evident in Figure 9, premise densities across the LSLEA region vary widely – from a low of 0.1 homes per square kilometer (or 1 home per 10 km^2) in the MD of Lesser Slave River and the MD of Opportunity to 91 homes/km^2 in the Town of Slave Lake.

As the cost of providing enhanced broadband services increases substantially as the premise density decreases, the quality and availability of these services does so as well. The higher the premise density (red squares) relative to the population (top of the blue columns), the better the capital deployment financials will be. Conversely, the lower the density relative to the size of the population, the worse they will be. To be operationally sustainable, in the higher density areas, if the top of the blue column is below, say, 5,000 individuals, partnering with other communities will likely be necessary.

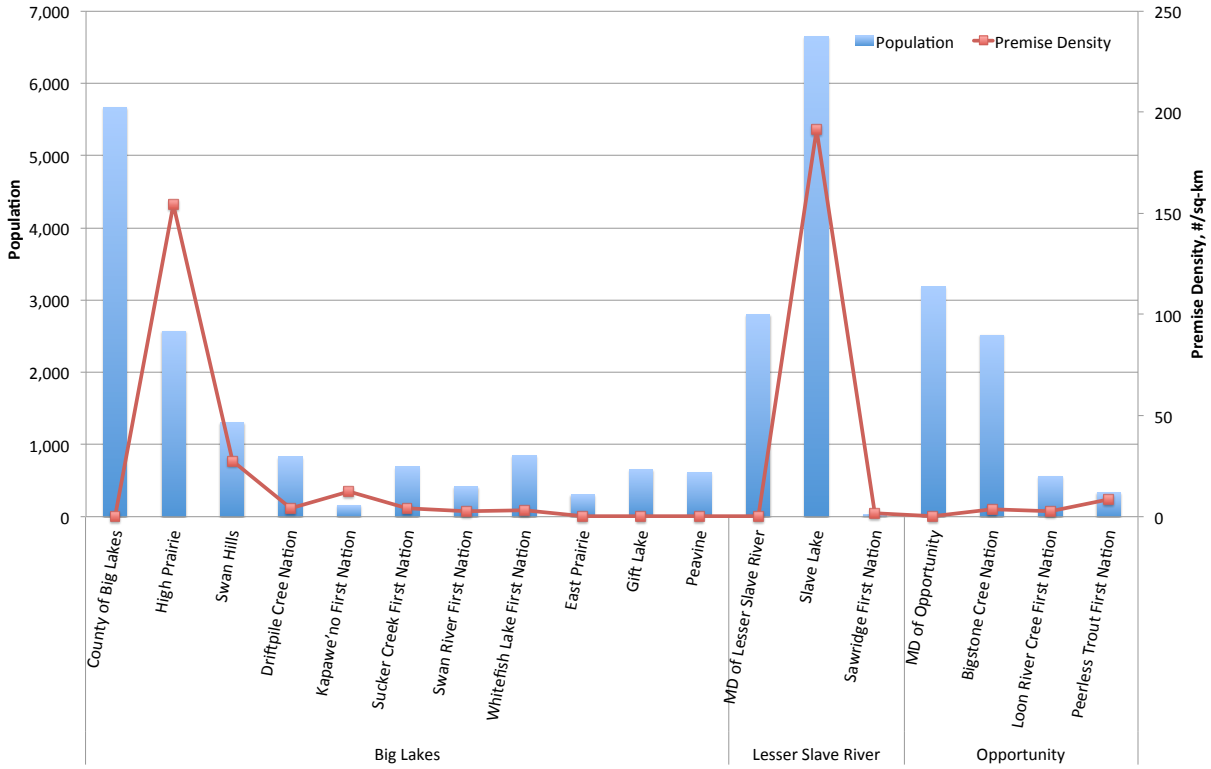


Figure 9 – LSLEA premise densities.

With large populations and negligible densities, the MDs and counties will have the biggest issue with fibre deployment and unless significant grant funding or novel financing arrangements become available, wireless or hybrid fibre/wireless solutions will be needed. Big Lakes County benefits from a slightly higher population density as well as the presence of two major centres. Lesser Slave River has Slave Lake, which helps, but the MD of Opportunity is pretty much entirely rural. At the municipal level, except possibly for Slave Lake, none of the municipalities in the region are large enough to support a fibre deployment on their own – collaboration with other communities or private industry will be needed.

1.6.2 Plans for Broadband in LSLEA

Within the LSLEA, Big Lakes County and its partner communities are advanced in recognizing the importance of broadband and looking for solutions to move forward.

Big Lakes County, the towns of High Prairie and Slave Lake, the MD of Lesser Slave River, and the Gift Lake Métis Settlement – Big Lakes County recently received funding from the *Alberta Community*

Partnership (APC) Program for its *Inter-Municipal Broadband Discovery Project* to assess the best ways to enhance broadband in the region. Big Lakes County will lead the project. At the time of the writing of this report, the project team is in the early stages of organizing and defining their broadband project.

Northern Alberta Broadband Society – The Northern Alberta Broadband Society, an independent voluntary organization, plans to improve broadband connectivity between the immediate Slave Lake region and the Peace River region.

Southshore Area First Nations and Lakeshore Internet Services – Lakeshore Internet Services (Lakeshore) provides fixed wireless-based Internet services to the First Nations and the communities in the Lesser Slave Lake area. Lakeshore's owner, the Lesser Slave Lake Indian Regional Council, is governed by its eight member/shareholder First Nations. The eight members include Driftpile, Duncan's, Horse Lake, Kapawe'no, Sawridge, Sturgeon Lake, Swan River, and Sucker Creek First Nations. Lakeshore strongly believes broadband will provide the infrastructure needed to develop and deliver advanced applications and services that will bring greater economic and social benefits to their communities and bridge the gaps that exist in employment, learning (online education), and healthcare. They would like to deploy fibre to their membership – they envision a pilot project as a way forward.

1.6.3 Utility Networks in LSLEA

Within the LSLEA, Big Lakes County and its partner communities are the most advanced in recognizing the importance of broadband and looking for solutions to move forward. Indeed, Big Lakes County took the initiative to obtain Alberta Community Partnership (ACP) funding for a detailed study for the Big Lakes County, inclusive of the municipalities, First Nations, and Métis settlements within its boundaries – specifically High Prairie, Swan Hills, the hamlets of Enilda, Faust, Grouard, Joussard, and Kinuso, the Kapewe'no First Nation, and the Métis settlement of Gift Lake. The study – *Inter-municipal Broadband Discovery Project* – will leverage the results of this work and then develop more detailed financials to evaluate the options of most interest to the County. As the more detailed financials have already been developed, they will be used in the analyses presented – thereby increasing both the accuracy and credibility of the financial results presented.

At the time of writing, neither the MD of Lesser Slave River nor the MD of Opportunity were ready for such a study. As such, the analyses in this document will focus on the results for Big Lakes County. As will be seen, the business case for an inclusive, open-access utility network focused on providing both fibre-to-the-premise (FTTP) networks in each of these communities as well as an inter-community connecting network within Big Lakes County, goes cashflow positive after seven years. Going forward, the model could be expanded to encompass options for both the MD of Lesser Slave River and the MD of Opportunity.

It is hoped that the Big Lakes County work will be leveraged by the Southshore Area First Nations and Lakeshore Internet Services as both realize the importance of broadband to deliver advanced applications and services that will bring greater economic and social benefits to their communities and bridge the gaps that exist in employment, learning (online education), and healthcare. They would like to deploy fibre to their membership – they envision a pilot project as a way forward. The models developed for Big Lakes should help make that possible. Partnering with Big Lakes would improve the financials for both.

1.7 Peace Region Economic Development Alliance (PREDA)

1.7.1 PREDA – At a Glance



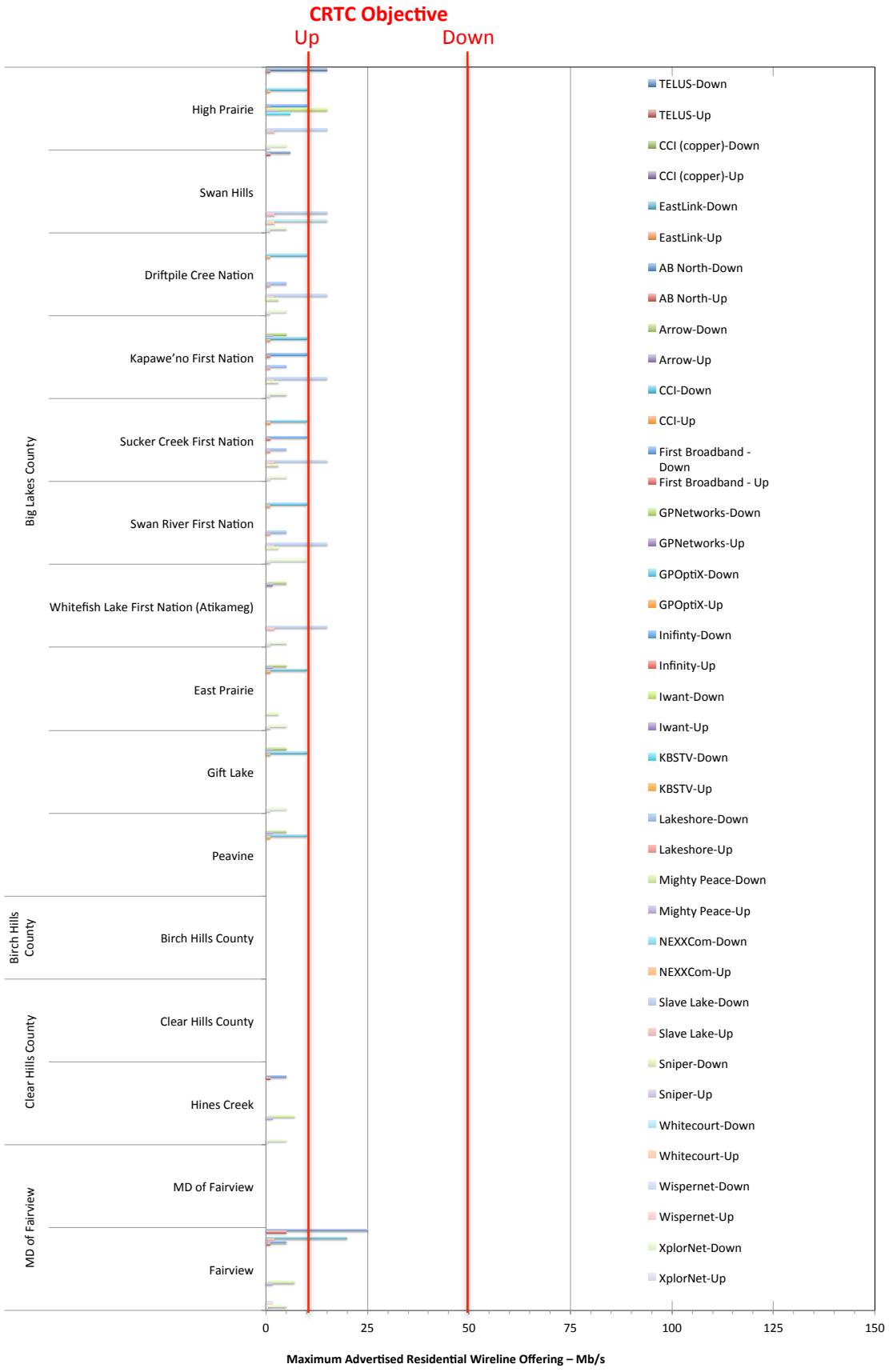
With almost 162,000 residents and 8,330 businesses, PREDA is the largest REDA by population in northern Alberta. The County of Grande Prairie and City of Grande Prairie are the most populated municipalities in the region. Resource extraction, primarily oil and gas, is the primary industry in a region spread over a vast geographic area comprising boreal forest, lakes, and land suitable for agriculture stretching from the Grande Prairie area in the south to the Peace River area in the north.

As shown in Table 5, PREDA includes 5 municipal districts (MDs), 7 counties, 1 city, 15 towns, 43 hamlets, 10 First Nations, and 3 Métis Settlements. Of the 161,245 residents, approximately two thirds (62.5%) live in municipalities while the remaining 60,476 (37.5%) are dispersed throughout the rural areas of the region.

Table 5 – PREDA Communities

	Cities	Towns	Villages	Hamlets	First Nations	Métis Settlements	Population	% of PREDA
Big Lakes County		High Prairie Swan Hills		Enilda Faust Grouard Joussard Kinuso	Driftpile Cree Nation Kapawe'no First Nation Sucker Creek First Nation Swan River First Nation Whitefish Lake (Atikameg)	East Prairie Gift Lake Peavine	14,045	8.7%
Birch Hills County				Eaglesham Peoria Tangent Watino Wanham			1,553	1.0%
Clear Hills County			Hines Creek	Cleardale Worsley			3,369	2.1%
MD of Fairview		Fairview		Bluesky Whitelaw			4,602	2.9%
Grand Prairie County	Grand Prairie	Beaverlodge Sexsmith Wembly	Hythe	Bezanson Clairmont Demmitt Dimsdale Elmworth Goodfare Huallen La Glace Teepee Creek Valhalla Centre Wedgewood	Horse Lake First Nation		93,366	57.9%
MD of Greenview		Fox Creek Grande Cache Valleyview		DeBolt Grovedale Landry Heights Little Smoky Ridgevalley	Sturgeon Lake Cree Nation		14,488	9.0%
Northern Lights County		Manning		Deadwood Dixonville North Star Notikewin			5,383	3.3%
Northern Sunrise County		Peace River	Nampa	Cadotte Lake Little Buffalo Marie Reine Reno St. Isidore	Lubicon Lake Band Woodland Cree First Nation		10,422	6.5%
MD of Peace 135		Grimshaw	Berwyn	Brownvale	Duncan's First Nation		5,153	3.2%
Saddle Hills County				Woking			2,225	1.4%
MD of Smoky River		Falher McLennan	Donnelly Girouxville	Guy Jean Cote			4,332	2.7%
MD of Spirit River		Spirit River	Rycroft				2,307	1.4%
52,524 32.6% 12	63,166 39.2% 1	34,355 21.3% 15	3,248 2.0% 7	Population Percent of PREDA 43	6,383 4.0% 10	1,569 1.0% 3	161,245 1 91	1

According to the service level charts in Figure 10, Internet services meeting the new CRTC objective of 50 Mb/s down and 10 Mb/s up are available in only 11 of the 91 communities (including hamlets, First Nation, and Métis settlements) in the region. The City of Grande Prairie and the Town of Peace River have TELUS fibre at 150/150 Mb/s, Beaverlodge, Sexsmith, and Wembley, have EastLink at 940/10 Mb/s, Fox Creek has EastLink at 400/10 Mb/s, and the remaining five have copper-based 50/10 Mb/s service. Services throughout the remaining communities and rural areas is uniformly poor relative to the new objectives.


CRTC Objective
Up
Down
Big Lakes County
High Prairie
Swan Hills
Driftpile Cree Nation
Kapawe'no First Nation
Sucker Creek First Nation
Swan River First Nation
Whitefish Lake First Nation (Atikameg)
East Prairie
Gift Lake
Peavine
Birch Hills County
Birch Hills County
Clear Hills County
Clear Hills County
Hines Creek
MD of Fairview
MD of Fairview
Fairview
TELUS-Down
TELUS-Up
CCI (copper)-Down
CCI (copper)-Up
EastLink-Down
EastLink-Up
AB North-Down
AB North-Up
Arrow-Down
Arrow-Up
CCI-Down
CCI-Up
First Broadband - Down
First Broadband - Up
GPNetworks-Down
GPNetworks-Up
GPOptiX-Down
GPOptiX-Up
Inifinty-Down
Infinity-Up
Iwant-Down
Iwant-Up
KBSTV-Down
KBSTV-Up
Lakeshore-Down
Lakeshore-Up
Mighty Peace-Down
Mighty Peace-Up
NEXXCom-Down
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Slave Lake-Down
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Whitecourt-Down
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Wispernet-Down
Wispernet-Up
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25
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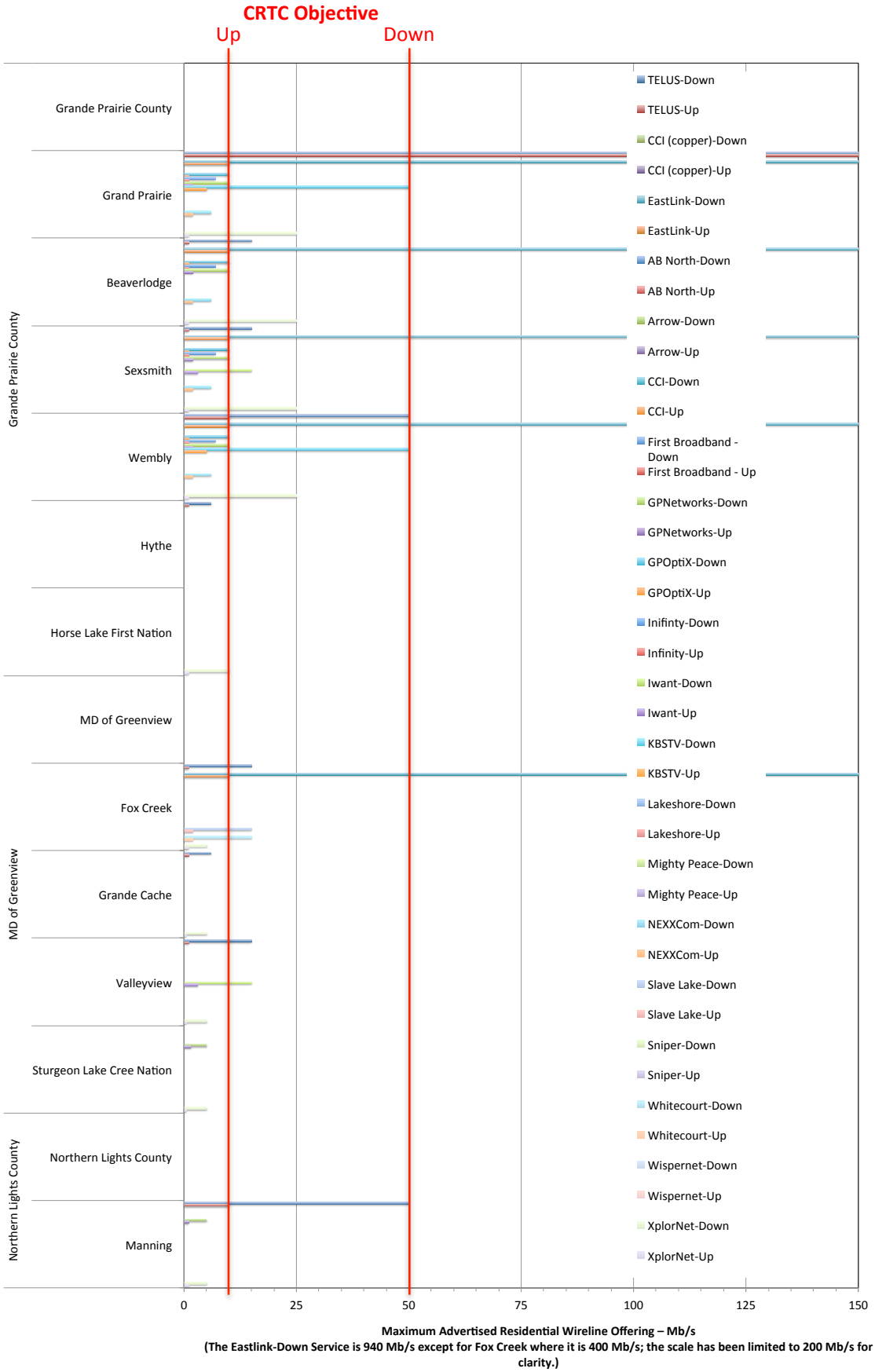
Maximum Advertised Residential Wireline Offering – Mb/s


CRTC Objective
Up
Down
Grande Prairie County
Grand Prairie
Beaverlodge
Sexsmith
Wembly
Hythe
Horse Lake First Nation
MD of Greenview
Fox Creek
Grande Cache
Valleyview
Sturgeon Lake Cree Nation
Northern Lights County
Manning
TELUS-Down
TELUS-Up
CCI (copper)-Down
CCI (copper)-Up
EastLink-Down
EastLink-Up
AB North-Down
AB North-Up
Arrow-Down
Arrow-Up
CCI-Down
CCI-Up
First Broadband - Down
First Broadband - Up
GPNetworks-Down
GPNetworks-Up
GPOptiX-Down
GPOptiX-Up
Inifinty-Down
Infinity-Up
Iwant-Down
Iwant-Up
KBSTV-Down
KBSTV-Up
Lakeshore-Down
Lakeshore-Up
Mighty Peace-Down
Mighty Peace-Up
NEXXCom-Down
NEXXCom-Up
Slave Lake-Down
Slave Lake-Up
Sniper-Down
Sniper-Up
Whitecourt-Down
Whitecourt-Up
Wispernet-Down
Wispernet-Up
XplorNet-Down
XplorNet-Up
0
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Maximum Advertised Residential Wireline Offering – Mb/s
(The Eastlink-Down Service is 940 Mb/s except for Fox Creek where it is 400 Mb/s; the scale has been limited to 200 Mb/s for clarity.)

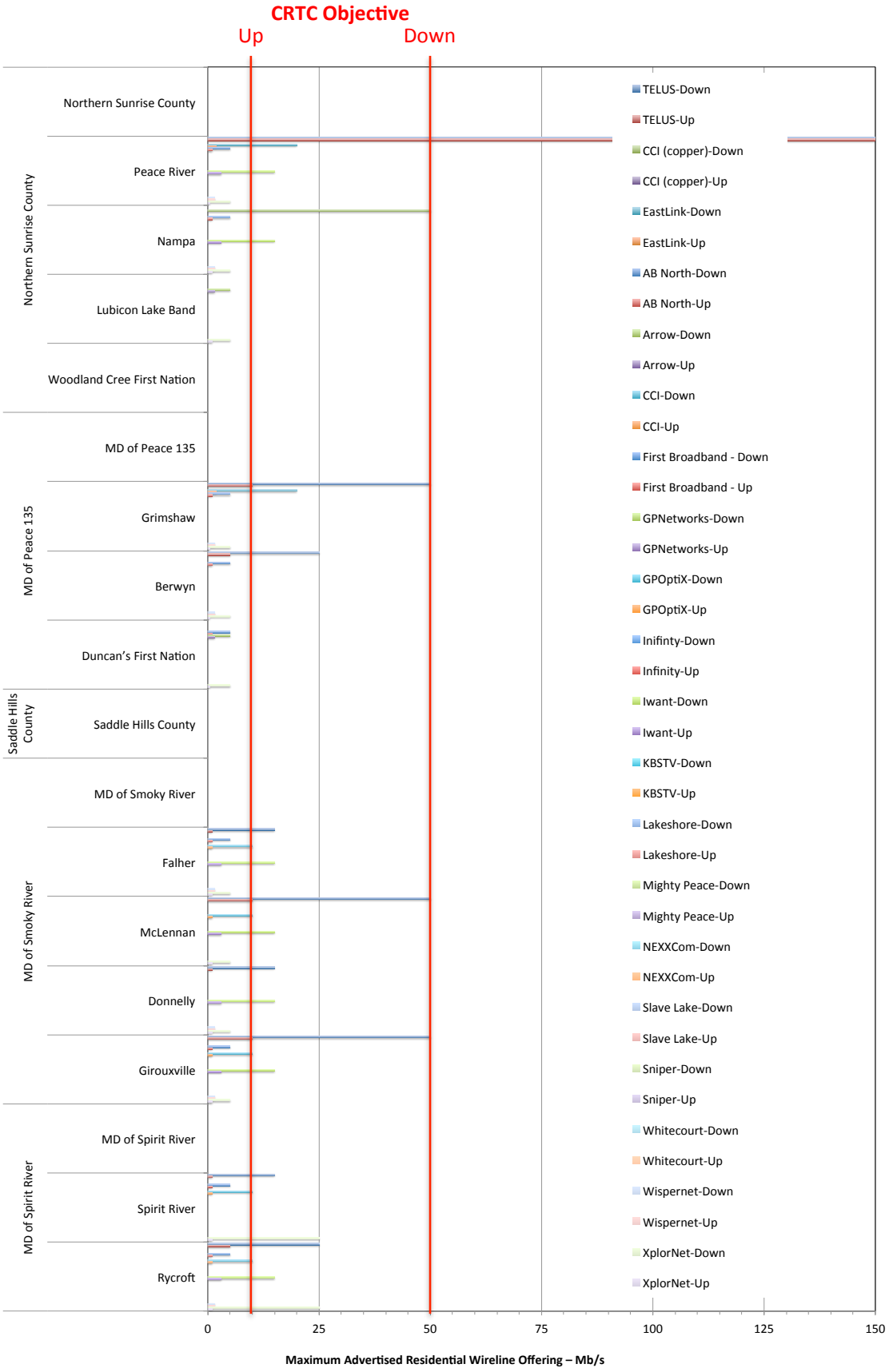
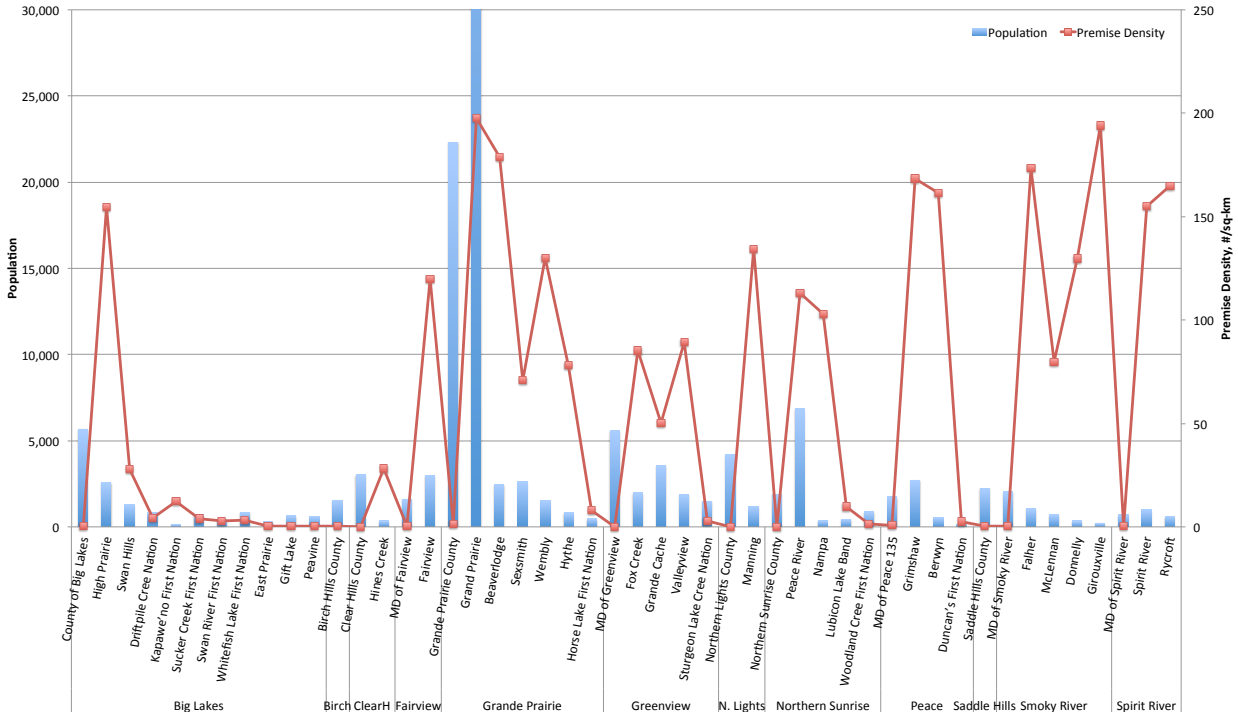


Figure 10 – PREDA Internet service levels.

Deployment options and strategies depend on population and density. As is evident in Figure 11, premise densities across the PREDA region vary widely – from a low of 0.038 homes per square kilometer (or 1 home per 26.5 km^2) in Northern Sunrise to 197 homes/km^2 in the City of Grande Prairie.

As the cost of providing enhanced broadband services increases substantially as the premise density decreases, the quality and availability of these services does so as well. The higher the premise density (red squares) relative to the population (top of the blue columns), the better the capital deployment financials will be. Conversely, the lower the density relative to the size of the population, the worse they will be. To be operationally sustainable, in the higher density areas, if the top of the blue column is below, say, 5,000 individuals, partnering with other communities will likely be necessary.



(To improve readability, the Population scale has been capped at 30k. The population of Grande Prairie is 63k.

Figure 11 – PREDA premise densities.

With large populations and negligible densities, the MDs and counties will have the biggest issue with fibre deployment and unless significant grant funding or novel financing arrangements become available, wireless or hybrid fibre/wireless solutions will be needed. The highest densities together with the largest communities are found in the County of Grande Prairie. Big Lakes County benefits from a slightly higher population density than the more rural MDs and counties as well as the presence of two major centres. As Peace River has TELUS fibre, deploying fibre in the remaining areas will be a challenge financially and hybrid fibre/wireless solutions will be needed. At the municipal level, except possibly for Grande Prairie and Peace River, none of the municipalities in the region are large enough to support a fibre deployment on their own – collaboration with other communities or private industry will be needed.

1.7.2 Plans for Broadband in PREDA

Along a continuum of interest, county and community level interest in broadband within the Peace Region Economic Development Alliance (PREDA) can best be described as '*visionary*' to '*status quo*'. The County of Grande Prairie's vision, a decade ago, led to more than 300 county-sponsored fixed wireless towers being built in the county and through their partnership with GPNetworks, fibre is being deployed to

subdivisions, towns, and villages. The County of Grande Prairie is poised to begin its next wave of enhancement to broadband services within their county. Its vision is to have greatly improved broadband speed available to its residents and businesses – speeds that fibre-based infrastructure is capable of.

Big Lakes County and its partner communities recently took the initiative to obtain Alberta Community Partnership (ACP) funding for a detailed broadband study for the County, inclusive of the municipalities, First Nations, and Métis settlements within its boundaries – specifically High Prairie, Swan Hills, the hamlets of Enilda, Faust, Grouard, Joussard, and Kinuso, the Kapewe'no First Nation, and the Métis settlement of Gift Lake. The study – *Inter-municipal Broadband Discovery Project* – will leverage the results of this work and then develop more detailed financials to evaluate the options of most interest to the County. As the more detailed financials have already been developed, they will be used in the analyses presented here – thereby increasing both the accuracy and credibility of the financial results presented.

The Town of Valleyview completed a Business Case for Broadband in July. Though they are a small community of some 1,000 premises, innovative approaches to both operations and financing have provided them with a positive business case. Valleyview is now moving on to the development of a business/implementation plan.

The councils of the five municipalities of Birch Hills County, Saddle Hills County, MD of Spirit River, Town of Spirit River, and Village of Rycroft are known as the G5 Municipalities. This group works together on matters of regional needs and inter-municipal cooperation, including broadband. Saddle Hills Utility Communications Network and the Peace River Internet Society (PRiS) provide fixed wireless-based Internet services in Saddle Hills County. Rycroft is planning to lay fibre conduit in conjunction with their upcoming curb and gutter project (summer 2017). Potentially, a community fibre project would see Rycroft and the Town of Spirit River leverage the construction of a new water pipeline between the two communities to bring fibre to both communities.

Saddle Hills County has undertaken the building of communications towers for the purposes of ISP co-location and, ultimately, the improvement of the quality of life for its residents and the success of its businesses. The construction of more towers is planned as they work toward their vision of having the county fully served. The county's view is long-term, and it is positioning for today's investments to still be beneficial in 10 to 20 years.

The MD of Smoky River as well as the towns of Falher and McLennan and the villages of Donnelly and Girouxville are poised to initiate a broadband plan.

1.7.3 Utility Networks in PREDA

To provide the more rural areas of PREDA with some guidance beyond more traditional wireless options, detailed financials for inclusive, open-access, lit fibre utilities for the Town of High Prairie, Big Lakes County, and the MD of Smoky River will be developed later in this report.

Though High Prairie is not a member of PREDA, it does fall within Big Lakes County, which is. The analysis is provided here as its size (population of approximately 1,000) is typical of many urban centres within PREDA and the results form part of the analyses for Big Lakes County.

The financials presented for High Prairie illustrate the issues communities such as Fairview, Beaver Lodge, Sexsmith, and Grimshaw will face when evaluating a community fibre access options. Financials for smaller communities such as Wembly, Manning, and Fahler can be found in the report for GROWTH Alberta – they are similar in size to Swan Hills. As High Prairie is large relative to most member communities and the financials are marginal, the idea will be to bring together several communities withinin reasonable proximity together and then leverage the larger client base to improve efficiency and margins. In general, the minimal aggregate size for buried builds is between 2 and 3 thousand premises.

The financials developed above for Big Lakes County show that the business case for an inclusive, open-access utility network focused on providing both fibre-to-the-premise (FTTP) networks in the urban centres as well as an inter-community connecting network within Big Lakes County, goes cashflow positive after seven years. Given their average premise density of only 0.2 premises/km^2, the results are encouraging. Though the county density is low, the population is concentrated along several corridors and with the urban centres involved, the operational scale is sufficient, but not by much. Given the importance of scale, should Big Lakes County proceed to establish a regional network operation, the operation could easily be expanded to encompass both the MD of Smoky River and others within the PREDA footprint – to mutual benefit of all communities involved.

The results for the MD of Smoky River are positive as well and can serve as a template for other communities looking for ways to move forward.

Given the similarities in population and density, it would seem that a similar regional fibre option would work for Northern Sunrise and Greenview. This is not the case, though, and both will have difficulty making the numbers work. The primary urban centre in Northern Sunrise is Peace River, which has TELUS fibre. Greenview's issue is that Grande Cache is far enough from the other centres that pooling operations with them may not be practical.

With both lower densities and fewer population centres, without grant funding, wireless will likely remain the dominant option for Clear Hills, Northern Lights, Saddle Hills, and Birch Hills. With higher densities, limited fibre networks focused on the urban centres are likely possible for Spirit River, Fairview, and Peace. Many options are available to the County of Grande Prairie.

1.8 Regional Economic Development Initiative for Northwest Alberta (REDI)

1.8.1 REDI – At a Glance



The REDI region is home to approximately 23,000 residents and 826 businesses. Its land supports boreal forest while the flat portions are suitable for agriculture in this remote part of Alberta. Twenty-nine percent of the region's residents live on First Nations reserves.

As shown in Table 6, REDI includes 1 county, 2 towns, 3 hamlets, 4 First Nations, and 1 Métis Settlements. Of the 22,780 residents, approximately a third (37%) live in municipalities, including hamlets) while the remaining 13,955 (63%) are dispersed throughout the rural areas of the region.

Table 6 – REDI Communities

	Towns	Hamlets	First Nations	Métis	Population	% of REDI
Mackenzie County	High Level Rainbow Lake	Fort Vermilion La Crete Zama City	Beaver First Nation Dene Tha' First Nation Little Red River Cree FN Tallcree First Nation	Paddle Prairie	22,017	100.0%
11,171 50.7% 1	3,954 18.0% 2	Population Percent of REDI 3	6,348 28.8% 4	544 2.5% 1	22,017 1 11	1

According to the service level chart in Figure 12, Internet service levels meeting the new CRTC objective of 50 Mb/s down and 10 Mb/s up are not available in any of the 11 municipalities (including hamlets, First Nation, and Métis settlements) in the region.

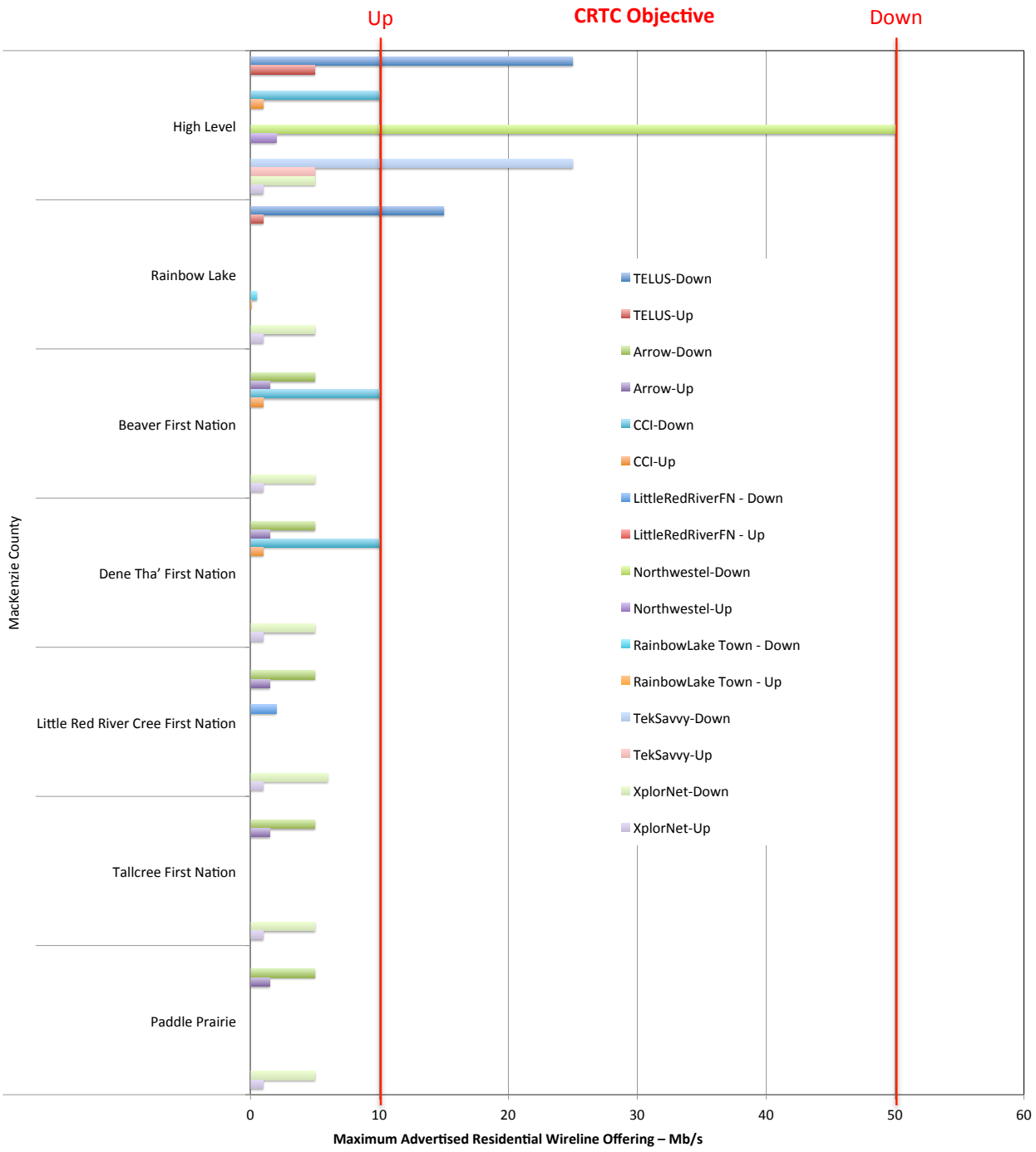


Figure 12 – REDI Internet service levels.

Deployment options and strategies depend on population and density. As is evident in Figure 13, premise densities across the LSLEA region vary widely – from a low of 0.04 homes per square kilometer (or 1 home per 22.6 km^2) in McKenzie County to 46 homes/km^2 in the Town High Level.

As the cost of providing enhanced broadband services increases substantially as the premise density decreases, the quality and availability of these services does so as well. The higher the premise density (red squares) relative to the population (top of the blue columns), the better the capital deployment financials will be. Conversely, the lower the density relative to the size of the population, the worse they

will be. To be operationally sustainable, in the higher density areas, if the top of the blue column is below, say, 5,000 individuals, partnering with other communities will likely be necessary.

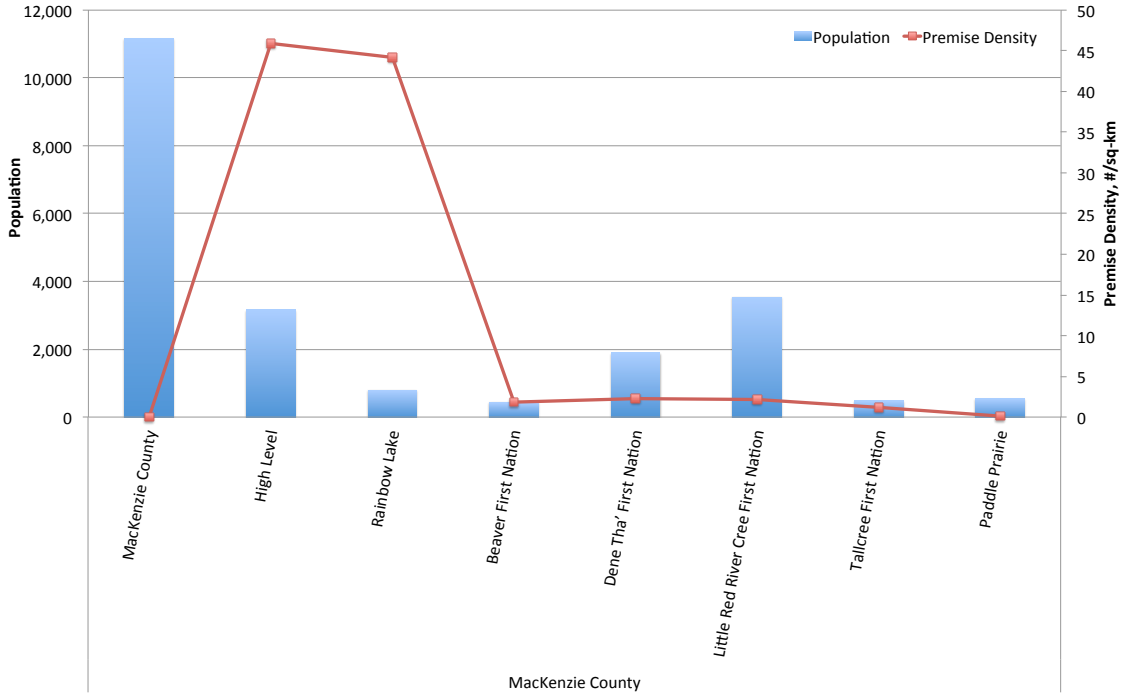


Figure 13 – REDI premise densities.

With larger populations and negligible densities, the county will have the biggest issue with fibre deployment and unless significant grant funding or novel financing arrangements become available, wireless or hybrid fibre/wireless solutions will be needed. At the municipal level, none of the municipalities in the region are large enough to support a fibre deployment on their own – collaboration with other communities or private industry will be needed.

1.8.2 Plans for Broadband

Within the Regional Economic Development Initiative for Northwest Alberta (REDI) the communities that have the greatest near-term broadband aspirations (likely a community hybrid fibre/fixed wireless solution) are the Town of High Level and the First Nations' communities of Dene Tha', Beaver First, Little Red River Cree, and Tall Cree.

1.8.3 Utility Networks in REDI

Each of the communities in REDI has access to SuperNet and the existing fibre routes do pass close to a number of fixed wireless towers. If the communities were interested in establishing an open-access utility network operation to enhance Internet services in the County, it'd likely be best to focus on Fibre-to-the-premise (FTTP) solutions in the communities and fibre to the towers to improve rural coverage. As of this writing the plans for SuperNet 2.0 had not been released so it will be assumed that the existing SuperNet connection sites will remain available and that the terms of their use are likely to become more reasonable. With this approach, the more communities, hamlets, First Nations, and Métis Settlements involved, the better. As broadband needs increase and priorities evolve, this initial focus on the communities could move to a greater focus on the more rural areas. The high-level financials developed indicate that a community focused FTTP play would be financially sustainable, but only if all communities were involved.

1.9 Available Analyses – In Summary

Figure 14 provides a view of the rural and urban populations and densities for each MD and county in the northern Alberta study region. The blue bars show the population of each MD or county and the organge bars,the aggregate population in the urban areas (cities, towns, and villages). Red squares show the rural premise density within each MD and county. In general, the larger the rural population and the lower the density, the more expensive a fibre deployment will be and the more difficult it will be to produce a financially sustainable operation. Should larger population centres (orange) be present in the area and partner with the MD or county, the increased operational scale will help ensure a sustainable operation for both.

In urban centres with significant density, the larger the population the better – as the scale helps operations and the density reduces the deployment cost. In general, urban populations above 4-5 thousand are required for a sustainable, stand-alone buried fibre-utility operation.

The financials developed for Big Lakes County and the VRRA indicate that regional utility-based fibre networks are possible and would be sustainable in those counties over the longer term. The results bold well for MDs and counties with similar or higher density characteristics, rural populations concentrated in smaller areas of the MD or county, and several urban centres with similar or larger aggregate populations. Without grant funding or aerial deployments, those with both lower densities and fewer population centres will need to rely more on wireless and hybrid fibre/wireless solutions.

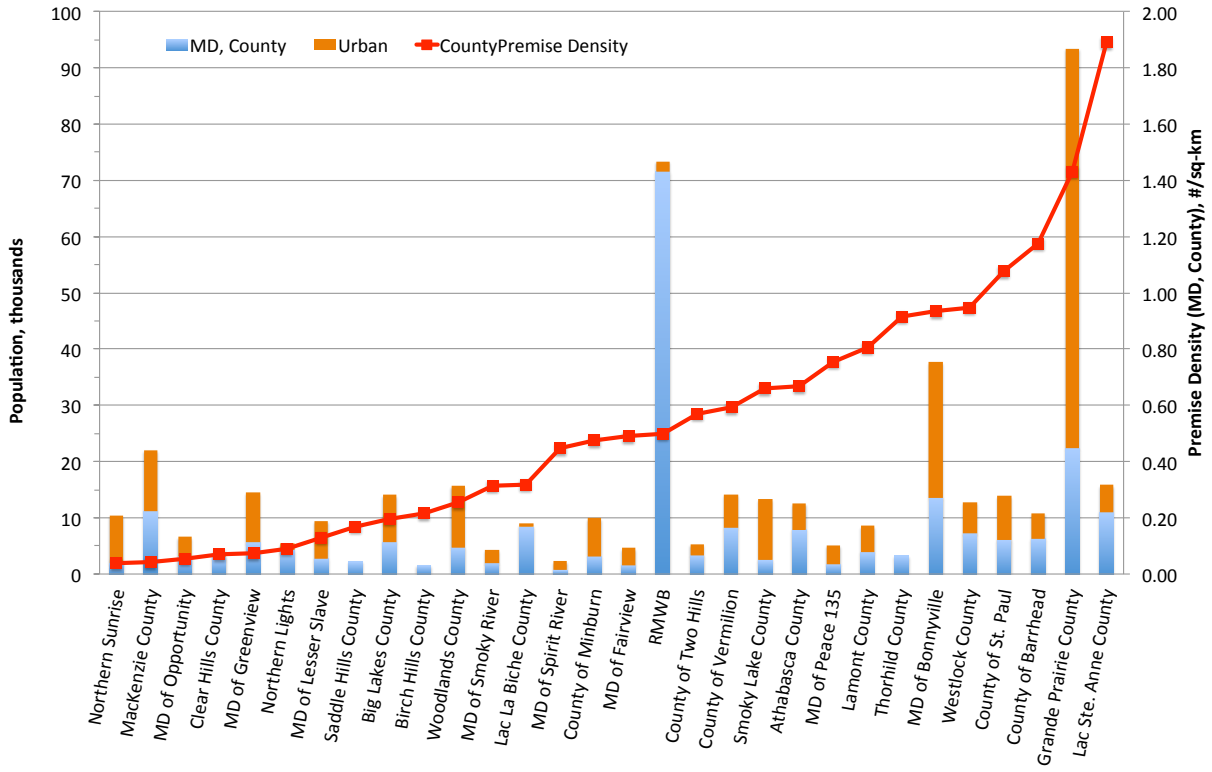


Figure 14 – Population and premise densities in northern Alberta.

Table 7– Analyses Completed for Communities and Regions in Northern Alberta

Report*	**Category**	**County/Community** (Premise Counts)	**Comments**
Alberta HUB	Urban Centres	Bruderheim – 601	High level analysis. To increase operational scale and combined financials with Lamont are also provided.
	MDs, Counties	Lac La Biche	Detailed analysis including capital estimates for the hamlets of Lac La Biche, Plamondon, Beaver Lake, and Rich Lake.
		Vermilion River	Detailed analysis based on the study for the Vermilion River Regional Alliance. In addition to a county network, capital estimates are provided for the town of Vermilion, Dewberry, Kitscoty, Marwayne, Paradise Vallet, and Mannville.
GROWTH Alberta	Urban Centres	Whitecourt – 4,250 Barrhead – 2,000 Swan Hills – 725	Provides an interesting comparative view of the impact of operational scale as community size decreases.
	MDs, Counties	Woodlands	Provides capital estimates to connect several urban centres and ISP towers.
LSLEA	Urban Centres	High Prairie – 1,000	Detailed capital estimate and financials from the Big Lakes Study for the town of High Prairie.
	MDs, Counties	Big Lakes	See PREDA.
NADC	Urban Centres	Athabasca – 1,341	Detailed capital and financial analysis for the Town of Athabasca.
	MDs, Counties	Athabasca	Including capital estimates for the Town of Athabasca and Boyle as well as for Athabasca County.
		Regional Municipality of Wood Buffalo	In fall, 2013, the now defunct Oil Sands Leadership initiative had Taylor Warwick complete a planning level conceptual review the options available to improve broadband services within Anzac, Conklin, Fort Chipewyan, Fort MacKay, Gregoire Lake Estates, and Janvier. The options included infrastructure to support mesh WiFi, hybrid fibre/WiFi, and full fibre/WiFi. The detailed study[8] is available on the NADC website.
PREDA	Urban Centres	High Prairie – 1,000	See LSLEA.
	MDs, Counties	Big Lakes	Detailed analysis based on the study for Big Lakes County. As the study is inclusive of the urban centres of High Prairie, Swan Hills, Enilda, Foust, Gift Lake, Grouard, Joussard, Kinuso, and area around Kinuso, capital estimates for each of these centre is provided.
		Smoky River	Detailed study Including capital estimates for Fahler, McLennan, and Donnelly.
REDI	Urban Centres	Mackenzie County	High level analysis Including High Level, Rainbow Lake, La Crete, Fort Vermilion, and Zama City.
The estimates provided are based on a common 'default' set of assumptions. Specifically, the assume a fully buried, air blown, home-run fibre network funded through a 25 year ACFA loan and operated on an open access basis as a utility. Depending on the choices made by individual communities and local conditions such as the availability of power poles, these numbers may change significantly. *All analyses appear in the NADC report. [9]			

[8] Dobson, C.; *Infrastructure Options for Rural Villages in the RMWB*; Oil Sands Leadership Initiative; 2013-09-14.

[9] Dobson, C.; *Northern Alberta Broadband Preparedness Project – NADC*; Taylor Warwick; 2017-09-15.

1.10 Next Steps

This document provides a starting place for communities, sub-regions, and regions across northern Alberta looking to enhance the availability and quality of broadband services in their areas. A range of options, from staying with the status quo, to negotiating with private enterprise, to establishing a fibre utility are presented and discussed. For the latter options, illustrative financials are presented.

While regional and municipal options do involve more responsibilities and risks than simply transferring control to private enterprise, they come with significant advantages. As well, to manage the level of their involvement, close to turn-key options do exist and can be easily incorporated into regional, sub-regional, and community deployment programs – once the community has decided upon the business and governance structure, operational arrangements, and financing.

Some areas, such as Big Lakes County and the Vermilion River Regional Alliance have already chosen a direction and are evaluating their direction further. The initial next step for those communities not there yet, is to work with key stakeholders and determine if something beyond the status quo is required and, if so, which of the many options available to enhance broadband infrastructure, is most appropriate. Once consensus on a direction has been reached, the direction will need to be verified based on negotiation, feasibility studies, or businesses case development as appropriate.

Whether or not cities, towns, villages, First Nation communities, Métis settlements, counties and MDs elect to move (or, for those that already are, continue moving) forward with broadband now or not, in order to position for future broadband planning and expansion, the following interim straightforward and inexpensive approaches to enabling significant future cost-savings should be considered:

Municipal Planning:

- Work with your community, sub-region, or REDA to leverage planning/policy and financial resources;
- Develop a Broadband Services Strategic plan specific to your community;
- Embed fibre network requirements in internal IT planning processes; and
- Accelerate currently planned IT infrastructure deployment.

Leverage Planned Civil Works:

- Develop a policy for including installation of fibre conduit as part of applicable and appropriate town and county infrastructure projects, such as road (re)construction and water / wastewater projects.

Position for the future:

- Require that the inclusion of fibre conduit be a mandatory requirement in all applications for new residential and businesses development permits; and
- Adopt an inside wiring standard with Cat-5 wiring as the minimum standard.

1.11 Conclusions

Whereas wealth creation in the industrial era required significant physical resources, access to raw materials, manpower, and efficient transportation, wealth creation in knowledge-based economies is largely independent of place, local resources, and physical assets. In contrast, wealth now arises from human ingenuity, intellectual property, and novel business models. With growth and development timeframes in the new economy largely unconstrained by the building of physical infrastructure and the movement of goods and services, knowledge-based businesses often grow exponentially. As a foundational cornerstone of these emerging systems of wealth creation, access to information and communications technology has become critical to sustainable economic development in virtually every community and society on the planet.

Through this work, REDA members (and non-members) are now in a better position to weigh their options and select those that best align with each's vision for the future of their area. Enhancing broadband has the potential to set the stage to dramatically and positively impact the fabric of life throughout the region by helping to enable exceptional network services; learn-in-place, work-in-place, and age-in-place opportunities for all generations; innovation and diversification in every economic sector; and positioning the region's brand as dynamic, progressive and relevant to the future.

As shown, the financial sustainability of stand-alone urban utility fibre operations is largely a function of size and the options a community decides to go with. In general, centres with populations of 4-5 thousand or greater can do what they wish. Smaller communities are typically more constrained and will require access to grant funding or other communities to partner with to make things work.

With very small and uneven densities, generalizations are more difficult when evaluating MDs and counties. In general, the sustainability of MD or county-based, fibre-utility operations is a function of rural and municipal population and density and their variation across the study region. Scale, as in partnering with neighbouring communities helps.

To accommodate both present and future economic development needs, facilitate full citizen inclusion, and help eliminate any digital divides within the NADC region, regional- or municipal-driven, utility-based, fibre-to-the-premise deployments capable of enabling symmetric access up to and beyond 1 Gb/s to all is recommended. The hybrid fibre wireless infrastructure suggested will cost-effectively scale to meet all future bandwidth requirements, minimize cost to all potential clients, and enable the region to maintain control of critical civic infrastructure.

2 Introduction

2.1 Project Definition

Advancing a robust, diversified economy in northern Alberta is highly dependent on having the necessary infrastructure in place to access markets, reduce cost of service delivery, and enhance the quality of life. Realizing this, with the support of Alberta Economic Development and Trade (EDT), the Northern Alberta Development Council (NADC), the Northeast Alberta Information HUB Ltd. (Alberta HUB), and the four other Regional Economic Development Alliances (REDAs) partnered to undertake this Northern Alberta Broadband Preparedness project. The study is to quantitatively evaluate the options available to enhance broadband infrastructure within the NADC region. The overall purpose is to document:

1. Current Broadband availability throughout the region (Current State).
2. Where each community would like to be in 3-, 5-, and 10-years (Desired State).
3. Potential benefits that might be realized once the availability of world-class broadband infrastructure became available (Benefits Assessment).
4. The options available to communities and sub-regional areas interested in enhancing the availability of broadband infrastructure within their environs (Opportunities, Options, and Strategy); and
5. The potential financials associated with the more do-it-yourself options (Business Cases).

Parts 1, 2, and 3 were completed and the results were released in draft form. Each focused on the entire northern Alberta study region and the NADC area – the NADC area encompassing 60% of the Alberta landmass. To facilitate a greater focus on the opportunities, options, and illustrative financials within each region, Parts 4 and 5 were combined and undertaken separately for the regions covered by each REDA and the NADC. The results for the Alberta HUB region are documented in this report.

2.2 Project Purpose

From a strategic perspective, the purpose of *Northern Alberta Broadband Preparedness Project* is to complete both the current (Phase 1) and desired (Phase 2) state for each community and the region as a whole, as well as identify the potential options available to bridge any gaps. The options of most interest are then used to develop a strategy (Phase 3) with which the Desired State can be achieved. In support of the proposed strategy, preliminary financials will then be developed. In summary, the steps are:



1. Establish the current state for each municipality, county, municipal district (MD), First Nation community, and Métis Settlement within the northern Alberta study area;
2. Establish the desired state for each of the above entities.
3. Using gap analysis, identify the options and opportunities available to realize the desired state, estimate the related capital requirements, and use the results to inform the development of a regional broadband strategy; and
4. Based on the agreed upon strategy, if applicable, develop a preliminary business case.[10]

2.3 Project Leadership and Study Partners

The *Northern Alberta Broadband Preparedness Project* is being led by the Northeast Alberta Information HUB (Alberta HUB), one of five Regional Economic Development Alliances (REDAs) in northern Alberta. REDAs are autonomous non-profit organizations comprised of member communities and regional

[10] Project contract between the Northeast Alberta Information HUB Ltd. and Taylor Warwick Consulting Limited; 2016-08-12.

stakeholders that work together to foster business development and prosperity in a defined geographic area.[11]

Funding for this study is provided by Alberta Economic Development and Trade (EDT), the Northern Alberta Development Council (NADC), and the five northern Alberta REDAs: Alberta HUB, Grizzly Regional Economic Alliance Society (GROWTH Alberta), Lesser Slave Lake Economic Alliance (LSLEA), Peace Region Economic Development Alliance (PREDA), and Regional Economic Development Initiative for Northwest Alberta (REDI).

The study is inclusive of all municipalities, First Nations, and Métis Settlements within the area encompassed by the NADC and the five REDAs. Chief Administrative Officers and their staff (information technology, planning and development, and economic development officers); First Nation and Métis Settlement administrators and managers; and Internet Service Providers (ISPs) were the primary contributors of information and data to this report. Other stakeholders contributing to the understanding of the '*current state*' included elected officials, primary and post-secondary educational institutions, Alberta Health Services, local Chambers of Commerce and Community Futures, business leaders and owners, and industry associations and organizations.

The collection of information, data, and general research took place primarily between October 2016 and March 2017. Attempts were made to contact all communities and ISPs within the study's scope to provide input for the study. Despite efforts by Taylor Warwick, the NADC, and the REDAs, input from some communities and ISPs was not forthcoming. Another challenge was keeping abreast of changes within the communities and ISPs and refreshing the study's databases, analyses, and this report as required. As such, the contents of this report should be viewed as a '*snapshot*' in time, and the reader is reminded that a variety of changes may have occurred since this report was written.

The NADC, along with Alberta HUB, GROWTH Alberta, LSLEA, PREDA, and REDI, focuses on advancing a robust, diversified economy in northern Alberta. Achieving continued economic growth in northern Alberta is highly dependent on having the necessary infrastructure to access global markets as well as providing connectivity for its residents.

2.4 Northern Alberta Study Area

2.4.1 Geographic Borders

The northern Alberta study area is inclusive of the NADC region and the REDA regions (members and non-members of a REDA). The study area is outlined in blue in Figure 15. The NADC region also shares this blue boundary; however, the boundaries and members of Alberta HUB and GROWTH Alberta extend beyond the NADC region, and a red line serves as the demarcation line.

The NADC's geographic borders extend north to Alberta's border with the Northwest Territories and east and west to Alberta's borders with Saskatchewan and British Columbia. It reaches south as far as the southern boundaries of the Municipal District (MD) of Greenview, Woodlands County, MD of Lesser Slave River, Athabasca County, Lac La Biche County, County of St. Paul, the Métis Settlements of Buffalo Lake, Kikino, and Fishing Lake, and the First Nations of Whitefish, Saddle Lake and Frog Lake.[12] The unlabelled, burgundy-shaded areas in Figure 15 are the Athabasca and Wood Buffalo regions located in the northeastern portion of the NADC.

[11] http://communityeconomicdevelopment.alberta.ca/regional-economic-development-alliances-redas/ ; Alberta Economic Development and Trade; 2017-08-08.

[12] NADC; *NADC Area Profile: An Economic Description of the Region*; 2016-05.

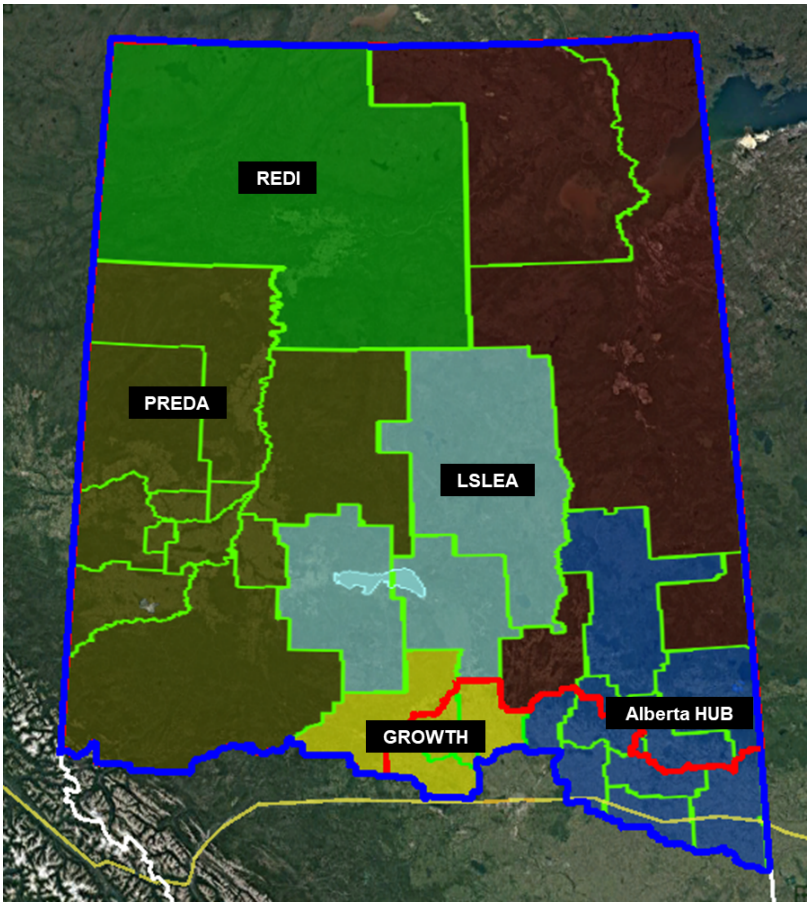


Figure 15 – Northern Alberta study area.

2.4.2 REDA Membership and Grouping of Communities

Most northern Alberta communities are a member of a REDA. There are exceptions and for the purposes of this study, those communities that geographically fall within a REDA but are not a member of the REDA are listed and grouped with member communities of that REDA. This is done to facilitate Phase 3 of this project – broadband opportunities, options, and strategy development at community and regional levels. Specifically, financially viable and operationally sustainable community or regional fibre-based network builds often require partnering with neighbouring communities to increase scale and efficiency. Communities that are not a member of a REDA are identified in each of the REDA-specific sections of this report. The reader is advised to refer to these sections for further information. Also, REDA membership can change over time.

2.4.3 Community Composition, Natural Resources, and Features [13]

There are 32 municipal districts and counties, 2 cities, 35 towns, 23 villages, 24 summer villages, 154 hamlets, 33 First Nations and 8 Métis settlements with a total of 456,811 people in the study area. Approximately 41.9% are urban dwellers while 58.1% live in rural communities. Of the 58.1%, approximately 7.5% live on First Nations reserves or Métis Settlements.

[13] NADC; *NADC Area Profile: An Economic Description of the Region*; 2016-05.

The study area is home to approximately 21,006 businesses (with employees).[14] Approximately 56% of these businesses are engaged in one of five industry sectors: construction; other services (except public administration); retail trade; professional, scientific, and technical services; and transportation and warehousing. The '*other services'* sector comprises establishments that have not been classified in any of the other 19 North American Industry Classification System (NAICS) industry sectors. For example, businesses that repair and maintain motor vehicles and other machinery or provide personal care services fall into this category.

The study area's natural resources of oil, natural gas, agricultural land, and forests are the basis for industry output in the study area. Nichols Applied Management estimated the NADC region (the NADC region can be used as a proxy for the northern Alberta study area giving its footprint is very similar) contributes approximately 17% to 19% of Alberta's total gross national product (GDP).[15] Mining and oil and gas extraction sector is the largest contributor. Other key industry sectors include (1) construction and (2) agriculture, forestry, fishing, and hunting.

A diverse natural landscape characterizes the study area, with five of Alberta's six land classification regions present. Although predominately Boreal Forest, there are pockets of Canadian Shield in its northeast corner and Rocky Mountains in its southwest corner. Its lower southwest has Foothills while its southeast corner and pockets in the west are classified as Parkland. The main boreal forest includes closely spaced evergreen and deciduous trees, as well as shade-tolerant shrubs, which create line-of-sight issues for fixed wireless and mobility service providers. The small portion of Canadian Shield in the Fort Chipewyan area consists of a very thin soil layer on top of the bedrock (granite). This dictates aerial broadband deployments.

[14] Calculations based on data provided by Michael Parkatti, Senior Director. Economic Information & Analytics, Alberta Economic Development and Trade; *Request - Alberta Businesses Counts by Industry*; Message to Doris Regula; 13 February 2017. E-mail.

[15] *Contribution of the NADC Region to the Alberta and Canadian Economies*; Nichols Applied Management; 2012-06.

3 Landscape

3.1 Context

An extensive Landscape document, providing overall perspective and context to a wide range of trends, issues, and concerns relating to broadband, was developed for and released by the Calgary Regional Partnership in September 2016. A copy of the report can be downloaded from the noted website.[16] Among the various other reports written by Taylor Warwick Consulting Limited, the following may also be of interest to the readers of this report:

- *A Business Case for Next Generation Broadband*, completed for the City of Chestermere, April 23, 2017;
- *Regional Broadband Investigation – Needs, Opportunities, and Approaches at the Local Level and for the Calgary Region*, September 28, 2016;
- *Regional Broadband Strategy – Options & Financials*, prepared for the Alberta SouthWest Regional Alliance, January 16, 2015; and
- *The True Economics of Broadband*, completed for the Regional Municipality of Wood Buffalo, September 2009.

Although the environment and underlying technologies, together with an ever-widening array of applications and impact areas, continue to evolve quickly, the material presented in the Landscape report remains comprehensive and relevant. Since the release of that document, however, there have been a number of developments at the federal, provincial, and service provider levels that are worth noting. These are outlined below.

3.2 Federal Updates

3.2.1 Basic Service Ruling[17]

On December 21, 2016, the Canadian Radio-television and Telecommunications Commission (CRTC) declared Broadband Internet to be a basic telecommunications service. Until now, only voice services were '*basic'.* Existing universal service frameworks will now shift from voice to Internet, with a basic universal service of 50 Mb/s download and 10 Mb/s upload and the option of unlimited data. The CRTC set the deployment target of 90% of Canadian households by 2021 and 100% by 2031.

Whereas in the past, service providers have had to contribute 0.53% of their voice service revenues into a fund accessible to providers to improve services in areas that do not meet minimum voice service levels. These funds will now be used to support meeting the broadband Internet objectives in rural areas where it is not otherwise economical to do so. This fund is expected to grow to $750 million within five years. A further proceeding in 2017 will examine the preliminary fund guidelines established in this ruling. Should this proceeding finish by the end of 2017, money from the fund is unlikely to be dispersed until late 2018.

The ruling also set an objective to have the latest generally deployed mobile wireless technology (currently long-term evolution (LTE)) deployed not only in homes and businesses but along as many major roads as possible.

[16] https://www.dropbox.com/s/i4m68awenkb546d/CRP-Regional%20Broadband%20Investigation-Landscape%20Issues-FINAL.pdf?dl=0.

[17] *Modern Telecommunications Services – The Path Forward for the Canadian Economy*; Telecom Regulatory Policy CRTC 2016-496; 2016-12-21.



3.2.2 Connect to Innovate Program (CTI)

Announced on December 15, 2016, the Federal *Connect to Innovate Program (CTI)* from Innovation, Science, and Economic Development (ISED) Canada will provide up to $500 million in support of new high-capacity open-access backbone networks; upgrades to existing backbone networks; improving resilience; and last mile access connections by 2021. The program covers 75% of the costs of new infrastructure and 50% of the costs for upgrades. Applications required significant detail, including design details and costs, the identification of who will build, own, and operate the network. Preferences were to be given to applications with the most community benefit, cover communities with the least service, cover multiple communities and/or provide infrastructure that is scalable and services that are the most affordable. The application deadline for the program closed on April 20, 2017 and the funding recipients are now being announced.

At the March, 2017 Digital Futures symposium in Cochrane, program staff indicated that a follow-up program is likely within an 18-month timeframe. As these programs have historically favoured shovel-ready projects and the application windows short, interested municipalities would do well to use the interim period to develop suitable projects and have them ready for when the next funding round opens.

3.2.3 Statistics Canada

Statistics Canada released their 2016 Census Population and Dwelling Counts on February 8, 2017.[18] All related numbers in this document have been updated to reflect new data.

3.2.4 Federation of Canadian Municipalities (FCM)

Working in partnership with the municipal sector, the Federation of Canadian Municipalities (FCM) continues to advocate for the federal government to:

- Adopt a comprehensive and long-term funding mechanism for basic broadband access. The existing arrangement for basic telecommunications services is a good starting point and
- Update the basic service objective to include universal access to affordable high-speed broadband Internet at speeds that reflect present realities and guarantee long-term, reliable connectivity while continually re-evaluate its broadband speed targets to reflect technological advancements, changes in user needs, traffic, and network capacity

[18] http://www12.statcan.gc.ca/census-recensement/2016/rt-td/population-eng.cfm

The FCM continues to engage with Innovation, Science, and Economic Development to ensure that the needs of rural municipalities are considered in the rollout of the *CTI*. For example, FCM shared feedback from the communities that indicated that more time was needed to prepare their applications, and the deadline was extended from March 13, 2017 to April 20, 2017.

The FCM actively participated in the CRTC's 2015-134-5, *Review of basic telecommunications services*. The FCM's submission to the CRTC consultation called for universal access to affordable and reliable high-speed Internet and highlights the significant barriers faced by communities in both rural and northern Canada. In particular, FCM recommended that the CRTC expand its basic service objective to guarantee long-term, reliable broadband connectivity across Canada and to continually evaluate its broadband speed targets to reflect technological advancements and evolving user needs.

The CRTC is currently in the process of consulting on the design of a new broadband infrastructure fund. The CRTC is examining matters related to the fund's establishment including: eligibility and assessment criteria; eligible costs; roles and responsibilities; and governance and accountability. All levels of government are encouraged to participate in these consultations beginning later this year. The FCM will continue engaging with the CRTC to ensure that municipalities are consulted in the design of this program.

3.3 Provincial Updates

3.3.1 Service Alberta and the Alberta SuperNet Contract

The original SuperNet operating contracts expires at midnight, June 30, 2018. According to Stephen Bull, Service Alberta's Assistant Deputy Minister responsible for the SuperNet, Cabinet has made its decision regarding the future direction of the SuperNet. Work is now proceeding to finalize a Request for Proposals. Three service providers have been pre-qualified.[19]

3.3.2 Changes to the Municipal Government Act (MGA)

The *Municipal Government Act (MGA)* currently gives municipalities the option to work together on initiatives with neighbouring municipalities. This is about to change. All municipalities outside of the growth management areas (e.g., City of Edmonton region) will be required to develop an Inter-Municipal Collaboration Framework. The framework will formalize how municipal entities will work together to better manage growth, coordinate service delivery, and optimize resources.[20]

3.3.3 Regional Economic Development Alliance (REDA) Broadband Studies

3.3.3.1 A Provincial View

Courtesy of funding from the NADC (for this project) and EDT, regional broadband studies are underway province-wide – each building on the results of the previous studies. On completion of the studies, there will be the opportunity to aggregate the results to create a province-wide broadband view and use the outcome as a basis to influence policy.

[19] Bull, Stephen – Assistant Deputy Minister, Service Alberta, SuperNet Secretariat; *Northern Alberta Broadband Preparedness Project – Finalizing the Current State Report*; Email message to Doris Regula; 2017-08-01.

[20] https://mgareview.alberta.ca/whats-changing/plan-for-growth/

3.3.3.2 Northern Alberta Broadband Preparedness Project

As outlined in the Introduction, the intent of the *Northern Alberta Broadband Preparedness Project* is to, at both the municipal and regional levels,

- Create a common understanding of both the potential benefits of enhanced broadband availability and the options available to realize them;
- Establish where each community is at and which are interested in pursuing broadband; and
- For those interested, which options might best meet their needs.

The work will then proceed to a feasibility review of the regional opportunities of most interest and develop a business case for those that garners the most support.

3.3.3.3 Calgary Regional Partnership (CRP)

The Calgary Regional Partnership (CRP) study was completed in September 2016 and all recommendations were unanimously endorsed by the Steering Committee, the Executive Committee, and the Board. A number of inter- and intra-municipality initiatives are now underway across the region.

3.3.3.4 Palliser Economic Partnership (PEP)

The mandate for the Palliser Economic Partnership (PEP) study is similar to the *Northern Alberta Broadband Preparedness* study, in that not only are strategic options to be developed, but also business cases for the options of most interest. Community engagement sessions were completed in June 2016 and by December, a set of options together with deployment cost estimates had been developed. A joint CRP/PEP backbone initiative is underway and business case estimates for the more promising options have been completed.

3.3.3.5 SouthGrow Regional Initiative (SouthGrow)

SouthGrow Regional Initiative (SouthGrow) issued a Request for Proposal for its broadband project in January 2017 and work commenced in February 2017. In this case, the emphasis is more on community engagement and requirements than deployment estimates and feasibility studies.

3.3.3.6 Broadband Toolkit and Portal – University of Alberta

Under contract to EDT, Dr. Michael McNally led a team at the University of Alberta to develop a document entitled, *Understanding Community Broadband – The Alberta Broadband Toolkit*. The document was released in early January 2017. In conjunction with the Toolkit, the group is creating an online portal to serve as a reference centre for related material.

3.3.4 Alberta Urban Municipalities Association (AUMA)

The Alberta Urban Municipalities Associations (AUMA) continues to advocate to the federal and provincial governments to address the lack of sufficient broadband service that affects many communities in Alberta. The AUMA has two active resolutions on broadband: Review of Broadband Internet and Broadband Internet Availability in Alberta. The first one was submitted by the City of St. Albert and requests the province to provide direct funding and support to municipalities for broadband. The second resolution's active clauses request that the AUMA establish a committee on broadband; work with REDAs and other organizations with similar mandates to advocate for affordable fibre optic-based Internet to Albertans; and continue to advocate for a provincial Broadband Policy. In February 2017, the AUMA released a bulletin, *Developing Broadband Solutions for your Community*, to assist members in determining their broadband needs.

The topic of broadband figures prominently during the AUMA's annual convention as well as during the two mayors' caucuses held each year. The AUMA conducted market research related to broadband with its members in 2016.

3.3.5 Alberta Association of Municipal Districts and Counties (AAMDC)

The Alberta Association of Municipal Districts and Counties (AAMDC) provides an advocacy voice for rural municipalities seeking ways to enhance rural broadband in their communities. It regularly engages with Service Alberta and ISED Canada to provide the rural Alberta perspective on challenges with rural broadband, funding programs, and existing infrastructure such as the Alberta SuperNet.

Over the past year, the AAMDC has worked with its members to gather a better understanding of their challenges, priorities, and initiatives related to developing rural broadband (e.g., AAMDC Broadband and SuperNet survey) and used the information to provide input into the development of the federal CTI program; the new Alberta SuperNet operating agreement; and the CRTC's review of whether broadband should be considered a basic telecommunications service.

Looking forward, the AAMDC plans to engage further with the CRTC when they begin the public proceeding related to the $750 million fund to support projects in areas that do not meet the CRTC's targets of speeds of 50 Mb/s download/10 Mb/s upload for fixed broadband Internet access services; an unlimited data option for fixed broadband access services; and the latest mobile wireless technology available not only in homes and businesses, but also along major Canadian roads. It will also engage with Service Alberta as they move forward in finalizing the new SuperNet operating agreement.

3.4 Service Provider Updates

TELUS Corporation (TELUS) is deploying fibre to mobility/cell towers and recently launched a SmartHub product that enables high-speed Internet using the 700 MHz spectrum to serve rural areas. TELUS' new SmartHub for rural customers offers speeds of 12 Mb/s to 25 Mb/s download. Three monthly plans are available (two-year contract) – progressively more expensive as the GB monthly data usage increases: $60 for 50 GB; $75 for 250 GB; and $110 for 500 GB. The Whitecourt Chamber of Commerce recently selected the higher-end service and is pleased with the results.

Bell Canada's (Bell's) Turbo Hub offers a similar service to rural communities with up to 150 Mb/s download and up to 50 Mb/s upload speeds with typical download speeds of between 12 Mb/s and 25 Mb/s (comparable to the TELUS offer). Monthly prices and data usage maximums are provided in Table 8.

Table 8 – Bell Turbo Hub Pricing & Data Usage Maximums

Price ($)	GB
$60	Up to 5
$75	5 to 10
$90	10 to 20
$110	20 to 50
$145	50 to 100

Rogers Communications' (Rogers') Turbo Hub offers '*light*' user and '*heavy*' user options, ranging from $10 for up to 100 MB monthly usage to $145 for between 50 GB and 100 GB usage per month.

4 Benefits of Broadband – Socioeconomic Effects

4.1 Overview

The ultimate value of a community's investment in high-speed broadband derives not from the infrastructure itself but from the economic and social ecosystem that grows and evolves around it.[21] Figure 16 depicts the complex web of effects and interrelations that exist between the economy and society that stem from increased broadband speeds. Very diverse economic and social benefits are apparent.[22] The map is a simplification – in reality there are even more factors and linkages.

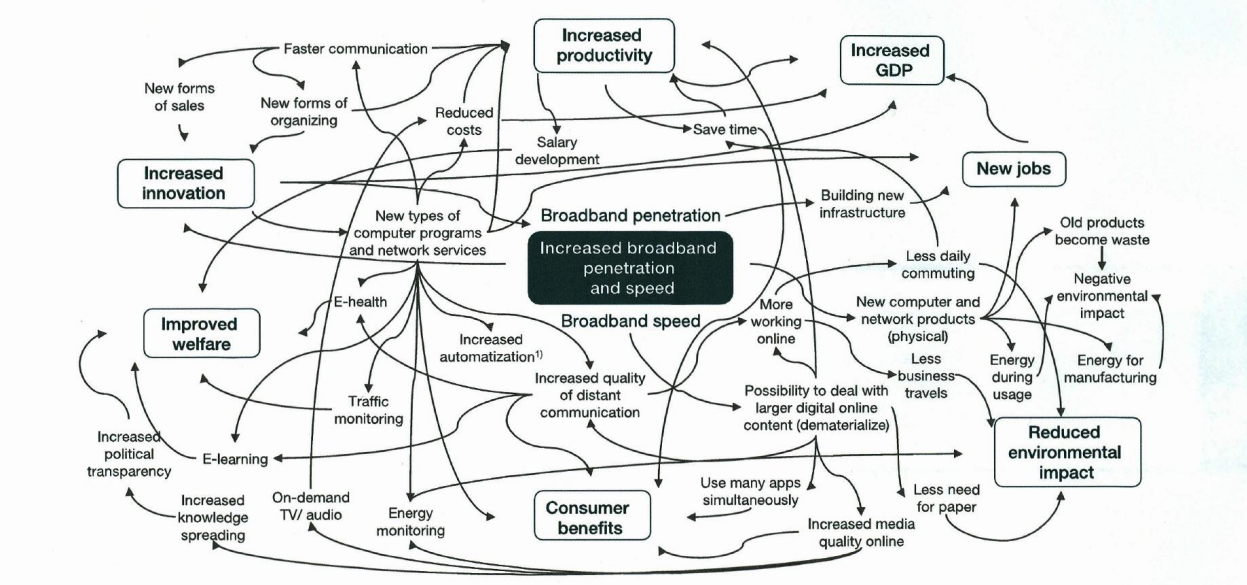


Figure 16 – Effect and interrelations that stem from increased broadband speeds.

Many economic and social benefits have been correlated with having access to broadband. In the late 1990s, Internet connectivity was transformed by '*always-on*' digital subscriber line (DSL) and cable modem services provided by the telephone and cable television companies, respectively. These first-generation broadband services dramatically improved broadband connectivity to the Internet, which led to the development of new inventions, processes, and business models; new and improved goods and services, and increased competitiveness and flexibility in the economy. While these first-generation technologies led to an estimated incremental economic benefits of 1.1% GDP to the United States economy, the Analysis Group predicts the next generation of connectivity, '*gigabit broadband*,' will provide an additional 1.1% GDP.[23]

Houlin Zhao of the International Telecommunication Union (ITU) Broadband Commission describes the importance of broadband networks to global social and economic development as follows:

> "*Broadband networks offer perhaps the greatest opportunity we have ever had to make rapid and solid advances in global social and economic development – across all*

[21] Smith, Steve; *The Economic Development Benefits of Broadband; Broadband Communities;* Broadband Communities Magazine; 2017-05/06.

[22] *Socioeconomic Effects of Broadband Speed;* Ericsson, Arthur D. Little, and Chalmers University of Technology; 2013-09.

[23] Sosa, David; *Early Evidence Suggest Gigabit Broadband Drives GDP*; Analysis Group.

sectors, including healthcare, education, new job opportunities, transportation, agriculture, trade and government services. In the twenty-first century, broadband networks therefore need to be considered as basic critical infrastructure, like roads, railways, water and power networks." [24]

4.2 Wealth Creation and the Knowledge-based Economy

For the third time in history, society's system of wealth is changing. In knowledge-based economies, wealth creation is largely independent of place, local resources, and physical assets compared to the previous industrial era where wealth was based on significant physical resources, access to raw materials, manpower, and efficient transportation. Wealth now arises from human ingenuity, intellectual property, and novel business models. With growth and development timeframes in the new economy largely unconstrained by the building of physical infrastructure and the movement of goods and services, knowledge-based businesses often grow exponentially. For example, Instagram, a social networking application (app) developed for sharing photos and videos from a smartphone, was developed in 18 months by 13 people. On April 9, 2012, the company was sold to Facebook for $1 billion US. Noteworthy is that those 13 people could have been located anywhere Internet access was available (and not necessarily in the same physical location). Also, with the availability of cloud computing resources such as Amazon Web Services (AWS), no local server farms were required and the service could be rapidly scaled globally. Instagram could have been developed in any community within the northern Alberta study area. There may be more to be gained from nurturing entrepreneurs than in creating traditional employment.

The presence of high-speed broadband in a community enables it to think globally. Remote work is one of the most immediate and obvious benefits – residents can be employed with companies in distant cities, and therefore, creating new opportunities beyond the reach of the local economic base. As well residents can remotely acquire the skills necessary to participate in the knowledge-based economy. Light manufacturers and specialty retailers even in small towns are afforded the opportunity to connect to a global marketplace through electronic commerce, which is vital to community sustainability and growth.[25] The development of manufacturing and retail economies are possible in more rural settings. High-speed, reliable broadband is a significant enabler for small businesses participating in manufacturing and professional services sector – especially, where there is a need to move significant volumes of data such as engineering designs and high-resolution colour product images on a regular basis. For example, entrepreneurs in a rural northern Alberta community could set up a 3D printing farm implement (toy, boat, parts, etc.) manufacturing facility in an old barn or other suitable vacant building. Alternatively, car enthusiasts in the region might sign on to Local Motors[26], the maker of the first 3D-printed car, and help design cars in their spare time. For approximately $20,000 US, a small urban community could send a person with high potential to Singularity University[27] (SU) and have him/her trained in how to establish a billion-dollar business in five years. Ten years ago, this prospect would have been a joke. Today, it is not and SU is a serious institution created to support entrepreneurial initiatives in a knowledge-focused economy.

[24] Zhao, Houlin – Secretary General of the ITU and Co-Vice Chair of the Broadband Commission for Sustainable Development, ITU; 2017-08-23.

[25] Smith, Steve; *The Economic Development Benefits of Broadband; Broadband Communitie;* Broadband Communities Magazine; 2017-05/06.

[26] Local Motors; https://localmotors.com

[27] Singularity University; https://su.org

From this perspective, the correlation between a community's economic development and its local capabilities and assets will likely decrease with time. If so, then perhaps what is more important than economic development premised on a local strengths, weaknesses, opportunities, and threats (SWOT) analysis,[28] is the ability of the community to be able to recognize, utilize, and leverage the types of capabilities and opportunities that digital technologies and networks are making possible. This new reality is being harnessed by a number of municipalities in the Calgary region.

4.3 Economic

4.3.1 Economic Impacts of New Broadband Investments

Research conducted by Ericsson in collaboration with Arthur D. Little, and Chalmers University of Technology found that increased broadband speed contributes significantly to economic growth. Doubling broadband speeds for an economy can add 0.3% to GDP growth.[29] The benefits of faster broadband can have both economic (e.g., increased innovation and productivity in business) and social effects, (e.g., better access to services and improved healthcare).

The study's authors further categorized the economic and social effects over three different timeframes: short-, medium-, and long-term (Figure 17). In the short-term, direct effects such as changes in employment, economic production, and behavior are generated during the course of the deployment of new infrastructure and rise GDP. In the medium-term, indirect effects are apparent. Examples of indirect benefits include cost savings, cost avoidance, productivity gains, and incremental economic activity. The third category, termed '*induced effects*', occurs over the long-term and include transformative impacts on the economy such as the introduction of new industries/industry clusters or new ways of working.

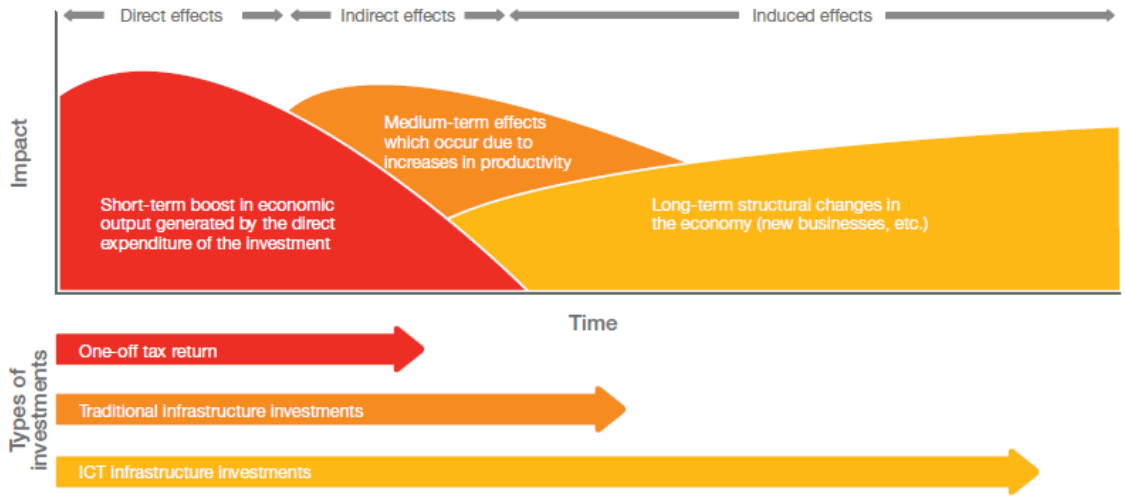


Figure 17 – Economic impacts of broadband speed upgrades over time.

[28] A SWOT analysis is a traditional business tool that first evaluates one's internal strengths and weaknesses and then uses the results as context and in addition to an analysis of its external strategic environment to identify its opportunities and threats. Ideally, the one's strategy would build on its strengths to exploit opportunities, counter threats, and resolve weaknesses.

[29] *Socioeconomic Effects of Broadband Speed;* Ericsson, Arthur D. Little, and Chalmers University of Technology; 2013-09.

4.3.2 Digital Adoption and its Impact on GDP

Canadians require more bandwidth for activities that require high-speed (such as telecommuting, telehealth, and videoconferencing), above-the-network services (such as cloud storage of digital files) and as more devices become Internet-enabled. Examples of important telecommunication services needed to participate in the digital economy include the following: telehealth, distance-learning, e-commerce, software and video game development, photo and video sharing, data analysis sharing and processing, telepresence robots for remote working and virtual tourism, and contributing to global work and research projects using shared software, and open network technologies and topologies. [30]

A study by the McKinsey Global Institute (MGI) estimated the potential impact the adoption of digital technologies could yet make on business productivity in various economic sectors – see Figure 18. [31]

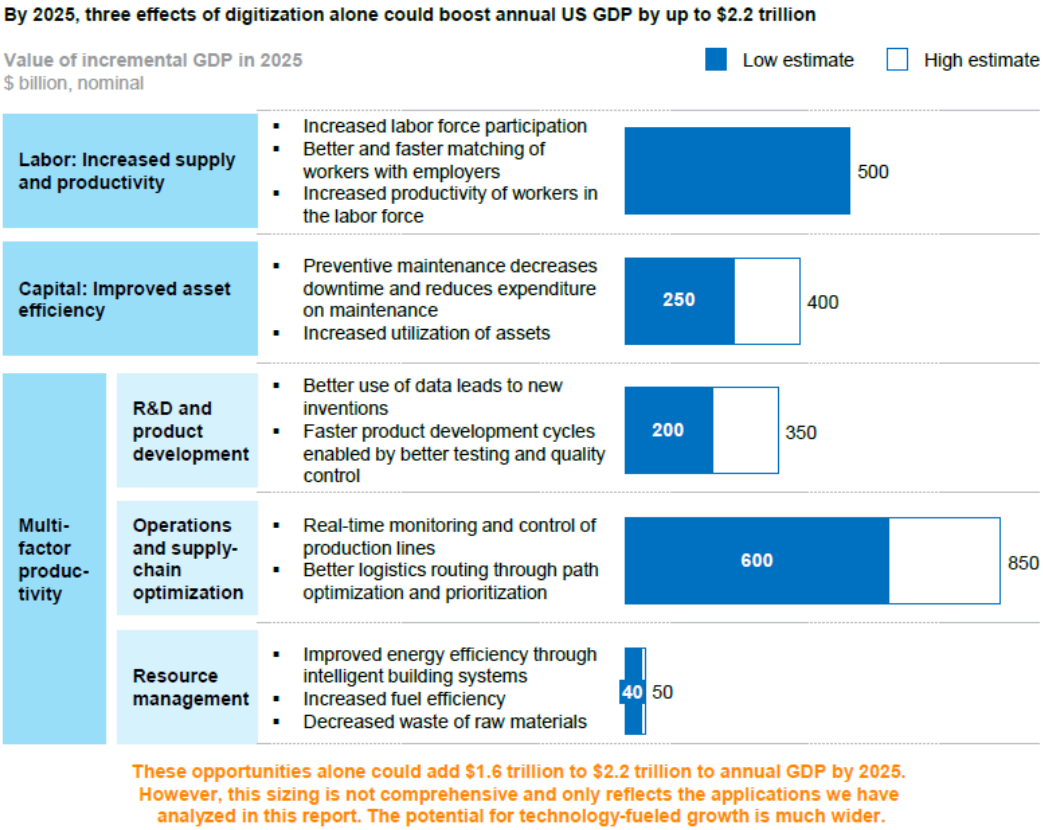


Figure 18 – Industry digitization & growth of annual GDP in the United States by 2025.

Examples include decreasing the costs of service delivery for education, healthcare, land and resource management, and many other sectors. Digital technologies also enable the virtual workplace – where a company can work with employees from anywhere and, equally important, enables local residents to freelance (instead of being employed by a particular company) and market their capabilities globally. The MGI study identified three effects of digitization and estimated that these three effects would be capable of boosting US GDP by up to $2.2 trillion by 2025. Scaling MGI's estimates to Canada, Taylor Warwick Consulting Limited estimated the potential impact of a wider adoption of digital technologies by Canadian

[30] Submission to Review of Basic Telecommunications Services; CRTC Telecom Notice of Consultation 2015-134; Cybera.

[31] Manyika, James, et al; *Digital America: A Tale of the Haves and Have-Mores;* McKinsey Global Institute; 2015-12.

industry could boost Canadian GDP by up to CAD$330 billion dollars. Assuming Canadian impacts to be 10% of those in the US, but 2025, three effects of digitization alone could boost Canadian GDP by $330 billion.

Over the past 200 years, automation has eliminated 99% of the farming jobs.[32] Advancing technology, however, has created far more jobs than it displaced and, as a result, society as a whole has moved forward. With the maturing of many digital related technologies, society is at the cusp of a profoundly new era and an era in which the possibilities are limited only by our imaginations.

4.3.3 Agriculture



While there are many futuristic videos available to highlight the potential of high-speed broadband for agriculture, a more currently grounded view can be viewed at the following website:

https://www.youtube.com/watch?v=Fr29UKzm2CI, starting at 1:48.

A growing global population coupled with the expectation that climate change will make food harder to produce, the agriculture industry is at the cusp of a new industrial revolution.[33] According to the United Nations, global agricultural output will need to increase by as much as 70% by the year 2050.[34] Globally, this challenge has been recognized. For example, the central theme of EXPO 2015 was *Feed the Planet, Energy for Life*. Each participating country was asked to examine its own position and offer solutions regarding the major challenges related to the future of food. To feed the forecasted population levels identified to the right (i.e., 9.7 billion), the agriculture industry will need to increase efficiency in growing food or increase the acreage allocated to food production and the landbase for agriculture is shrinking.[35] Farmers are also looking for ways to farm more precisely and profitably. The same technology that's propelled growth in other industries, such as robotics and data analytics, hold the promise of producing more food on less land.





[32] Friedman, T.; Thank You for Being Late: An Optimist's Guide to Thriving in the Age of Accelerations; Farrar, Straus and Giroux; 2016-11-22.

[33] Tunney, Catharine; *To Take Advantage of Coming Agriculture 'Revolution' Canada Needs Investment, Says Expert*; CBC News; 2017-02-18.

[34] Penn, J. B. – Chief Economist, John Deere; *Agriculture's Past, Present and Future*; John Deere Journal; 2016-03-31. https://johndeerejournal.com/2016/03/agricultures-past-present-and-future/

[35] Mark, Tyler, Whitacre, Brian, and Griffin, Terry; *Assessing the Value of Broadband Connectivity for Big Data and Telematics: Technical Efficiency*; selected paper prepared for presentation at the Southern Agricultural Economics Association's 2015 Annual Meeting Atlanta, Georgia; 2015-01-31 to 02-03.

Technological Change and Advancement

Farmers initially adopted the Internet to access discussion forums, social media, commodity prices, weather forecasts, and shop for parts. Recent advancements in wireless capabilities allowing farmers to wirelessly evaluate irrigation systems, weather stations, field equipment, and employees. Those making the most of broadband connectivity are transferring data between a variety of strategically located sensors on the farm and cloud-based storage, pushing prescriptions to applicators, and monitoring real-time alert systems for immediate pest threats.[36]



It is interesting to note that in Statistics Canada's most recent census, the 2016 Census of Agriculture, agricultural operators were queried about their use of emerging digital devices, including those associated with Precision Agriculture (PA) as well as those devices that require wireless and wireline technologies.[37] The Appendix 13.1 provides the Statistics Canada applications and technologies usage data for northern Alberta producers. For farm management, 52% of farms in the region are using computers or laptops while 42% reported using smartphones or tablets.

What is changing is the connectivity of agricultural equipment and the variety of sensors providing raw data to cloud-based analytics services. This is evident at the farms in southwestern Ontario, where wireless devices and technologies feed data from multiple access points on the farm, such as the residence, barn, and fields, to cloud services. Figure 19 – The Connected Farm, provides a schematic diagram of the various data transmission paths. Accessing cloud services will only be possible (or at least work more effectively) when fibre comes closer to the rural areas/farms or when more advanced wireless technologies become available. The cloud will support farmers with other technologies and services such as decision support services. In addition to farmers, the data and analytics can be sent to analysts and others with access rights. New lines of business, businesses, and jobs are being created, often by intermediaries (i.e., information or data brokers). As more data is re-purposed and sold, agriculture product and food value chains are becoming more heavily data driven.[38] A recent study of field crop producers in southwestern Ontario found that the three access points mentioned above compete for bandwidth and as a result some businesses are subscribing to more than one service provider to ensure mobility and reliability.[39] It should be noted that most PA data needs to be uploaded rather than downloaded.[40]

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[36] Mark, Tyler, Whitacre, Brian, and Griffin, Terry; *Assessing the Value of Broadband Connectivity for Big Data and Telematics: Technical Efficiency*; selected paper prepared for presentation at the Southern Agricultural Economics Association's 2015 Annual Meeting Atlanta, Georgia; 2015-01-31 to 02-03.

[37] Hambly, Helen; *Release of 2016 Census of Agriculture – Relevance to Rural Broadband in Ontario*; Rural and Remote Broadband (R2B2) Project blog; 2017-05-12.

[38] Hambly, Helen – R2B2 Project Lead and Associate Professor, University of Guelph; Telephone Interview; 2017-04-12.

[39] *Role of Broadband Internet Access in the Adoption of Precision Agriculture Applications;* Executive Summary, Draft Report; R2B2 Project.

[40] Mark, Tyler and Griffin, Terry; *Defining the Barriers to Telematics for Precision Agriculture: Connectivity Supply and Demand;* selected paper prepared for presentation at the Southern Agricultural Economics Association's 2016 Annual Meeting, San Antonio, Texas; 2016-02-06/09.

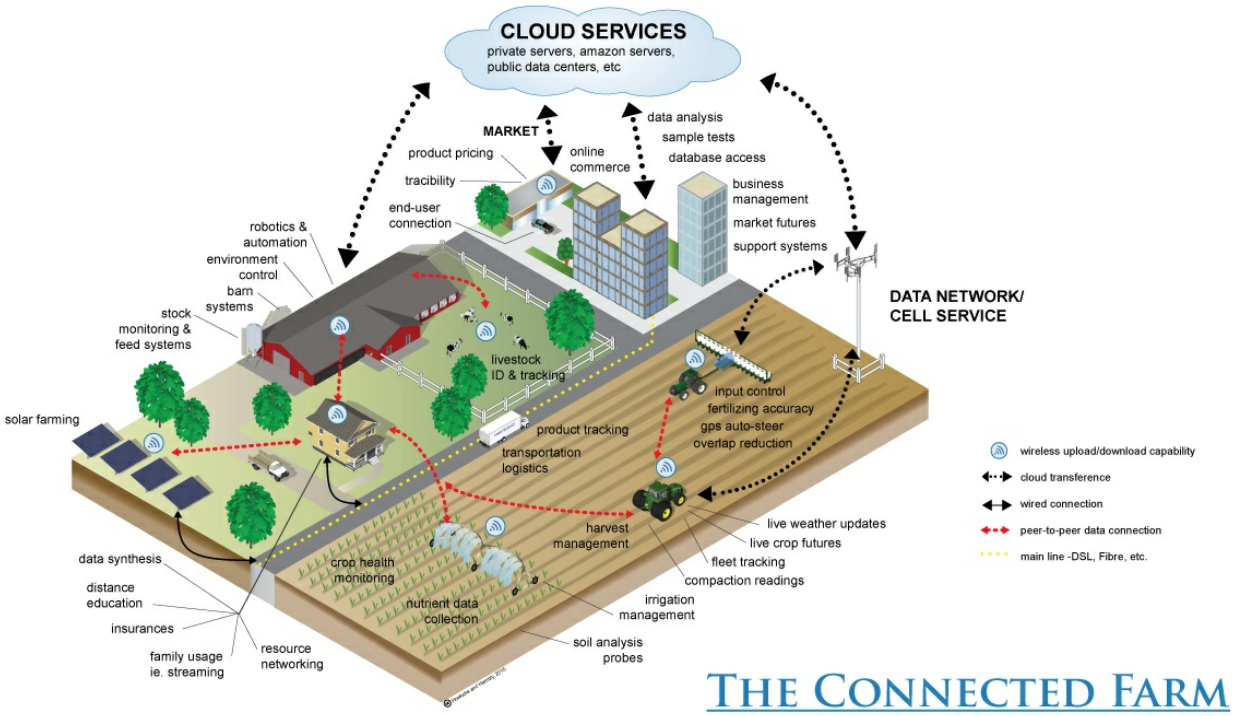


Figure 19 – Next generation farms and rural communities.

Trimble, provider of advanced location-based solutions that help various industry sectors maximize productivity and enhance profitability using core technologies in positioning, modeling, connectivity, and data analytics, identified the following trends in agriculture technology (Figure 20).

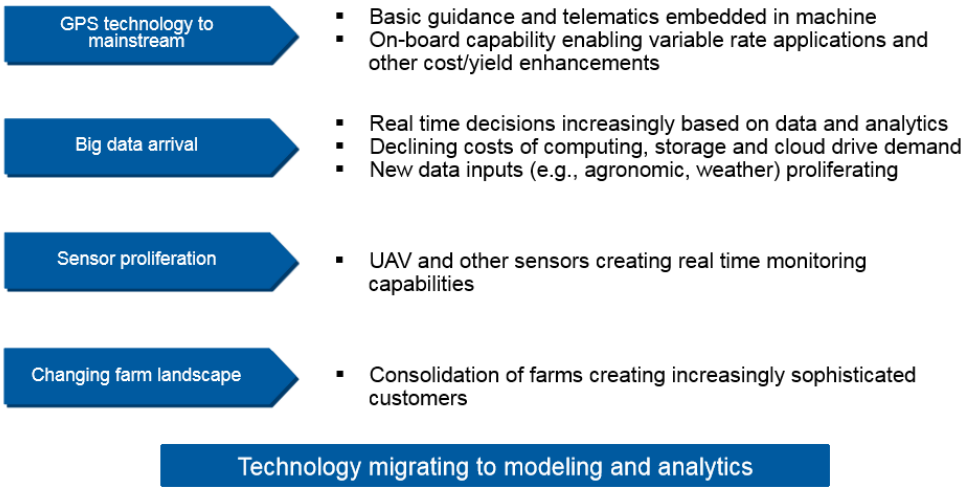


Figure 20 – Trends in agriculture technology.

Patchy rural wireless and broadband coverage is a barrier to the adoption of PA as shown in Table 9.[41]

[41] *Towards Smart Farming, Agriculture Embracing the IoT Vision*; Beecham Research Ltd.

Table 9 – Adoption of Precision Agriculture - Technology Drivers and Barriers

Drivers	Barriers
• M2M-based monitoring and tracking becoming more mainstream across industries • Reducing costs of sensors, connectivity • Improving data management technologies to manage tidal wave of M2M data • Farmers becoming more familiar with everyday IT use	• Rural wireless and broadband coverage patchy • Standards for sensor networks and data communications still under development • Specialist agricultural software still maturing • Uncertainty as to how to treat and safeguard data

Quantifying the Indirect Benefits of High Speed Broadband to Agriculture

Quantifying the value of high-speed broadband to the agriculture industry, specifically the level of efficiency that can be created at the farm level, is not an easy task. Agricultural economists Tyler Mark, Brian Whitacre, and Terry Griffin, used simulation data and envelopment analysis to assess the increase in efficiency and net producer income for grain producers who would be able to fully implement telematics - made possible by broadband connectivity. They found that if producers were able to adopt PA technology along the continuum to data and data use (i.e., Big Data), average net farm income would increase by 9.8%.[42]

4.4 Social

4.4.1 Connected Communities

To quote Thomas Friedman: *More people than ever can now compete and collaborate on more things, for less money, with more ease and equality than ever before*.

4.4.2 Education

Olds College is prime example of how the benefits of gigabit networking can be leveraged in an educational environment. An overview is available in the video produced for the College's 100th anniversary:[43]

https://www.youtube.com/watch?v=55iJvk57nrQ&list=PL-Ua1K2KRZdmaXPlqEv-Is1c51ykrib3l&index=4

Robust, reliable broadband is a necessity for achieving excellence in 21st century learning - information, media, and technology skills have become the foundation for learning. Equitable broadband access means that all students have the same learning opportunity regardless of where they live.[44]

In Alberta, K-12 and advanced education learning environments are adopting cloud-based computing and service delivery (e.g., Google Cloud, Microsoft Office 365, and other cloud-based providers).[45] Cloud-

[42] Mark, Tyler, Whitacre, Brian, and Griffin, Terry; *Assessing the Value of Broadband Connectivity for Big Data and Telematics: Technical Efficiency*; selected paper prepared for presentation at the Southern Agricultural Economics Association's 2015 Annual Meeting Atlanta, Georgia; 2015-01-31 to 02-03.

[43] Olds College; *iPad Integration*; YouTube; 2013-02-22.

[44] Ontario; *2017-18 Education Funding Engagement Guide*; Ministry of Education.

[45] Luedtke, Ralph – Senior Manager, Education Technology and Hauschildt, Dave – Education Manager, Technology Leadership Branch, Field Services Sector, Alberta Education; Telephone Conversation; 2017-05-04; Sokolowski;

based services require broadband connections. Figure 21 shows the evolution of broadband in a typical K-12 educational system – basic connectivity needs give way to more advanced and scalable connectivity needs.[46]

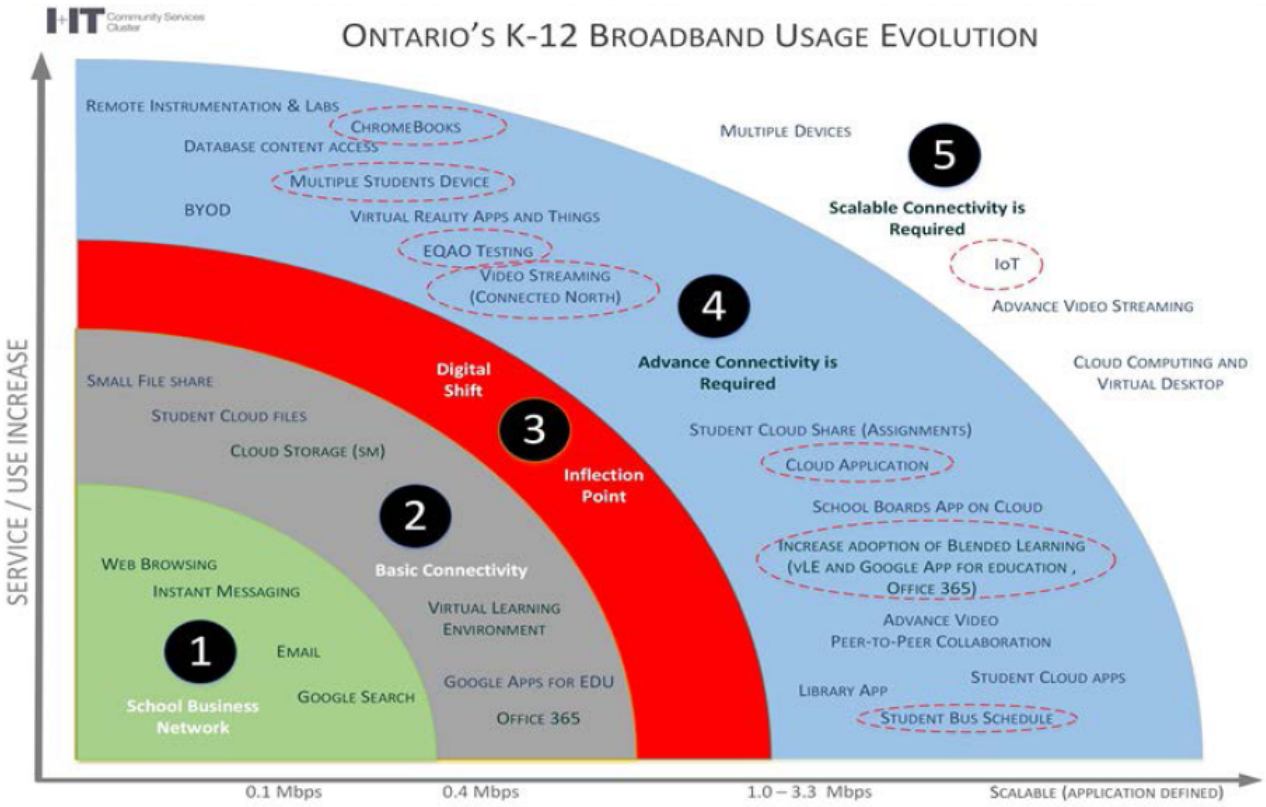


Figure 21 – Evolution of broadband in K-12 schools.

Today in Alberta, web-based products, such as Google G Suite,[47] are being used by school communities for such things as word processing and document storage (i.e., stage 2 in the figure above). Even the Stage 2 advancements of this increasingly complex array of technology solutions and tools is very reliant upon adequate Internet connections for students, parents, teachers, and administrators in schools and at home.

Improving equity in education is a high priority for Tallcree First Nation's Chief – it is his goal and his ambition.[48] Located in remote northeastern Alberta, education and employment opportunities are limited.

To compete in today's economy, you must have a skilled workforce with specialized training. The education attainment levels among Indigenous (First Nation, Métis, and Inuit) people are lower than non-

Carol – Director, External Stakeholder Relations, Information and Technology Management Sector, Alberta Advanced Education; Telephone Conversation; 2017-05-09.

[46] Education Funding Engagement – Digital Education presentation; Ontario; 2016-11-10.

[47] Google G Suite is a set of intelligent apps including Gmail, Docs, Drive, and Calendar.

[48] Cardinal, Mike – Band Manager, Tallcree First Nation; Telephone conversation; 2017-04-13.

indigenous people. The graph on the left side of Figure 22 indicates that 29% of Indigenous people in Canada did not attain a certificate, diploma, or degree while 13% of non-Indigenous people did.[49] Data specific to Alberta was not available from Statistics Canada.

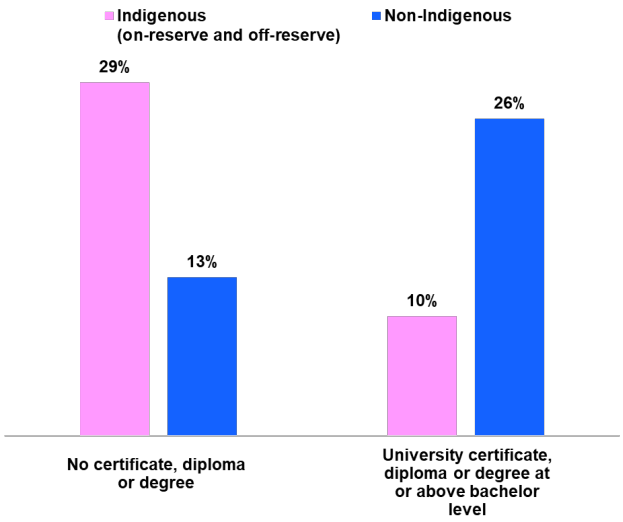


Figure 22 – Comparison of education attainment levels – indigenous verses non-indigenous.

The Tallcree First Nation is interested in providing more educational opportunities for its people (which will lead to more employment opportunities). They are redesigning and implementing a new curriculum and training opportunities, which will be based on communication with post-secondary institutions using videoconferencing and platforms such as Skype and Facetime. They need to confidently know that their system is capable of the required bandwidth and streaming. After distance learning with the Northern Alberta Institute of Technology (NAIT) failed due to inadequate Internet bandwidth, Tallcree First Nation and NAIT collaborated on a pilot program, involving NAIT deploying mobile education units to the Tallcree reserves in the High Level area for trade-related training (e.g., electrical, millwright).

The use of learning management systems is proliferating in Alberta.[50] These software applications support administration, documentation, tracking, reporting, and delivery of educational courses or training programs. In some cases, access is made available for parents to review a student's assignments, progress, or other content and provide feedback. Enabled by technology, teaching and learning is moving away from '*point-in-time-assessment'* to a more continual assessment of learning. It is estimated that 80% of the districts in Alberta's K-12 system is moving towards some degree of Google-based platform. Google developed a blended learning platform, Google Classroom, for schools that aims to simplify creating, distributing, and grading assignments in a paperless way. It was introduced as a feature of G Suite for Education 2014.

For students, high-speed broadband can offer a higher level of authenticity as they gain access to '*real-world'* audiences for collaboration or feedback.

[49] *Distribution of the population aged 25 to 64 (total and with Aboriginal identity), by sex and highest certificate, diploma or degree* – Table 477-0096; Statistics Canada; 2011.

[50] Luedtke, Ralph – Senior Manager, Education Technology and Hauschildt, Dave – Education Manager, Technology Leadership Branch, Field Services Sector, Alberta Education; Telephone Conversation; 2017-05-04.

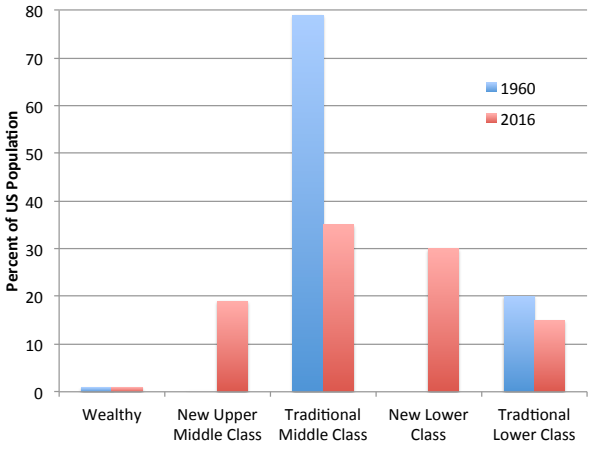
4.4.3 Entrepreneurship

Three generations ago, for example, the opportunity was to electrify everything (i.e., take manual product X (say, a manual pump), add electricity, and obtain new, enhanced, and more valuable product Y (electrical pump)). Now, the opportunity is to add intelligence to everything (i.e., take dump product X (laundry), add intelligence, and obtain a new, enhanced, and more valuable product Y (clothes that tell a washing machine how to wash them)).[51] Likewise for many other services:

- Medical: after winning Jeopardy in 2011, Watson was repurposed to do medical diagnoses. It has since moved to the cloud and variations are being developed to provide the services to medical practitioners world-wide;[52]
- Stock Portfolios: manage stock indices and currency exchanges to optimize and balance portfolios in real time vs once a year;
- Real Estate: match buyers and sellers and suggest optimal financing packages; and
- Project Management: take into account change orders, weather, traffic, currency exchange rates, and so on.
- Law: sift through mountains of evidence and legal arguments and suggest lines of defense.

4.4.4 Employment

Within this changing environment, the days of good, stable, middle-class jobs and the age-old advice, '*go to college, get a job, get married, buy a house, raise kids, and retire on a good pension*' are over. Of the jobs left, one in three will be converted to software, robots, and smart machines within eight years, half will be susceptible within 20 years, and both high and low skilled members of the workforce will be affected.[53] To thrive, it's becoming more about '*go create a job*' than the traditional '*go find a job*'.[54]



All the tools one needs are online – help' computing, and storage resources are available at scale and are virtually free – all you need is a capable network. A small sampling of the resources available in key categories appears in Table 10 below. All you need is a capable fibre network to support the digital traffic.

Table 10 – Online Resources

Computing Resources	Intelligence on demand	https://www.ibm.com/communities/analytics/watson-analytics/
	Unlimited computing power	https://aws.amazon.com/ec2/
	Quantum computing	https://aws.amazon.com/ec2/

[51] Kelly, Kevin; The Inevitable: Understanding the 12 Technological Forces That Will Shape Our Future; Penguin; 2016-06-07.

[52] Watson has also been made available as a general purpose artificial intelligence (AI) engine that can be harnessed by going to: https://www.ibm.com/communities/analytics/watson-analytics/

[53] *The Americans We've Left Behind;* Trends Magazine; 2016-03.

[54] Friedman, Thomas L.; Thank you for Being Late; Farrar, Strauss, and Giroux; 2016-11-22.

Education	Tailoring skills to employment requirements	https://www.coursera.org https://www.khanacademy.org
Employment / Hiring	Contingent work	https://www.freelancer.com/
	Matching individuals to traditional jobs	http://www.careerbuilder.ca https://www.linkedin.com https://www.monster.ca
Product Development	Design	https://99designs.ca
	Invention platform	https://www.quirky.com
Venture Funds		https://grow.indiegogo.com https://www.kickstarter.com

4.4.5 Healthcare

Need for Productivity Improvements in Healthcare

In 2016, Canada's total health expenditures reached an estimated $228.1 billion—representing 11.1 per cent of total GDP or $6,299 per Canadian. Despite the recent slowdown in health spending growth, Canada's looming baby-boom bulge is likely to have a major impact on health and social service demand and expenditures.[55]

As future health care funding is estimated to consume between 44% and 55% of provincial and territorial revenues, there are concerns that without additional strategic funding, Canada's provinces and territories will need to find substantial annual productivity improvements to maintain the health care spending and service levels.[52]

Alberta is moving towards community-based care, which includes shifting from a focus on hospitals and facilities to more community-based care closer to home, planning and structuring health care around people and their community, and enabling Albertans to be active partners in their own health.[56]

Health system capacity in rural and remote areas

There is a need for trained healthcare workers to provide continuing care and other health services if the transition of the system from '*hospital to community'* is to be successful. In professions where staff levels are sufficient, unequal distribution across Alberta remains a factor, with particular difficulty in recruiting to rural and remote areas where the planned expansion of home and community care services is most needed.[57]

The percentage of physicians practising in rural and remote areas in Alberta has decreased. Despite growth in Alberta's overall physician supply, physician access continues to be an issue in many rural and remote areas as well as in some urban areas. These trends also impact the affordability and sustainability of the health system.[58]

Digital Health Technologies

[55] Brichta, Jessica, Dinh, Thy, and Stonebridge, Carole; *A Road Map to Health System Sustainability, CASHC Compendium Report, 2011-16;* Conference Board of Canada; 2017-05.

[56] Alberta Budget 2017, Fiscal Plan 2017-20.

[57] Alberta Health Business Plan 2017-20.

[58] *Physician Resource Planning*; Alberta Health; 2017-02-14.

The following short video by Canada Health Infoway (Infoway) describes some of the digital innovations in healthcare, which assist in tackling some of the issues mentioned above:[59]

https://www.infoway-inforoute.ca/en/component/edocman/resources/videos/3068-innovation-in-health-care?Itemid=101

Infoway defines digital health technologies as telehealth and remote patient monitoring (RPM) (also know as telehomecare); drug information systems; diagnostic imaging systems; and physician office and electronic medical records (EMRs).

The Alberta SuperNet supports telehealth in Alberta. Currently this model of healthcare delivery or tool primarily uses videoconferencing technology with the equipment located at videoconference sites in the communities or in nearby communities. The evolution of this remote service would allow for '*virtual visits'*, where consultations would take place directly in the patient's home and on any device. The ability to provide virtual care has significant cost saving for providers and patients.

RPM is transforming traditional healthcare service delivery models in Canada and has the potential to improve patient outcomes through self-management and home-based care and decrease the use of health system resources. Figure 23 shows the relationship between technology complexity and patient acuity as well as the associated impact on the use the healthcare system resources, both in health resource intensity and per capita costs.[60]

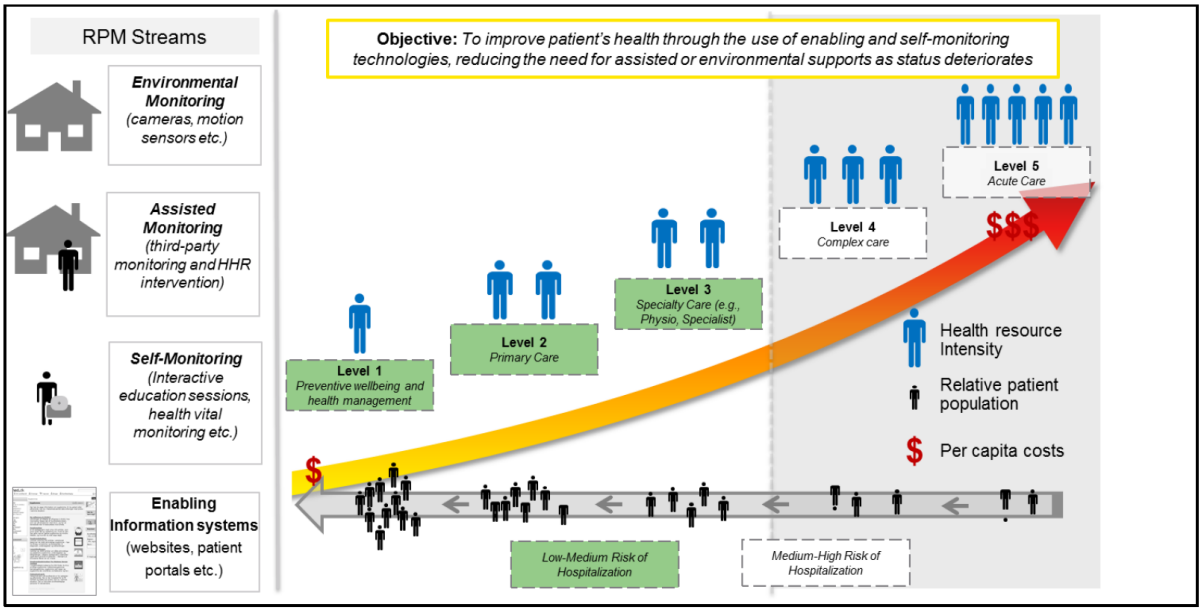


Figure 23 – Continuum of patient acuity and use of healthcare system resources.

Infoway's RPM study found evidence of the benefits shown in Table 11.[61]

[59] *Innovation in Healthcare*; Canada Health Infoway; 2017-08-28.

[60] *Connecting Patients with Providers – A Pan-Canadian Study on Remote Patient Monitoring;* Ernst & Young for Canada Health Infoway; 2014-06.

[61] *Connecting Patients with Providers – A Pan-Canadian Study on Remote Patient Monitoring;* Ernst & Young for Canada Health Infoway; 2014-06.

Table 11 – Benefits of Remote Patient Monitoring

	Benefits
Quality	▸ ↑ **Patient satisfaction** ▸ ↑ **Patient compliance** ▸ ↑ **Quality of life** ▸ Promote integrated care
Access	▸ ↓ **Caregiver burden** ▸ ↑ Access to specialists ▸ ↑ Dissemination of health data
Productivity	▸ ↓ **ED visits/hospitalizations** ▸ ↓ **Per client health $** ▸ ↓ Per client care time

The increasing adoption of the Internet of Things (IoT) technology is resulting in the convergence of mobile, social, and sensors. By integrating data collected from IoT sensors, wearables, and connected patient monitoring devices with applications such as EMR, clinical professionals can focus on leveraging that data to apply the most appropriate clinical protocols. Computer-based intelligence will also play an important role in turning data collected via IoT-enabled sensors into actionable information and insights for both patients and clinicians.[62]

Recently Infoway selected TELUS Health to be the technical solution provider for PrescribeIT, a e-prescribing service. The multi-jurisdiction e-prescribing service will promote medication safety and greater convenience and efficiency for patients and providers. Infoway describes the benefits of e-prescribing in the following video:[63]

https://www.infoway-inforoute.ca/en/component/edocman/resources/toolkits/knowing-is-better-for-clinicians/videos/3093-the-benefits-of-e-prescribing?Itemid=101

According to Canada Health Infoway, digital health technologies result in an estimated $2.5 billion in annual benefits (2015 study) for Canada. Figure 24 shows momentum building in the adoption and use of these technologies. As well it breakouts out each technologies' contribution, with telehealth and telehomecare contributed an estimated $407 million in 2015. Extrapolation of these telehealth and telehomecare data to estimate the annual benefits for 2017 resulted in $681 million. Softer benefits include improved patient quality of care, outcomes, comfort, and safety; access to specialists, timeliness, and productivity.

[62] *Vendor Spotlight – Making Digital Transformation Real for Healthcare and Life Sciences Organizations;* IDC Health Insights; 2017-01.

[63] *The Benefits of e-Prescribing*; Canada Health Infoway; 2017-08-28.

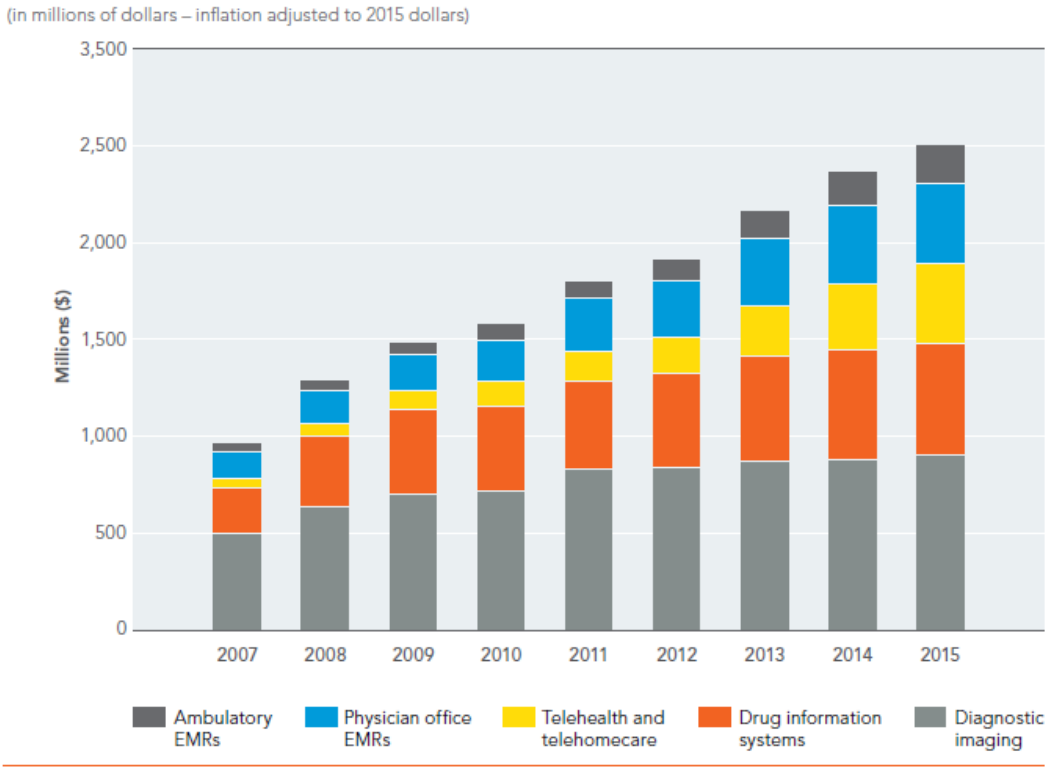


Figure 24 – Adoption and use of digital health technologies in Canada.

Quantifiable rural telehealth benefits include potentially generating local revenues for lab work and pharmacies as well as savings in travel cost, lost wages and hospital costs. These were the findings of the National Telephone Co-operatives Association (NTCA) – The Rural Broadband Association. National average estimates of annual cost savings were done on a per medical facility basis and after conversion to Canadian dollars are as follows:[64]

- Travel savings - $7,654;
- Lost wages - $4,593;
- Hospital cost savings - $27,898;
- Increased lab work revenues - $12,320 to $53,386 per type of procedure; and
- Increased local pharmacy revenues - $3,104 to $8,352, depending on the specific drug prescribed.

4.4.6 Government Delivery of Public Services

Organizations around the world are riding the digital transformation wave to drive innovation. In addition to innovation, the government sector is also looking to digital transformation to improve operational effectiveness and efficiency, often leveraging SMACi technologies. Astute governments are integrating ICT in their operations across multiple domains and jurisdictions to generate sustainable public value.[65] Figure 25 shows four key areas of focus for governments.

[64] Estimates were converted to Canadian dollars using the Bank of Canada's average exchange rate for the month of March, 2017.

[65] *Imagining the Digital Future – How Digital Themes are Transforming Companies Across Industries;* Ernst & Young; 2015-02.

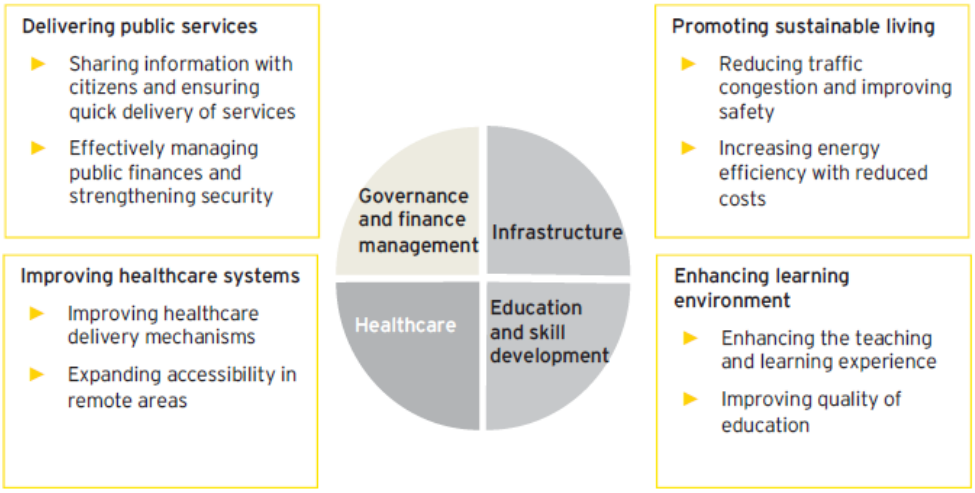


Figure 25 – Government sector – areas of digital transformation.

With advent of social media, citizens are now communicating and interacting differently than ever before with each other, the companies they do business with, and the service providers they rely on for healthcare, education, and other services. Public service delivery needs to accommodate these changes and embrace new channels and approaches. And this is why delivery is shifting away from specialized agencies and discrete services towards more streamlined, citizen-centric processes, as demonstrated in Figure 25.[66]

5 Areas of Opportunity

5.1 Overview

The NADC region and its constituents have many options available to facilitate enhanced, more inclusive, and more affordable broadband infrastructure within its environs. Indeed, the options range from simply accelerating any currently planned broadband initiatives, to negotiating with the incumbents and potentially subsidizing private operators, to do-it-yourself (DIY) initiatives as exemplified by O-Net in Olds and Q-Net in Coquitlam.

In considering the options outlined below, note that in the broadband infrastructure game, a land-grab of sorts is currently underway and time is of the essence. The longer it takes communities to debate their options and assemble the required resources, the more time the traditional telecom and cable service providers have to replace aging infrastructure in their most profitable markets – the cities and towns – with fibre, which then removes valuable cashflow from more inclusive community-wide plays. To move forward quickly, LSLEA will likely need to take an active role with those communities most interested in moving ahead. As momentum develops and the issues are resolved, other communities could come onboard.

To be most effective, collaboration will also need to include both distribution and access networks within municipalities as well as the backhaul networks that link the communities together – an issue that will blur the more traditional LSLEA modus operandi in which their role is solely focused on coordination between communities and not on what each community elects to do itself.

5.2 Status Quo

For reasons ranging from a lack of resources, more important priorities, a belief that municipalities should not be in the infrastructure game, to satisfaction with current service levels, communities may elect to leave broadband to the existing players and not get involved. While this approach may work well for those in the more populated areas, experience to date suggests that those in the more rural areas could be waiting a long time.

Given the CRTC's recent framework decision, money to support infrastructure upgrades in the most rural areas will become available over the next fifteen years.[66] Indeed, the objective is to enable ubiquitous 50 by 10 Mb/s services by 2031. Proposed funding levels in support of this program are insufficient and affordability criteria have yet to be established.

5.3 Incremental

Should the Region or its constituents not have the support to *'jump in with both feet'*, but position for a possible broadband play later, interim straightforward and inexpensive approaches include:

- Broadband Facilities Master Plan:
  - Carry out high-level boundary connections assessment to potential future back-haul locations;
  - Carry out high-level feeder network assessment for development, re-development, and capital project inclusion of conduit/fibre/tower locations and/or ROW protection and agreements; and
  - Use as informed decision support when working with service providers, development community, and/or regional partners.
- Municipal Planning:

[66] http://www.crtc.gc.ca/eng/internet/internet.htm.

- Work with NADC and your neighbours to leverage staff capacity and resources;
- Develop a Broadband Services Strategic plan specific to your community;
- Embed fibre network requirements in internal IT planning processes; and
- Accelerate currently planned IT infrastructure deployment.

- Leverage Planned Civil Works:
  - Develop a policy for including installation of fibre conduit as part of applicable and appropriate town and county linear infrastructure projects, such as road (re)construction and water / wastewater projects.
- Position for the future
  - Require that the inclusion of fibre conduit be a mandatory requirement in all applications for new residential and businesses development permits; and
  - Adopt an inside wiring standard with Cat-5 wiring as the minimum standard.

As the civil construction accounts for some 70% of the cost of buried infrastructure deployment, leveraging civil works can reduce the deployment costs significantly. The only catch is that an overall plan is required upfront, thus the baseline need for a Broadband Facilities Master Plan, particularly if the work is to take place over a number of years – fibre ducting must be appropriately sized, have breakout points in suitable locations, and, mesh with other components deployed.

5.4 Negotiate with Current Providers

5.4.1 Work with the Carriers and Seek their Investment

Over the past few years, both TELUS and Axia have been interested in and indeed installing fibre-to-the-premise (FTTP) networks in communities throughout Alberta. As shown in the adjacent summary slide of TELUS deployments, since 2014 and at a cost of $430M, TELUS' fibre has been deployed to 107,000 Alberta premises.[67] In addition to those in the table, TELUS has laid fibre in Cold Lake, Grande Prairie, Slave Lake, and Fort McMurray. TELUS plans to spend another $1.2 billion by year-end 2019.

Community	Premises	Community	Premises
Blackfalds	3.1k	Peace River	3.3k
Bonnyville	1.3k	Ponoka	0.9k
Calgary	33.3k	St. Paul	2.7k
Coaldale	2.8k	Stettler	2.6k
Didsbury	1.7k	Taber	3.6k
Drumheller	2.9k	Vegreville	3.1k
Edmonton	17.5k	Wainwright	3.3k
Edson	3.4k	Westlock	2.0k
Hinton	5.0k	Wetaskiwin	5.3k
Innisfail	3.2k	Misc Communities	13k

TELUS fibre in the selected communities is deployed at no cost to the municipality. Home and property owners are under no obligation to obtain services when granting permission for TELUS to place the fibre drop directly to their premises. Over fibre, TELUS offers Internet services at rates up to 150 by 150 Mb/s. Axia offers symmetric 1 Gb/s business and 100 Mb/s residential services[68] together with an option for other service providers to lease their fibre access lines. On the other hand, the CRTC will require TELUS to provide wholesale access to their fibre on some yet to be determined basis, whereas Axia will not be so encumbered.

At this point, TELUS does not provide their retail service offerings over community fibre networks, even in smaller centres in which TELUS has not upgraded their plant to fibre, and in which community networks

[67] Mawji, Zainul; *Expanding Broadband Networks;* 12 September 2016.

[68] On Sept. 6, 2017, Axia began upgrading all 50 and 100 Mb/s subscribers to a symmetric 1 Gb/s service at no charge.

could provide TELUS with significantly more capacity than is available on TELUS' aging copper plant and do so with no requirement for a capital outlay. Given the momentum for community approaches that is developing within the province, though, TELUS' appears to be revisiting their approach and has recently expressed a renewed interest in working with communities to find an arrangement that works for both.

On the other hand, in return for access to a municipality's rights-of-way, Axia is offering to deploy fibre infrastructure throughout individual communities and offer Internet services at up to 1 Gb/s for residential and business clients should 30% of the addressable premises in the municipality show interest in subscribing to Axia's services. The offer is contingent on due diligence by Axia and the towns of Barnwell, Hanna, Fort Macleod, Nanton, Nobleford, Stirling, Raymond, and Vulcan now have town-wide FTTP service. Axia has also announced FTTP services for Fairview, Magrath, and Pincher Creek. Though Axia has approached a number of towns and villages in the study region, as of yet, none are moving forward.

While merits of an essentially hassle-free and free, fibre infrastructure are self-evident, the Axia offer is neither without cost nor risk. All revenues from the network would accrue to Axia's shareholders and once deployed, Axia would have monopoly control over critical civic infrastructure. No infrastructure would be deployed into the surrounding MD and the network would not be open in the traditional sense of the term.

5.4.2 Establish a Private-Public Partnership (PPP)

While there is a lot of merit to PPP arrangements, care must be taken to ensure ongoing alignment of private and public interests. The two largest broadband deployments to date are in Ontario – the Eastern Ontario Regional Network (EORN) and the SouthWest Integrated Fibre Technology (SWIFT) initiative – and are both PPP arrangements. While in both cases, significant public money was/is involved, after seven years, the EORN network assets vest to the private partners while the SWIFT funding recipients gain the option to divest some or all of their network assets at that time. Once control of the infrastructure moves to private industry, the communities may lose many of the gains made.

A second more subtle concern is that of minimizing conflict of interest and ensuring a level playing field when the focus of the PPP arrangement is to deploy and operate infrastructure on an open-access basis and when the private partners are vertically integrated players wishing to utilize the network to deliver their own service portfolios. To maintain transparency and ensure a level playing field, operators of open-access networks must be structurally separate from those providing retails services over the network.

5.4.3 Subsidize a Private Partner

The traditional market driven, private sector led business model is not providing many municipalities within the LSLEA region with the infrastructure they desire due to a lack of financial incentives. By directly subsidizing a private operator, municipalities could provide that operator with adequate incentive. Given that this approach in essence anoints a select supplier, it does provide the supplier with a market advantage in an area where market forces do not prevail and municipalities need to carefully consider the terms under which these arrangements are made. On the plus-side, the arrangement keeps the infrastructure deployment and operations in the hands of private sector players and minimizes Council involvement and resources. On the other hand, the selected supplier will end up with a defacto monopoly in the municipality.

When the arrangements involve fixed wireless players, additional issues arise from the fact that the infrastructure does not scale well. While an upfront subsidy may result in infrastructure adequate for current requirements, additional capital infusions will likely be required to meet ever increasing capacity demands.

In lieu of a direct subsidy, some counties reduce the cost of services deployment in rural areas by providing tower infrastructure for the ISPs to use. The Special Areas Board in southeast Alberta adopted this approach and then contracted a single provider, Netago, to provide services. With input into where the towers were located, the arrangement has been a successful one. Parkland County, on the other hand, wished to promote competition amongst ISPs in the County and operate the tower infrastructure on an operating cost recovery basis. To attract mobility and the Alberta First Responders Radio Communications System (AFRRCS) equipment onto the towers to help cashflow, robust (expensive) towers were constructed at sites which were a compromise amongst the requirements of the Mobility, ISP, and AFRRCS providers. Few liked the locations, competition amongst the ISPs did not materialize, and the County is now struggling to find a way to make things work.

5.5 Develop a Community or Regional Fibre Network

Given the lack of interest from the incumbent telecom and cable operators to serve much of the NADC region, the municipalities, including the Counties and MDs in the LSLEA region, may wish to consider establishing their own community and/or regional fibre network. Indeed, with an appropriate and sustainable business model, individual municipalities and/or sub-regions could establish, either on their own or in partnership, a fibre-based community and/or regional broadband network and operate it as a fourth utility. Inclusive, county-wide initiatives are currently being established in Big Lakes County, the County of Vermilion River, and the County of Grande Prairie. Potential business models are shown in Figure 26.

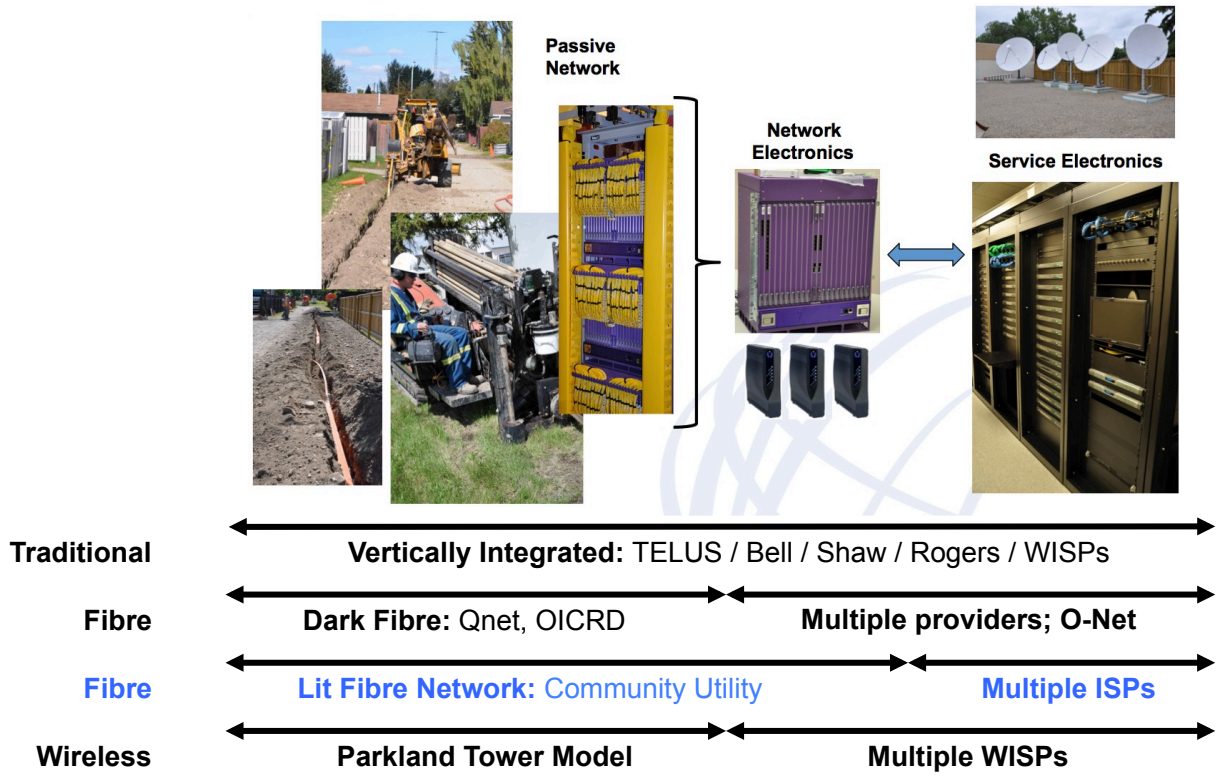


Figure 26 – Types of business models.

As shown by deployments throughout Europe and the Far East, utility infrastructure could enable a municipality to provide competitive service providers equal access to unmatched symmetric bandwidth capabilities and thereby enable the delivery of a variety of novel community-based intelligent community services (as well as entertainment services such as HDTV) to its residents and businesses.

Should a municipality wish to consider this option, a number of the more common business model, financing, and governance options available to help make it happen appear in Table 12. Common models are outlined in more detail in Appendix 16.2. Should either a community or group of communities elect to move forward, these options are typically evaluated as part of the business case / business planning process.

While regional and municipal options do involve more responsibilities and risks than simply transferring control to private enterprise, they come with significant advantages. As well, to manage the level of their involvement, close to turn-key options do exist and can be easily incorporated into regional, sub-regional, and community deployment programs – once the community has decided upon the business and governance structure, operational arrangements, and financing.

Table 12 – Common Business Model, Financing, and Governance Options

Business Model	Funding	Governance
• Conduit only • Wholesale fibre: dark or lit • Retail: open or closed and with or without service partners	• Debt financed via ACFA • MSI Funding / Grants • Co-operative • Utility/Power • Private-public partnership (PPP) • Private Equity • Combinations of the above	• Commission • Municipality • Municipal Services Corporation • Co-operative • Not-for-profit • Private

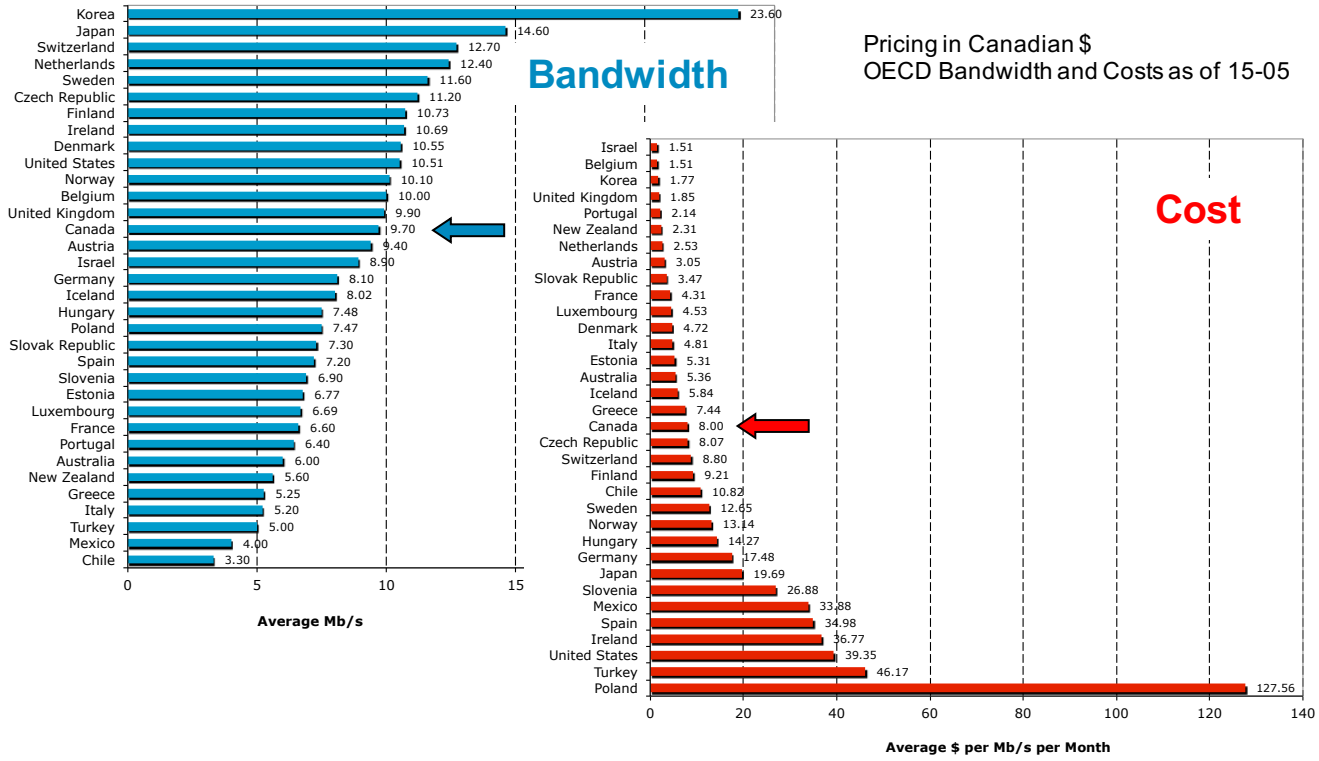
6 Community and Regional Fibre Networks

6.1 Learning from Abroad

As foreign governments recognize the merits of open utility-based fibre infrastructure, Canada is falling increasingly behind. To date, neither the federal nor provincial governments have yet placed the emphasis on technology policy to address broadband to the extent evident internationally. Though the initiative has since changed course, in 2009, Australia announced plans to spend AUD$31 billion on a National Broadband Network. In 2013, France pledged €20 billion for superfast broadband. In the US, of 48 reporting states, 25 have established a broadband office.

The impact of this lack of policy is evident in the OECD statistics charted in Figure 27 on the next page – the latest statistics available.[69] As of early 2016, Canada ranked 14th in terms of average available download bandwidth, 18th in terms of cost, and 23rd in terms of fibre penetration. Whereas in Korea, the average download bit rate of 23.6 Mb/s is available for $ 1.77/mo. (13.3 Mb/s/$), in Canada, one can only expect 9.7 Mb/s for $8.00/mo. (1.21 Mb/s/$). Fibre penetration in Korea is 69.39% compared to 5.32% in Canada.

Though not shown, but perhaps more telling is a comparison between Internet service availability here and in, say, Västerås, Sweden. Whereas at most locations in Canada you may have the option of two wireline providers (TELUS and Shaw in Western Canada), in Västerås, there are over thirty. At least part of the issue is the Federal government's belief in facilities-based competition – versus the services-based regime in Sweden. By restricting service provisioning to those which can afford to deploy a network, the number of providers is necessarily small. When services can be provided over an open network provided on a utility basis, many can.



[69] http://www.oecd.org/sti/broadband/oecdbroadbandportal.htm#map

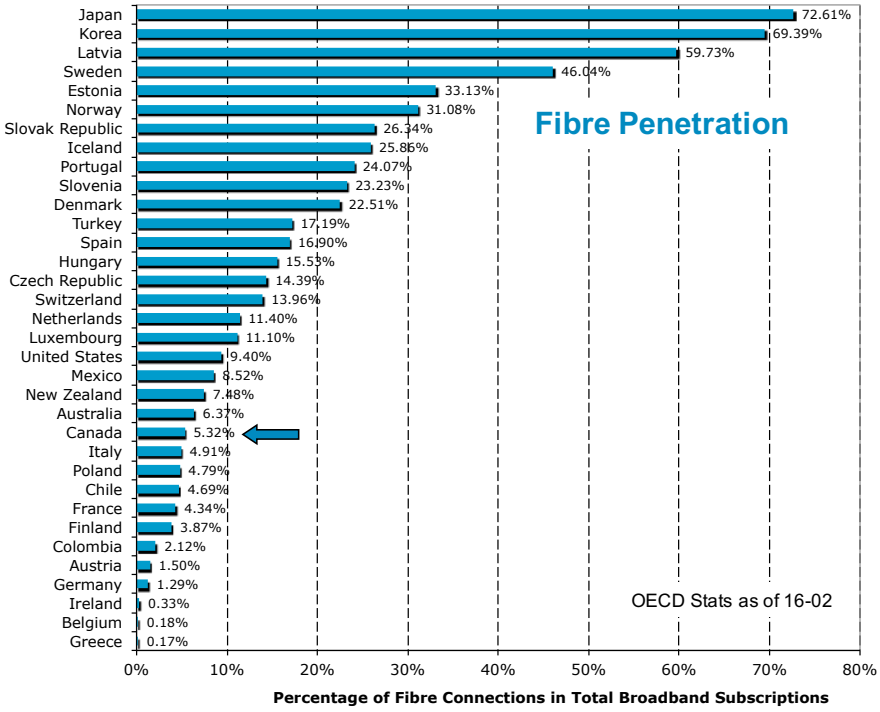


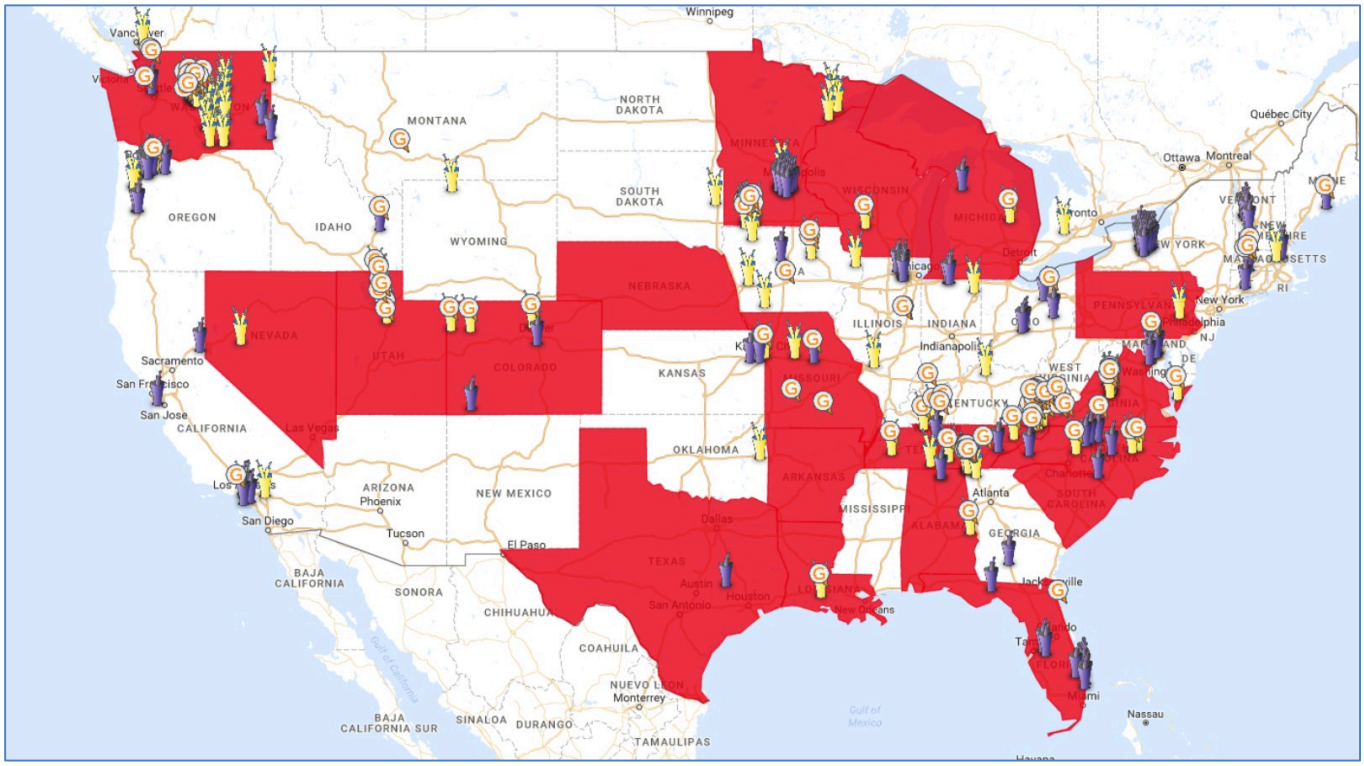
Figure 27 – International Internet service levels and pricing comparison.

An overview of the key models with which municipal and regional networks are becoming available internationally appears in Appendix 13.2.

Thanks to the initial Google Fibre Competition close to a decade ago, the value of broadband networks to both economic development and quality of life within communities, became self-evident to the more than a thousand initial applicants and, since then, community networks in the US have flourished. In addition to the over 200 networks shown in Figure 28, for example, 77 communities have publicly-owned cable networks and over 185 serve at least some portions of their community with fibre[70] – and this is in-spite of the fact that many US states actively inhibit (due to incumbent lobbying efforts) such approaches. Competition for talent amongst these *'gig'* communities is intense – see for example, the ads in Figure 29.

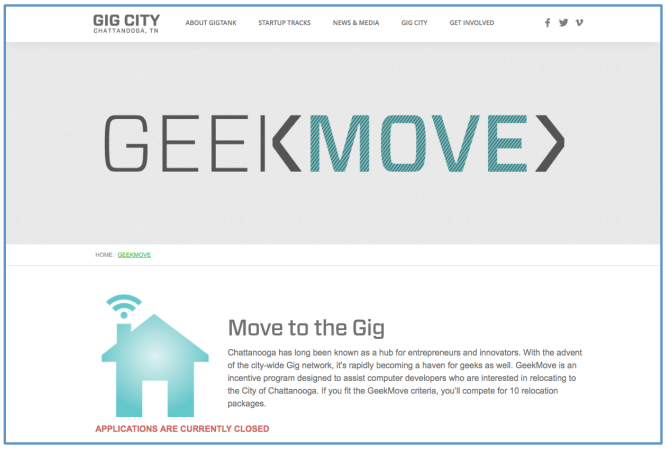
The business model options each community favours results from considerations ranging from size to risk, to priorities, complexity, and vision. What would seem to make the most sense to communities in northern Alberta would be a lit open-access utility-based model which can then leverage local ISP capabilities and resources and promote market-based competition on the services side. Personnel from Big Lakes County recently visited three public utility districts in the northwest US – specifically those in Grant, Chelan, and Douglas counties. All three operate open-access utility fibre networks for the benefit of all ISPs in their respective counties. All three are willing to share their learnings and expertise with municipalities in northern Alberta.

[70] https://muninetworks.org/communitymap

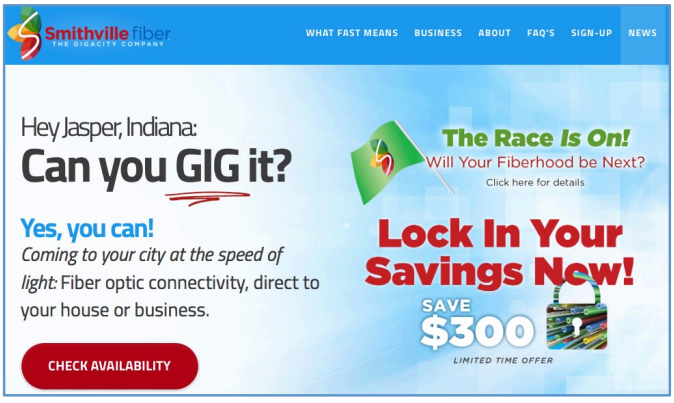


	95 Communities with a publicly owned FTTP network reaching most or all of the community.		Over 110 communities in 24 states with a publicly owned network offering at least 1 Gb/s services
	Over 130 communities with publicly owned dark fibre available.		19 states have barriers in place that discourage or prevent local communities from deciding locally if such an investment is a wise decision.

Figure 28 – Municipal fibre networks in the United States (updated to May, 2017).



Chattanooga, TN



Smithville, TN

Figure 29 – Talent competition among United States *'Gig'* communities.

6.2 Municipal Networks in Canada

6.2.1 Overview

As shown in Figure 30, Alberta ranks 11th out of 13 provinces and territories based on download speed – and Alberta has the SuperNet. Even Alberta's two largest cities do not fair well – Calgary and Edmonton are respectively ranked 11th and 21st out of 25.

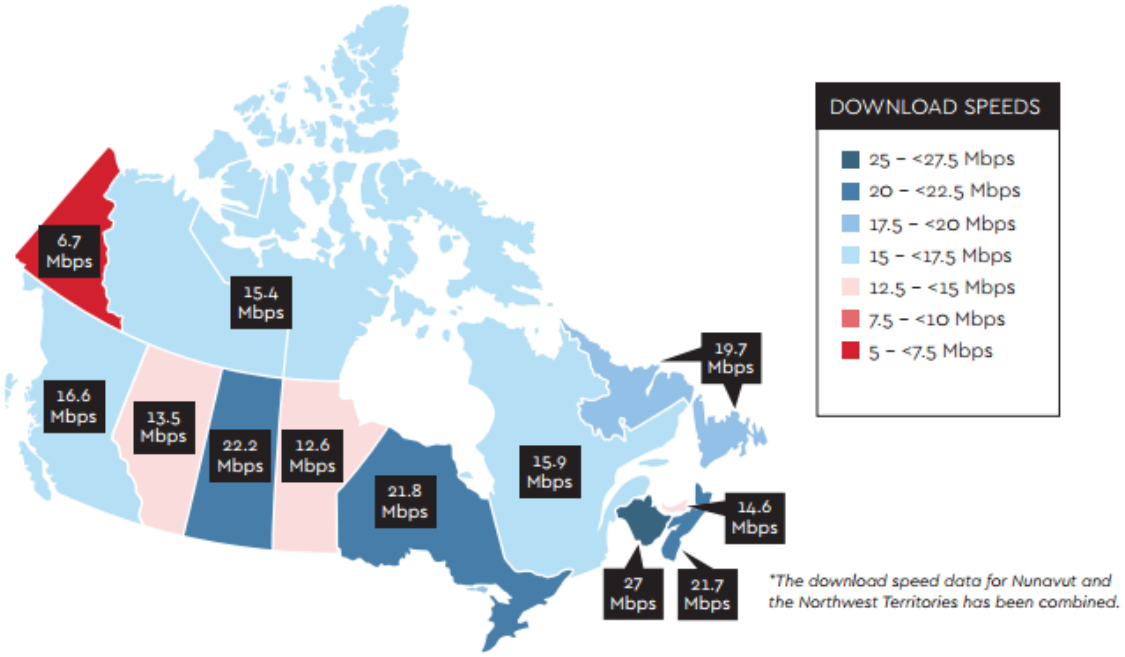


Figure 30 – Comparative Internet speeds across Canada. [71]

Whereas there are over 110 communities in 24 US states with publicly owned networks offering 1 Gb/s services, in Canada, there is only one – that in Olds, Alberta. Given the many initiatives currently underway, this may change. Some key initiatives in Alberta are outlined below.

6.2.2 Alberta SouthWest

The Alberta SouthWest Regional Alliance initiated the first regional broadband strategy encompassing the member municipal districts of Pincher Creek, Cardston, Willow Creek, Crowsnest Pass, Ranchland, and Waterton together with the towns of Claresholm, Fort Macleod, Granum, Nanton, Pincher Creek, and Stavely, and the villages of Cowley, Glenwood, and Hill Spring. The initial work focused on community engagement, education, and strategy. Once completed, the focus shifted to individual community support. Once completed, the final phase was to refine the regional strategy and facilitate implementation. While well-intended, an unintended consequence of their focus on helping individual members move forward, was that some of their larger members then did so – on their own – to some extent stranding both the smaller members and inhibiting a more regional approach. Axia's concurrent offer of *'free and hassle-free fibre'* to communities in the Region that could show 30% of their addressable premises interested in Axia services simply compounded the problem. With the defacto foreclosure of a more regional approach, the regional level work did not proceed to implementation.

[71] CIRA; *Canada's Internet Performance: National Provincial and Municipal Analysis*; 2016-04.

Of the communities moving ahead on their own, the current success story is Waterton. Leveraging a Shared Services Canada project to upgrade water facilities throughout the Waterton townsite, the town moved to deploy fibre to every premise in Waterton and now provides a rich set of both fibre and WiFi based Internet services throughout the town and campground. Now that the TELUS backhaul links have been upgraded to 1 Gb/s, O-Net will begin providing a full triple-play (Internet, telephone, and television) portfolio to residential clients when the tourist season begins to wind down this fall.

Perhaps partially in light of their experience, there is a growing recognition of the importance of multi-community scale. Indeed, the sharing of resources and expertise from dense to less dense areas enables a broader deployment of fibre in the areas to be served. In early 2016, the Alberta Government introduced a grants program aimed at facilitating regional scale planning-level broadband studies. Under the program, matching grants of up to $20 000 are made available to interested REDAs. Under the Community and Regional Economic Support (CARES) program, an additional allotment of up to $100,000 per REDA/yr for two years became available in 2017.

6.2.3 City of Calgary

In September, 2015, the City of Calgary adopted a dark fibre strategy based on the argument that facilitating Internet-based services is only one of six networks requiring connectivity[72] in the City and that providing the required connectivity for all networks is the City's responsibility, particularly as space in their rights of way is limited and the City does not wish to have their streets continually dug up – see Figure 31.

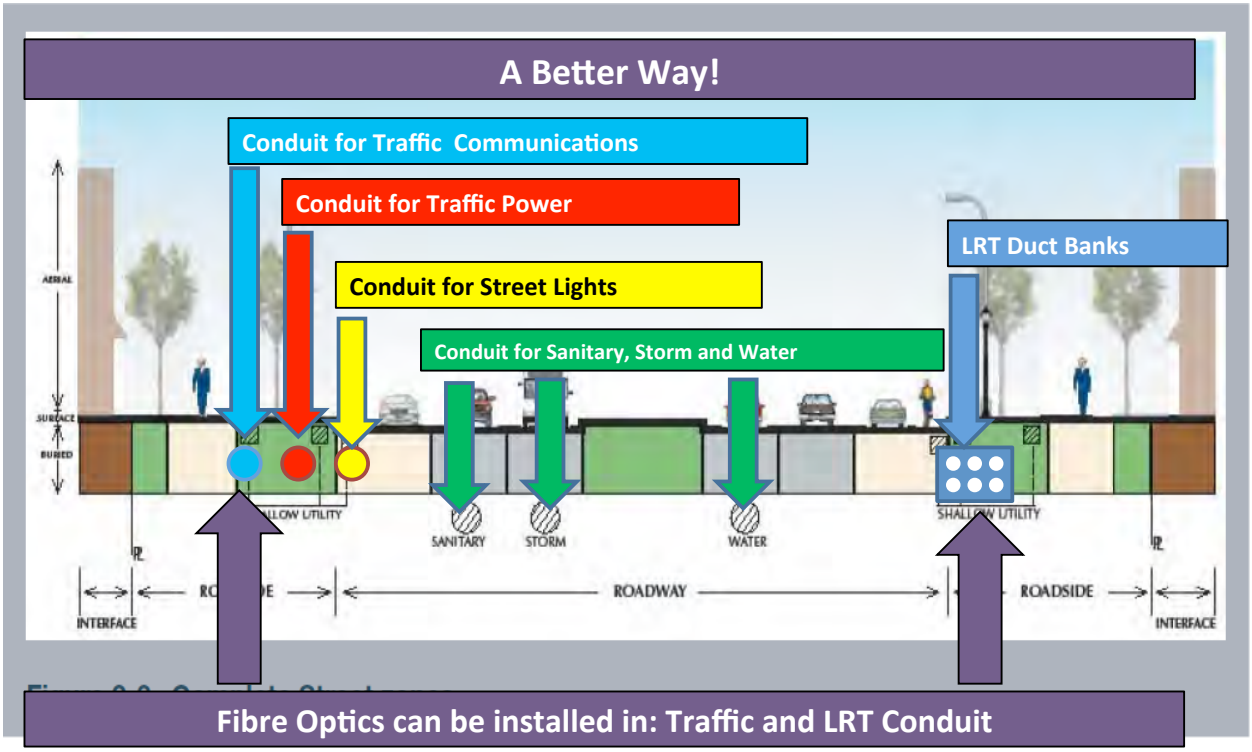


Figure 31 – City of Calgary – rights of way issues.

[72] Disaster recovery, critical infrastructure, law enforcement, asset management, citizen services, & public safety

From the City's perspective, connectivity to some 230 remote offices, 450 traffic controllers, dozens of lift stations, and a multitude of transit and bus stations, traffic and security cameras, and so on is required.[73] Upon review, the City of Calgary found their four biggest challenges to be:[74]

- Managing the rights of way (RoW) – challenging now and will only get worse as duplicate infrastructure accelerates.
- Cost effective Connectivity for the City – Internet of Things (IoT) and Smart City Trends are drivers.
- Protecting City's ability to self-provision services – relies on infrastructure and access to ROW's.
- Community inequities are inevitable – What's the plan?

Their solution was to adopt a city-wide dark fibre strategy based on rich connectivity. Approved last September, the strategy aims to enable the connectivity required to create a healthy digital ecosystem and minimize disruption due to the civic construction required to provide it. The City will deploy dark fibre infrastructure and any others needing access to it will be able to.

The network will be run on an equitable, open-access basis and will connect all communities in Calgary. The City will not be entering the retail telecommunication services arena, nor providing fibre to the home. Competitive providers will be able to extend the City fibre to the business for those purposes and the City will buy the last mile fibre back over time, so that all fibre will remain the property of the City and the City can therefore retain control of what it sees as critical civic infrastructure. A presentation outlining the City of Calgary's approach can be viewed at:

https://youtu.be/dQMzkz6oaqg

Though the approach makes sense for larger centres and there are now three such efforts underway in Canada – Coquitlam, New Westminster, and most recently Campbell River. It is less applicable to smaller centres as those markets are not likely large enough to support more than one provider lighting up the network – in which case the *'first provider in'* gains a de facto monopoly.

6.2.4 Kainaiwa

As exemplified by the initiative undertaken by the Kainai Nation in southern Alberta, communities undertaking a do-it-yourself approach directly benefit from both the alignment between their broadband objectives and the interests of their communities as well as from the financial benefits that no longer flow to the shareholders of the incumbent service organizations. With respect to the Kainaiwa Fibre Network, the Blood Tribe claims to have repaid deployment expenses in five years and reduced their telecom expenditures from $50k to $7k per month – an annual savings of $516k that can be reinvested into the community.

6.2.5 Olds, Alberta

In the early 2000's, the Town of Olds, The Olds Chamber of Commerce, The Olds Agricultural Society, and Olds College partnered to establish a non-profit community development organization, the Olds Institute for Community and Regional Development (OICRD). The brilliance of the OICRD is that by combining the expertise from the public and private sectors, its activities became inclusive, could be more broadly supported and, without the encumbrances of local election cycles, were better able to take on longer-term projects. Over time, a dozen committees were formed under the auspices of the OICRD, each

[73] A video presentation on their strategy is available at: https://youtu.be/dQMzkz6oaqg

[74] Basto, David; *Building the Business Case for a Connected City*; City of Calgary; 16-03-10.

focused on a different aspect of community development – from community engagement, to business retention, to, well, technology.

Shortly after its inception, the Technology Committee, chaired by Joe Gustafson, settled on the notion of enabling superior broadband throughout the region via the deployment of fibre optic cabling. The idea was that if the OICRD got the fibre in the ground, they could then connect it to the newly created Alberta SuperNet and things would take-off from there. Reality struck quickly:

- Regional fibre estimates for Mountain View County came in shy of $100M. The focus then changed to Olds itself, with the regional option to be re-evaluated later.
- The SuperNet only provided backhaul connectivity (e.g., SuperNet could connect an Old's network to Calgary) but was not established to either light community fibre networks or to provide Internet services over them.

From the SuperNet, the Technology Committee then approached Shaw and TELUS. Shaw declined upfront, but TELUS indicated that should the network be deployed to their specifications, TELUS would consider lighting it and providing services. That did not materialize and they explored potential partnerships. In the end, the Technology Committee undertook to both deploy and light a state-of-the-art fibre network in Olds. When Bell Canada, Navigata Communications, MTS Allstream, and Rogers Communications then also declined to provide services, the OICRD established a wholly owned for-profit subsidiary to develop, provide, and operate a full set of triple-play (Internet, telephone, and television) services over the open, passive, OICRD network under the O-Net brand. In July, 2012, Olds became the first community in Canada with community-wide gigabit per second Internet.[75] O-Net became cashflow positive in the fall of 2015 and hasn't looked back since. Their Internet services table appears in Table 13.

Table 13 – Internet Services In Olds, Alberta

RUSH	ZOOM	GIG
$90/MO†	$100/MO†	$120/MO†
50 Mbps Download†	**100Mbps Download†**	**1000Mbps Download†**
50 Mbps Upload†	**100Mbps Upload†**	**1000Mbps Upload†**
500GB Monthly Usage	**1TB Monthly Usage**	**2TB Monthly Usage**
Wi-Fi	Wi-Fi	Wi-Fi
2 Email Addresses	2 Email Addresses	2 Email Addresses
Local Support	Local Support	Local Support

The Olds' Connected Community Network (OCCN) illustrates by example how a small town community with a population of approximately 8,700 people can take ownership of ensuring its businesses and residents have access to global standard IT infrastructure and services as the foundation for their economic, social, cultural and environmental sustainability. It also demonstrates a potential path that

[75] Chung, Emily; *Small Alberta Town Gets Massive 1,000 Mb/s Broadband Boost*; CBC News; 2013-07-13.

Canada might take to regain its past position in the global telecom space. Modeled on the European services-based competition model, the Olds fibre network is separate from the services company.

Established as a largely social enterprise, O-Net is now available to provide similar services to any municipality that is able to deploy lit fibre optic network within their community. Further, those behind the Olds' fibre initiative are willing to share their learnings with any community that is interested – as outlined in the following video from the OICRD:

http://youtu.be/Uc_plnE3W5U

In it, Olds specifically offers to share their experience and expertise with any community interested in enabling state-of-the art fibre-based services within their communities.

It has been said that community fibre endeavours are likely 80% social and 20% technical and the Olds' experience supports this from several perspectives. First, the community-wide inclusive nature of the OICRD enabled coordinated long-term planning and broad-based support for projects like the OCCN. It enabled complementary support for key related initiatives such as community engagement. Being leading edge, mistakes were expected and no blame was attached. Issues from rights-of-way to financing were encountered and the cross-disciplinary nature of the OICRD enabled efficient resolution.

6.2.6 Parkland County

To enhance broadband services to the rural areas of Parkland County while preserving market forces amongst the wireless internet service providers (WISPs) in the area, Parkland deployed a number of fibre connected primary towers as well as a set of smaller secondary towers with wireless backhaul to the primary towers. WISPs, mobility providers, and first responders can rent space on these towers for their antennas. The idea was to bring the capital cost of serving remote areas down and help enable competitive broadband services to areas which might otherwise go unserved. The tower infrastructure was to be operated on a cost recovery basis.

To attract mobility and the Alberta First Responders Radio Communications System (AFRRCS) equipment onto the towers to help cashflow, robust (expensive) towers were constructed at sites which were a compromise amongst the requirements of the mobility, ISP, and AFRRCS providers. Few liked the locations, competition amongst the ISPs did not materialize, and the County is now struggling to find a way to make things work.

6.3 General Financial Considerations

6.3.1 Off-balance Sheet Considerations

Whereas traditional business case numbers only consider direct revenues generated by the provisioning of triple-play services in the community, when it comes to Council considerations, a municipality may wish to capture broader community (off-balance sheet) benefits such as positive impacts on the community's quality of life, youth retention, business attraction, and competitiveness (Figure 32). At the Council level, the debate as to whether this new infrastructure will focus largely on private benefits (broadband fibre as a market commodity) or public benefits (broadband fibre as a utility to achieve purposeful public benefits) will be decided. The results will help dictate who should own and control the fibre assets, should a community elect to go that way, and how well the assets will achieve broader public benefits.

In more rural settings, by quantifying and including broader public benefits, fibre can be justifiably deployed far deeper into rural areas than generally realized based on a simple *'internet-only'* case. As can be seen in Figure 32, the inclusion of tangible, public benefits into the broadband business case for a set of First Nations communities in the Wood Buffalo area turned a marginal business case for fixed-wireless into a strong case for fibre.

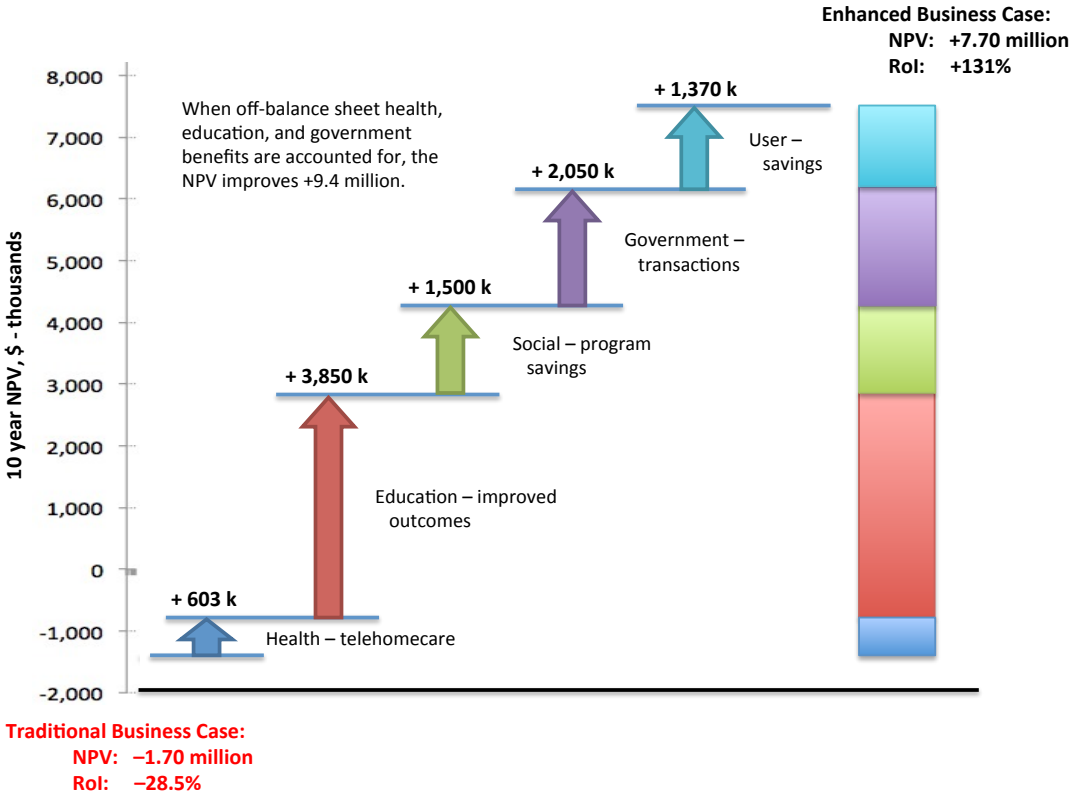


Figure 32 – Benefits assessment for RMWB First Nations.[76]

6.3.2 Wireless versus Wired

Though rural wireless solutions may initially be less expensive to deploy, they are both capitally and operationally more expensive over terms exceeding ten years. As home and business Internet usage tends to increase at rates exceeding 20%/yr, and has done so for over a decade, to meet this increasing demand, capacity must increase over five-fold per decade. Indeed, Neilson's Law suggests that this increase may be as high as 50%/yr for high-end users[77], – which implies that 1 Gb/s connections will need to be generally available by 2020. As scaling fixed wireless systems to keep pace with these demands becomes increasingly expensive, fibre/wireless cost comparisons should be done on a minimum ten-year total cost-of-ownership basis – in which case, fibre is generally found to be the least expensive technology to deploy.

In a sample design for a 200 square-mile rural area in Chamberlain, S.D., Vantage Point Consulting found that whereas the least expensive wireless deployment came in at $370 per Mb/s per client, fibre came in at $9. In this comparison, the wireless network was designed to support 4 Mb/s per client whereas the fibre network could support 1 Gb/s.[78]

[76] Dobson, C.; *The True Economics of Broadband*; OSLI; 2013-09-29.

[77] https://www.nngroup.com/articles/law-of-bandwidth/

[78] Thompson, L., et al; *Comparing Wired and Wireless Broadband;* Vantage Point Consulting; 2015-05-06.

There has recently been significant press regarding the development and potential rollout of 5G wireless technologies as early as 2020. With peak speeds of 10 Gb/s, the potential seems tremendous. The details, however, are not so encouraging:[79]

- While the 10 Gb/s rate is a theoretical maximum peak rate under ideal lab conditions, the specification of most interest to users is the actual throughput capacity of the network. Throughput capacity tends to run at about 15% of the peak rate and declines as the user moves away from the cell-tower.
- At 15%, the useable throughput of a 10 Gb/s system is 1.5 Gb/s and as this is shared amongst all users with the cell's range, the usable throughput to individual users is simply 1.5 Gb/s less the average throughput of each user times the number of concurrent users in the cell.
- To minimize capacity issues, 5G deployment scenarios assume cells with a 150m radius – or about 14 cells per square kilometre.
- As each cell must be fibre connected, in rural areas, fibre-to-the-farm will likely be a less expensive and certainly a more scalable solution than 5G.
- When operational costs and capital replacement costs are considered, the same conclusion holds for all but the larger, densest urban areas.

In community settings, wireless can be an inexpensive way to improve Internet services quickly. As the first step in a community fibre deployment program, WiFi access points can be rolled out with the initial feeder network. As fibre access in the community becomes more ubiquitous, the WiFi system migrates to an overlay that can be used when one is '*out and about'* in the community.

6.3.3 Aerial versus Buried Deployment

If a deployment area receives its power aerially – i.e., via power pole infrastructure – and the poles can take the additional weight and there is sufficient clearance, fibre can be provided aerially at about a third of the cost of a buried deployment. Though buried infrastructure is more secure on a long-term basis, if the lower cost of an aerial deployment can be realized, the reduced capital requirements may increase the possibly of attracting private equity. Aerial deployments can also be done quickly and during winter months. On the other hand, if the pole infrastructure must be upgraded, then the buried deployment may prove less expensive.

The issue many municipalities run into when considering an aerial deployment relates to the fact that pole attachment standards have changed since many of their poles were installed. As long as the poles remain *'untouched'*, poles deployed prior to the standards changes are grandfathered and can be left as is. Unfortunately, though, as soon as a community wishes to place fibre on the poles, the poles will have to be upgraded to current standards prior to fibre being attached. Though credits are available to help offset the upgrade and/or pole replacement costs, the costs add up and may obviate the advantages of going to an aerial build.

6.3.4 Grant Funding

Grant funding or cash infusions to a broadband deployment project reduces the project's capitalization requirements and can thereby increase the affordability to smaller and more rural municipalities. As well, the subsequent reduction in principal and interest repayments improves the bottom-line margin and reduces operational risk. Municipalities still need sufficient scale, though, to achieve positive operational margin needed for sustainability.

[79] Thompson, L. & Vande Stradt, W.; *5G is Not the Answer for Rural Broadband;* Broadband Communities; 2017-03/04.

The revised CRTC universal services fund mentioned in Sec. 3.2.1 will grow to $750M within five years. The terms by which these funds will be made available are under development and will likely be vetted in 2018. The first disbursements are expected in early 2019.

While the federal CTI program mentioned in Sec. 3.2.2 has ended, staff have indicated that a follow-up program is likely within an 18-month timeframe. As these programs have historically favoured shovel-ready projects, interested municipalities would do well to use the interim period to develop suitable projects.

6.3.5 Don't Delay

Electing to establish a municipal or regional fibre program is often perceived as a complex undertaking and postponing related decisions is an enticing option. While there may be very legitimate reasons to do so – say, the local water-plant needs to be refurbished and current funds are limited – some are less so. Examples include:

- ***Current offerings are sufficient to meet current requirements –*** yes, but demand and usage is growing exponentially while infrastructure deployment is linear. In order to meet future demand, deployments will need to start soon.
- ***Wireless technology is improving and will provide an inexpensive alternative –*** as discussed in Sub-section 8.3.2 above, from a usability and cost perspective, wireless technologies will not meet rural requirements anytime soon.
- ***Fibre may be usurped by the next 'big' thing –*** though not economical for FTTP implementations, opto-electronic equipment designed for long-haul implementations currently supports 160 wavelengths (channels or data-streams) on each fibre. As each wavelength can support a 100 Gb/s data-stream, the usable aggregate capacity on one fibre is 16,000 Gb/s – or 16 Tb/s. As the theoretical capacity of fibre is much higher and as the primary cost of deploying fibre is civil construction, current fibre capabilities will likely be sufficient for at least the next 30 years – and the deployment costs are not likely to decrease significantly.

Other considerations include:

- If a community delays a deployment, they lose the benefits of broadband until either they do or a private provider does it for them.
- Over time, the best *'anchor tenants'*, or key potential clients for the network (which would boost initial cashflow and reduce deployment risk may be lost due to either the client paying for a custom-build from an incumbent, or the key clients being successfully courted by the incumbents. The risk extends to the premises, businesses, and areas with the highest profit margin potential. Once these clients are unavailable to a public provider, the decreased revenue may limit deployments in less profitable areas (e.g., using revenues from the higher margin areas to support the more rural lower margin areas; and using revenues from a business district to help fund a residential deployment).

Given that a land-grab of sorts is underway and that outside the larger centres only one fibre network is likely to be deployed, communities interested in inclusive fibre as a fourth utility need to move prior to their business case becoming untenable.

6.3.6 Public versus Private Financing

In general, private enterprise, particularly small to medium-sized enterprises, cannot compete with municipalities when financing long-term infrastructure. To see this, consider a $1M fibre deployment project. With 25-year financing from the Alberta Capital Finance Authority (ACFA) at the mid-August, 2017 interest rate of 3.076%, municipality payments come in at $4,802/mo. – $9.60/subscriber/mo. with 500 subscribers. Private enterprise looking to finance this over 5 years at 2.023% would face payments of $17,608/mo. – $35.22/subscriber/mo. with 500 subscribers. Larger private providers able to attract

patient capital may look to 10 to 15-year payback periods to make their numbers work. Indeed, TELUS refers to fibre as a *'generational'* investment.

Exacerbating this issue, is that, whether large or small, private industry will be evaluating investments on a net-present-value (NPV) basis. This implies that they are looking for a return on their investment that exceeds the gain available via a risk-free bond investment. From a municipality perspective, as long as the program is intrinsically sustainable, many will be more motivated by off-balance sheet benefits and economic development potential than by the project's NPV.

6.4 Business Models

6.4.1 Structure

Referring to Figure 33, counties and municipalities have the option to design, finance, and deploy lit home-run fibre networks to facilitate enhanced broadband services to their business and residential communities. Once the Community-Net (C-Net) infrastructure is in place, the community has several options to obtain services such as Internet, telephone, and possibly television. They can connect directly to a local service provider if one is available (say, CCI or MCSNet) or they can arrange backhaul to an Internet Exchange (IX) facility and there either connect directly to the global internet or cross-connect to an ISP that has a presence at the exchange.

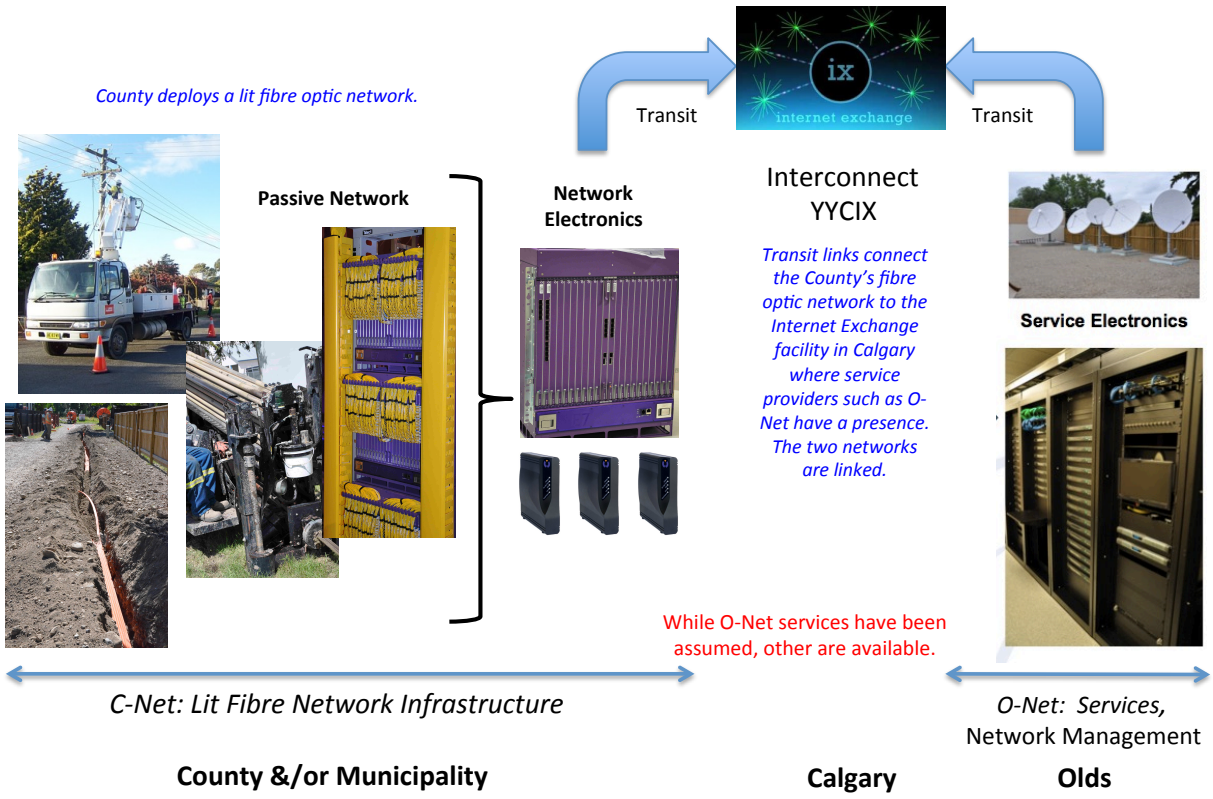


Figure 33 – Components of a telecommunications network.

In the figure, C-Net has arranged for a backhaul connection to the YYCIX Internet Exchange in Calgary and cross-connected to O-Net. With this arrangement, C-Net could contract O-Net to (1) manage their lit network and (2) at either the wholesale or retail level, be the service provider of choice, for at least the initial, say, five-year period.

Though the intent may be to establish C-Net on an open-access – level playing field – basis to all Internet, telephone, and television service providers interested in using the network to connect and deliver broadband services throughout the community, the underlying services ecosystem needed to facilitate this in Alberta is not sufficiently developed. While several ISPs could provide Internet, and possibly voice, services, over the network, at present, O-Net is the only *'local'* provider that can provide the full suite of triple play services necessary to compete in an area currently serviced by TELUS and either Eastlink or Shaw. In the business cases financials to follow, O-Net services are assumed. Should the communities opt to pursue these options further, other options, as well as the trade-offs amongst them, would be evaluated.

To assist municipalities, O-Net can provide services on either a wholesale or retail basis, in which case a community could respectively approach a municipal fibre operation as a retail service or as a wholesale network operator. The differences are significant as in the retail arrangement, the community would need to establish local service operations, say CommNet, and assume the market risk associated with selling the services (Internet, telephone, and possibly television) and achieving sustainable revenue levels. In the wholesale case, as the service provider, it would be up to O-Net to establish local retail operations and assume the market risk associated with achieving revenue levels sufficient to cover both the costs of using C-Net as well as its operations in the community. With the retail option, O-Net receives regular monthly revenue based on the pricing levels of O-Net's wholesale services suites. In both cases, the network entity, C-Net, receives a regular income stream based on the cost of wholesale access to its network from the retail service provider – whether that be from a local ISP, CommNet, or O-Net.

Should the community choose the retail option, structurally, CommNet (service) and C-Net (network) operations could be one entity. Keeping them separate, however, leaves the door open to running C-Net as a local network utility on an open-access basis – in which case, CommNet may eventually be only one of multiple service providers on the network. Integrating them enables greater operational efficiency, but may inhibit open network operations down the road. In Olds, ISP operations are provided by O-Net and the network assets and operations are run by the Technology Committee of the OICRD.[80]

6.4.2 The Wholesale (Utility) Network Option – C-Net

A schematic showing service delivery and money-flows with the wholesale network option appears in Figure 34. Here, O-Net becomes the (initial) retail services operator and pays to use to C-Net to connect with and deliver their services to residential, commercial, and industrial clients in the community. For convenience, C-Net will outsource network operations to O-Net. Network operations includes arranging for client connections (client yard surveys, drops, and opto-electronics) to the network as well as network monitoring, operations, locating, and repair services. Contractor charges for drop installations and cable-cut repairs as well as costs for the optical network terminals (ONTs) required in client premises to connect to the fibre optic cable, including installation, will be billed back to C-Net. Monthly costs for the software required to maintain and operate the ONTs will be C-Net's responsibility as well.

[80] The Olds analogy is not exact as in Olds, O-Net actually owns the network electronics and the Technology Committee owns and controls a dark fibre network.

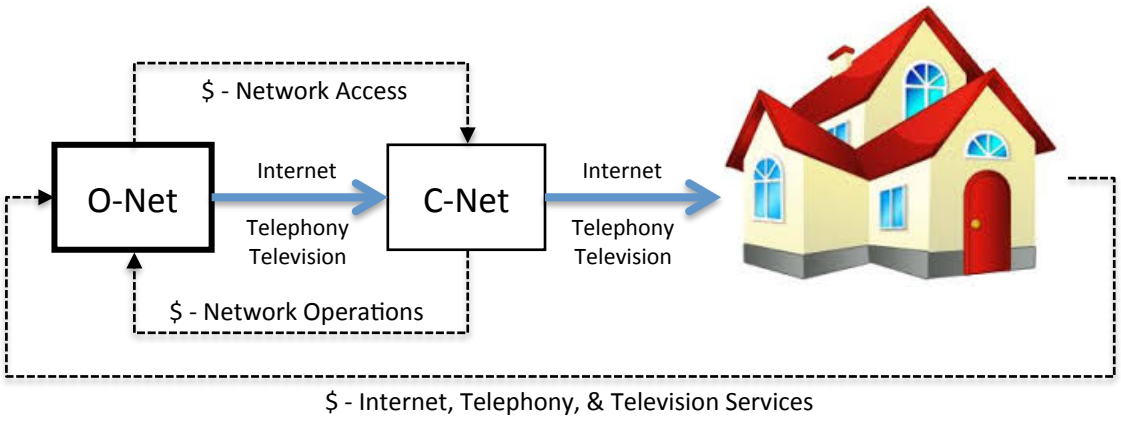


Figure 34 – A wholesale/utility network model.

As the ISP, all marketing, sales, home installations beyond the ONT, client support/help desk, services, and service delivery responsibilities reside with O-Net.

A variation on this is the dark fibre option in which the community deploys a dark fibre network and then leaves the network electronics to the ISP(s). While operationally simpler from both network and service provider perspectives, in smaller communities, once one service provider comes in, others may not.

6.4.3 The Retail Services Option – CommNet

To enable local retail options, O-Net offers an *'ISP-in-a-Box'* service wherein O-Net provides wholesale access to its triple play services portfolio together with all back-office billing, customer service, sales and marketing, and operations support tools a municipality needs to set up a local broadband services operation. The services could either be marketed under the O-Net brand or re-branded to, say, CommNet.

To utilize this offering, the community would need to establish a local services entity, i.e., open a sales office and either hire staff or contract for sales and marketing, accounting, installation, repair, and support operations. Structurally, options for the entity range from a non-profit to a small municipal services corporation.

A schematic showing service delivery and money-flows with the retail services option appears in Figure 35.

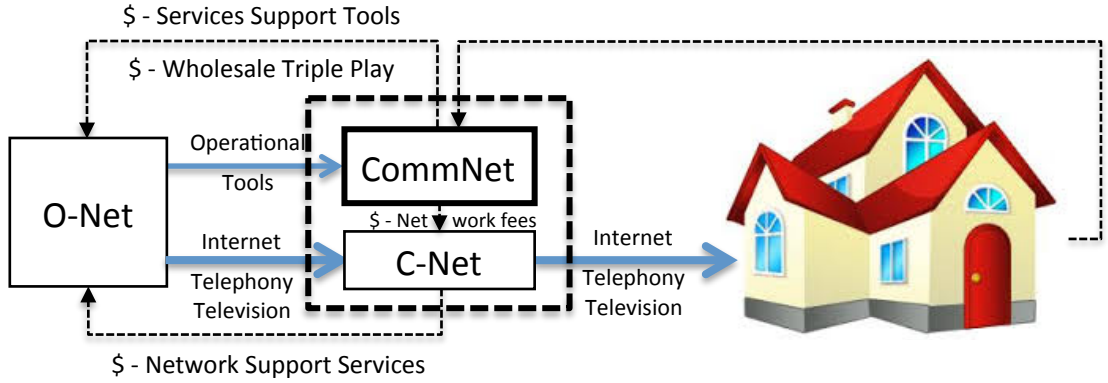


Figure 35 – A retail /ISP business model.

As the ISP, CommNet is responsible for sales and bills clients for services. Out of the ensuing revenue stream, CommNet would need to compensate:

- O-Net for the wholesale delivery of Internet, telephone, and television signals to C-Net, which delivers the signals (services) to the end customers,
- O-Net for access to the operational tools needed to run its network and services operations, and
- C-Net for use of its network.

For the numbers to work financially:

- The *'network fees'* CommNet pays to C-Net for use of the network must cover both its operational expenses and any principal and interest payments associated with acquiring the capital used to finance the network deployment.
- At a minimum, CommNet's revenue must be sufficient to cover C-Net payments, the wholesale ISP-in-a Box payments to O-Net, and the costs of its own internal operations.

In summary, with this structure, the plan to enhance broadband connectivity and services throughout the community, would involve:

- deploying an operational (passive network plus network electronics) fibre network that passes every home and business in the community
- deploying the network and opto-electronics required to light the network
- connecting the network to the Internet Exchange facility in Calgary (YYCIX in the figure)
- interconnecting with O-Net at YYCIX to provide city-wide Internet, telephone, and television service – as well as back-office support, network monitoring, customer services, and billing
- establishing local operations, installation, maintenance, and marketing support to a competent provider and assuming the market risk associated with selling services

6.4.4 Financial Considerations

Business cases for fibre deployments tend to be interesting for two reasons. First, significant upfront capital is required to finance deployments and, second, the capital required increases with both the initial take-up rates (due to the costs to connect clients) and the intensity of the competition in the community (which decreases revenue). To offset these effects, initial deployments typically target more densely populated business districts to initiate revenue streams, then move on to the residential areas, and then to the outlying areas. Service uptake is typically higher for businesses, and margins on voice and Internet services are higher than those for television services. In essence, the strategy is to use cashflow from the more profitable areas to help finance deployments in the less profitable areas.

Strategies to reduce capital requirements include:

- Finance the project over as long a term as possible (e.g. a 30+ year fibre asset with a 30-year debt repayment term) to lower the monthly bill to customers;
- Use aerial deployment where pole infrastructure is satisfactory to reduce overall costs;
- Leverage planned civil works wherever possible (e.g., laying conduit whenever trenches and roadways are opened-up for repair or made available due to work on water, power, gas or telecom utilities in new development areas). In buried builds, civil works (i.e., trenching) account for approximately 70% of the deployment costs;
- Require conduit deployment and cat-5 wiring in all new developments;
- Leverage the additional cashflow available from the business, commercial, and greenfield areas (in some ways, the low-hanging fruit) to offset the less dense/lower revenue areas of the community or region;
- Allocate a portion of expected municipal operational savings to the project;
- Use a tax levy for, say, the drop portion of the build;
- In lower density areas, provide fibre-to-the-tower to enable higher bit rate, higher capacity wireless services to the surrounding area; and
- Go with WiFi first – build a community/customer base first.

Incredibly, some smaller communities cannot even raise the quarter million dollars an aerial deployment might cost them. As this is a trivial amount to larger communities with, say, a $15M build, larger communities might consider including the smaller communities in their plans. The additional scale their inclusion brings to the table, combined with the added municipal participation, can help leverage their operational costs, enhance grant applications, and enhance the sub-region's connectivity and capacity generally.

6.5 A Default Model for the Analyses

6.5.1 Context

To avoid repetition in the many analyses included in this document, the default assumptions that will underlie all of them are outlined below. With the same basis for each analysis, comparisons between them are possible. Note though, that there are many options and considerations that go into a region's or municipality's decision to pursue a community fibre network and the pro forma financials presented very much depend on the options selected. Moving from a buried deployment to an aerial one might, if the pole infrastructure in a region is suitable and meets current standards, save an area up to 40% of the initial deployment cost. The default assumptions below are typical, however, and are sufficient to highlight the challenges that communities looking to deploy fibre infrastructure on a utility basis will have to deal with.

6.5.2 Business Structure

Each analysis assumes that the region or community deploys an open-access, lit fibre-optic network that will make world-class, fully scalable broadband infrastructure available throughout the region. In urban centres, the network will pass every home and business, with drops to the premises only deployed when service is orderd. In a region, the intercommunity network will generally connect to each urban centre and enable connections to key ISP towers. Key ISP towers are those that the ISP would upgrade, and thereby improve coverage throughout the tower's coverage area, if fibre to the tower were to be available.

To leverage local ISP capabilities, the wholesale network option is assumed, implemented on an open-access basis, and made available to all ISPs. Hence, the business model assumed for each community network is that shown in Figure 36 below. The local network entity, in this case TAt-Net for the Town of Athabasca network, will be labeled differently for each analysis.

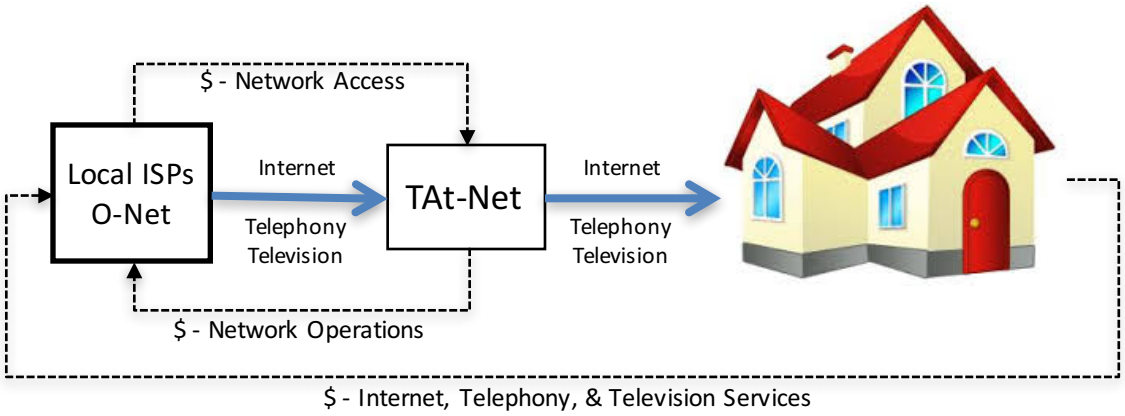


Figure 36 – Utility network model.

To keep things simple, it is assumed that each municipality outsources management of its network to O-Net, simply because O-Net has in-house fibre/opto-electronics expertise. Network operations include

arranging for client connections (client yard surveys, drops, and opto-electronics) to the network as well as network monitoring, operations, locating, and repair services. Contractor charges for drop installations and cable-cut repairs as well as costs for the optical network terminals (ONTs) required in client premises to connect to the fibre optic cable, including installation, will be billed back to, in this case, TAt-Net. Monthly costs for the software required to maintain the network and premise gateways (ONTs) will be TAt-Net's responsibility as well.

With this arrangement, providers such as CCI, MCSNet, and others can each contract access to TAt-Net and utilize the network to deliver services over fibre to residents and businesses. This allows the ISPs to leverage their current service portfolio and support processes and increase their client base without a commensurate expenditure of capital. For this access, though, each ISP would compensate B-Net based on, say, the number of subscribers it served. Each connecting ISP would be responsible for all marketing, sales, home installations beyond the ONT, client support/help desk, and service delivery.

6.5.3 Deployment Capital

Deployment capital is estimated separately in each analysis. Home-run air-blown fibre architectures are assumed throughout.

Once the feeder and distribution networks are in place throughout a town, additional capital costs will be incurred to deploy conduit and fibre from each premise ordering service to the distribution conduit running past the premise. The wiring within each premise may also have to be upgraded to enable service distribution to the premise computers, phones, and televisions – but that falls to the ISP.

6.5.4 Deployment Schedule

In general, deployments begin in 2018. Depending on the size of the deployment, it may complete in 1 year or take several. Deployment schedules are outlined in each analysis.

6.5.5 Opto-electronics and Backhaul

In addition to the deployments costs outlined above, capital is required for the opto-electronics and routing equipment required to '*light*' the fibre and establish a functional network, the electronics required in client premises, tools and test equipment, and so on. As the network is deployed incrementally over a number of years (drops are only installed as service is ordered), to provide a breakdown of the overall capital expenditures a cumulative multi-year view is needed. Using the cumulative capital expenditures over the first five years of operation, a breakdown of the expenditures is shown in a pie chart.

With long range optics, the opto-electronics assumed can support services to residents and businesses up to 35 km from the central office – which would enable the utility to extend services to residents and businesses in the surrounding county. To extend the range further, similar equipment can be placed up to 70 km away – which would then support services up to 105 km from the central office, and everything in-between (and so on).

The backbone connection from the Edmonton Internet Exchange (YEGIX) to the TAt-Net also needs to be sized appropriately. Should only Internet and phone services be offered, a single 250 Mb/s connection would initially suffice. To support television services, a minimum of 1 Gb/s connections would be needed. As the client base grows, the required backbone capacity will increase.

6.5.6 Drop Capital

The drop cost parameters assumed in the financials are based on:

	Drops		
	Brownfield	Inside unit fibre	Greenfield
Residential	1,100	550	250
Commercial	1,200	600	300

Inside copper wiring is simply reused.

Greenfield refers to drops in new suburban areas which leverage joint trench deployment. The '*Inside unit fibre'* is for deploying fibre within multi-dwelling units where reusing existing copper-based inside wiring is not possible.

6.5.7 Markets and Revenue

As retail service suites (Internet, telephone, and television) come from the ISPs using the network, TAt-Net revenues are based on the payments collected from the ISPs using the network. While there are various ways these payments can be structured, the financials presented below assume that each ISP pays a flat monthly fee to TAt-Net for each client they connect to. The fees assumed are:

	Residential	Commerical
Wholesale Network: $/mo	80.00	80.00

Revenue is thus determined by the penetration rates realized by the ISPs providing services. Assumed penetration rates are shown below.

	Assumed Penetration Rates			
	Year 1	Year 2	Year 3	Year 4 on
	1	2	3	4
Residential penetration	20%	35%	45%	50%
Business penetration	30%	50%	65%	70%

Based on what O-Net has experience in Olds, these penetration rates are conservative, particularly as they would be the cumulative penetration amongst all providers using the network.

6.5.8 Operations

The operational costs for wholesale network operation are straightforward as most are handled via outsourced contracts. Once the network build is completed in 2018 and the target penetration rates are realized, operational costs stabilize and a view of those calculated for 2022 are presented.

6.5.9 Financial Projections

To finance the deployment and establish operations as outlined above, the Town would secure two loans from the Alberta Capital Finance Authority (ACFA). As loan terms cannot exceed the useful life of the assets they cover, a shorter term, eight-year loan to cover the opto-electronics and a 25-year loan to cover the passive network and start-up costs. Whereas the opto-electronics will likely need to be upgraded every eight years or so, the passive network assets should last over 30. Interest rates are as per the published ACFA rates as of August 15, 2017 (25 years at 3.076% and 10 years at 2.430% – interest is not quoted for an 8-year term). Operating expenditures cover interest payments. Loan amounts must be sufficient to cover the deficits.

Model financial parameters assumed in the projections are detailed in the Table 14. Loan amounts are maximums only and vary depending on the scope of the deployment, the actual amounts required are drawn down in tranches once a year. Revenue and cost inflation are set to 1% and 2% respectively. The technology/bandwidth – Tech/BW – improvement factor accounts for the decreasing cost of electronics with time. In the model, network electronics are replaced every eight years. Contingencies and tax rates are set to zero.

Table 14 – Assumed Financial Parameters

General Parameters	
CDN$/US$	1.350
Inflation - revenue	1.00%
Inflation - cost	2.00%
Tech/BW improvement factor	15.00%

Grant Funding	
Grant funding	0

Contingencies	
OpEx contingency	0.00%
CapEx contingency	0.00%

Tax Considerations	
Include tax	No
Corp. tax rate - small bus	12.50%
Small bus limit	500,000
Corporate tax rate - bus	27.00%

Long Term Loan	
Loan Principal Limit	5,000,000
Term, yr	25
Interest rate	3.076%

Short Term Loan	
Loan Principal Limit	800,000
Term, yr	7
Interest rate	2.430%

6.5.10 Options to Improve Financial Margins

Options to be considered to improve profit margins include:

- Partner with neighbouring communities to increase operational scale.
- Assist your ISPs with marketing to increase penetration rates above 50/70%; support efforts to create a '*culture of use*' among residents and businesses.
- If the power poles in the region are in good order, an aerial deployment would reduce deployment costs by 40%, thus decreasing the required debt load and repayment schedule.
- Reduce the debt service payments by perhaps (1) obtaining grant funding, (2) attracting local capital, or (3) covering some of the build (say the drops) via the tax roll.
- The wholesale network access rate is set to $80/mo/subscriber. While this could be increased to $85 or $90/mo, the higher rates decrease service provider margins. Other charging arrangements are also possible. B-Net, for instance might charge a much lower rate, but on all serviceable premises, regardless of how many take service.
- Reduce operational costs by leveraging local resources and staff or outsourcing to a competent service provider.

The actions above provide proactive ways that a region or urban centre could manage financial risks and create a path toward financial sustainability of their fibre operation.

7 Northern Alberta Development Council (NADC)

7.1 Current State

7.1.1 Introduction

The Current State is the first phase of the three strategy development phases outlined to the right (for communities interested in executing broadband strategies, a fourth phase, business case development, will be undertaken).



The current state establishes the present situation ('what is') – an inventory, as it relates to broadband – current service providers; assets that could potentially be leveraged to support enhancing broadband infrastructure; and current and planned civil infrastructure and works that can significantly reduce the cost of laying fibre conduit. Essentially, the starting point and premise of the *Northern Alberta Broadband Preparedness Project* is to build on what's already or soon to be in place.

Specifically, the current state data collection and analysis focuses on the following:

- Determining the population size and number of dwellings (and growth/decline rates) of each community and business counts by REDA and municipality. Estimating the percentages of aerial and buried utility (power) infrastructure by community. Identifying relevant economic, industrial, political, and social developments. Communities include all types of municipalities (urban, rural, and specialized) as well as First Nations and Métis Settlements.
- Identifying the current state of community plans and strategies – i.e., is broadband included in current municipal, First Nations, and Métis Settlements plans; what factors impact each community's capability to pursue broadband/fibre initiatives; what role could broadband play in addressing individual community's challenges; and where would each community like to be with respect to broadband in the near- and long-term? Where possible, local issues, barriers, and constraints relevant to potentially deploying fibre infrastructure are documented, and the level of broadband policy and planning support established by the entities are identified.
- Developing a clear picture of the broadband service providers and the service options that are available to communities on a community-by-community basis. Service providers can be classified as Wireless Internet Service Providers (WISPs)/fixed wireless, mobility/cellular, wireline ISPs and serve residential, business, and wholesale customers. Services can be provided using radio frequency, optical fibre, copper twisted pair, and coaxial cable.
- Creating an inventory of local and regional assets – community- or privately-owned. Communications towers, fibre networks, and utilities transmission/distribution lines can potentially be leveraged to support enhanced broadband and extend broadband infrastructure deeper into a community.
- Identifying planned public and private sector major projects within northern Alberta as well as planned community/local capital projects and civil works, which can provide an opportunity to incorporate fibre conduit during construction to save network deployment costs.

7.1.2 Methodology

Developing the current state comprised data collection, mapping, and analysis on a community-by-community basis. Figure 37 shows the information and data being sought from each of the communities. The information and data was attained using primary and secondary research methods.

Various community statistics are needed for broadband business case inputs. Statistics Canada (StatsCan) population and dwelling data from the Census 2011 and 2016 (updated data when 2016 Census was issued in February 2017) was used to calculate five-year growth rates and compounded annual growth rates (CAGRs). The underlying data for the business counts was also from StatsCan. Since buried fibre deployments are significantly more expensive than aerial builds, it was necessary to assess how the

community's utilities (e.g., power) are currently delivered. For this task, community Land Use maps were used to identify residential, commercial, and industrial areas. As well Google Maps and Earth was used – looking at street detail for the presence of poles and condition of road surfaces (gravel vs. paved). Various methods were used to count dwellings. Site visits were made to five communities in the Alberta HUB region (Bruderheim, Lamont, Chipman, Hilliard, Mundare), where residential and commercial areas were observed, houses and multi-unit dwellings counted, and tall structures noted.

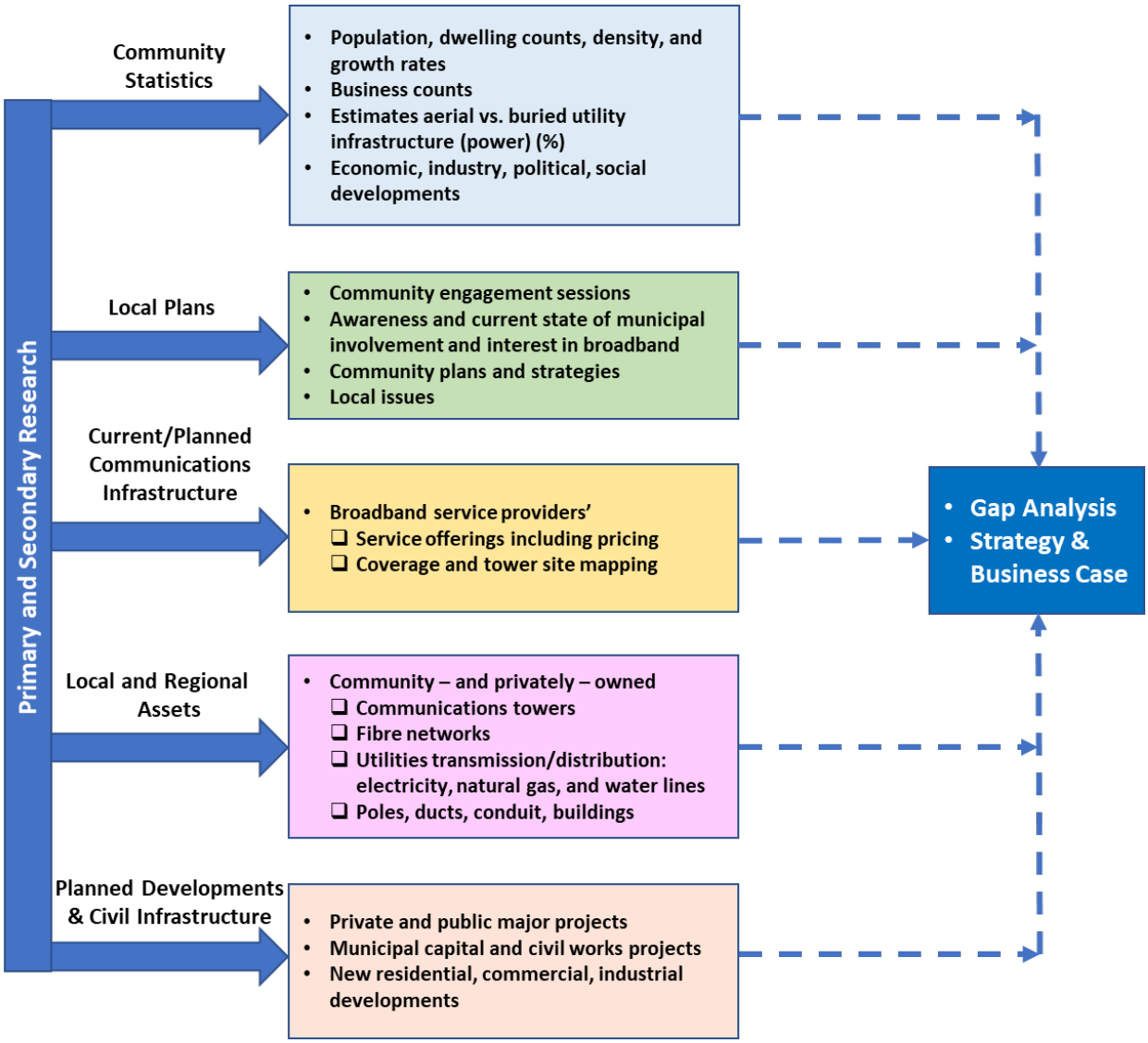


Figure 37 – Developing the current state.

To discover *'local plans'*, the project team interacted directly with the communities through community engagement sessions; information and data requests; and telephone conversations (with communities, utility companies, ISPs and other community stakeholders). Extensive follow-up telephone calls were made by the report's author, the NADC, and the REDAs. The NADC created a video and Information bulletins to support the project. Alberta HUB and GROWTH Alberta conducted surveys with businesses located in their respective areas. The information attained was supplemented by document, website, and social media searches. Local and regional assets, both community- and privately-owned were inventoried and detailed insight about planned developments and civil infrastructure projects was attained.

Community contacts included Chief Administrative Officers and their staff as well as First Nation and Métis Settlement administrators and managers. Other groups or entities contacted during the study included ISPs, First Nations Technical Services Advisory Group (TSAG); electric and water utilities (e.g., Aquatera Utilities, NEW Water, Smoky River Regional Water Management Commission, ATCO Electric and Fortis Alberta).

Local ISPs were identified on a community-by-community basis and through conversations and website searches, their current and planned communications infrastructure, service offerings, and coverage were documented and tower sites mapped.

7.2 Regional Profile

Since the geographic footprints of the northern Alberta study area and the Northern Alberta Development Council (NADC) region are very similar, it follows that the community compositions are also very similar. The NADC region, shown in Figure 38, covers approximately 60% of the Alberta's total landmass, which is slightly less than the study area covers.[81] There are 24 municipal districts and counties, 2 cities, 23 towns, 9 villages, 11 summer villages, 137 hamlets, 33 First Nations and 8 Métis settlements with a total of 377,000 people in the NADC area. Approximately 41% are urban dwellers while 59% live in rural communities. Of the 59%, approximately 8% live on First Nations reserves or Métis Settlements. In addition to the permanent population there are mobile workers (known as shadow population), estimated to be about 43,000 in the Regional Municipality of Wood Buffalo. Please visit the NADC's website for more information http://www.nadc.ca/.

The NADC region is home to approximately 17,198 businesses (with employees).[82] Approximately 56% of these businesses are engaged in one of five industry sectors: construction; other services (except public administration); professional, scientific, and technical services; transportation and warehousing; and retail trade. The *'other services'* sector comprises establishments that have not been classified in any of the other 19 North American Industry Classification System (NAICS) industry sectors. For example, businesses that repair and maintain motor vehicles and other machinery or provide personal care services fall into this category. About 60% of businesses in the region are defined as micro businesses with less than five employees.[83]

[81] NADC; *NADC Area Profile: An Economic Description of the Region*; 2016-05.

[82] Calculations based on data provided by Michael Parkatti, Senior Director. Economic Information & Analytics, Alberta Economic Development and Trade; *Request - Alberta Businesses Counts by Industry*; Message to Doris Regula; 2017-02-13.

[83] NADC; *NADC Area Profile: An Economic Description of the Region*; 2016-05.

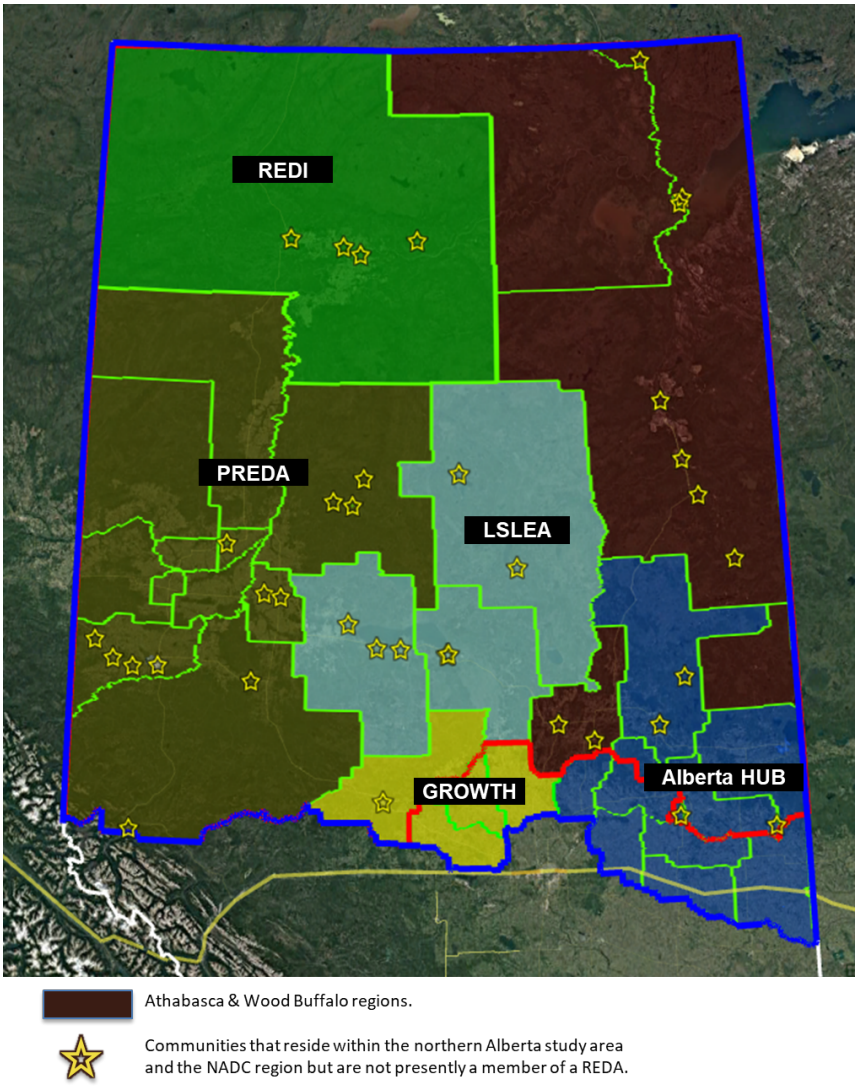


Figure 38 – Northern Alberta Development Council region.

7.3 Current Service Providers, Services, and Infrastructure

7.3.1 Fixed Wireless-based

Current Internet Service Providers using fixed wireless technology in the NADC region include the following. Appendix 16.4.1 provides the details of their service offerings (Internet only – no bundling unless otherwise stated) and geographic coverage. The coverage maps of the individual service providers are those that were available on their websites at the time of the writing of this report.

- AB North,
- Arrow Technology Group,
- Boreal Wireless,
- CCL Networks,
- Clearwave Broadband Networks (Clearwave),
- Corridor Communications (CCI) (fixed wireless and wired Digital Subscriber Line (DSL)-based),
- Crossover Networks,
- DeneTech (Cold Lake First Nations),
- First Broadband,

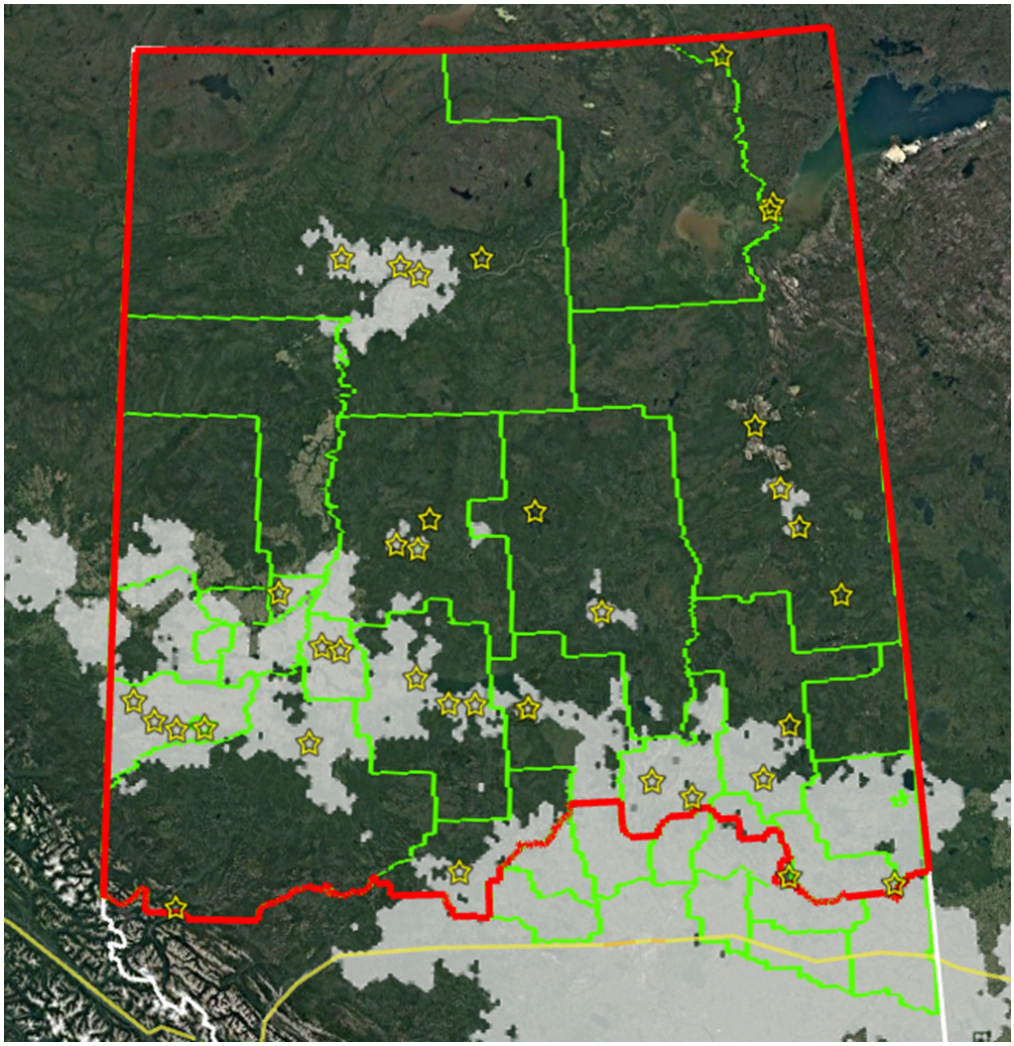
- GPNetworks (fixed wireless) and GPOptiX (fibre),
- I Want Wireless,
- Infinity Internet Solutions,
- Infinity Internet Solutions Alberta,
- Lakeshore Internet Services,
- Little Red River First Nations,
- MCSNet,
- Mighty Peace Wireless,
- NexxCom Technologies,
- Peace River Internet Service Society (PRiS),
- Slave Lake Communications,
- Sniper Communications,
- Whitecourt Communications,
- Wispernet.ca,
- XplorNet (fixed wireless and satellite-based), and
- Xtremewave Services.

Through its DSL partnership with TELUS, CCI offers wired service in the villages of Glendon, Mannville, Marwayne, and Nampa. Clearwave is planning a province-wide expansion. XplorNet Communications' (XplorNet's) new satellites will allow them to offer download speeds of 25 Mb/s across their customer base by July 2017. GPNetworks' sister company, GPOptiX, has begun rolling out an fibre-to-the-premise (FTTP) network in the City of Grande Prairie and surrounding area.

The PRiS, a not-for-profit organization, was formed in 1994 to *'bridge the wireless divide'* that then existed in the Dawson Creek, British Columbia area. PRiS has placed wireless Internet equipment on three towers in the Saddle Hills Utility Communications Network (UTN) and plans to co-locate on the remaining six towers in the future. In June 2016, PRiS received funding from the Canadian Internet Registration Authority (CIRA) to equip three towers in Saddle Hills County.

A combined view of the fixed wireless coverage is shown in Figure 39 (light gray areas). The map is based on minimal 5 Mb/s down (toward the end-client) by 1 Mb/s up (from the end-client to the network).[84] Coverage is generally available in the southeastern portion of the NADC and the Wood Buffalo region as well as in the Grande Prairie and Peace River areas. There is no fixed wireless service in the Grande Cache area and coverage is very limited along Highway 40 – the highway that runs north of Grande Cache to Grande Prairie and south of Grande Cache to Highway 16.

[84] http://crtc.gc.ca/eng/internet/internetcanada.htm



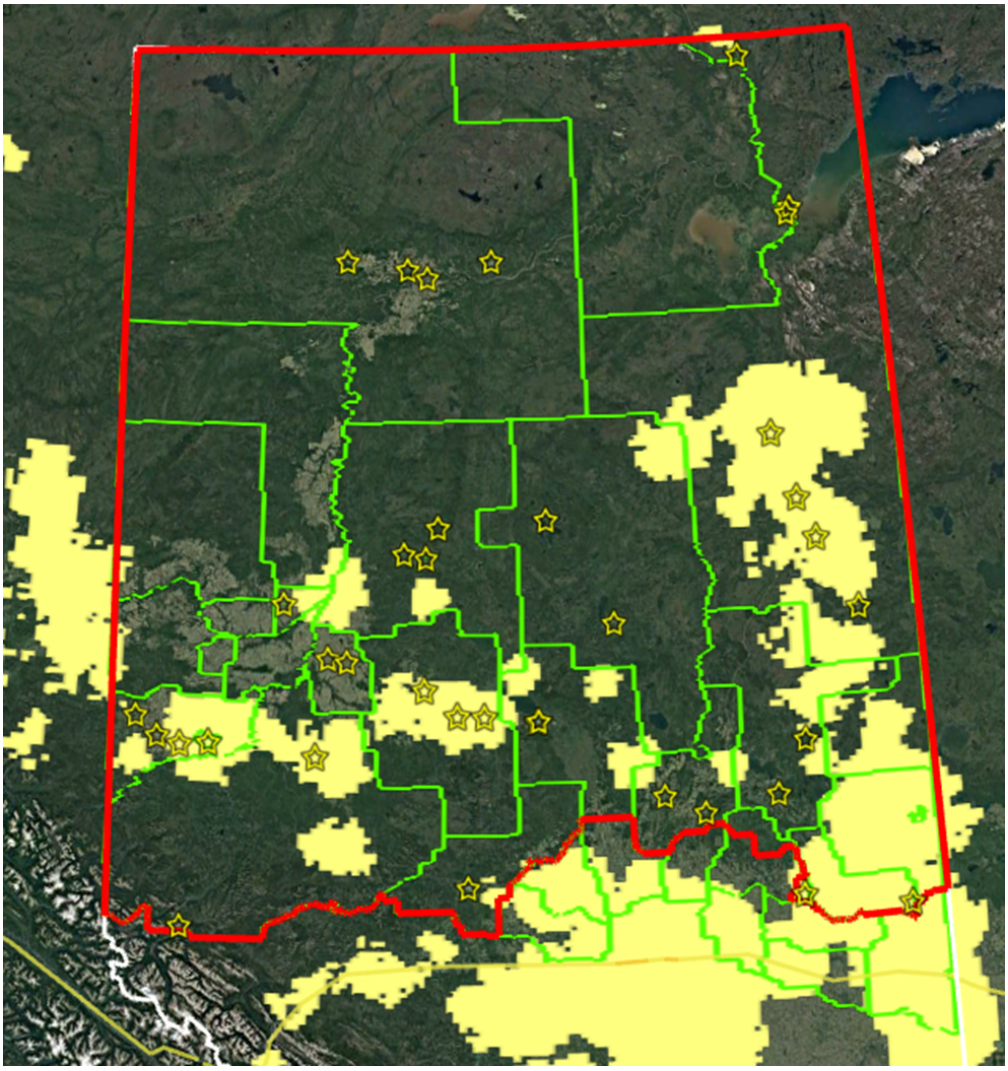
Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

The gold stars represent communities that reside within the northern Alberta study area and the NADC region but are not presently a member of a REDA.

Figure 39 – NADC region fixed wireless coverage.

7.3.2 Mobility

Shown as yellow areas in Figure 40, mobility data services are available from TELUS/Bell and Rogers. Appendix 16.4.2 provides the coverage maps for each of the providers of mobility services. As discussed earlier Bell, TELUS, and Rogers are now using cellular towers and SmartHubs to provide at-home Internet services. Grande Cache and the most northern communities are without mobility data services.



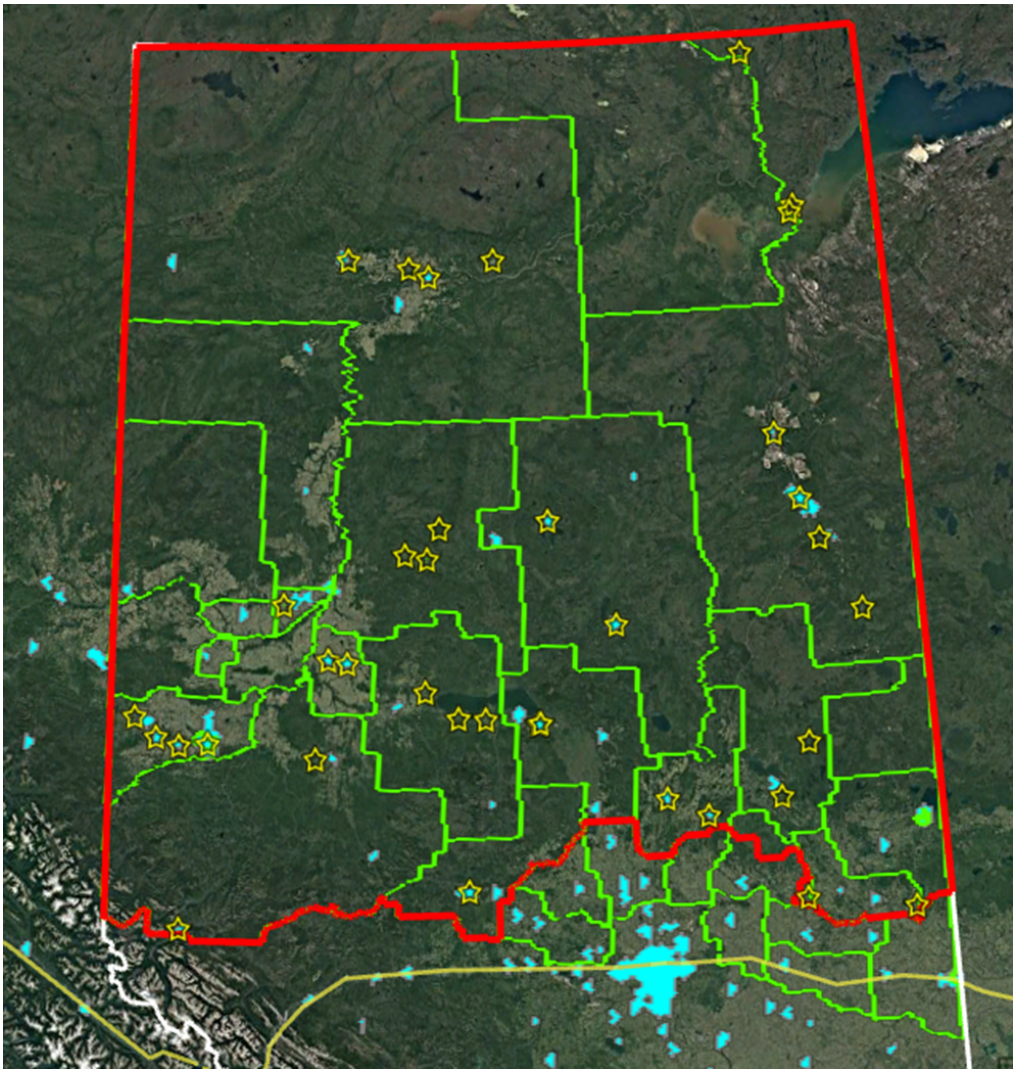
Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

The gold stars represent communities that reside within the northern Alberta study area and the NADC region but are not presently a member of a REDA.

Figure 40 – NADC region mobility data services coverage.

7.3.3 Wireline-based – DSL

Digital Subscriber Line (DSL) refers to a group of last mile technologies that are used by wireline-based service providers such as TELUS in Alberta to provide broadband services over twisted-pair copper wiring. The local copper wire loop is a remnant from the days when (and how) the telephone company connected residential and business premises to the telephone company's network for the purposes of providing local and long distance telephone services (and dial-up Internet services). Since DSL's performance degrades with distance, the technology is only deployed in urban areas where access distances are less than about two miles. As shown in Figure 41, communities served by DSL technologies (shown in blue) are scattered throughout the NADC region.



Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

The gold stars represent communities that reside within the northern Alberta study area and the NADC region
but are not presently a member of a REDA.

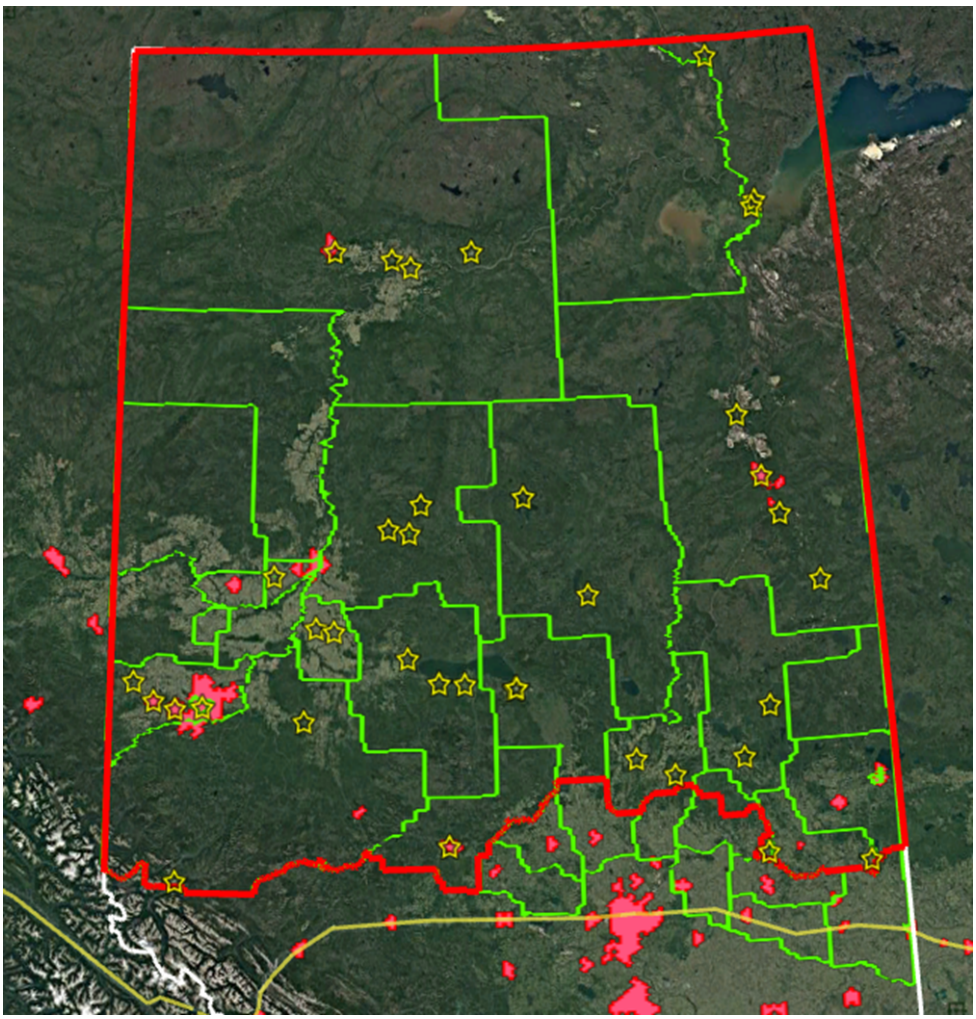
Figure 41 – NADC Region DSL coverage.

7.3.4 Wireline-based – Coaxial Cable

Eastlink, NorthwesTel Inc. (NorthwesTel), and Shaw Communications (Shaw), originally television broadcast companies, use coaxial cable and modern cable modem technology to provide broadband services in the NADC region (red areas in Figure 42). The predominate coverage area within the NADC region is the Grande Prairie area. The cable companies currently use the Data Over Cable Service Interface Specification (DOCSIS) 3.0 standard to achieve broadband speeds of 100 Mb/s or more over coaxial cable. Shaw expects to complete its DOCSIS 3.1 upgrade by the end of August 2017.[85] According to the Cybera, *State of Alberta Infrastructure Report*, *"The next-generation DOCSIS 3.1 standard is expected to*

[85] *Shaw Announces Third Quarter and Year-to-Date Result*; Shaw Communications; 28 June 2017. 8.

revolutionize hybrid fibre-coaxial cable connections by providing up to 10 Gb/s download and 1 Gb/s upload network throughput and significant improvements in latency."[86]



Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

The gold stars represent communities that reside within the northern Alberta study area and the NADC region but are not presently a member of a REDA.

Figure 42 – NADC region coaxial cable coverage.

Maximum advertised wireline offerings are shown in Appendix 16.3. Since these are *'up to'* bit rates, during high usage periods, actual bit rates will be less – Eastlink and Shaw more so than TELUS due to the way the aggregation is implemented. In both cases, the offerings are highly asymmetric – upload and download bit rates differ significantly.

7.3.5 Internet Service Provider Wi-Fi

Bell, Shaw, and TELUS WiFi services are available in the NADC region.

[86] *State of Alberta Digital Infrastructure Report;* Cybera; 2016-09-13.

7.3.6 Axia Fibre

Axia NetMedia provides retail services to corporate clients and, through AxiaConnect (Axia), provides retail Internet services in smaller communities (e.g., Town of Fairview – fall 2017). In exchange for access to a community's rights-of-way, Axia will invest in FTTP if a community can demonstrate that at least 30% of its residences and businesses have an interest in purchasing Internet services from Axia once the *'closed-access'* network is built.

7.4 Backhaul Availability

7.4.1 Alberta SuperNet

The extent of the SuperNet within the NADC region is shown in Figure 43. The green lines represent the Bell-operated Base Area Network (BAN) portion while the blue lines represent the Axia-operated Extended Area Network (EAN) segments. A more general discussion about the SuperNet is presented in Appendix 16.5.

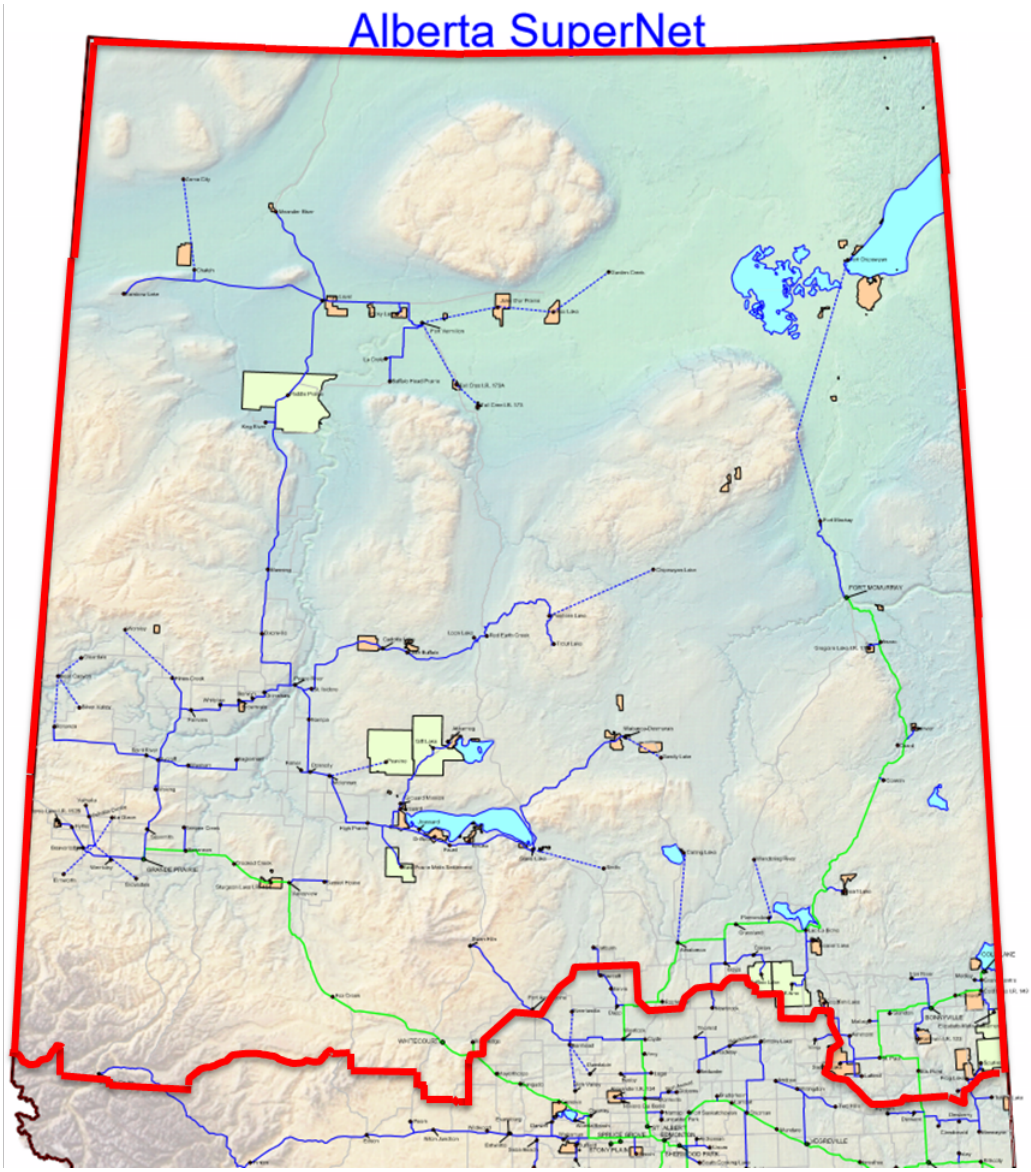


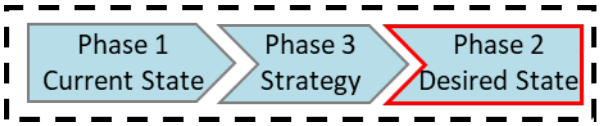
Figure 43 – NADC region SuperNet infrastructure.

7.4.2 Shaw Wholesale

Given the uncertainty associated with the next iteration of the SuperNet contract by June 30, 2018, municipalities, First Nations, and Métis Settlements requiring access to fibre transport for backhaul to Edmonton may want to consider Shaw, Bell, or TELUS.

7.5 Desired State

The Desired State, Phase 2 as outlined in the diagram to the right, establishes each communities' broadband vision, specifically within the next decade with each community breaking down their progress (within 3-, 5-, and 10-years) to realizing their vision.



Specifically, the desired state data collection and analysis focuses on the following:

- The most significant issues and challenges facing each community over the next five years and whether broadband can play a role in addressing these issues and challenges.
- Whether broadband is on each community Council's agenda.
- The factors that directly impact each community's capability to pursue a broadband/fibre initiative.
- Communities' short- and long-term broadband visions.
- Identifying communities, cluster of communities, or regions wishing to move forward with their broadband plans in the near-term (within three years).

The desired state informs the gap analysis and provides direction to the strategic options phase of the project, Phase 3. There are several options to close the gap between a community's current state and desired state. Although not exhaustive, the following is a list of options:

- Incorporating fibre network requirements during local and regional planning.
- Seek additional investment from the incumbent services providers in the urban centres.
- Support WISPs in rural areas.
- Subsidize private providers.
- Establish a community or regional broadband network (various models of ownership, governance, operation, and service provision, including laying fibre as basic infrastructure but leases the network to a private party to provide the electronics, marketing, and retail services).

The views expressed by those that participated in the community sessions and contributed during the research phase may not be inclusive of the entire community; however, this report is based on the knowledge gained and the information received as well as the author's ability to synthesize and summarise the same at the time of writing.

7.5.1 Methodology

Developing the desired state comprised data collection and analysis on a community-by- community basis. The information and data was attained using primary and secondary research methods.

To discover the *'future broadband visions and aspirations'* from the perspectives of the communities, the project team interacted directly with the communities through community engagement sessions, information and data requests, and telephone conversations. The information and data was evaluated and analysed to identify those communities, community partnerships, or regions that were most likely to develop and begin executing a broadband strategy in the near-term.

Community contacts included Chief Administrative Officers and their staff (information technology, planning and development, and economic development officers); elected officials; and First Nation and Métis Settlement administrators and managers.

The research for this phase of the project was conducted between January 2017 and May 2017. The reader is advised that the information and data found in this report is a *'snapshot'* in time. In other words, a variety of changes may have occurred since its collection (e.g., communities may have changed or evolved their broadband aspirations and visions, changes may have occurred in key staff who contributed to this report).

For the purposes of this phase of the project, broadband is defined a wide bandwidth data transmission with an ability to simultaneously transport multiple signals and traffic types. The medium can be twisted-pair copper wiring, optical fibre, coaxial cable, or radio. Broadband service is characterized as offering symmetric bandwidth between 50 Mb/s and 1 gigabit (Gb/s)/1,000 Mb/s and higher (really unlimited bit rates) (symmetric meaning the upload bit rate is as fast as the download bit rate).

7.5.2 Key Observations and Conclusions

This project has promoted conversations, questions, and general thinking about community broadband networks and their roles in urban and rural communities' futures. Broadband is recognized as a topic for today's conversations and discussions. Communities are asking questions such as the following:

- Do residents and businesses in my community want or need enhanced broadband?
- What will the network cost? Who will pay for it and who will own it?
- Will the network build be done in collaboration with the incumbents/ISPs?
- What happens to current ISPs?
- Will a current memorandum of understanding (MOU) with an incumbent provider or similar agreement with a prospective provider restrict a community's options in the future?
- How will the changes coming to the Alberta SuperNet operations contract affect us?
- Why isn't the provincial government providing incentives for communities to work together?
- How do you predict where technology is going to take us in the future?

7.5.3 Segmentation

During this project, it became increasingly evident that northern Alberta communities' interest in community-based broadband network concepts and models can be segmented based on population size. Larger urban centres (with populations greater than 5,000) comprise the first segment, largely *'selected'* already by the larger incumbent wireline-based ISPs. These communities generally do not see the benefits of a community-fibre initiative for themselves and prefer to leave the evolution of enhanced broadband services to the local incumbents.

Urban centres, with populations between approximately 1,000 and 5,000 people, represent the second segment. This segment is typically looking for solutions and expresses interest in working on regional solutions. The thought of doing their own community network build is too challenging and they have the perception that it would be too expensive. Furthermore, they do not believe they have the funding power, skills, or capacity needed for a community fibre initiative. AxiaConnect offers a compelling solution - seen as presenting a solution that requires the least cost and community involvement (learning, skills, capacity) in the short-term – often the longer-term implications (e.g., monopoly control of critical civic infrastructure) have not necessarily been envisioned at the time of the community's decision.

The third segment, and the segment with the most to gain from a community-led broadband effort, are towns and villages with populations less then approximately 1,000 people, counties, municipal districts (MDs), First Nations, and Métis Settlements. Today, they receive the poorest quality Internet services (if they receive service at all) and pay the most for these services. Their options are limited. Larger incumbent service providers do not have the financial incentive to serve this segment because its potential subscriber base is too small and too spreadout geographically (i.e., low population density). The concerns of this

segment are attaining coverage for all residents and businesses; improved bandwidth/capacity; and securing access to affordable and reliable service.

7.5.4 Issues and Challenges

Typical issues and challenges identified by municipalities include the following:

- From an economic development perspective – the ability to attract and retain residents, businesses, and industry.
- From rural communities' perspective – the lack of access to reliable high-speed Internet restricts business opportunities and, in turn, negatively impacts the community's overall quality of life.
- Internet bandwidth and speeds and lack of connectivity to high-speed infrastructure (fibre) as well as limited availability and interest of broadband service providers.
- Retention of young people and entrepreneurs.
- Other critical infrastructure such as water, wastewater, and roads are aging and in need of repair, upgrading, or replacement.
- Maintaining current taxation levels.
- Addressing the requirements of the modernized *Municipal Government Act*.
- Financial.
- Learners having sufficient bandwidth to do homework at home and the ability to access distant learning.
- Social (high unemployment rate and the ability to access employment opportunities online, youth leaving, and addiction).
- Loss of industry leads to the loss of the community's assessment/tax base, which is needed to fund critical infrastructure projects. As infrastructure declines, residents move away and the subsequent population decline translates into reduced core municipal grant funding (e.g., Municipal Sustainability Initiative (MSI)). If this vicious circle, as depicted in Figure 44, gains momentum it can spell the decline of a community.

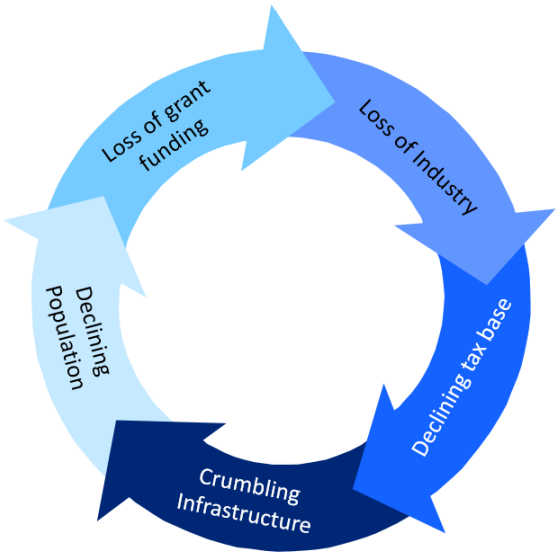


Figure 44 – Lack of high-speed broadband connectivity causes many issues.

In addition to several of the above challenges, some people living on First Nations reserves and Métis Settlements have the following challenges:

- Access to critical infrastructure and essential services such as roads, safe drinking water, and wastewater and waste disposal.

- Access to economic and business opportunities.
- Housing and living conditions.
- Financial stability.
- Bridging the socio-economic gap – lower labour market participation and employment rates.
- Lack of First Nations' capacity (i.e., people and skill sets).
- Access to educational opportunities and digital literacy (youth). *"It's a well understood cycle. A good education leads to greater financial stability, which leads to increased opportunities for the next generation."*[87]
- Maintenance and subject expertise and knowledge.

There is a need and the demand for improved and enhanced broadband services in northern Alberta communities; however, the key factor holding the majority of communities back from pursuing community-based broadband infrastructure is cost.

Community composition in the Northern Alberta Development Council (NADC) region is very similar to that of the northern Alberta study area. Only some communities in GROWTH Alberta and Alberta HUB fall outside of the boundaries of the NADC.

7.5.5 List of Communities with Near-term Broadband Plans Within the NADC

The following is a list of communities with near-term broadband plans within the NADC. The communities are either REDA members or fall geographically within a REDA. Full details about each individual community's plans can be found in the REDA-specific sections in this report.

- County of St. Paul, the Town of Elk Point, the Elizabeth Métis Settlement and Saddle Lake First Nation - Northeast Alberta Information HUB Ltd. (Alberta HUB);
- Town of Swan Hills - Grizzly Regional Economic Alliance Society (GROWTH Alberta);
- Big Lakes County, the towns of High Prairie and Slave Lake, the MD of Lesser Slave River, and the Gift Lake Métis Settlement; the Northern Alberta Broadband Society; and the Southshore Area First Nations and Lakeshore Internet Services - Lesser Slave Lake Economic Alliance (LSLEA);
- County of Grande Prairie, the Town of Valleyview, G5 Municipalities, Saddle Hills County, and the MD of Smoky River - Peace Region Economic Development Alliance (PREDA); and
- Town of High Level and the First Nations communities of Dene Tha', Beaver First, Little Red River Cree, and Tall Cree - Regional Economic Development Initiative for Northwest Alberta (REDI).

7.6 Athabasca and Wood Buffalo Regions

7.6.1 Introduction

As previously mentioned, most northern Alberta communities are both members of a REDA and the NADC. There are, however, exceptions – some are only members of one. For the purposes of this study, those communities that geographically fall within a REDA's boundaries but are not a member of the REDA are listed and grouped with the member communities of that REDA. This is done to facilitate the Phase 3 – Strategy portion of this project. The specific communities of this nature include the following:

- Beaver Lake, Frog Lake, Heart Lake, and Saddle Lake First Nations (within Alberta HUB's boundaries).
- Alberta Beach (not an NADC member), Whitecourt, and Alexis Nakota First Nation (within GROWTH Alberta's boundaries).
- Slave Lake, Big Lakes County, MD of Lesser Slave River and Bigstone Cree, Driftpile, Kapawe'no, Loon River, Peerless Trout, Sawridge, Swan River, and Woodland Cree First Nations (within LSLEA's boundaries).

[87] Kronyk, Rhonda; *Indigenous on Campus*; New Trails; Spring 2017.

- City of Grande Prairie, Beaverlodge, Grande Cache, Wembley, Donnelly, Girouxville, and Spirit River (within PREDA's boundaries).
- Beaver, Dene Tha', Little Red River, and Tallcree First Nations (within REDI's boundaries).

In each of the REDA-specific sections of this report, these communities are identified and discussed.

The municipal and First Nations communities in the Athabasca and Wood Buffalo regions also are not members of a REDA. They are covered in the discussion that follows.

7.6.2 Current State

7.6.2.1 Regional Profiles

The Athabasca and Wood Buffalo regions include 1 town, 1 village, 8 summer villages, the County of Athabasca, the Regional Municipality of Wood Buffalo (RMWB), and 6 First Nations as shown in Table 15. A map is shown in Figure 45.

The Wood Buffalo region also includes two improvement districts. Improvement District No. 24 (ID 24) is located along the Alberta-Northwest Territories border and encompasses the Alberta portion of Wood Buffalo National Park. It includes the unincorporated community of Peace Point 222, part of the Mikisew Cree First Nation. According to the Statistics Canada's 2016 Census of Population, ID 24's population is 648, and there are approximately 100 private dwellings within its boundaries. Improvement District 349 is located north of the City of Cold Lake and was created in 2012 by separating lands from the RMWB and Lac La Biche County. The Alberta portion of the Cold Lake Air Weapons Range is within its boundaries. The 2016 Census indicated that there are not any people living there, and there are not any private dwellings located there.

Of the communities that make up the Athabasca and Wood Buffalo regions, TELUS has made a generational fibre investment in the urban service area of the RMWB. The RMWB is comprised of an urban service area and rural communities. The RMWB urban service area's growth is correlated with the growth of the petroleum industry within the area. Its utility infrastructure is buried. In 2011, TELUS laid fibre optics in the urban service area, and is currently offering Internet speeds of 150 Mb/s download and upload. Shaw also offers 150 Mb/s download speeds. The urban service area has some municipality-owned fibre (underground) between some of the its buildings, which is for the urban service areas' purposes.

On May 1, 2016, an uncontrolled wildfire swept through parts of RMWB urban service area and some of the rural communities, forcing the largest wildfire evacuation in Alberta's history.

Table 15 – Athabasca and Wood Buffalo Regions

Towns	Villages	Summer Villages	Counties/Improvement Districts/RMs	First Nations
Athabasca	Boyle	Bondiss Island Lake Island Lake South Mewatha Beach South Baptiste Sunset Beach West Baptiste Whispering Hills	Athabasca Improvement District No. 24 Improvement District No. 349 Wood Buffalo	Athabasca Chipewyan Chipewyan Prairie Fort McKay Fort McMurray Mikisew Cree Smith's Landing

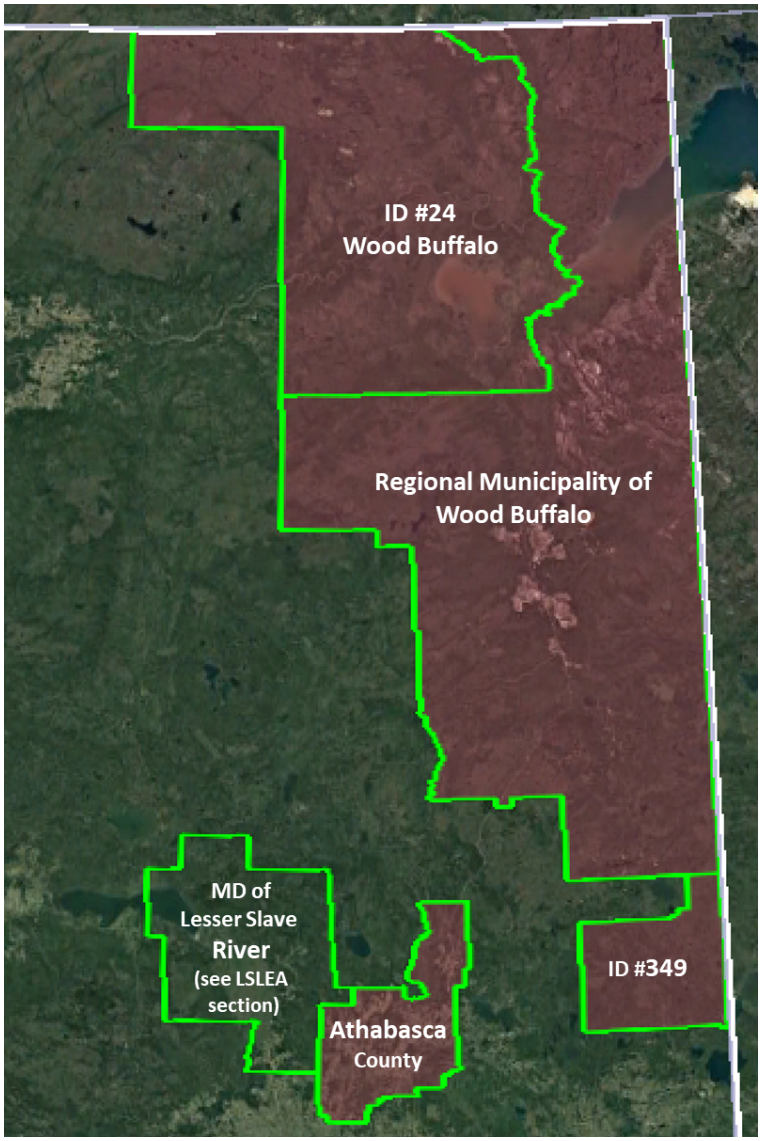


Figure 45 – Athabasca and Wood Buffalo regions.

The Athabasca and Wood Buffalo regions are home to almost 92,000 residents.[88] Table 16 provides a breakdown by municipality (rural and urban) and First Nation as well as five-year population growth trends and compound annual growth rates (CAGRs). Statistics Canada's 2016 Census of Population data indicate significant growth among all First Nations communities over the five-year period.

There are 2,811 businesses (with employees) in the two areas that comprise the Athabasca and Wood Buffalo regions. As shown in Table 17 and Figure 46, 28% of the businesses in the region participate in the top two industries – construction and other services.[89] Industries were classified according to the NAICS.

[88] Calculations based on Statistics Canada's 2016 Census of Population.

[89] Other Services is comprised of businesses primarily engaged in repairing and maintenance on motor vehicles, machinery, and other products; providing personal care, funeral, and laundry services; organizing and promoting religious activities; and supporting causes such as grant making and advocacy.

The *'Other Industries'* segment (12.9%) shown in the Figure 46 chart includes industries that individually contribute between 3.2% and 0.2% to the category.[90]

Table 16 – Athabasca and Wood Buffalo Regions Population & Population Growth Trends

Municipality	Rural				Urban					First Nations (FN)				
	Population (2016)	CAGR (%) (2011-2016)	5-Year Trend (%) & Direction		City/ Town/ Village	Population (2016)	CAGR (%) (2011-2016)	5-Year Trend (%) & Direction		Reserve / Settlement	Population (2016)	CAGR (%) (2011-2016)	5-Year Trend (%) & Direction	
Athabasca, County	7,869	0.5	2.7	▲	Athabasca	2,965	-0.2	-0.8	▼					
					Boyle	845	-1.6	-7.8	▼					
					SV[1] (8)	904	-0.6	-3.1	▼					
					Sub-total	4,714								
Wood Buffalo, RM (includes Urban Service Area = 74,000)	77,600 (shadow population removed)	na	na							Athabasca Chipewyan	na	na	na	
										Chipewyan Prairie	414	7.0	40.3	▲
										Ft McKay	742	5.7	32.0	▲
										Ft McMurray	321	3.2	17.2	▲
										Mikisew Cree	226	3.0	15.9	▲
										Smith's Landing	48	9.9	60.0	▲
Total	85,469					4,714				**Total - FN**	1,751			

CAGR – Compound Annual Growth Rate

Note 1: SV - Summer Village: Bondiss, Island Lake, Island Lake South, Mewatha Beach, South Baptiste, Sunset Point, West Baptiste, Whispering Hills

Total Population = **91,934**

Source: Statistics Canada Census 2011 and 2016.

Table 17 – Athabasca and Wood Buffalo Regions Number of Businesses (with employees) by Industry

Industry	Businesses	Percent (%)
Construction	456	16.2
Other services (except public administration)	339	12.1
Retail trade	332	11.8
Professional, scientific and technical services	279	9.9
Transportation and warehousing	230	8.2
Real estate and rental and leasing	197	7.0
Accommodation and food services	191	6.8
Healthcare and social assistance	157	5.6
Administrative and support, waste management and remediation	145	5.2
Wholesale Trade	123	4.4

Source: Calculations based on dataset provided by Alberta Economic Development & Trade, Economic Information & Analytics, Feb. 13, 2017.

[90] Mining, quarrying, and oil and gas extraction; agriculture, forestry, fishing, and hunting; manufacturing; finance and insurance; arts, entertainment and recreation; educational services; information and cultural industries; management of companies and enterprises; public administration; and utilities.

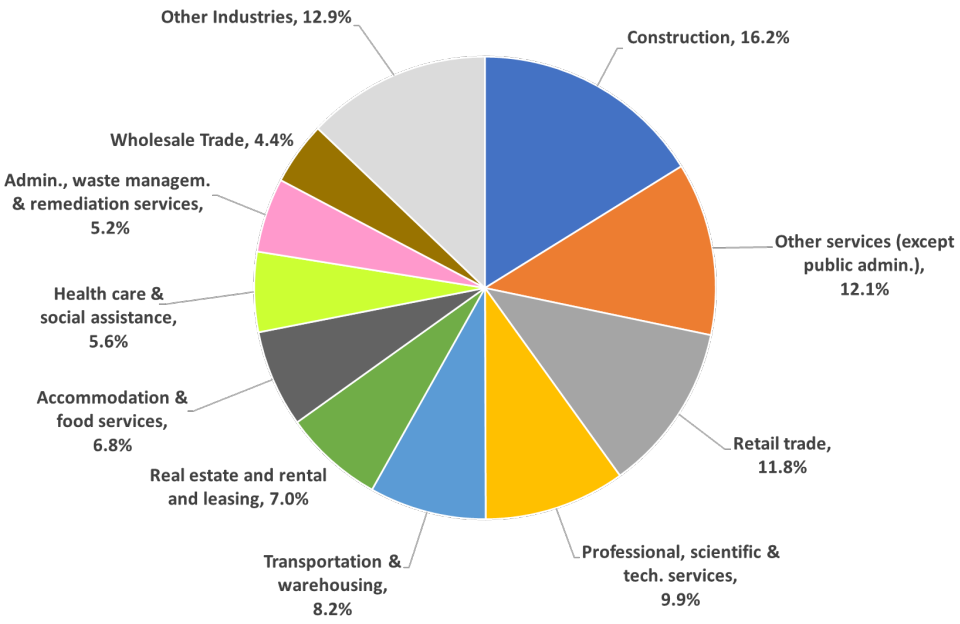


Figure 46 – Athabasca and Wood Buffalo regions industry mix (based on business counts).

Athabasca University's main campus is in the Town of Athabasca. Keyano College has two campuses: one in urban service area of the RMWB and one in Fort Chipewyan as well as four learning centres (Fort McKay, Conklin, Janvier, and Gregoire Lake). Portage College has a learning location Boyle.

7.6.2.2 Municipal, First Nations and Métis Settlement Broadband Interests

Communities within the Athabasca and Wood Buffalo regions are at different stages in recognizing the importance of broadband services and connectivity to economic diversification, municipal sustainability, regional competitiveness, public service delivery, and quality of life.[91] Table 18 identifies the awareness and current state of municipal involvement and interest in broadband.

The Town of Athabasca is working with Axia to lay fibre in select areas of their town. Challenging terrain (valleys) present issues for the fixed wireless-based provider, MCSNet. Further complicating these issues, MCSNet is experiencing over-capacity on their towers. Density is also an issue. Athabasca County is also not satisfied with their current level of service and are seeking alternatives to improve broadband services to their residents.

[91] The five elements of broadband's importance were identified by the Calgary Regional Partnership, Economic Prosperity Steering Committee, *Request for Decision*; 2016-09-08.

Table 18 – Athabasca and Wood Buffalo Regions Involvement & Interest in Broadband[92]

Community	Enthusiastic	Interested *'Maybe'*	Need Help Too Small	Too Expensive	Status Quo	Don't Know[93]	No Response[94]
Towns							
Athabasca	X						
Villages							
Boyle							X
Counties/RMs							
Athabasca		X					
Wood Buffalo[95]	'The RMWB is actively involved and interested in broadband initiativesâ						
First Nations							
Athabasca Chipewyan							X
Chipewyan Prairie							X
Fort McKay							X
Fort McMurray							X
Mikisew Cree							X
Smith's Landing							X

7.6.2.3 Current Service Providers, Services, and Infrastructure

Fixed Wireless-based and Mobility

Current ISPs using fixed wireless technology in the Athabasca and Wood Buffalo Regions include the following Appendix. 14.3 provides the details of their service offerings (Internet only – no bundling unless otherwise stated) and geographic coverage. The coverage maps of the individual service providers are those that were available on their websites at the time of the writing of this report.

- CCL Networks,
- MCSNet, and
- XplorNet (fixed wireless and satellite-based).

XplorNet's new satellites will allow them to offer download speeds of 25 Mb/s across their customer base by July 2017.

[92] Communities were asked to rate their involvement and interest in broadband. Broadband was defined as follows: In telecommunications, broadband is a wide bandwidth data transmission with an ability to simultaneously transport multiple signals and traffic types - the medium can be twisted-pair copper wiring, optical fibre, coaxial cable, or radio. Broadband service is characterized as offering symmetric bandwidth between 50 Mb/s and 1 gigabit (Gb/s)/1,000 Mb/s and higher (really unlimited bit rates) (symmetric meaning the upload bit rate is as fast as the download bit rate).

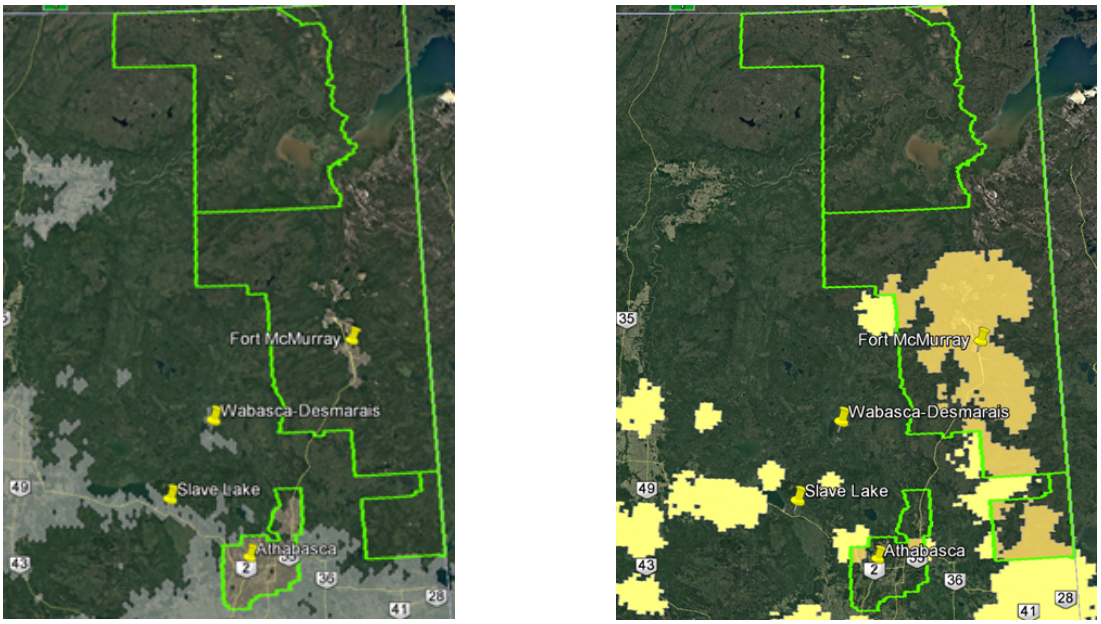
[93] Don't Know – the respondent was unable to rate their community's interest and involvement in broadband.

[94] No Response – the community did not respond to the inquiries regarding their community's interest and involvement in broadband.

[95] Regional Municipality of Wood Buffalo - email; 2017-06-13.

According to the CRTC website[96], minimal 5 Mb/s down (toward the end-client) by 1 Mb/s up (from the end-client to the network) service is available in Athabasca and sparse in the RMWB. A combined view of the fixed wireless coverage is shown in Figure 47 (left side, light gray areas).

Shown as yellow areas on the right side in Figure 47, mobility data services are available from TELUS/Bell and Rogers. Appendix 16.4.2 provides the coverage maps for each of the providers of mobility services. As discussed earlier Bell, TELUS, and Rogers are now using cellular towers and SmartHubs to provide at-home Internet services.



Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

Figure 47 – Athabasca and Wood Buffalo regions fixed wireless & mobility data services coverage.

Wireline-based – DSL & Coaxial Cable

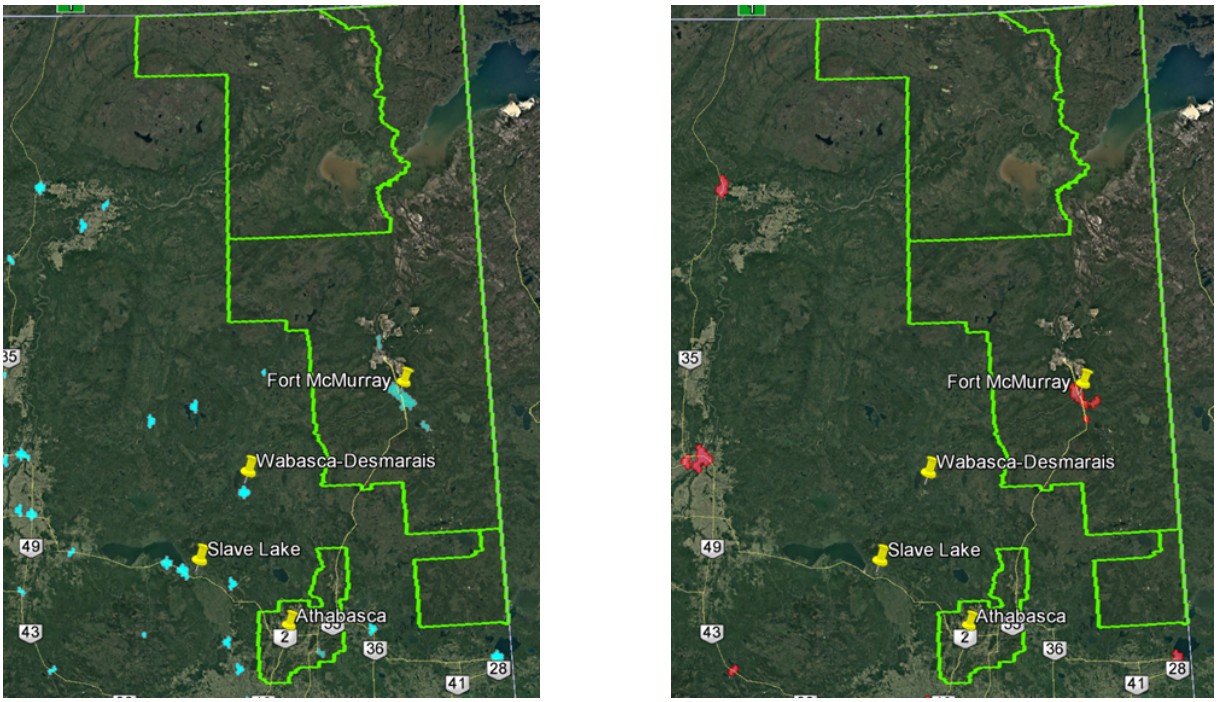
Digital Subscriber Line (DSL) refers to a group of last mile technologies that are used by wireline-based service providers such as TELUS in Alberta to provide broadband services over twisted-pair copper wiring. The local copper wire loop is a remnant from the days when (and how) the telephone company connected residential and business premises to the telephone company's network for the purposes of providing local and long distance telephone services (and dial-up Internet services). Since DSL's performance degrades with distance, the technology is only deployed in urban areas where access distances are less than about two miles. In Figure 48, areas served via DSL technologies are shown in blue.

Shaw, originally a television broadcast company, uses coaxial cable and modern cable modem technology to provide broadband services in the region (red areas in Figure 48). The cable companies currently use the DOCSIS 3.0 standard to achieve broadband speeds of 100 Mb/s or more over coaxial cable. Shaw expects to complete its DOCSIS 3.1 upgrade by the end of August 2017.[97] According to the Cybera, *State of Alberta Infrastructure Report*, *"The next-generation DOCSIS 3.1 standard is expected to revolutionize*

[96] http://crtc.gc.ca/eng/internet/internetcanada.htm

[97] *Shaw Announces Third Quarter and Year-to-Date Results;* Shaw Communications.

hybrid fibre-coaxial cable connections by providing up to 10 Gb/s download and 1 Gb/s upload network throughput and significant improvements in latency." [98]



Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

Figure 48 – Athabasca and Wood Buffalo regions DSL & coaxial cable coverage.

Maximum advertised wireline offerings are shown in Appendix 16.3. Since these are *'up to'* bit rates, during high usage periods, actual bit rates will be less, Shaw more so than TELUS, due to the way the aggregation is implemented. In both cases, the offerings are highly asymmetric – upload and download bit rates differ significantly.

Internet Service Provider Wi-Fi

Wi-fi is available in the RMWB urban service area but not in the Town of Athabasca. TELUS offers WiFi at 32 locations in RMWB urban service area while Bell offers six locations. Shaw offers Go WiFi at multiple locations as shown in the coverage map below (Figure 49).

Axia Fibre

Axia NetMedia provides retail services to corporate clients and, through AxiaConnect (Axia), provides retail Internet services in smaller communities (e.g., Town of Fairview – fall 2017). In exchange for access to a community's rights-of-way, Axia will invest in FTTP if a community can demonstrate that at least 30% of its residences and businesses have an interest in purchasing Internet services from Axia once the *'closed-access'* network is built.

[98] *State of Alberta Digital Infrastructure Report;* Cybera; 2016-09-13.

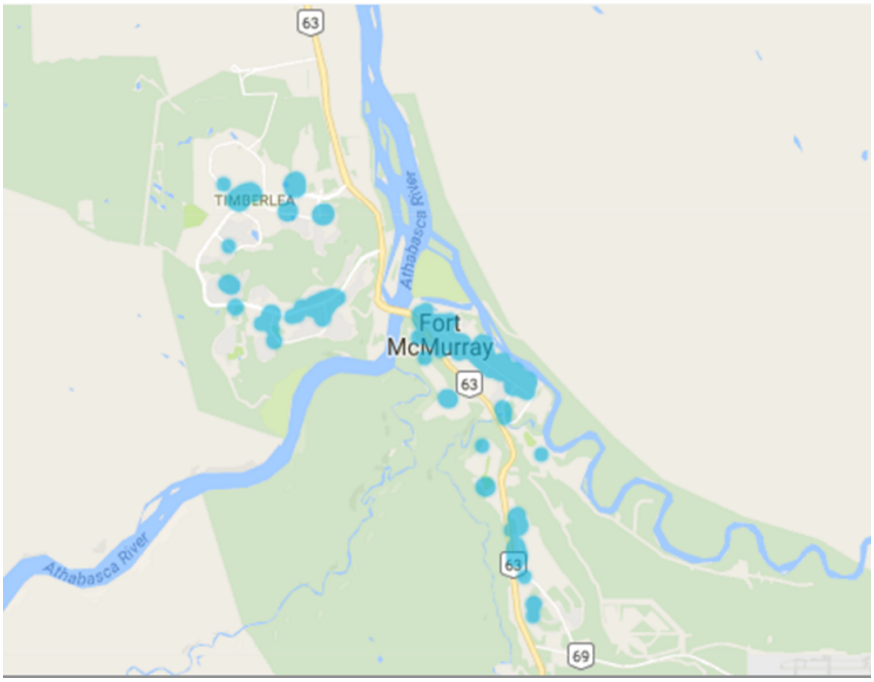


Figure 49 – Athabasca and Wood Buffalo regions Shaw Go WiFi coverage.

7.6.2.4 Backhaul Availability

Alberta SuperNet

The extent of the SuperNet within the Athabasca and Wood Buffalo Regions is shown in Figure 50. The green lines represent the Bell-operated BAN portion while the blue lines represent the Axia-operated EAN segments. A more general discussion about the SuperNet is presented in Appendix 16.5.

Shaw Wholesale

Given the uncertainty associated with the next iteration of the SuperNet contract by June 30, 2018, municipalities, First Nations, and Métis Settlements requiring access to fibre transport for backhaul to Edmonton may want to consider Shaw, Bell, or TELUS. Shaw fibre in the region is limited to a run parallel to Highway 63 from Edmonton to the RMWB urban service area and on to several oilsands camps beyond. Capacity is limited and upgrades to enable Dense Wavelength Division Multiplexing (DWDM) to increase bandwidth would be expensive.

TELUS Wholesale

Except under a non-disclosure agreement, TELUS does not provide maps of fibre assets.

7.6.2.5 Existing Infrastructure

Towers and Other Tall Structure

When planning a broadband build-out it is important to build on what is already in place. The key inquiry for the current state analysis is what assets does the community have that can be provided at little or no incremental cost that improve the economics of the broadband deployment and operations? Assets include existing towers, fibre and community networks, which the community might be using for communications or asset management. Existing and possible access to tall structures or buildings are also important to inventory for potential placement of wireless equipment.

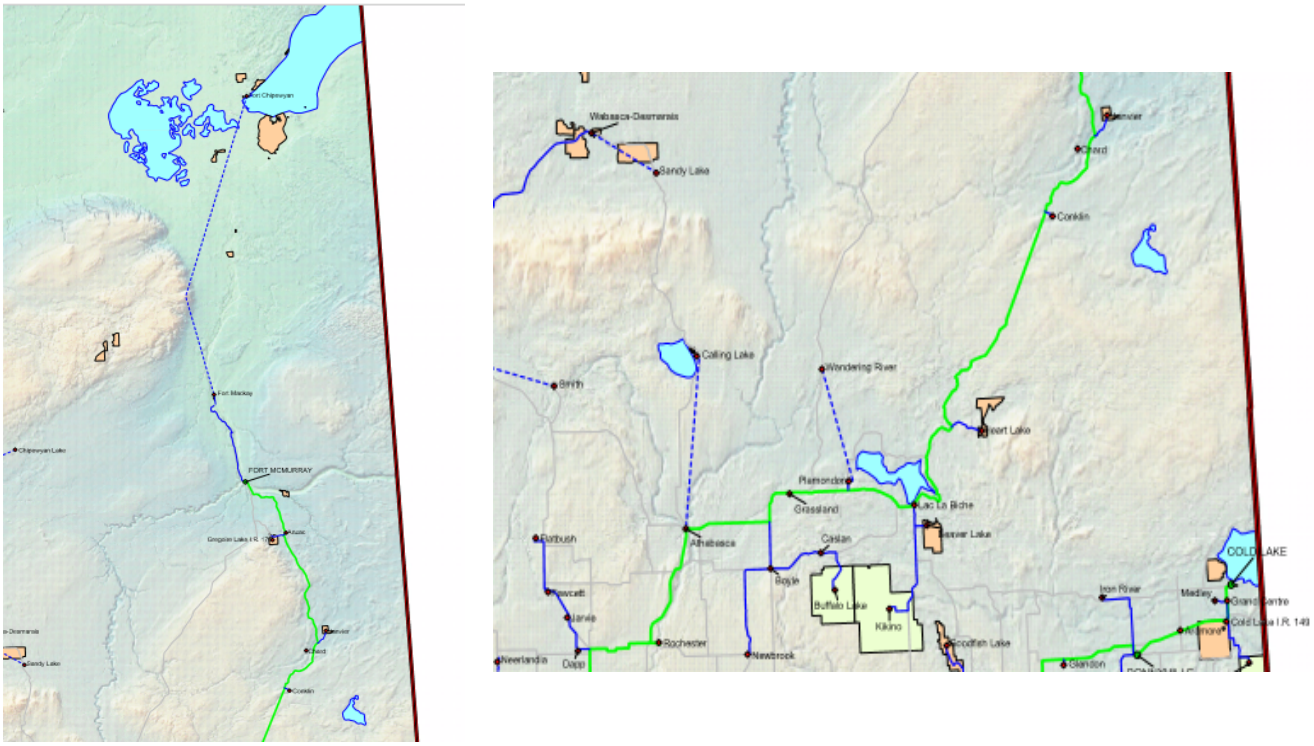


Figure 50 – Athabasca and Wood Buffalo regions SuperNet infrastructure.

Before 2006, Athabasca County partnered with Boyle and MCSNet to construct broadband infrastructure.[99] In the 2012 to 2013 timeframe, Athabasca County received grant funding from the *Final Mile Rural Community Program* for Internet infrastructure expenses such as towers, fibre optic cable, wireless equipment, installation costs, and radio license fees. Athabasca County has eight municipality-owned towers.

Utility Infrastructure

The existing overhead and underground transmission and distribution lines of electric utility companies (ATCO Electric, Fortis Alberta) and natural gas co-operatives (co-ops) present deployment options for community broadband builds - access to and installing fibre cables to travel along utility poles, in ducts and conduit, and along rights-of-way can significantly improve the economics of broadband service expansion projects and network deployments. Inquiries about the availability of communications spaces on utility providers' poles and where multi-party trench agreements exist will be made during the preliminary infrastructure design phase of a broadband network. Appendix 16.6 shows ATCO Electric's and Fortis Alberta's respective service areas in northern Alberta.

First Nations Fibre Infrastructure

First Nations Technical Services Advisory Group (TSAG) is a non-profit organization established by the Chiefs of Alberta to provide technical support and training to First Nations in the Treaty 6, 7, and 8 regions. In 2008, TSAG partnered with Health Canada to develop the network components (fibre connections) at First Nations health centres to support First Nations' telemedicine. With Health Canada funding and TSAG project management, community fibre networks connections were made to the Alberta SuperNet points-of-presence on each or close to each First Nations in 2011. Upon completion, each First Nations became

[99] *Alberta SuperNet Final Mile Rural Task Force: Recommendation Report*; 2008-03-14.

the owner of its local fibre network. As shown in Figure 51, First Nations' schools, health centres, band administration offices, and water treatment plants are now connected.

TSAG operates a state-of-the-art Network Operations Centre (NOC). The NOC's real time network monitoring ensures availability, network security/SPAM filtering, telehealth bridge management, and support, and applications (high-speed connectivity and remote water monitoring system for water treatment plants, OneHealth.ca, and FirstNationsTH.ca). Onehealth.ca is a national health portal that provides information and services to health care professionals working in First Nations communities. FirstNationsTH.ca – Telehealth provides education and travel-free patient and health care assessments via video-conferencing.

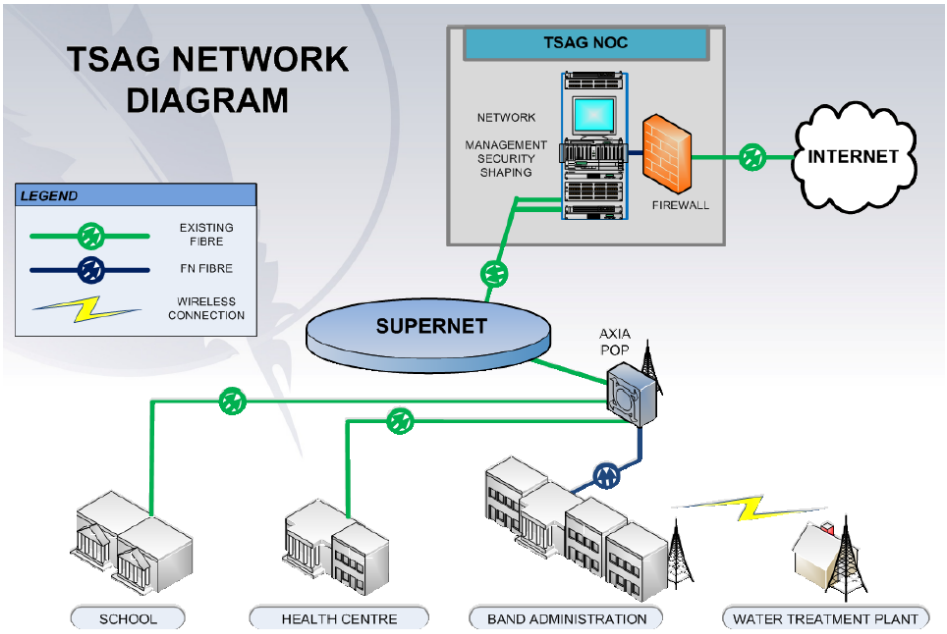


Figure 51 – TSAG network diagram.

Gas Co-op

In the 1960s, non-profit gas co-ops were formed to supply natural gas to rural Alberta - franchise areas were designated. The Village of Boyle operates the only gas co-op in the area.

7.6.2.6 Planned Infrastructure

Major Projects

There are several private and public sector capital projects planned in the Athabasca and Wood Buffalo Regions. Where possible these projects maybe leveraged to reduce the costs associated with the deployment of broadband infrastructure. Figures 52 and 53 show the capital projects in the Athabasca and Wood Buffalo Regions.[100] Besides the projects shown in these figures, other major projects in the region include those in the RMWB urban service area (Appendix 16.7).

[100] Alberta Major Projects, Economic Development and Trade; 2016-12. http://majorprojects.alberta.ca/.



Figure 52 – Major projects – Athabasca.

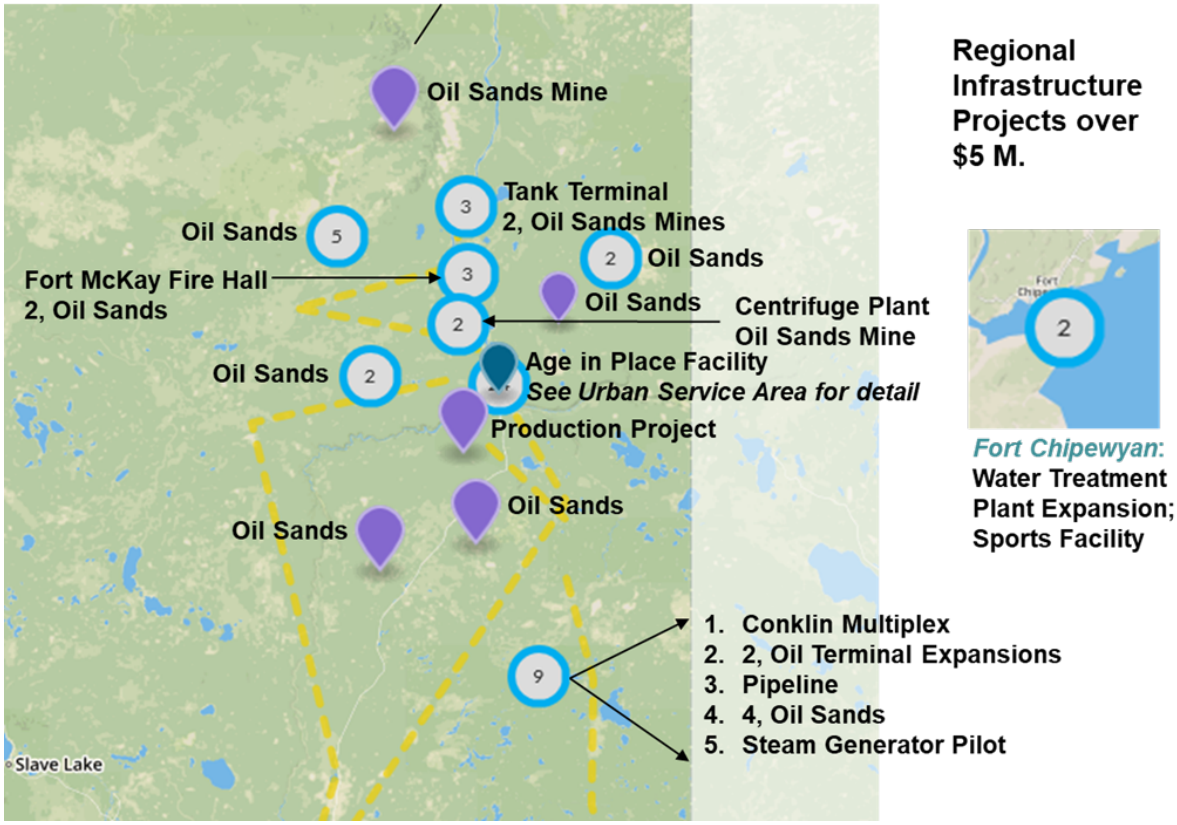


Figure 53 – Major projects – Regional Municipality of Wood Buffalo, excluding Urban Service area.

Electricity Transmission Development Plans

Industrial load in the Athabasca and Wood Buffalo Regions (within the Alberta Electric System Operator's (AESO's) Northeast Planning region) comes from the large industrial operations in Fort McMurray.[101] As can be seen in Figure 54, local 138/144 kV networks also serve load across the planning region. In the Fort McMurray area, 144 kV networks connect load and behind-the-fence facilities.

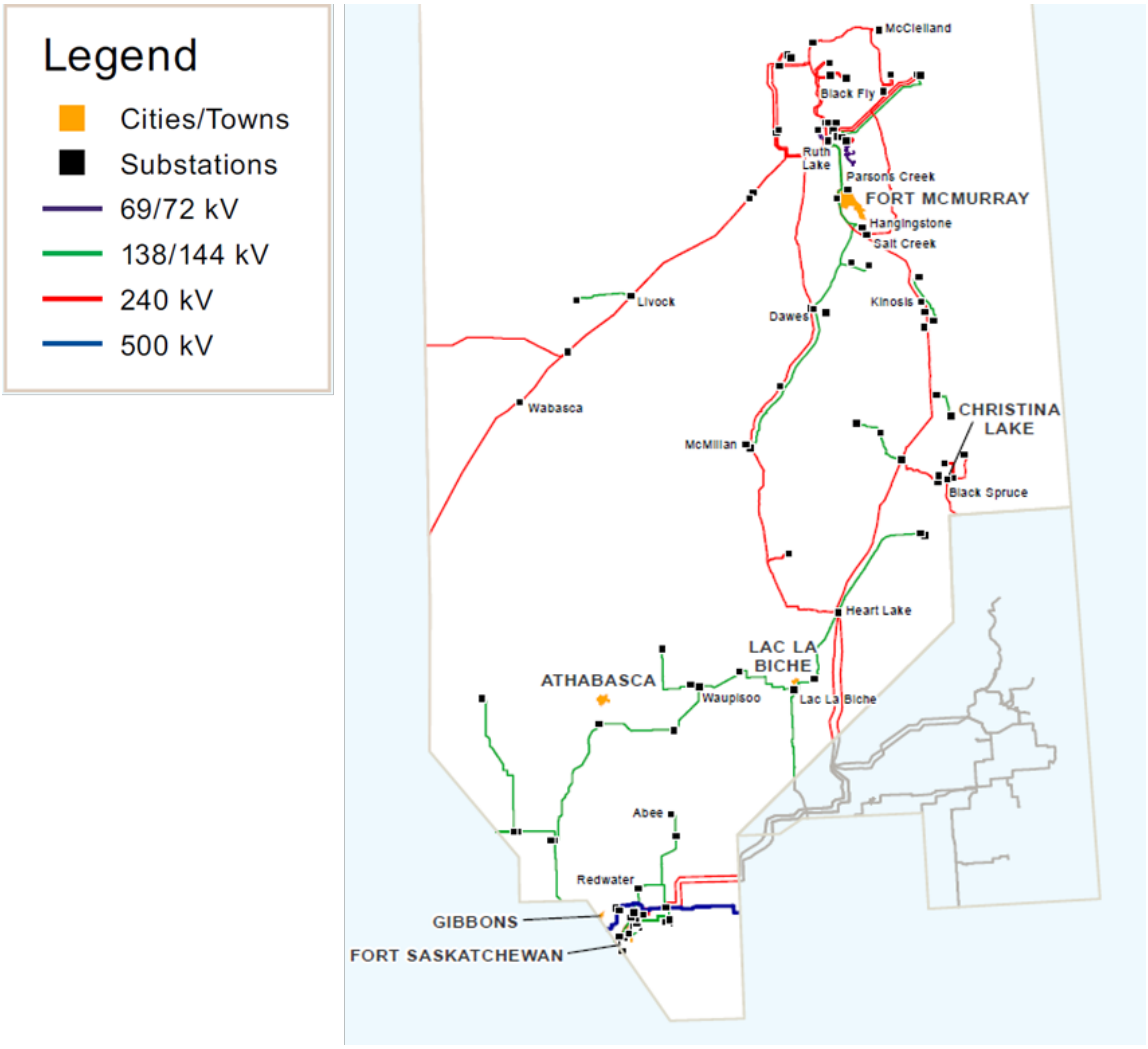


Figure 54 – Athabasca and Wood Buffalo regions – existing electricity transmission system.

Having received approval in January 2017, the construction of a major electricity transmission line, the Fort McMurray West 500 kV, is scheduled to begin in summer 2017. It is being built by Alberta PowerLine, a partnership between ATCO and Quanta Services. Construction will begin in the Fort McMurray area and end in the Wabamun area (a map of the route can be found in Appendix 16.9). Designed to address increased electricity demand in the Fort McMurray area, the facilities will be completed and operational by June 2019.[102]

[101] *AESO 2015 Long-term Transmission Plan*; AESO.

[102] Alberta PowerLine; 2017-03-24. www.albertapowerline.com.

Oilsands projects in the Fort McMurray could drive major 240 kV and 138 kV enhancements; however, given the economic uncertainty of these developments, timelines for some transmission projects remain uncertain.[103] In the medium term new 144 kV lines between Salt Creek and Parsons Creek and between Ruth Lake and Parsons Creek are proposed. Pipelines in the Athabasca area are likely to drive the need for 138 kV enhancements on the Athabasca-Lac La Biche network, including a new line between Abee and Waupisoo.

Municipal Capital and Civil Works Projects

Leveraging civil infrastructure projects can reduce broadband deployment costs by 75%. Given civil infrastructure costs typically account for 70% of buried deployment costs, this is significant. Capital projects that involve trenching or erecting towers or poles such as during the development of new subdivisions, road construction, or the construction of rehabilitation of water or sewer lines are typical projects that can improve the economics of community broadband projects. Table 19 shows the capital and civil works projects that the municipalities self-reported.

Table 19 – Athabasca and Wood Buffalo Regions Municipal Capital & Civil Works Projects

Towns	
Athabasca	2, water/sewer projects (downtown and University area) Road extension – University area Edwin Parr Composite School New swimming pool (cost split with Athabasca County)
Villages	
Boyle	Did not respond to project inquiries and no information was available on the village's website
Counties/RMs	
Athabasca	Athabasca Flats East shallow utilities New swimming pool (cost split with Town of Athabasca)
Wood Buffalo	Projects associated with the rebuild

7.6.3 Desired State

The Athabasca and Wood Buffalo regions shown in Figure 55 are not REDA members and do not fall within a REDAs' boundaries. At the time of the writing of this report the town of Athabasca was in discussions with AxiaConnect to proceed with the building of a fibre network.

[103] *AESO 2015 Long-term Transmission Plan*; AESO.

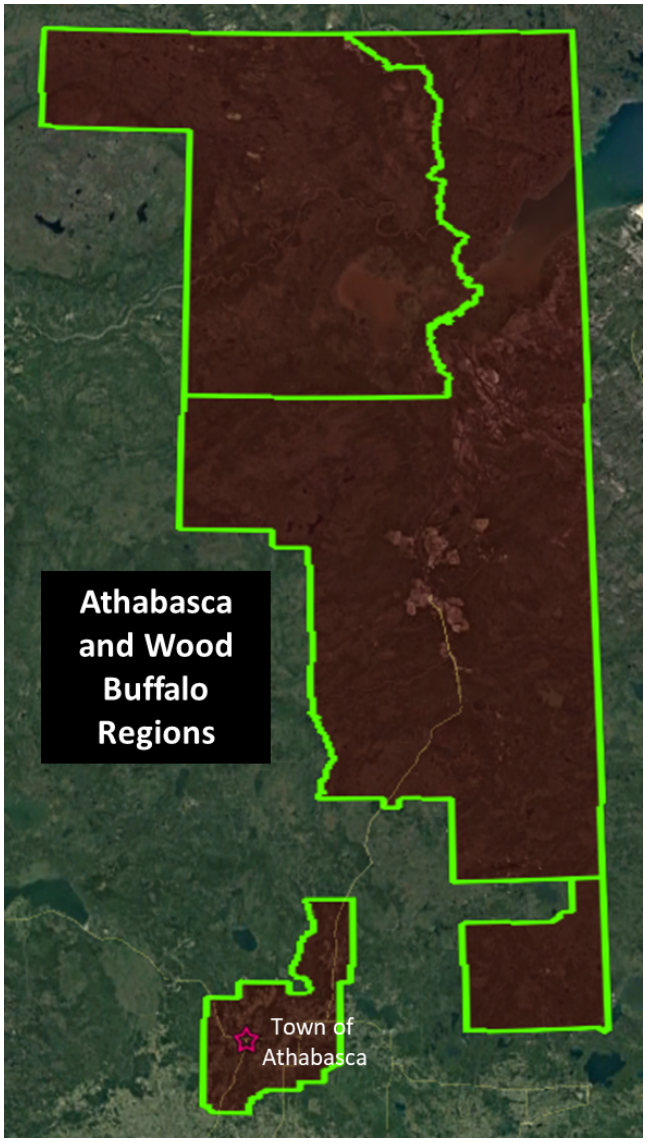


Figure 55 – Athabasca and Wood Buffalo regions – communities with near-term broadband plans.

More information is provided in the Appendix about each community's issues and challenges; whether fibre/broadband is on their Council's agenda; the factors impacting their community's capability to pursue a fibre/broadband initiative; and their multi-year visions.

7.7 Town of Athabasca – A 1,341 Premise Community

7.7.1 Default Scenario

In the analysis below, the business structure, opto-electronics and backhaul, operations, drop capital, and markets and revenues assumed are those outlined in the default implementation scenario presented in Section 6.5.

7.7.2 Deployment Capital

A pre-conceptual buried fibre design was completed for the Town of Athabasca and appears in Figure 56. Feeder routes are shown in magenta and distribution in cyan. From Table 21, the overall cost to deploy a network that passes every premise in Athabasca comes to about $2.36M.

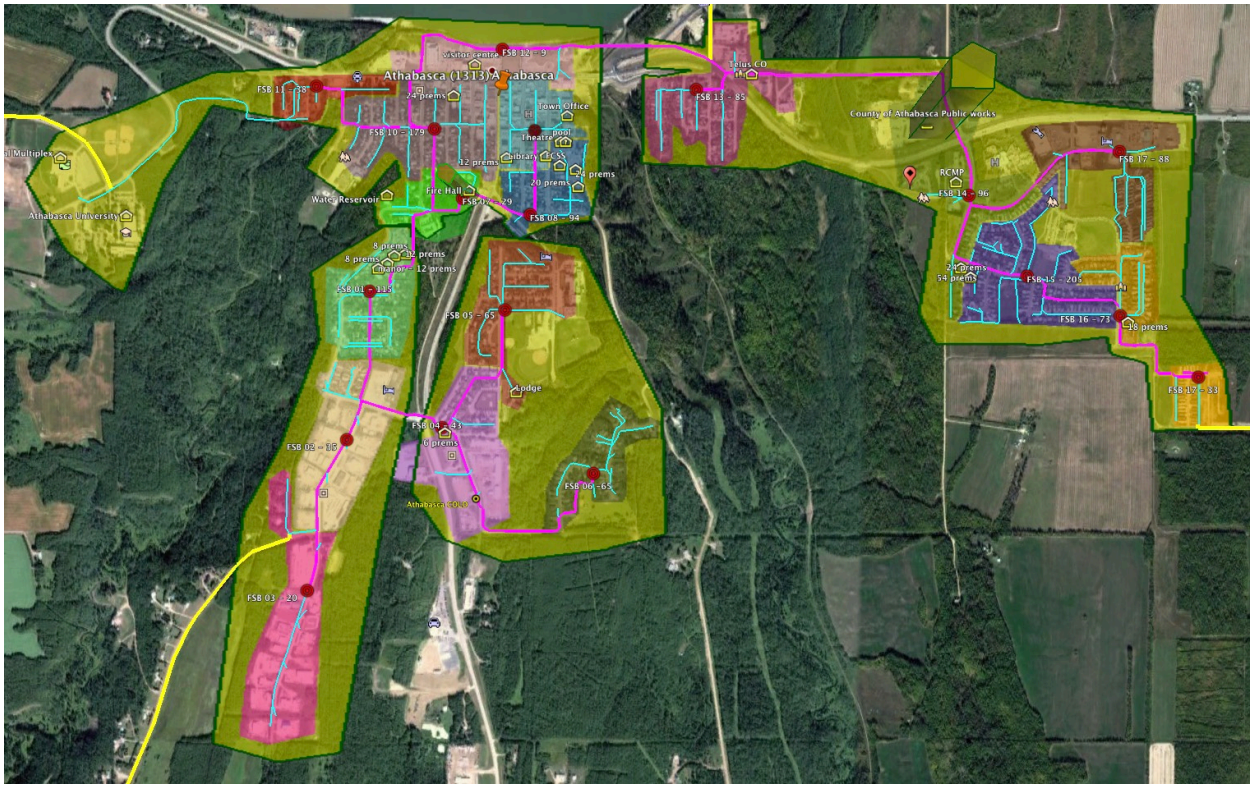


Figure 56 – Fibre layout for the Town of Athabasca.

7.7.3 Deployment Schedule

This business case assumes that the network would be deployed throughout the Town of Athabasca over the spring, summer, and fall of 2018.

7.7.4 Opto-electronics and Backhaul

Capital cost estimates over the first five years of operation for the proposed scenario come to $4.14M. In Figure 57, the 69% or $2.87M outside plant (OSP) deployment estimate includes the feeder and distribution plant required to pass every premise and provide drop connections to those premises that take service.

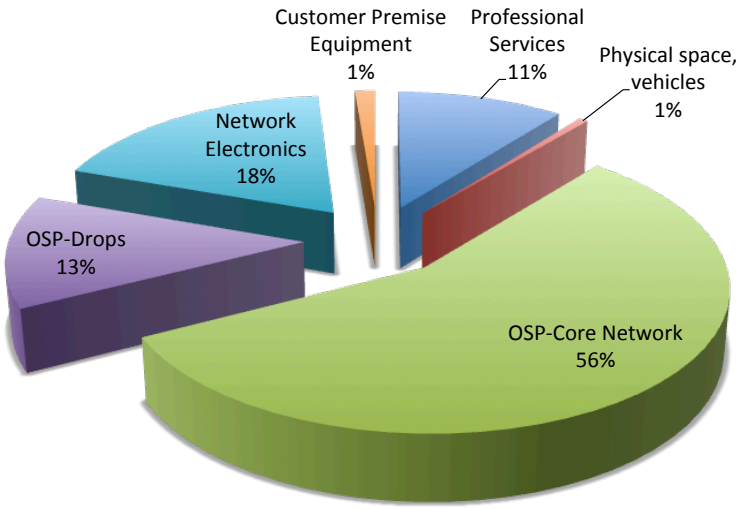


Figure 57 – Cumulative capital expenditures from 2018 to 2022.

7.7.5 Operations

The operational costs for wholesale network operation are straightforward as most are handled via outsourced contracts. Once the network build is completed in 2018 and the target penetration rates are realized, operational costs stabilize and a view of those calculated for 2022 are shown in Figure 58. In the chart, Admin, ops, and o-e refer to administration, operations, and opto-electronics, respectively. The numbers assume that the Town of Bruderheim provides both equipment and storage space at no charge.

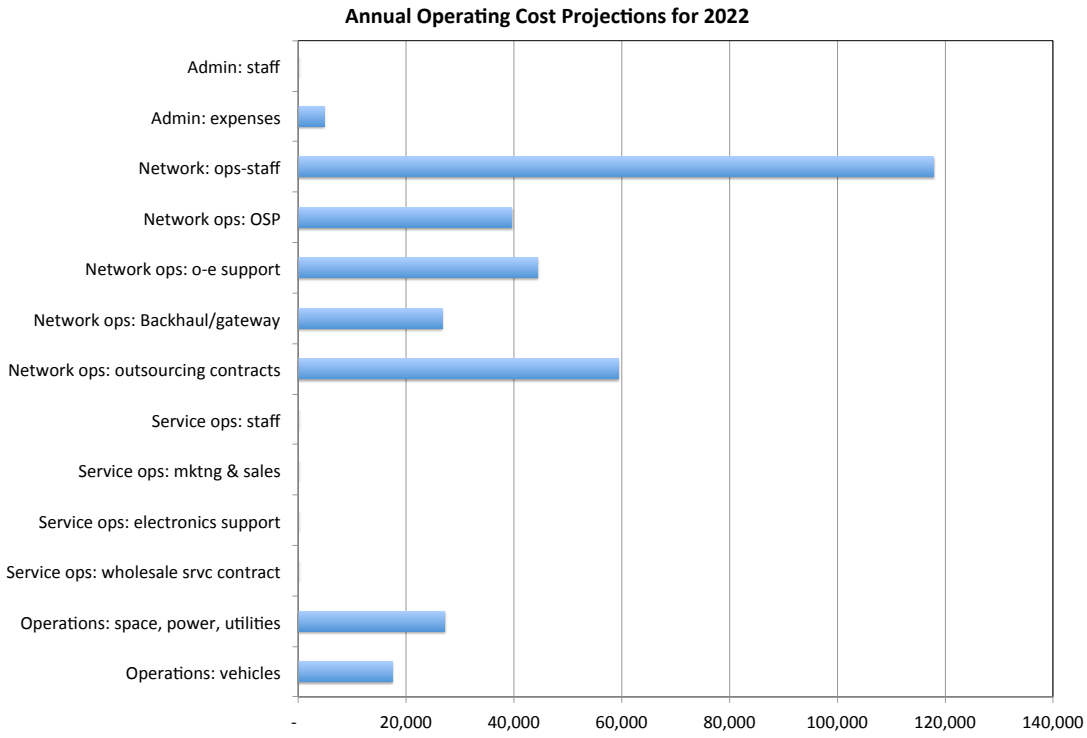


Figure 58 – Projected operational costs in 2022.

7.7.6 Financial Projections

Cashflow results for this scenario for TAt-Net are summarized in the left side of Table 20. Though the operation goes cashflow positive in year 4[104], with debt servicing considered, the overall financials do not go cashflow positive until year 7. As the required capital must therefore be sufficient to cover a 6-year deficit, some $4.36M in capital will be required to fund the operation. By year 15, approximately $123,849 is being returned to the Town annually.

Table 20 – Utility Model Results Summary for Athabasca and Boyle

Town of Athabasca

	Results
Years to positive cashflow	
Operating	3
With debt servicing (p&i)	6
Financing	
Start-up capital required	4,360,702
Net Cashflow - before debt servicing	
Profit - annual at 10 yr	173,795
Profit - annual at 15 yr	271,532
Net Cashflow - after debt servicing	
Profit - annual at 10 yr	28,862
Profit - annual at 15 yr	123,849

Athabasca and Boyle

	Results
Years to positive cashflow	
Operating	3
With debt servicing (p&i)	4
Financing	
Start-up capital required	5,285,788
Net Cashflow - before debt servicing	
Profit - annual at 10 yr	353,357
Profit - annual at 15 yr	480,453
Net Cashflow - after debt servicing	
Profit - annual at 10 yr	177,141
Profit - annual at 15 yr	299,682

In graphical form, the non-discounted cashflow chart for the proposed utility appears in Figure 59. The capital (red) required to finance the project is shown to pretty much all be required upfront and the financing must be sufficient to maintain a net cashflow of at least zero. Operational sustainability is determined by the gap or difference between the revenue (blue) and operational expenditure (green) lines whereas overall sustainability, which includes principal repayment, is the difference between the revenue (blue) and the operational + principal repayment (dotted blue) lines. The bigger the gap, the better. The net overall cashflow line is the dotted orange line.

While technically these numbers work, operationally, the risk is high due to the small margins and resulting deficits. Given the small client base available and the importance of scale to operational sustainability, these initial results are typical for communities with small populations. To mitigate the scale issue, the Town of Athabasca might consider partnering with a neighbouring communities like Boyle.

A pre-conceptual design for the Village of Boyle appears in Figure 60. Deployment cost to pass every premise is about $724,000. Summary financials for a combined Athabasca/Boyle operation are shown on the right hand side of Table 20. Required capital increases by about the cost of the Boyle deployment. Though Boyle is only a third the size of Athabasca, the margins increase 6 times by year 10 and level out at 2.5 times by year 15. The cashflow chart is shown in Figure 61.

[104] With 3 years to positive cashflow, the project goes cashflow positive in year 4.

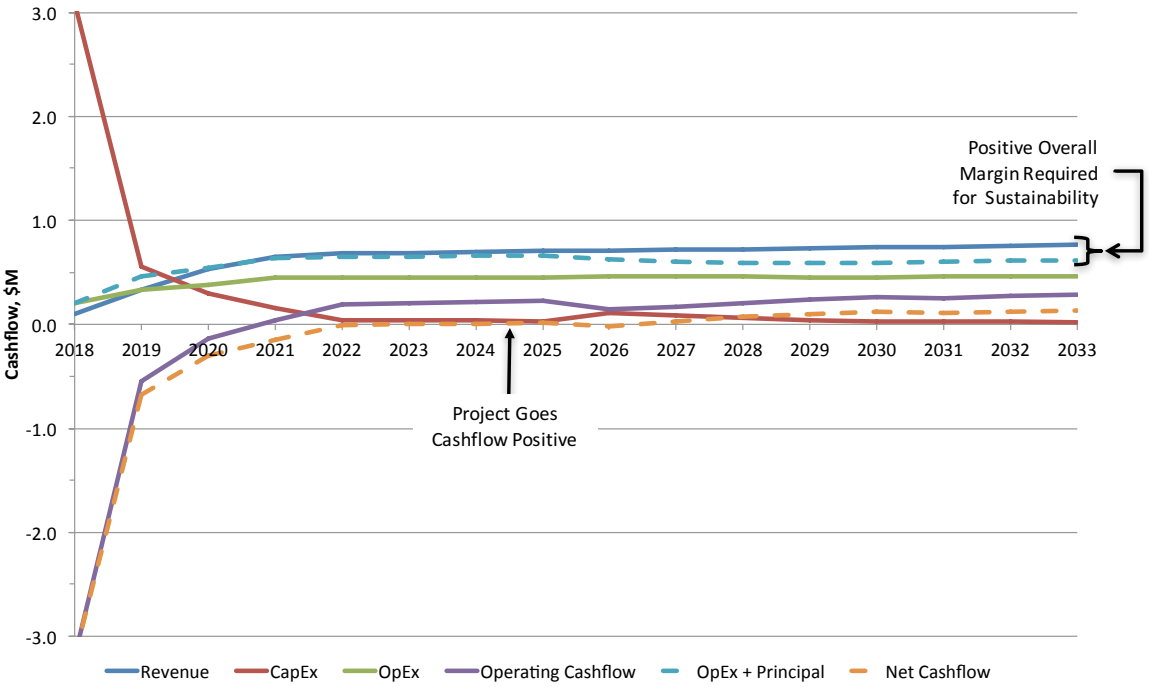


Figure 59 – Non-discounted cashflow projections for Bruderheim.

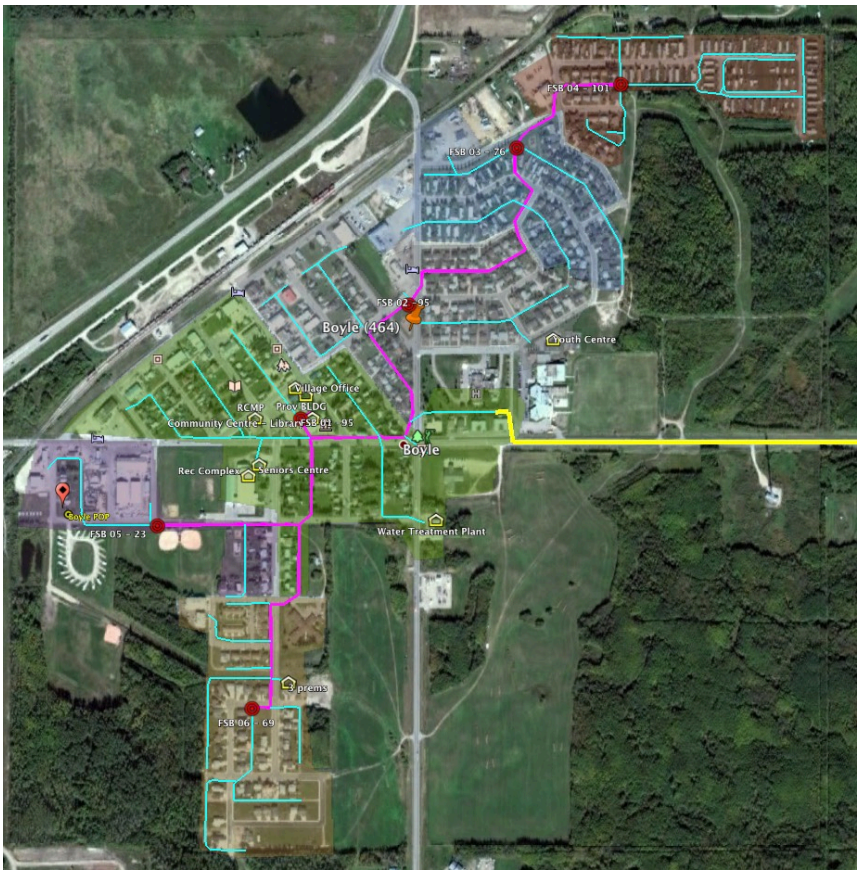


Figure 60 – Fibre layout for the Village of Boyle.

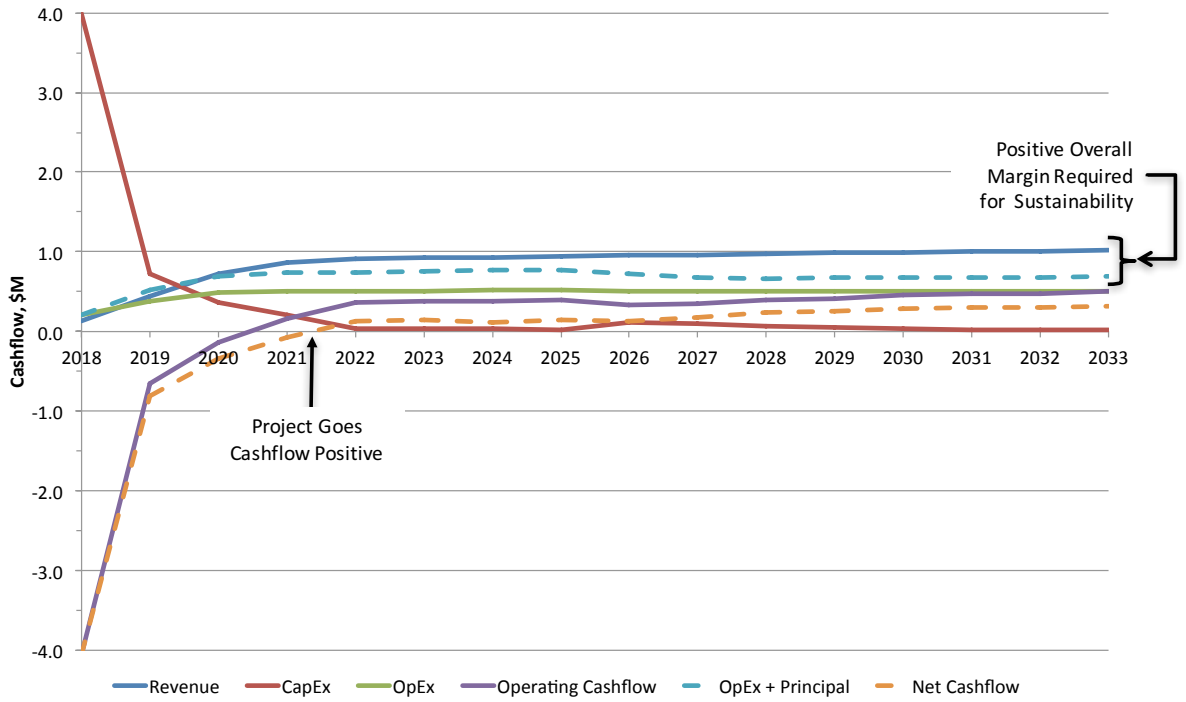


Figure 61 – Non-discounted cashflow projections for Athabasca and Boyle.

Additional options to be considered to improve margins are discussed in Sub-section 9.5.10.

7.8 Athabasca County – An Inclusive Regional Utility Network

7.8.1 Context

For guidance for the MDs and Counties throughout the NADC region, an inclusive regional network analysis for Athabasca County will be outlined below. From this and the regional analyses done for members of the REDAs, other NADC members should be able to get a realistic view of the options available to them.

A map of the County appears in Figure 62. Towns and hamlets are marked with orange and yellow pins. Key ISP tower sites are marked by red balloons. These are towers that the ISPs would like to upgrade should fibre access become available. SuperNet access sites are shown with yellow text and circles. SuperNet access sites enable connections back to Internet exchanges in Edmonton and Calgary without the need for additional fibre deployment. Each community network must at least indirectly connect back to an Internet Exchange.

7.8.2 Default Scenario

In the analysis below, the business structure, opto-electronics and backhaul, operations, drop capital, and markets and revenues assumed are those outlined in the default implementation scenario presented in Section 6.5. In this case, the local network entity established to house the local fibre operation will be referred to as Atha-Net.

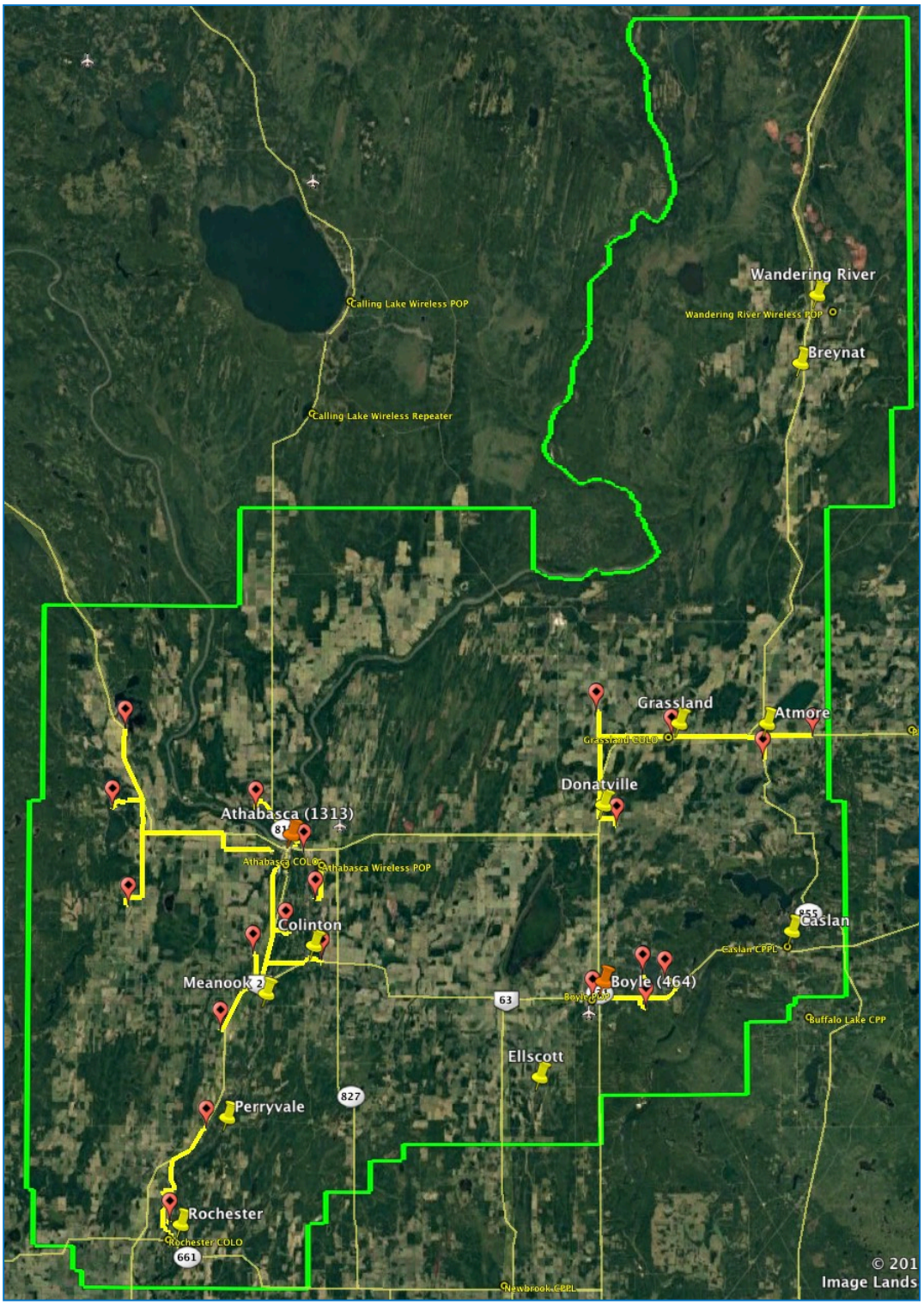


Figure 62 – Athabasca County.

7.8.3 Deployment Capital

Deploying an inclusive regional network involves both laying fibre to connect all communities and enable connections to key ISP towers as well as deploying access, fibre-to-the-premise networks in all towns,

villages, and hamlets. The intercommunity network is shown in yellow in Figure 62. For simplicity here, assume that the full intercommunity network and the fibre access networks are deployed in 2018.

The capital costs to deploy both the connection network and access networks in each community are shown in Table 21. In this context, access refers to laying fibre that passes every premise in a municipality. Later, when a premise orders service, a fibre drop connection from the premise to the fibre running past the premise will be needed. Overall cost, should the entire network be deployed, comes to about $8.1M. In the financial projections which follow, the year of deployment for each community is shown in the tan coloured row. Overall, the network will be deployed over the two-year period from 2018 to 2019.

Table 21 – Deployment Cost Summary

	County Backbone Routes				Towns & Villages	
Network Component	From Rochester SN POP	From Boyle SN POP	From Grasslands SN POP	From Athabasca SN POP	Athabasca	Boyle
Year of Deployment	2018	2018	2018	2018	2018	2019
Feeder	270,948	425,377	766,075	1,807,681	671,833	134,876
Distribution	-	-	-	-	1,446,230	442,480
Subtotal - civil construction	270,948	425,377	766,075	1,807,681	2,118,063	577,356
Mobilization/De-mobilization	2,709	4,254	7,661	18,077	42,361	11,547
Engineering, Permitting, and Planning	27,095	42,538	76,608	180,768	37,971	99,878
Activation: Fibre Micro-cabling	138,888	127,521	336,825	739,719	162,045	35,190
Grand-total, deployment	439,640	599,689	1,187,168	2,746,245	2,360,441	723,971
				4,972,743		3,084,412

A breakdown of the capital expenditures over the first five years of operation appears in the pie chart in Figure 63. The chart represents expenditures of $10.3M and assumes that the ISPs using the network obtain a collective market penetration of 50% of the residential and 70% of the business communities.

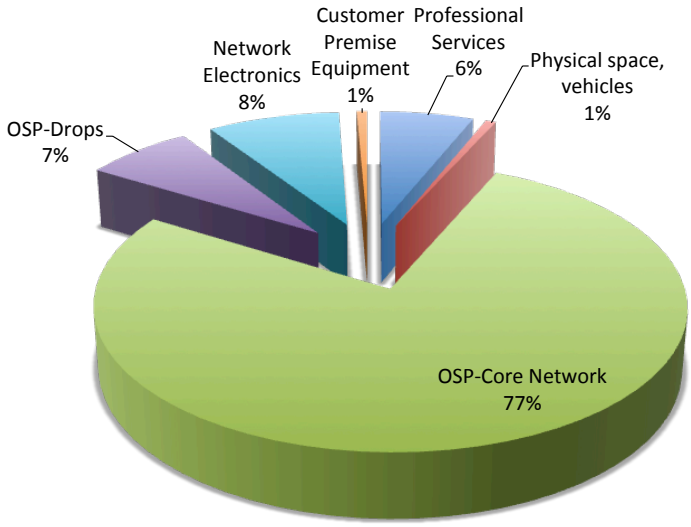


Figure 63 – Cumulative capital expenditures from 2018 to 2022.

7.8.4 Operations

Operational costs include payments to O-Net for network management and monitoring services and for local technical staff required to maintain the network. A breakdown of the expenses, as estimated for the 2022 operating year, appears in Figure 64 for the scenario proposed. In the chart, Admin, ops, o-e, and

mktng refer to administration, operations, opto-electronics, and marketing respectively. All service-related costs are zero as responsibility for those remains with the ISPs.

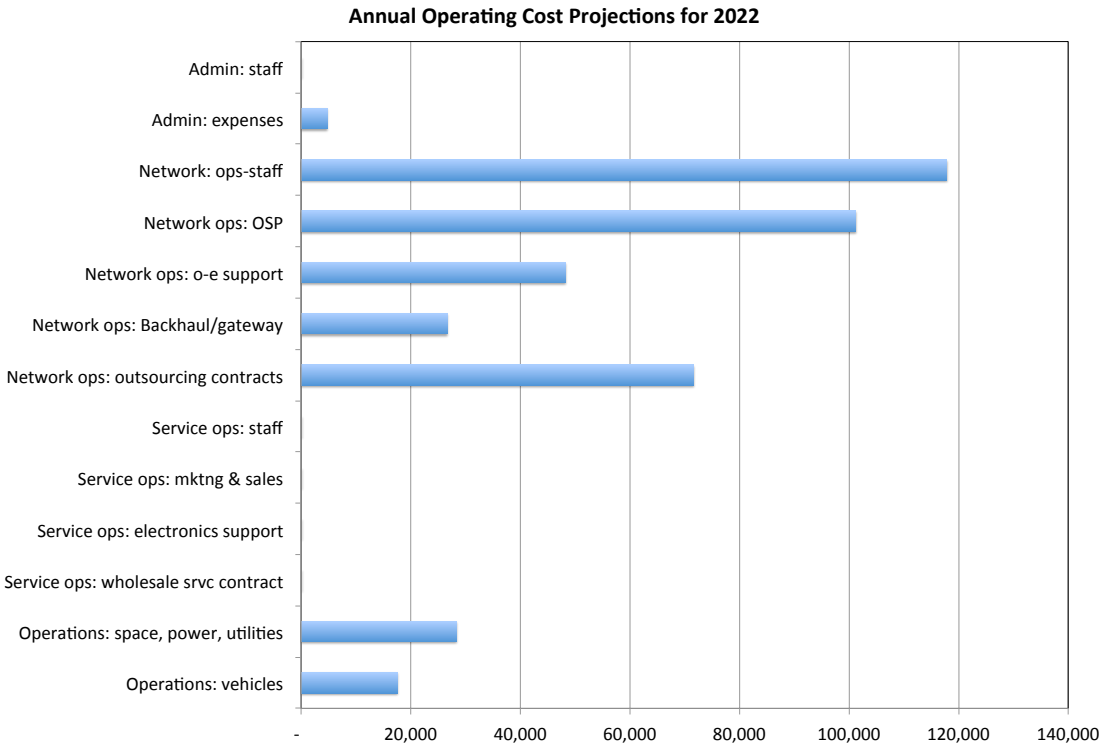


Figure 64 – Projected operational cost projections for the utility fibre network in 2022.

7.8.5 Financial Projections

Deploying intercommunity network is expensive and would be best done based on the availability of grant funding or in conjunction with other linear infrastructure builds (road rehabilitation, water line deployments, etc.) and staged in a way as to minimize impact on cashflow and required capital.

As can be seen in the summary results shown in Table 22, the wholesale network operation for the County goes cashflow positive in year 4, with debt servicing considered, the overall financials stay negative throughout the 16-life of the model, i.e., the operation incurs a deficit each year. Partly as a result of the ongoing deficit, the required capital increases with time and, by year 16, has reached $14.7M. With grant funding to cover the $5M intercommunity network, the financials would revert to those shown for Athabasca and Boyle. Other options to improve margins include staging the network deployment over a number of years and leveraging linear infrastructure builds as outlined in Sub-section 6.5.10.

Table 22 – Utility Model Results Summary for Athabasca County

	Results
Years to positive cashflow	
Operating	4
With debt servicing (p&i)	16
Financing	
Start-up capital required	14,671,385
Net Cashflow - before debt servicing	
Profit - annual at 10 yr	118,909
Profit - annual at 15 yr	248,881
Net Cashflow - after debt servicing	
Profit - annual at 10 yr	0
Profit - annual at 15 yr	0

7.9 Infrastructure Analysis for Five RMWB Communities

In fall, 2013, the Sustainable Communities Working Group (SCWG) of the now defunct Oil Sands Leadership initiative had Taylor Warwick complete a planning level conceptual review the options available to improve broadband services within Anzac, Conklin, Fort Chipewyan, Fort MacKay, Gregoire Lake Estates, and Janvier. The options included infrastructure to support mesh WiFi, hybrid fibre/WiFi, and full fibre/WiFi. The detailed study[105] is available on the NADC website.

[105] Dobson, C.; *Infrastructure Options for Rural Villages in the RMWB*; Oil Sands Leadership Initiative; 2013-09-14.

8 Northeast Alberta Information HUB Ltd. (Alberta HUB)

8.1 Current State

8.1.1 Regional Profile

As shown in Table 23, the Northern Alberta Information HUB Ltd. (Alberta HUB) region is made-up of numerous communities – the City of Cold Lake, 10 towns, 13 villages, 3 summer villages, and 9 counties or municipal districts (MDs), 7 First Nations, and 4 Métis Settlements. A map of the Alberta HUB region is shown in Figure 65. Please visit Alberta HUB's website for more information http://www.albertahub.com/.

Of the communities within Alberta HUB, TELUS has made generational fibre investments in Bonnyville, Cold Lake, St. Paul, and Vegreville. Elk Point has started the engagement process with AxiaConnect for their community's fibre connectivity.

Table 23 – Alberta HUB Communities

City	Towns	Villages	Summer Villages	Counties/MDs	First Nations	Métis Settlements
Cold Lake	Bonnyville Bruderheim Elk Point Lamont Mundare Smoky Lake St. Paul Two Hills Vegreville Vermilion	Andrew Chipman Dewberry Glendon Innisfree Kitscoty Mannville Marwayne Myrnam Paradise Valley Vilna Waskatenau Willingdon	Bonnyville Beach Horseshoe Bay Pelican Narrows	Bonnyville Lac La Biche Lamont Minburn Smoky Lake St. Paul Thorhild Two Hills Vermilion River	Beaver Lake* Cold Lake Frog Lake* Heart Lake* Kehewin Cree Saddle Lake* Whitefish Lk. (Goodfish)	Buffalo Lake Elizabeth Fishing Lake Kikino

*Community resides within the northern Alberta study area and the NADC region but is not presently a member of a REDA.

The region is home to approximately 135,000 residents (including approximately 20,000 for the Alberta portion of the City of Lloydminster).[106] Table 24 provides a population breakdown by municipality (rural and urban), First Nation, and Métis Settlement as well as five-year population growth trends and CAGRs. The MD of Bonnyville and City of Cold Lake are the most populated municipalities in the Alberta HUB region, with populations of 13,575 and 14,961, respectively. The MD of Bonnyville has grown significantly (approximately 21%) during the five-year period between 2011 and 2016; however, the population of the Town of Bonnyville has declined (although the town's own earlier census suggests differently). Some communities within Alberta HUB have completed their own population census subsequent to the Federal census. Therefore, the population figures provided in this report are subject to change. Statistics Canada's 2016 Census of Population data indicate that the Buffalo Lake Métis Settlement has grown significantly over the five-year period.

[106] Calculations based on Statistics Canada's 2016 Census of Population.

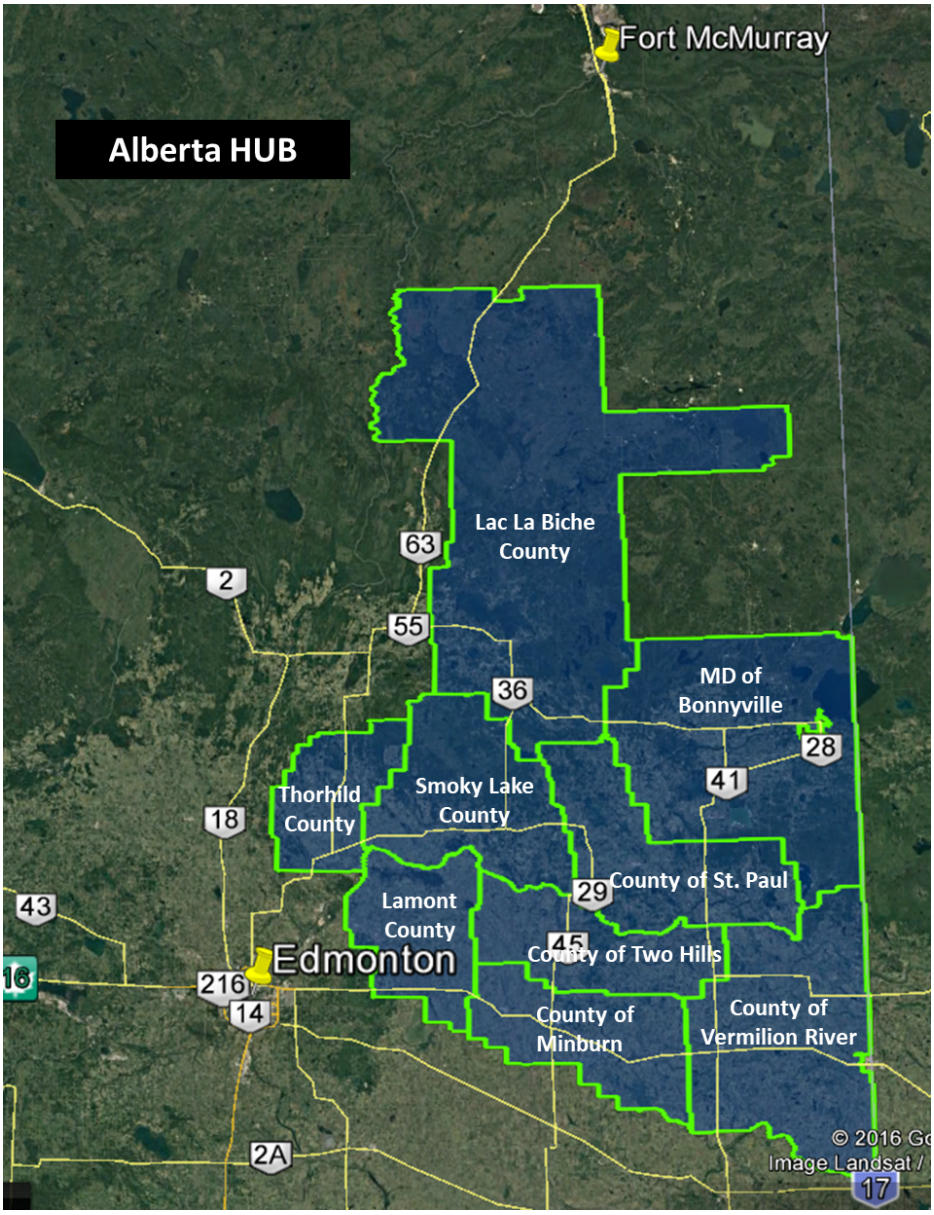


Figure 65 – Alberta HUB region.

It should be noted that the Village of Innisfree is currently undergoing a viability review - data are being collected and a Viability Team is being formed. Effective September 1, 2017, the Village of Willingdon will be dissolved and become a hamlet of the County of Two Hills.[107] Lac La Biche County has applied to Alberta Municipal Affairs to become a specialized municipality. Its largest hamlet, Lac La Biche, has a population of 2,314 and this represents a decline of minus 8.2% between 2011 and 2016.

[107] Order Dissolving the Village of Willingdon; O.C. 240/2017; 12 July 2017.

Table 24 – Alberta HUB Population & Population Growth Trends

Municipality	Rural				Urban					First Nations (FN)/Métis Settlements				
	Population (2016)	CAGR (%) (2011-2016)	5-Year Trend (%) & Direction		City/Town/ Village	Population (2016)	CAGR (%) (2011-2016)	5-Year Trend (%) & Direction		Reserve / Settlement	Population (2016)	CAGR (%) (2011-2016)	5-Year Trend (%) & Direction	
Bonnyville, MD	13,575	3.9	21.3	▲	Cold Lake	14,961	1.6	8.1	▲	Cold Lake	874	2.1	10.9	▲
					Bonnyville	5,417	-2.7	-12.9	▼	Kehewin Cree	976	-1.7	-8.4	▼
					Glendon	493	0.3	1.4	▲	Elizabeth (Métis)	653	0.0	-0.2	▼
					SV[1] (2)	235	-1.8	-8.6	▼	Fishing Lk. (Métis)	446	0.5	2.3	▲
					Sub-total	21,106				**Sub Total - FN**	1,850			
										Sub Total - Métis	1,099			
Lac La Biche, County	8,330	-0.2	-0.9	▼						Beaver Lake	414	-0.4	-2.1	▼
										Heart Lake	184	3.0	15.7	▲
										Sub Total - FN	598			
Lamont, County	3,899	0.1	0.7	▲	Andrew	425	2.3	12.1	▲					
					Bruderheim	1,308	2.5	13.2	▲					
					Chipman	274	-0.7	-3.5	▼					
					Lamont	1,774	0.2	1.2	▲					
					Mundare	852	-0.1	-0.4	▼					
					Sub-total	4,633								
Minburn, County	3,188	-1.2	-5.8	▼	Innisfree	193	-2.6	-12.3	▼					
					Mannville	828	0.6	3.1	▲					
					Vegreville	5,708	0.0	-0.2	▼					
					Sub-total	6,729								
Smoky Lake, County	2,459	na	na		Smoky Lake	964	-1.2	-5.7	▼	Saddle Lake	6,500	na	na	
					Vilna	290	3.1	16.5	▲	Whitefish (Goodfish)	1,310	2.0	10.3	▲
					Waskatenau	186	-6.1	-27.1	▼	Buffalo Lk. (Métis)	712	7.7	44.7	▲
										Kikino (Métis)	934	-0.5	-2.6	▼
					Sub-total	1,440				**Sub Total - FN**	7,810			
										Sub Total - Métis	1,646			
St. Paul, County	6,036	0.7	3.6	▲	Elk Point	1,452	0.6	2.8	▲	Frog Lake	531	1.9	9.7	▲
					St. Paul	5,827	1.5	7.8	▲					
					SV[2] (1)	49	5.8	32.4	▲					
					Sub-total	7,328								
Thorhild, County	3,254	-1.0	-4.8	▼										
Two Hills, County	3,322	1.0	5.1	▲	Myrnam	339	-1.7	-8.4	▼					
					Two Hills	1,352	-0.4	-2.0	▼					
					Willingdon	319	3.0	16.0	▲					
					Sub-total	2,010								
Vermilion River, County	8,267	0.9	4.6	▲	Dewberry	186	-1.5	-7.5	▼					
					Kitscoty	925	1.8	9.3	▲					
					Marwayne	564	-1.6	-7.8	▼					
					Paradise V.	179	0.6	2.9	▲					
					Vermilion	4,084	0.8	3.9	▲					
					Sub-total	5,938								
Total	52,330					49,184				**Total - FN**	10,789			
										Total - Métis	2,745			

CAGR – Compound Annual Growth Rate

Note 1: SV - Summer Village: Bonnyville Beach and Pelican Narrows

Note 2: SV - Summer Village: Horseshoe Bay

Total Population = **115,048**

Source: Statistics Canada Census 2011 and 2016, Saddle Lake First Nations, Smoky Lake County Municipal Census.

There are 4,860 businesses with at least one employee operating in the Alberta HUB region. The top 10 industries in which they operate is shown in Table 25 and Figure 65 (industries were classified according to the NAICS). The data reflects a diverse economy with approximately 17% of businesses with employees engaged in the construction industry. The sector with the second highest participation is the other services

(except public administration).[108] Together the two sectors makeup almost 28% of businesses with employees in the region. The *'Other Industries'* segment (14.3%) shown in the Figure 66 chart includes industries that individually contribute between 3.5% and 0.3% to the category.[109]

Table 25 – Alberta HUB Number of Businesses (with employees) by Industry

Industry	Businesses	Percent (%)
Construction	800	16.5
Other services (except public administration)	538	11.1
Retail trade	491	10.1
Professional, scientific and technical services	488	10.0
Transportation and warehousing	464	9.5
Agriculture, forestry, fishing, and hunting	380	7.8
Mining, quarrying, and oil and gas extraction	322	6.6
Healthcare and social assistance	266	5.5
Accommodation and food services	212	4.4
Administrative and support, waste management and remediation	202	4.2

Source: Calculations based on dataset provided by Alberta Economic Development & Trade, Economic Information & Analytics, Feb. 13, 2017.

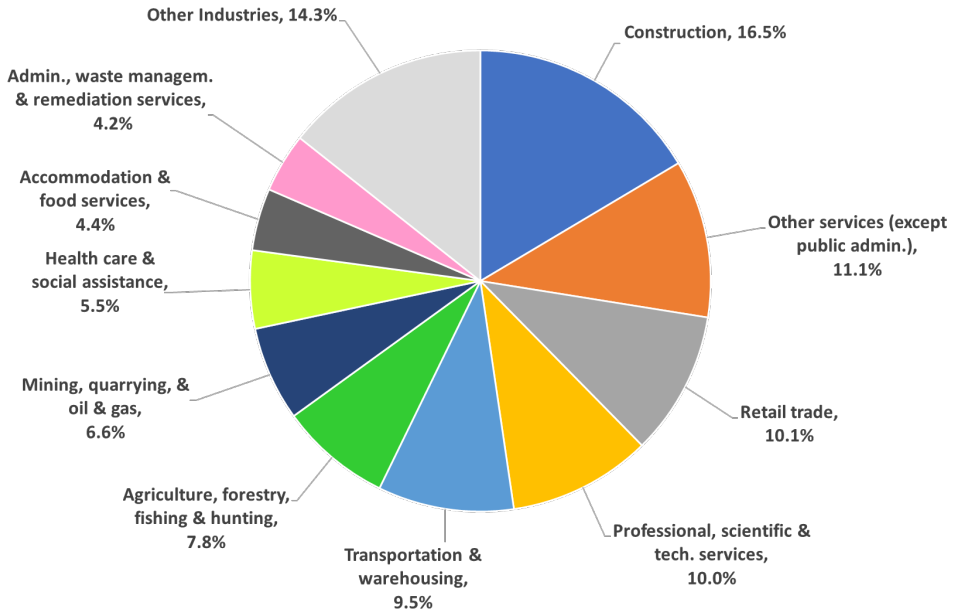


Figure 66 – Alberta HUB mix (based on business counts).

[108] Comprised of businesses primarily engaged in repairing and maintenance on motor vehicles, machinery, and other products; providing personal care, funeral, and laundry services; organizing and promoting religious activities; and supporting causes such as grant making and advocacy.

[109] Real estate and rental and leasing; wholesale trade; manufacturing; finance and insurance; educational services; public administration; information and cultural industries; arts, entertainment and recreation; management of companies and enterprises; and utilities.

During the data collection stage for the Current State, Alberta HUB conducted a broadband survey with businesses in the region. When asked about whether current Internet service levels were preventing their business from expanding, more than 50% of the 54 respondents indicated that service levels were inhibiting their growth and ability to serve their customers as shown in Figure 67.

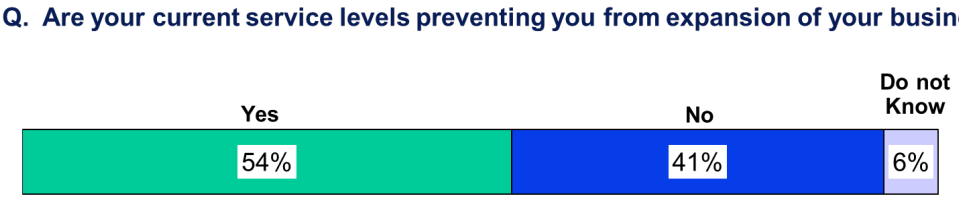


Figure 67 – Current Internet service levels impact.

Cross-tabulation analysis did not generally find a strong correlation between industry sector and affirmative *'yes'* responses, with the exception of the professional services sector. Firms active in providing accounting, human resources, legal, and web design services predominately felt their current Internet service levels were preventing them from expanding their businesses. Most respondents were small businesses, some working in home offices located in the rural areas of Alberta HUB. Firms involved in banking, financial services, and insurance activities indicated that Internet service levels were not inhibiting their growth. As one might anticipate, businesses currently attaining Internet speeds of more than approximately 20 Mb/s also did not feel their growth was being impacted in a negative way.

Respondents almost unanimously indicated they would need to increase their current levels of Internet service over the next 3, 5, and 10 years, some adding that it would have to be sooner than the timeframes cited. Select explanatory comments included the following (Figure 68):

- Yes, as more educational opportunities are offered online, video and web conferencing technologies (*adult literacy and learning organization*).
- Yes, the availability of the more technological applications is only going to increase (*manufacturing business*).
- Yes, as our business grows, we can see real challenges and potential problems. We would like to increase our use of video conferencing and feel the present system would be taxed (*sand and gravel company currently receiving Internet download speeds of 10 Mb/s*).
- Yes, as we grow our business, Internet service is a necessary component to our success (*retail trade business – automotive, industrial, and agriculture*).



Figure 68 – Need to increase current internet service levels.

The Alberta HUB region is strategically located – its transportation corridors connecting Edmonton, the Saskatchewan border area, and the resource rich areas of northeastern Alberta. There are several vital supply chains running through the region, which have created opportunities for trucking, rail

transportation, and warehousing as well as for the use of airport assets in the region.[110] *"Currently, rubber tire traffic is the dominate means of movement of goods and people in the region."*[111]

Post-secondary educational institutions in the Alberta HUB region include University Blue Quills, Lakeland College, and Portage College. Blue Quills University, near the Town of St. Paul, is a First Nations owned and operated university – owned by seven First Nations.[112] Portage College has campuses or learning locations in the communities of Boyle, Cold Lake, Frog Lake, Lac La Biche, Saddle Lake, St. Paul, and Whitefish Lake.

8.1.2 Municipal, First Nations, and Métis Settlements Broadband Interests

Communities within Alberta HUB are at different stages in recognizing the importance of broadband services and connectivity to economic diversification, municipal sustainability, regional competitiveness, public service delivery, and quality of life.[113]

The MD of Bonnyville and the Town of Bonnyville are preparing an Inter-Municipal Development Plan for the lands located around the town. Amendments to the *MGA* include the implementation of mandatory regional planning mechanisms for land-use planning and the requirement for municipalities to work together regarding service delivery and cost sharing.[114] Through the *Inter-Municipal Collaborative Development Program (ICMP)*, the MD of Bonnyville provides funding to the Town of Bonnyville, Cold Lake, and the Village of Glendon to compensate them for their infrastructure usage by the MD's residents.

The City of Cold Lake will be upgrading the city-owned network from leased lines and radio connections to fibre in 2017 to reduce costs, enhance network throughput, and increase reliability.[115]

Table 26 identifies the awareness and current state of municipal involvement and interest related to broadband and fibre network deployments. Most municipalities in the Alberta HUB region are at a relatively early stage. The County of Vermilion River and its urban centres have formed the Vermilion River Regional Alliance (VRRA) to evaluate the options to provide capable broadband infrastructure on an open-access utility basis. The Town of Two Hills is possibly interested in working on a regional broadband plan. Lac La Biche County expressed the need for affordable backhaul to Edmonton.

[110] Alberta HUB; 15 February 2017.

[111] *Alberta HUB Transportation Study*, Final Report; Outlook Market Research & Consulting; 31 October 2016. 8.

[112] Beaver Lake, Cold Lake, Frog Lake, Heart Lake, Kehewin, Saddle Lake, and Whitefish Lake.

[113] The five elements of broadband's importance were identified by the Calgary Regional Partnership, Economic Prosperity Steering Committee, *Request for Decision*; 2016-09-08.

[114] Alberta Municipal Affairs; *What's Changing*; 7 February 2017. http://mgareview.alberta.ca/whats- changing/.

[115] *City of Cold Lake: 2017 Capital Budget;* City of Cold Lake. 5.

Table 26 – Alberta HUB Involvement & Interest in Broadband [116]

Community	Enthusiastic	Interested *'Maybe'*	Need Help Too Small	Too Expensive	Status Quo	Don't Know[117]	No Response[118]
City							
Cold Lake (TELUS fibre)			X	X			
Towns							
Bonnyville (TELUS fibre)					X		
Bruderheim			X				
Elk Point	X						
Lamont					X		
Mundare				X			
Smoky Lake	X						
St. Paul (TELUS fibre)					X		
Two Hills		X					
Vegreville (TELUS fibre)					X		
Vermilion	X						
Villages							
Andrew							X
Chipman							X
Dewberry	X						
Glendon		X	X	X	X		
Innisfree							X
Kitscoty	X						
Mannville	X						
Marwayne	X						
Myrnam							X
Paradise Valley	X						
Vilna							X
Waskatenau		X	X				
Willingdon	Effective September 1, 2017 the village will become a hamlet of the County of Two Hills[119]						

[116] Communities were asked to rate their involvement and interest in broadband. Broadband was defined as follows: In telecommunications, broadband is a wide bandwidth data transmission with an ability to simultaneously transport multiple signals and traffic types - the medium can be twisted-pair copper wiring, optical fibre, coaxial cable, or radio. Broadband service is characterized as offering symmetric bandwidth between 50 Mb/s and 1 gigabit (Gb/s)/1,000 Mb/s and higher (really unlimited bit rates) (symmetric meaning the upload bit rate is as fast as the download bit rate).

[117] Don't Know – the respondent was unable to rate their community's interest and involvement in broadband.

[118] No Response – the community did not respond to the inquiries regarding their community's interest and involvement in broadband.

[119] Order Dissolving the Village of Willingdon.

Community	Enthusiastic	Interested *'Maybe'*	Need Help Too Small	Too Expensive	Status Quo	Don't Know	No Response
Counties/MDs							
Bonnyville					X		
Lac La Biche						X, no plan in place	
Lamont		X	X	X	X		
Minburn					X		
Smoky Lake	X	X					
St. Paul		X		X			
Thorhild							X
Two Hills							X
Vermilion River	X						
First Nations							
Beaver							X
Cold Lake							X
Frog Lake							X
Heart Lake							X
Kehewin Cree			X				
Saddle Lake		X					
Whitefish Lake (Goodfish)							X
Métis Settlements							
Buffalo Lake							X
Elizabeth	X						
Fishing Lake							X
Kikino							X

8.1.3 Current Service Providers, Services, and Infrastructure

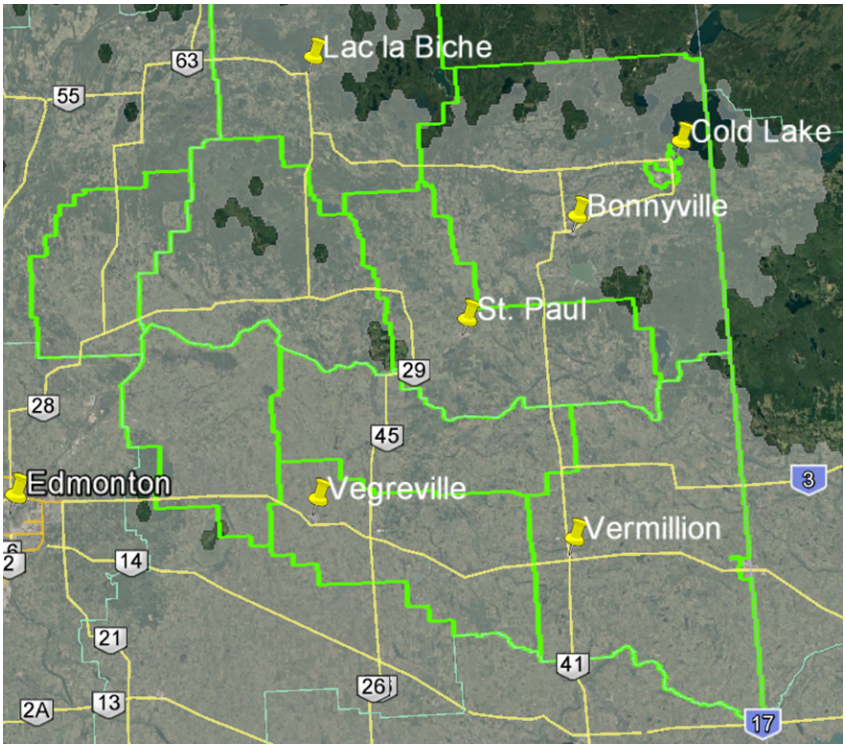
8.1.3.1 Fixed Wireless-based

Current ISPs using fixed wireless technology in the Alberta HUB region include the following. Appendix 16.3 provides the details of their service offerings (Internet only – no bundling unless otherwise stated) and geographic coverage. The coverage maps are those that were available on their websites at the time of the writing of this report.

- Alberta Communication Cable Services,
- Arrow Technology Group,
- Bellevista Broadband,
- CCL Networks,
- Clearwave Broadband Networks (Clearwave),
- Corridor Communications (CCI) (fixed wireless and wired Digital Subscriber Line (DSL)-based),
- DeneTech (Cold Lake First Nations),
- DigitalWeb Internet Services,
- Infinity Internet Solutions,
- MCSNet,
- Wild Rose Internet, and
- XplorNet (fixed wireless and satellite-based).

According to the CRTC website[120], minimal 5 Mb/s down (toward the end-client) by 1 Mb/s up (from the end-client to the network) service is almost ubiquitously available throughout the Alberta HUB region. A combined view of the fixed wireless coverage is shown in Figure 69 (light gray areas).

Through its DSL partnership with TELUS, CCI offers wired service in the villages of Glendon, Mannville, and Marwayne. Clearwave is planning a province-wide expansion. XplorNet's new satellites will allow them to offer download speeds of 25 Mb/s across their customer base by July 2017.



Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

Figure 69 – Alberta HUB fixed wireless coverage.

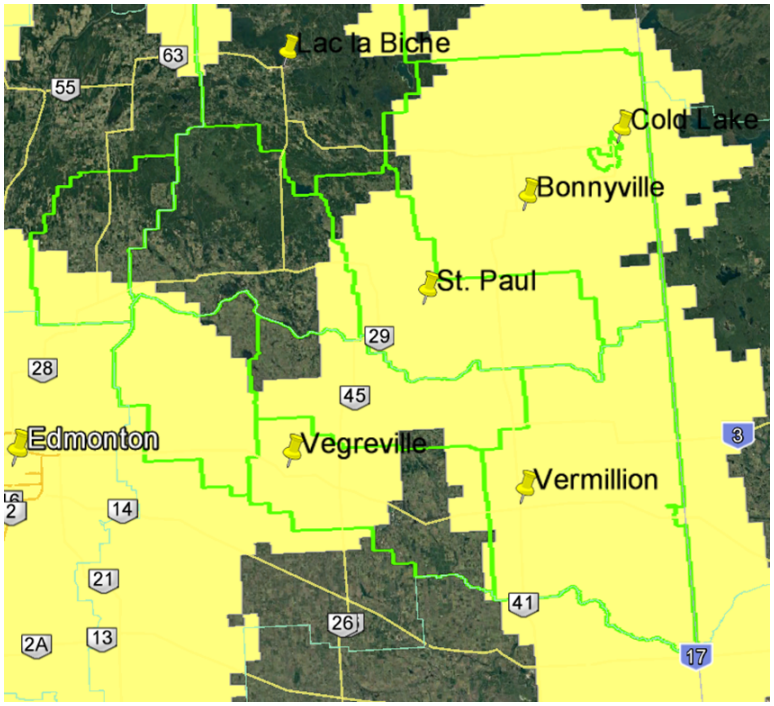
8.1.3.2 Mobility

Shown as yellow areas in Figure 70, mobility data services are widely available from TELUS/Bell and Rogers. Appendix 16.4.2 provides the coverage maps for each of the providers of mobility services. As discussed earlier Bell, TELUS, and Rogers are now using cellular towers and SmartHubs to provide at-home Internet services.

8.1.3.3 Wireline-based – DSL

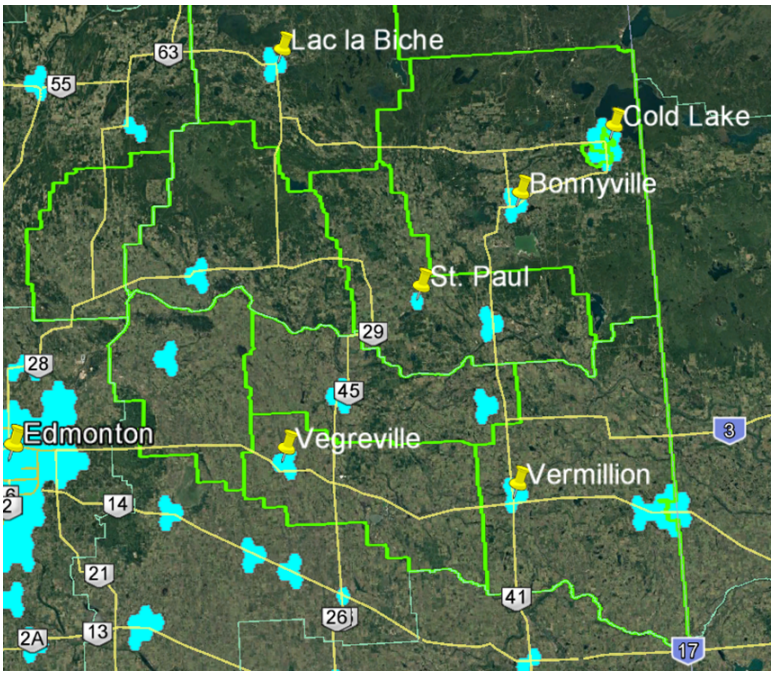
DSL refers to a group of last mile technologies that are used by wireline-based service providers such as TELUS in Alberta to provide broadband services over twisted-pair copper wiring. The local copper wire loop is a remnant from the days when (and how) the telephone company connected residential and business premises to the telephone company's network for the purposes of providing local and long distance telephone services (and dial-up Internet services). Since DSL's performance degrades with distance, the technology is only deployed in urban areas where access distances are less than about two miles. In Figure 71, areas served via DSL technologies are shown in blue.

[120] http://crtc.gc.ca/eng/internet/internetcanada.htm .



Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

Figure 70 – Alberta HUB mobility data services coverage.



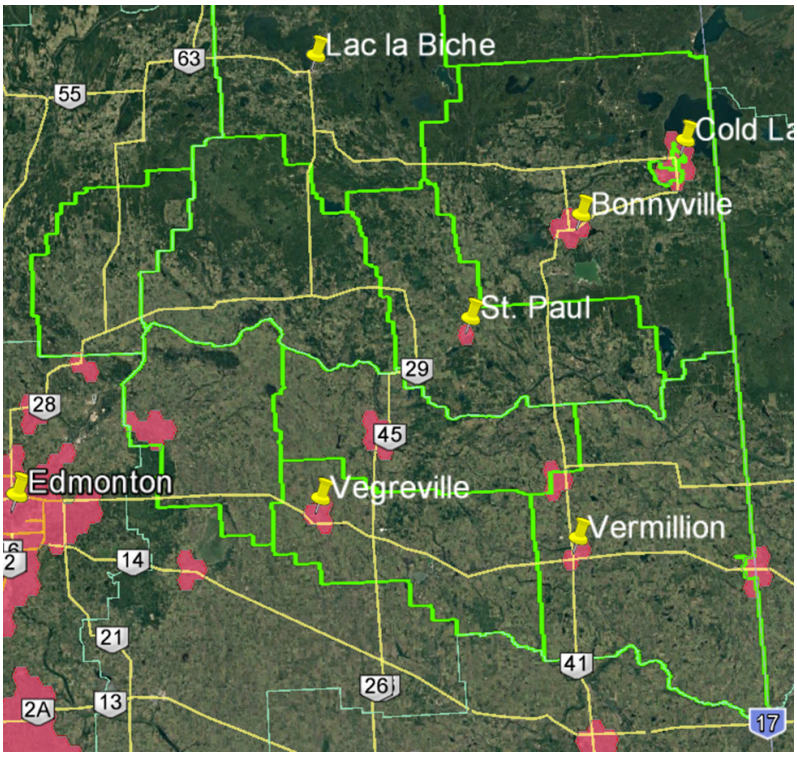
Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

Figure 71 – Alberta HUB DSL coverage.

8.1.3.4 Wireline-based – Coaxial Cable

Eastlink and Shaw Communications (Shaw), originally television broadcast companies, use coaxial cable and modern cable modem technology to provide broadband services in the Alberta HUB region (red areas in Figure 72). The cable companies currently use the DOCSIS 3.0 standard to achieve broadband speeds

of 100 Mb/s or more over coaxial cable. Shaw expects to complete its DOCSIS 3.1 upgrade by the end of August 2017.[121] According to the Cybera, *State of Alberta Infrastructure Report*, *"The next-generation DOCSIS 3.1 standard is expected to revolutionize hybrid fibre-coaxial cable connections by providing up to 10 Gb/s download and 1 Gb/s upload network throughput and significant improvements in latency."*[122]



Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

Figure 72 – Alberta HUB coaxial cable coverage.

Maximum advertised wireline offerings are shown in Appendix 16.3. Since these are *'up to'* bit rates, during high usage periods, actual bit rates will be less – Eastlink and Shaw more so than TELUS due to the way the aggregation is implemented. In both cases, the offerings are highly asymmetric – upload and download bit rates differ significantly.

8.1.3.5 Internet Service Provider Wi-Fi

Bell, Shaw, and TELUS WiFi services are available in the Alberta HUB region. TELUS has multiple sites in Cold Lake and the towns of Bonnyville, St. Paul, and Vegreville as well as single locations in the towns of Elk Point, Lamont, and Smoky Lake (Table 27).

[121] *Shaw Announces Third Quarter and Year-to-Date Results;* Shaw Communications. 8.

[122] *State of Alberta Digital Infrastructure Report*; Cybera; 13 September 2016. 35.

Table 27 – Alberta HUB Wi-Fi Availability

City/Town	TELUS	Bell
Bonnyville	7	1
Cold Lake	9	4
Elk Point	1	2
Lamont	1	0
Smoky Lake	1	0
St. Paul	11	2
Vegreville	20	1
Vermilion	0	1

Shaw offers multiple Go WiFi locations in urban centres along Highways 15 and 16 as shown in Figure 73.



Figure 73 – Alberta HUB Shaw Go WiFi coverage.

8.1.3.6 Axia Fibre

Axia NetMedia provides retail services to corporate clients and, through AxiaConnect, provides fibre-based retail Internet services in a number of smaller communities. In exchange for access to a community's rights-of-way, Axia will consider investing in fibre-to-the-premise (FTTP) infrastructure in communities that can demonstrate that at least 30% of its residences and businesses are interested in purchasing Internet services from Axia once the '*closed-access*' network is built. To date, Axia has not announced any plans for FTTP deployments in any Alberta HUB community.

8.1.4 Backhaul Availability

8.1.4.1 Alberta SuperNet

The extent of the SuperNet within the Alberta HUB region is shown in Figure 74. The green lines represent the Bell-operated BAN portion while the blue lines represent the Axia-operated EAN segments. A more general discussion about the SuperNet is presented in Appendix 16.5.

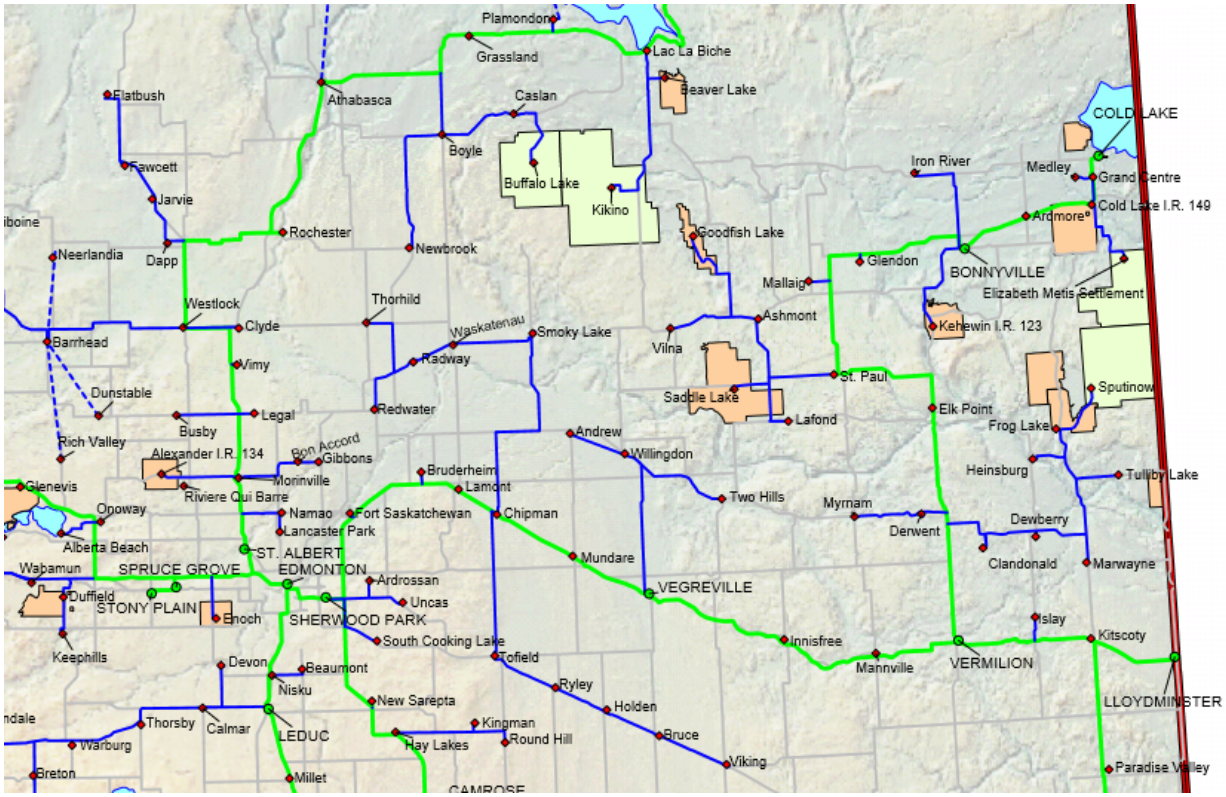


Figure 74 – Alberta HUB SuperNet infrastructure.

8.1.4.2 Shaw Wholesale

Given the uncertainty associated with the next iteration of the SuperNet contract by June 30, 2018, municipalities, First Nations, and Métis Settlements requiring access to fibre transport for backhaul to Edmonton may want to consider Shaw, Bell, or TELUS.

Shaw facilities in Alberta HUB are limited to two runs of fibre:

- The first runs parallel to Highway 63 from Edmonton to Fort McMurray and on to several oilsands camps beyond. Capacity is limited and upgrades to enable DWDM to increase bandwidth would be expensive.
- The second runs parallel to Highway 16 from Edmonton to Lloydminster.

8.1.4.3 TELUS Wholesale

Except under a non-disclosure agreement, TELUS does not provide maps of fibre assets.

8.1.5 Existing Infrastructure

8.1.5.1 Towers and Other Tall Structures

When planning a broadband build-out it is important to build on what is already in place. The key inquiry for the current state analysis is what assets does the community have that can be provided at little or no incremental cost that improve the economics of the broadband deployment and operations? Assets include existing towers, fibre and community networks, which the community might be using for communications or asset management. Existing and possible access to tall structures or buildings are also important to inventory for the potential placement of wireless equipment.

Several municipal districts or counties within Alberta HUB received grant funding to expand high-speed Internet access to unserved areas and address gaps in coverage from Alberta Agriculture and Forestry's *Final Mile Rural Community Program* in the 2012/2013 timeframe. The MDs and counties of Bonnyville, Lac La Biche, Lamont, St. Paul, Thorhild, and Vermilion River each received between approximately $130,000 and $400,000.[123] Table 28 shows existing MD- and county-owned tower infrastructure.

Table 28 – Alberta HUB Existing MD- and County-owned Towers

	Towers	Details
Bonnyville	9	6, 100' 1, 120' 2, 150' In 2018, the ownership of the above towers will transfer to a local ISP
Lac La Biche	4	1, 200' (fire department VHF repeater (2017) 1, 95' (needs improvement) 2, less than 100' (at capacity)
Minburn	1	Used for fire/emergency services
St. Paul	9	9, currently used by private company 1 or 2 radio system towers
Thorhild	8	At fire hall sites plus others used by private company
Vermilion River	9	5, 100' 2, 150' 2, 200'

Other tall structures in the Alberta HUB region include the water towers at Kitscoty and Mundare and grain elevators in the villages of Marwayne and Willingdon. Bruderheim has a fire hall. Mannville has a RCMP radio repeater and owns a 50-foot emergency tower while Vermilion has a radio tower.

8.1.5.2 Utility Infrastructure

The existing overhead and underground transmission and distribution lines of electric utility companies (ATCO, Fortis), Rural Electrification Associations (REAs), and natural gas co-operatives (co-ops) present deployment options for community broadband builds - access to and installing fibre cables to travel along utility poles, in ducts and conduit, and along rights-of-way can significantly improve the economics of broadband service expansion projects and network deployments. Inquiries about the availability of

[123] *Alberta SuperNet Final Mile Rural Task Force: Recommendation Report*; 2008-03-14.

communications spaces on utility providers' poles and where multi-party trench agreements exist will be made during the preliminary infrastructure design phase of a broadband network.

8.1.5.3 First Nations Fibre Infrastructure

First Nations Technical Services Advisory Group (TSAG) is a non-profit organization established by the Chiefs of Alberta to provide technical support and training to First Nations in the Treaty 6, 7, and 8 regions. In 2008, TSAG partnered with Health Canada to develop the network components (fibre connections) at First Nations health centres to support First Nations' telemedicine. With Health Canada funding and TSAG project management, community fibre networks connections were made to the Alberta SuperNet points-of-presence on each or close to each First Nations in 2011. Upon completion, each First Nations became the owner of its local fibre network. As shown in Figure 75, First Nations' schools, health centres, band administration offices, and water treatment plants are now connected.

TSAG operates a state-of-the-art Network Operations Centre (NOC). The NOC's real time network monitoring ensures availability, network security/SPAM filtering, telehealth bridge management, and support, and applications (high-speed connectivity and remote water monitoring system for water treatment plants, OneHealth.ca, and FirstNationsTH.ca). Onehealth.ca is a national health portal that provides information and services to health care professionals working in First Nations communities. FirstNationsTH.ca – Telehealth provides education and travel-free patient and health care assessments via video-conferencing.

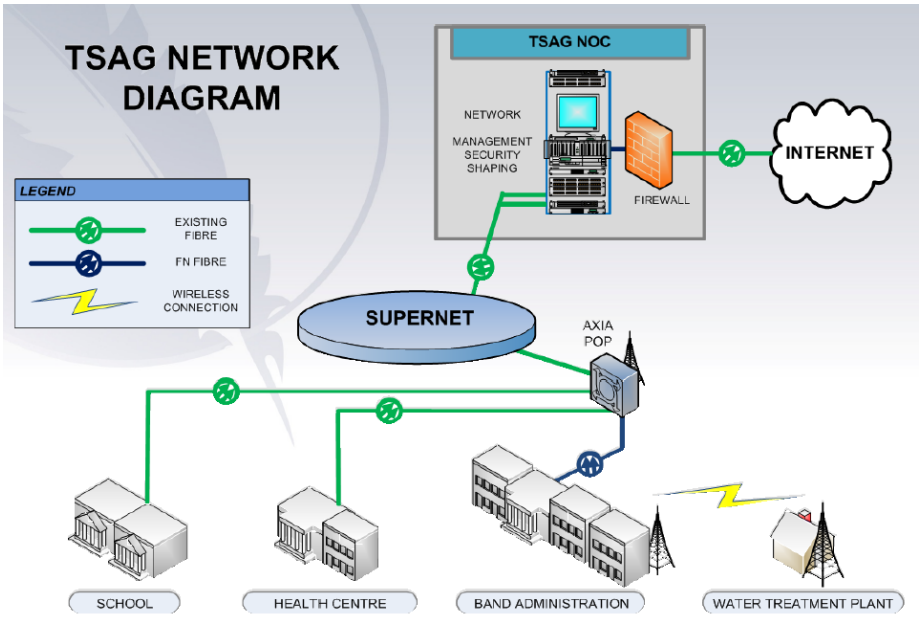


Figure 75 – TSAG network diagram.

8.1.5.4 Rural Electrification Associations (REAs)

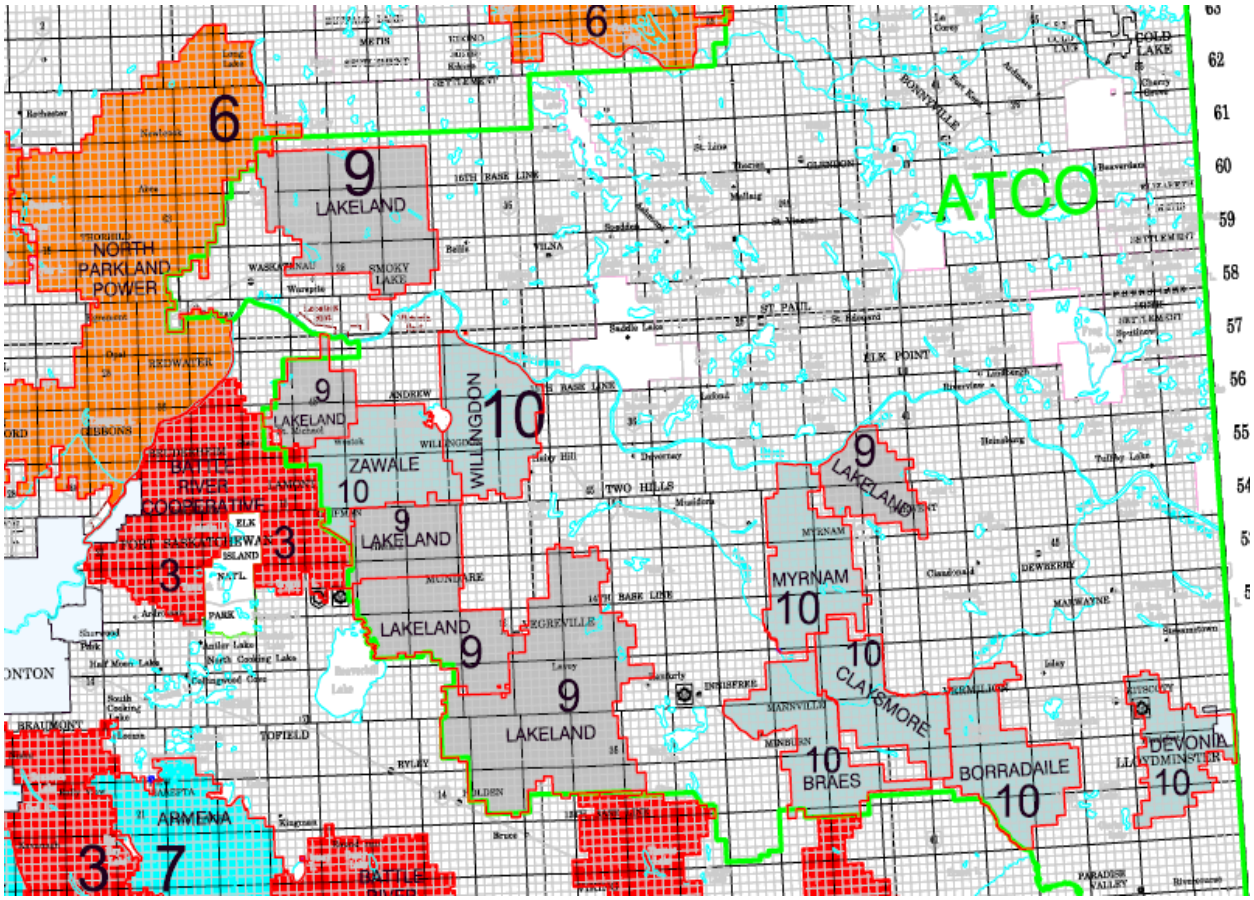
REAs are member-owned electric distribution systems that provide electricity service to farm members within a specific geographic boundary. Each REA has an elected board of directors that is responsible for the business operations of the REA. Construction, operations, and maintenance is done by ATCO Electric (through contracts with the REAs) for following REAs within the Alberta HUB region:

- Borradaile REA Ltd. (Vermilion)
- Braes REA Ltd. (Mannville)
- Claysmore REA Ltd. (Vermilion)
- Devonia REA Ltd.

- Lakeland REA Ltd. (Vegreville)
- Myrnam REA Ltd.
- Northern Parkland Power REA Ltd. (Thorhild)
- Willingdon REA Ltd.
- Zawale REA Ltd. (Wostok)

Appendix 16.6 shows ATCO Electric's and Fortis Alberta's respective service areas in northern Alberta. REA and distribution company systems are intertwined in the REA service area as shown in Figure 76, and they work together to ensure there is reliable service and no duplication of distribution lines and service. In Alberta, most rural areas are radial networks. A radial distribution line may serve both distribution entity and REA customers and different parts of the same line maybe owned by one or the other party.[124]

There are 351 Lakeland REA members (connections) within the County of Minburn. The majority of connections are overhead lines to the landowner's property, at which point it is up to each individual member whether they have an underground or overhead secondary wire to their yard. There are only about 20 underground primary connections out of the total of 351 within the County of Minburn.



Source: Rural Electrification Associations Service Areas, Accessed Nov. 2016.

Figure 76 – Alberta HUB REA & ATCO service areas.

[124] Alberta Utilities Commission; *Notice of Hearing, Application 21148-A001: Application for an order directing FortisAlberta Inc. to remove certain facilities and effect permanent disconnection Sunset Shores RV Resort Inc.* 1.

8.1.5.5 Gas Co-operatives – Zones 3 and 4

In the 1960s, non-profit gas co-ops were formed to supply natural gas to rural Alberta - franchise areas were designated. The following six Zone 3 gas co-ops currently operate in the Alberta HUB region. Figure 77 provides a map showing the group's geographic coverage.

- County of Two Hills
- County of Vermilion River
- Lac La Biche County
- Smoky Lake County
- Thorhild County
- Town of Smoky Lake



Source: Federation of Alberta Gas Co-ops, http://www.fedgas.com/Map. Accessed Feb. 1, 2017

Figure 77 – Alberta HUB Zone 3 gas co-operatives.

Another six gas co-operatives operate in what the Federation of Alberta Gas Co-ops has designated as Zone 4, which is also in the Alberta HUB region. Figure 78 shows the areas they serve. In 2010, the Lac La Biche District Natural Gas Co-op received a grant of $500,000 from the *Rural Connections: Community Broadband Infrastructure Pilot Program* to assist in the deployment of a wireless broadband network to provide coverage to areas around Plamondon, Lac La Biche, and Hylo.

- Goodfish Lake Gas Utility
- Kehewin Cree Nation
- Lac La Biche District Natural Gas Co-op Ltd (a shareholder of CCI)
- Lamco Gas Co-op Ltd. (Lamont)
- Minco Gas Co-op Ltd. (Innisfree)
- North East Gas Co-op Ltd. (Bonnyville)

There are two rural water co-operatives operating in the Alberta HUB area: Bruderheim Water Co-op Ltd. and Josephburg Water Co-op Ltd. (Lamont).

8.1.6 Planned Infrastructure

8.1.6.1 Major Projects

The Alberta HUB region has several private and public sector capital projects planned. Where possible these projects maybe leveraged to reduce the costs associated with the deployment of broadband

infrastructure. Figure 79 shows the capital projects valued at $5 million or greater in the Bonnyville area.[125] Besides the projects shown in this figure, other major projects in the Alberta HUB region include a bio-diesel refinery at Bruderheim; a wastewater treatment plant at St. Paul; and various school upgrades and road work – see the Smoky Lake, St. Paul, Vegreville, and Vermilion maps in Appendix 16.7.



Source: Federation of Alberta Gas Co-ops, http://www.fedgas.com/Map. Accessed Feb. 1, 2017

Figure 78 – Alberta HUB Zone 4 gas co-operatives.

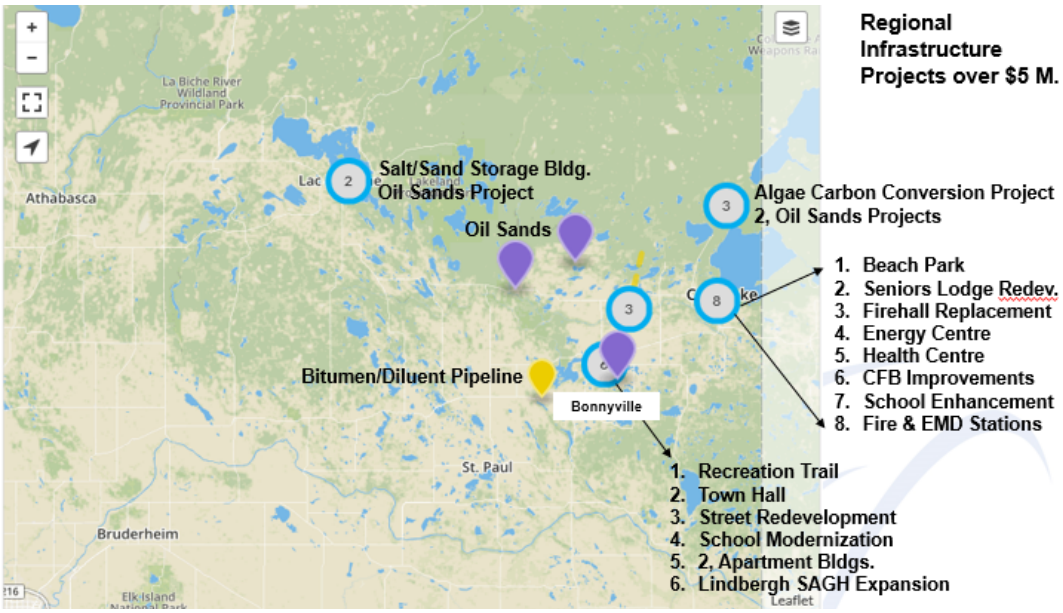


Figure 79 – Major projects – Bonnyville.

The Alberta Central East (ACE) Regional Water System is the corporation comprised of 13 municipalities (shareholders) created to supply potable water through a regional water system. Phases 4 and 5 will be constructed in 2017 and 2018. The Phase 4 water line construction will be 25 kilometres and take place along county road rights-of-way from the City of Lloydminster to the Hamlet of Blackfoot. The line will

[125] Alberta Major Projects, Economic Development and Trade; December 2016. http://majorprojects.alberta.ca/.

then continue west to the Village of Kitscoty. Phase 5 will include 22 kilometres from Kitscoty to Marwayne. Appendix 16.8 provides a map of the route.[126]

Another regional water supply expansion is being undertaken by the Cold Lake Regional Utility Services Commission. Phase 1 will be approximately 46 kilometres and supply water to Bonnyville and the Cold Lake First Nation from Cold Lake's water treatment plant.

Lamont County is installing a water line from Lamont to St. Michael (to be completed in October 2017). The direct drill method is being used, which does not provide an opportunity to lay broadband cable.

8.1.6.2 Electricity Transmission Development Plans

Figure 80 shows the existing electricity transmission system in the Alberta HUB region.[127] The Cold Lake area is served by 240 kV and local 144 kV transmission lines to support oilsands and industrial development. Major projects approved and/or under construction include 240 kV and 144 kV enhancements in the Cold Lake area.

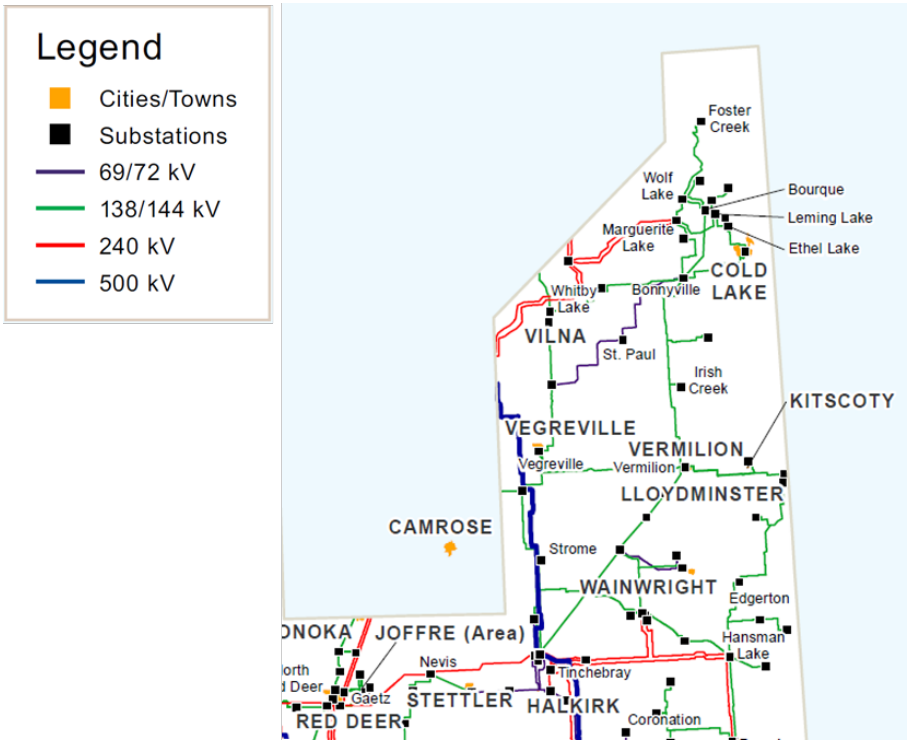


Figure 80 – Alberta HUB – existing electricity transmission system.

Proposed transmission developments relevant to potential fibre deployment include the following new lines (planning horizons are noted as near-term (to 2020); medium term (to 2025); or long-term (to 2035)):

- 240 kV between new substations in Lloydminster and Vermilion (*medium-term*);
- 144 kV between new substations in Vermilion and Vegreville (*medium-term*); and
- 144 kV between Marguerite Lake, Wolf Lake, and Bourque substations east of Cold Lake (*long-term*).

[126] ACE brochure; November 2016 Update.

[127] *AESO 2015 Long-term Transmission Plan*; AESO.

- Projects to rebuild existing lines to higher capacity are proposed for the 144 kV line from Vermilion to Irish Creek (*near-term*) and the 138 kV line between the substations of St. Paul and Bonnyville (*long-term*). The oilsands load is expected to drive 138 kV enhancements.

8.1.6.3 Municipal Capital and Civil Works Projects

Leveraging civil infrastructure projects can reduce broadband deployment costs by 75%. Given civil infrastructure costs typically account for 70% of buried deployment costs, this is significant. Capital projects that involve trenching or erecting towers or poles such as during the development of new subdivisions, road construction, or the construction of rehabilitation of water or sewer lines are typical projects that can improve the economics of community broadband projects.

Lac La Biche County successfully applied for a grant from Alberta Transportation's *AMWWP* for their water treatment plant ($3,7 million). Thorhild County received a total of $8.8 million for lagoon repair and expansion from the *AMWWP* and the *W4L Program*. Lamont County also received $677,700 for the detailed design work for regional water supply from the *W4L Program*.

The Federal *Small Communities Fund* (part of the New Building Canada Fund) for infrastructure projects, now includes a *'Connectivity and Broadband'* category. 2016 approved non-broadband projects within Alberta HUB include (figures shown are the Total Eligible Project Cost - Federal, Provincial, and Municipal):

- Bonnyville – 51 Ave. underground rehabilitation $11.4 million;
- Marwayne – Underground renewal $3.1 million;
- Smoky Lake – Cast iron watermain replacement $556,344;
- MD of Bonnyville – Ardmore underground utilities rehabilitation $8.7 million;
- County of St. Paul – Counties of St. Paul and Two Hills joint facultative lagoon and transfer station expansion $5.2 million; and
- Thorhild County – Lagoon repair, capacity upgrade, sanitary forcemain replacement, and lift station upgrade $6.2 million.

Table 29 shows the capital and civil works projects that either the municipalities self-reported or were identified by another source. TELUS has invested in fibre to the home/premise in the City of Cold Lake and three of the towns (Bonnyville, St. Paul, and Vegreville) within Alberta HUB, subsequently these entities generally did not share information about upcoming civil works that might provide fibre installation opportunities beneficial to the sub-region as a whole. Three villages contributed to the inventory.

8.2 Desired State

As observed in the Current State analysis, the range of interest in broadband varies throughout the Northeast Alberta Information HUB Ltd. (Alberta HUB) region. The majority of communities in Alberta HUB are at a relatively early stage and need guidance on how to proceed, with the exceptions of the towns of Smoky Lake and Vermilion and in general, the Vermilion River region. These communities are ready to move forward with developing their broadband strategies and plans.

Vermilion River Region – To enhance broadband infrastructure in the Town of Vermilion and the villages and hamlets within the County of Vermilion River, these communities have created a partnership, the Vermilion River Regional Alliance (VRRA). The partnership includes the Alberta portion of the City of Lloydminster, which is not part of the project study area. A detailed evaluation of the broadband strategies and options to enhance and extend broadband offerings throughout the region will commence shortly – beginning with a network infrastructure analysis.

Table 29 – Alberta HUB Municipal Capital & Civil Works Projects

City	
Cold Lake	Water main extension; roadway infrastructure improvements; facilities infrastructure (Energy Centre expansion, artificial turf field, RCMP building expansion)[128]
Towns	
Bonnyville	Nothing planned ---yet from article: Road paving (Gurneyville Road and 66th Street)
Bruderheim	Street rebuilding; residential development; possible industry development
Elk Point	Natural gas to new 14 lot residential subdivision (spring 2017)
Lamont	Nothing planned
Mundare	Nothing planned
Smoky Lake	Nothing planned
St. Paul	Road maintenance, paving, and upgrading[129]
Two Hills	Possible replacement of water and sewer main and distribution lines; installation of storm drainage system
Vegreville	Declined to respond due to TELUS fibre
Vermilion	Residential development (late 2018 – early 2019)
Villages	
Mannville	Nothing planned
Marwayne	Water/sewer renewal (2018)
Willingdon	Nothing planned
Counties/MDs	
Bonnyville	Road construction
Lac La Biche	Nothing planned
Lamont	Road construction; water line
Minburn	Hamlet of Minburn sewer lift station; road construction
Smoky Lake	Water transmission line from Spedden to Ashmont then to Mallaig
St. Paul	Road construction; water transmission line from Ashmont to Mallaig
Thorhild	Lagoon repair and force-main replacement
Two Hills	Did not respond to project inquiries and no information was available on the county's website
Vermilion River	Natural gas distribution (20 km to 50 km annually); water line replacement in Blackfoot (2 blocks); road construction

Other communities and community clusters intent on decisive near-term action include the following:

Town of Smoky Lake and Smoky Lake County – The Town of Smoky Lake is actively looking for and evaluating solutions to improve broadband for their community. Fibre is the preferred option, and discussions with incumbent service providers are occurring. A wireless solution, which the town would deploy itself, is also being considered. The town Council will ultimately decide which option the town will pursue. If the decision is to go with a wireless solution and the town becomes the Internet Service Provider (ISP), the rollout to the community would occur in within three to five years to attain town-wide connectivity. A multi-year project roadmap would define an incremental build-out, likely starting in the commercial areas of downtown.

The County of Smoky Lake helped create and invested in Corridor Communications (CCI) to address the lack of connectivity in their county. Their future broadband vision includes provisioning county/CCI towers with fibre within three years. Within five years they envision the establishment of micro-tower sites to

[128] *City of Cold Lake: 2017 Capital Budget;* City of Cold Lake.

[129] Whitfield, Janani; *Town Approves Capital Budget, Projects*. St. Paul Journal; 2017-05-23.

provide service to the remaining two percent of county residents. Ten years will see new technology and gigabit-capability.

County of St. Paul – The County of St. Paul's *'desired state'* is high quality, affordable high-speed Internet availability throughout the county. It was one of the counties within Alberta HUB that was successful in receiving grant funding to expand high-speed Internet access to unserved areas and address gaps in coverage from Alberta Agriculture and Forestry's *Final Mile Rural Community Program* in the 2012/2013 timeframe. Since some coverage gaps still exist in the county, the County plans to address those gaps as well as potentially bring fibre to some of its hamlets. The County recently supported MCSNet's application to the Federal *Connect to Innovate Program*. If the application is successful, the subsequent deployment of fibre by MCSNet along Highway 28 will serve the hamlets of Ashmont and Mallaig. Also, the County has applied for grant funding to the provincial *Community and Regional Economic Support (CARES) Program*, and if approved, the funds will be used to develop an economic development strategy for the region.

Town of Elk Point – The Town of Elk Point is one of the communities that did not feel it has the funding power to pursue a community-built on their own and is accessing the option of having AxiaConnect build a fibre network and become the ISP for their community.

Town of Bruderheim – Broadband is on the Town of Bruderheim Council's agenda – Council recently passed a service levy bylaw that includes the provision fibre conduit in new developments and areas where major street repairs are scheduled to take place. Given the town's small size, a regional initiative is likely to be the most effective and expedient way to attract a single service provider. Within five years their vision is to have 100% of their community supported by fibre-based broadband infrastructure. Ten years would see integration with the surrounding communities, potentially with communities outside of the northern Alberta study area such as Strathcona County.

Elizabeth Métis Settlement – Increased Internet literacy among the community's people coupled with very poor Internet service levels (unbearably slow and unreliable) provides the catalyst for the community to seek improved broadband solutions.

Saddle Lake First Nation – would like to see broadband widespread in their community of 6,000 to 6,500 people within three years. They are interested in taking an active role in realizing their broadband vision such as an equity partnership or community-owned business.

Figure 81 provides a geographic representation of those communities wanting to move forward while the details of each community's issues and challenges; whether fibre/broadband is on their Council's agenda; the factors impacting their community's capability to pursue a fibre/broadband initiative; and their 3-, 5-, and 10-year broadband visions can be found in the Appendix 16.11.

8.3 Town of Bruderheim– A 600+ Premise Community

8.3.1 Default Scenario

Assume that the Town of Bruderheim deploys an open-access, lit fibre-optic network that will make world-class, fully scalable broadband infrastructure available to every home and business in the town. In the analysis below, the business structure, opto-electronics and backhaul, operations, drop capital, and markets and revenues assumed are those outlined in the default implementation scenario presented in Section 6.5. In this case, the local network entity established to house the local fibre operation will be referred to as B-Net.

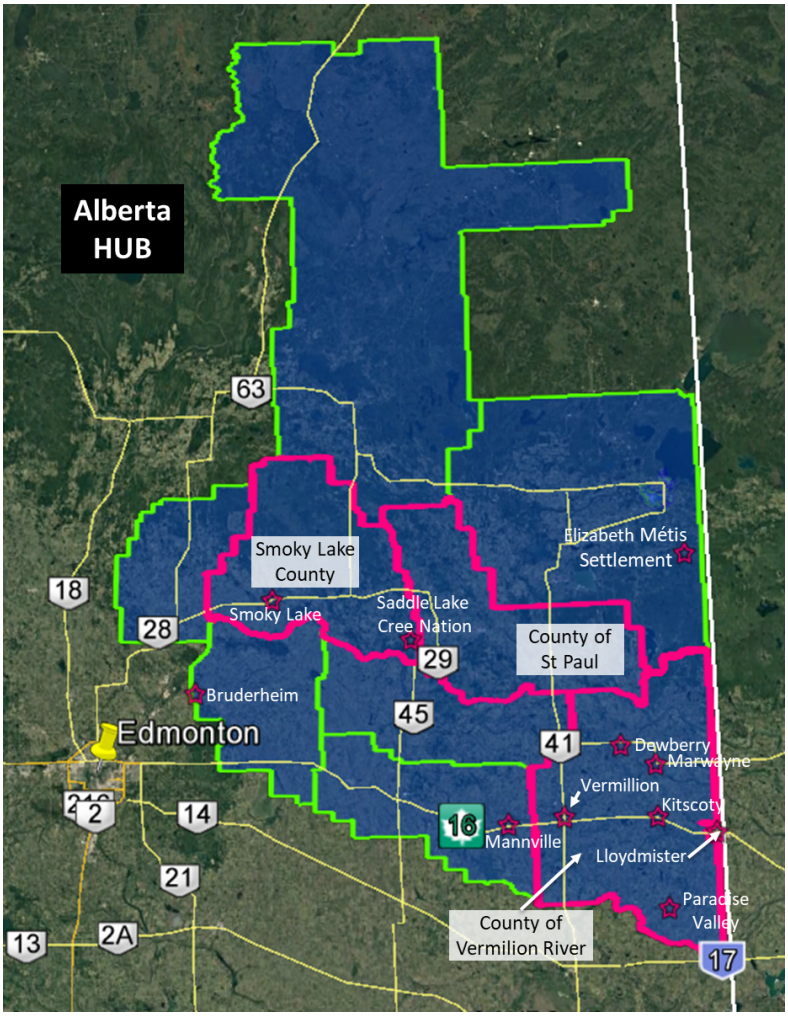


Figure 81 – Alberta HUB – communities with near-term broadband plans.

8.3.2 Deployment Capital

As a pre-conceptual buried fibre design were not completed for the Town of Bruderheim, a high-level estimate of $2,000/premise to deploy a community fibre network that passes very premise will be assumed. Deployment cost would run about $1.3M.

Once the feeder and distribution networks are in place throughout the town, additional capital costs will be incurred to deploy conduit and fibre from each premise ordering service to the distribution conduit running past the premise. The wiring within each premise may also have to be upgraded to enable service distribution to the premise computers, phones, and televisions – but that falls to the ISP.

8.3.3 Deployment Schedule

This business case assumes that the network would be deployed throughout Bruderheim over the spring, summer, and fall of 2018.

8.3.4 Opto-electronics and Backhaul

A breakdown of the capital expenditures over the first five years of operation appears in the pie chart in Figure 82. Capital cost estimates over the first five years of operation for the proposed scenario come to $2.31M. In the chart, the 59% or $1.36M outside plant (OSP) deployment estimate includes the feeder

and distribution plant required to pass every premise and provide drop connections to those premises that take service.

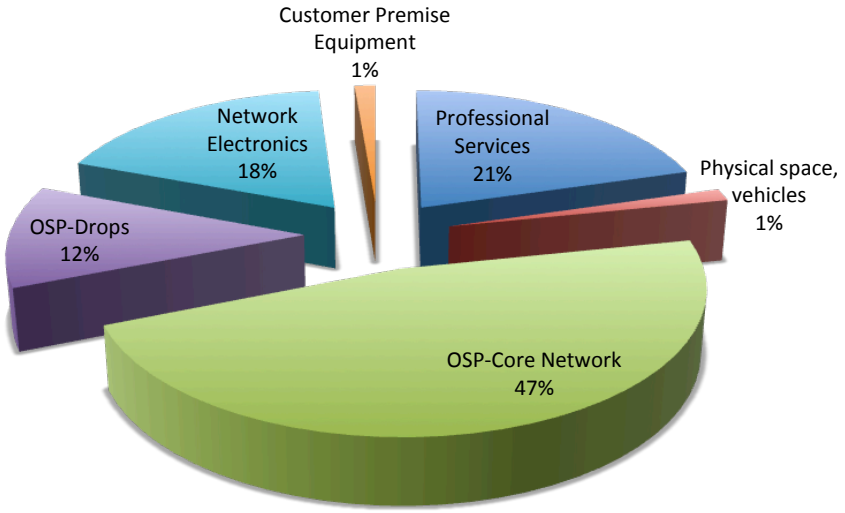


Figure 82 – Cumulative capital expenditures from 2018 to 2022.

8.3.5 Operations

The operational costs for wholesale network operation are straightforward as most are handled via outsourced contracts. Once the network build is completed in 2018 and the target penetration rates are realized, operational costs stabilize and a view of those calculated for 2022 are shown in Figure 83. In the chart, Admin, ops, and o-e refer to administration, operations, and opto-electronics, respectively. The numbers assume that the Town of Bruderheim provides both equipment and storage space at no charge.

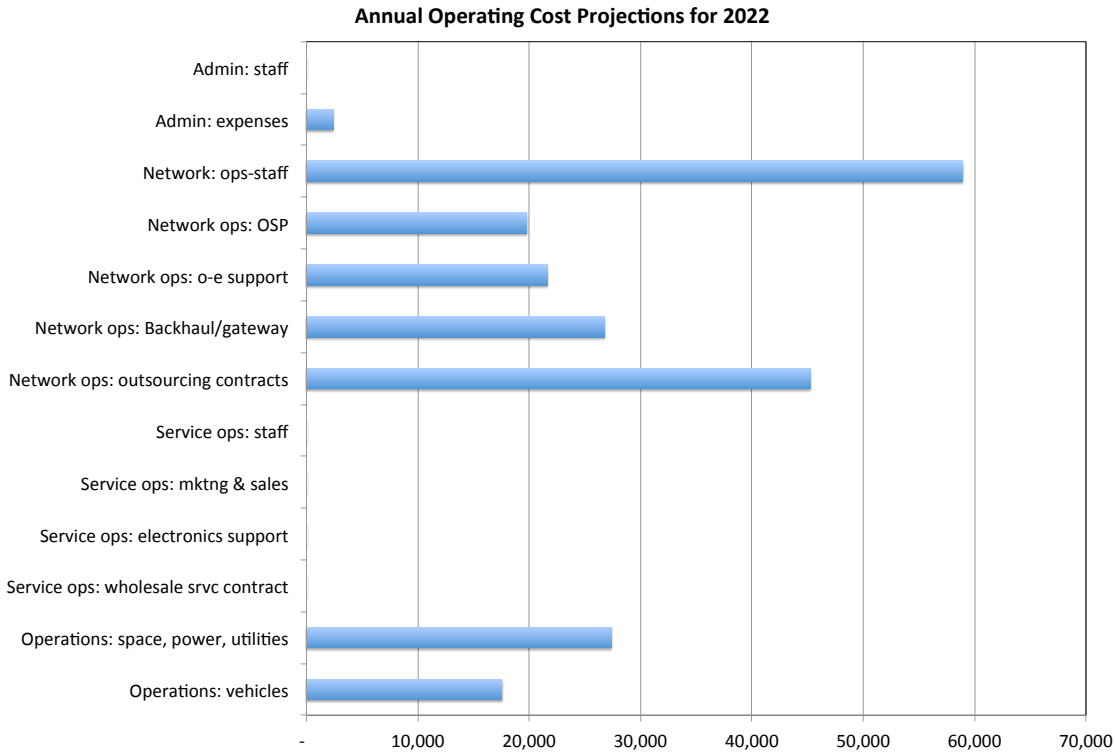


Figure 83 – Projected operational costs in 2022.

8.3.6 Financial Projections

Cashflow results for this scenario for Bruderheim are summarized in Table 30. Though the operation goes cashflow positive in year 5[130], with debt servicing considered, the overall financials do not go cashflow positive until year 9. As the required capital must therefore be sufficient to cover an 8-year deficit, some $2.92M in capital will be required to fund the operation. By year 15, approximately $222,859 is being returned to the Town annually.

Table 30 – Utility Model Results Summary for Bruderheim and Lamont

Bruderheim

	Results
Years to positive cashflow	
Operating	4
With debt servicing (p&i)	8
Financing	
Start-up capital required	2,922,361
Net Cashflow - before debt servicing	
Profit - annual at 10 yr	193,415
Profit - annual at 15 yr	321,991
Net Cashflow - after debt servicing	
Profit - annual at 10 yr	98,748
Profit - annual at 15 yr	222,859

Bruderheim & Lamont

	Results
Years to positive cashflow	
Operating	4
With debt servicing (p&i)	4
Financing	
Start-up capital required	4,799,786
Net Cashflow - before debt servicing	
Profit - annual at 10 yr	419,853
Profit - annual at 15 yr	590,979
Net Cashflow - after debt servicing	
Profit - annual at 10 yr	270,043
Profit - annual at 15 yr	433,065

In graphical form, the non-discounted cashflow chart for the proposed utility appears in Figure 84. The capital (red) required to finance the project is shown to pretty much all be required upfront and the financing must be sufficient to maintain a net cashflow of at least zero. Operational sustainability is determined by the gap or difference between the revenue (blue) and operational expenditure (green) lines whereas overall sustainability, which includes principal repayment, is the difference between the revenue (blue) and the operational + principal repayment (dotted blue) lines. The bigger the gap, the better. The net overall cashflow line is the dotted orange line.

While technically these numbers work, operationally, the risk is high due to the small margins and resulting deficits. Given the small client base available in Bruderheim and the importance of scale to operational sustainability, these initial results are typical for communities with small populations. To mitigate the scale issue, Bruderheim might consider partnering with a neighbouring communities. Say, for instance, that the Town of Lamont were to be interested. If Bruderheim and Lamont jointly deployed a utility fibre network and shared operations, the cashflow results would change to those on the left side of Table 30. Being slightly larger than Bruderheim, bringing Lamont on-board more than doubles the projects capital requirements. On the other hand, the increased scale improves margins sufficiently that the project goes cashflow positive in year 5, even with principal repayments considered, and the net profit almost doubles. The cashflow chart for the combined operation appears in Figure 85. As can be seen, the model assumed that the Bruderheim network was deployed in 2018 and Lamont in 2019.

[130] With 4 years to positive cashflow, the project goes cashflow positive in year 5.

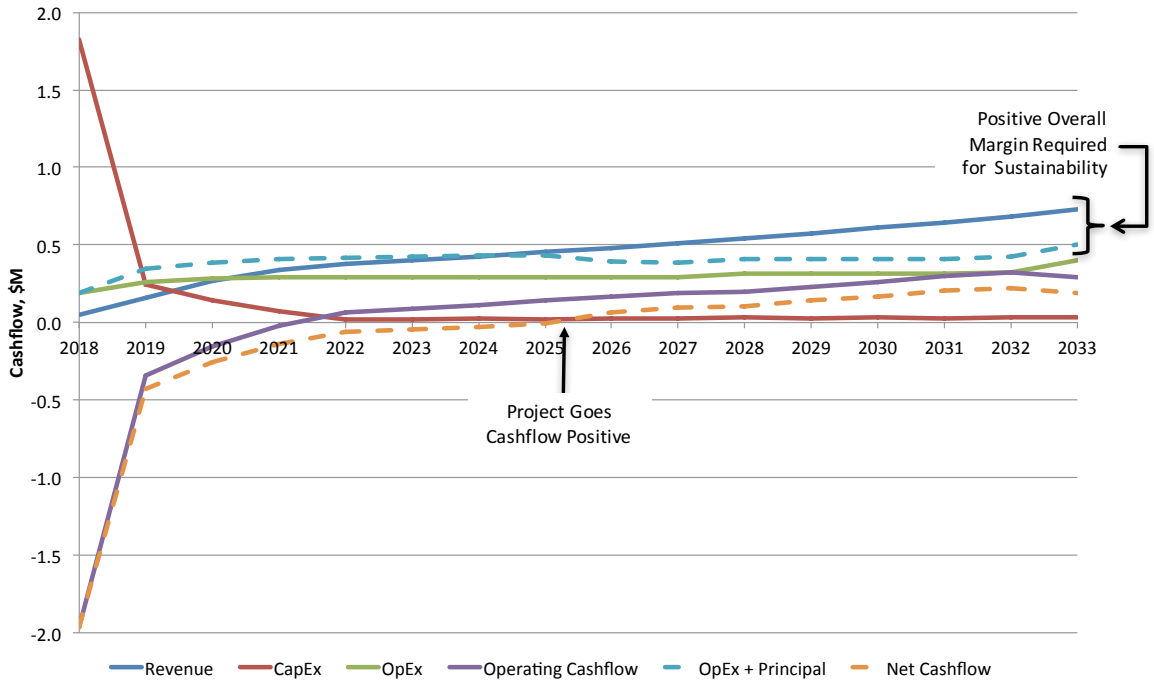


Figure 84 – Non-discounted cashflow projections for Bruderheim.

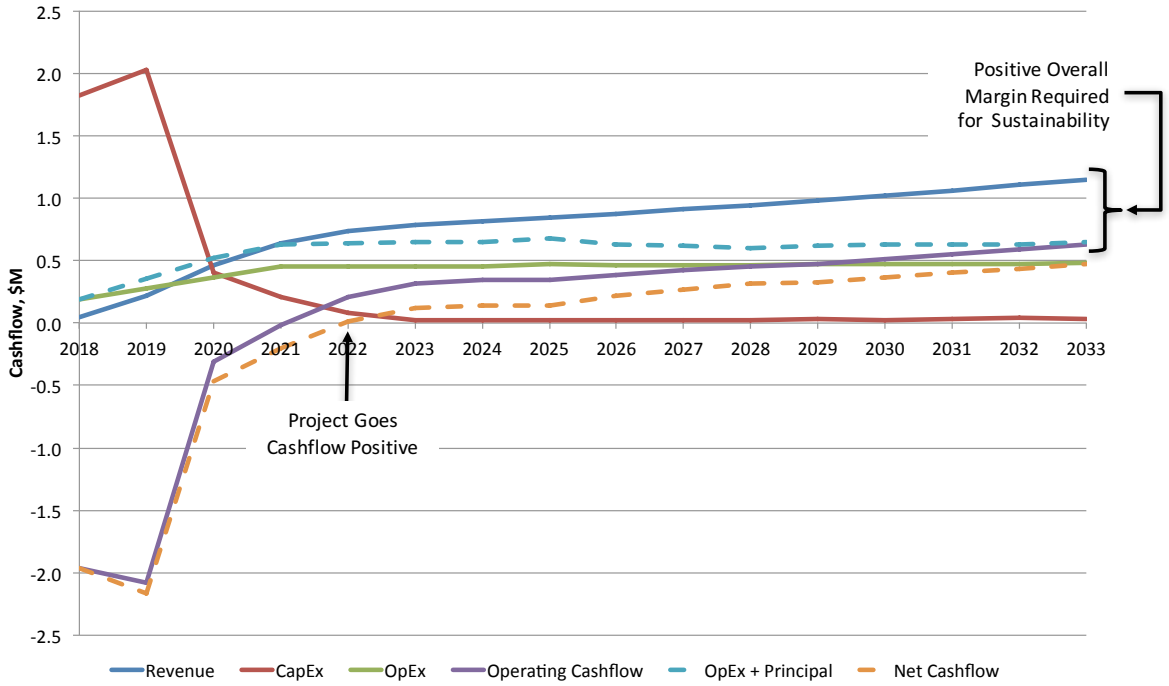


Figure 85 – Non-discounted cashflow projections for Bruderheim and Lamont.

Additional options to be considered to improve margins are outlined in Sub-section 6.5.10.

8.4 Lac La Biche – An Inclusive Regional Network

8.4.1 Context

A map of Lac La Biche County appears in Figure 86. Hamlets are marked by yellow pins. From a fibre perspective, as there are very few premises in Hylo and Venice, they can be well served via wireless and will not be considered further. Rich Lake, though is home to about 153 premises and will be. SuperNet access sites are shown with yellow text and circles. SuperNet access sites enable connections back to Internet exchanges in Edmonton and Calgary without the need for additional fibre deployment. Each community network must at least indirectly connect back to an Internet Exchange.

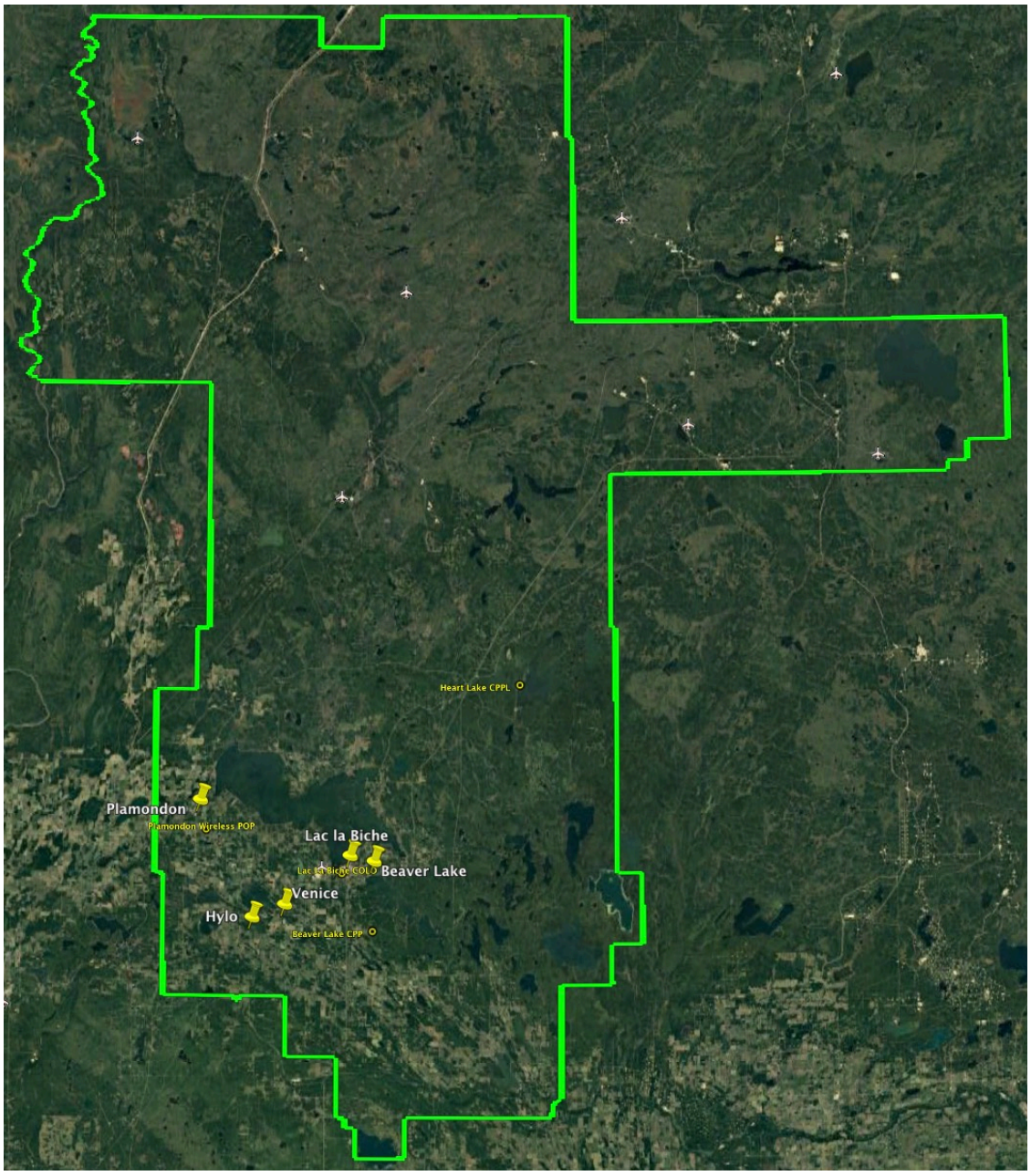


Figure 86 – Lac La Biche County.

8.4.2 Default Scenario

Assume that Lac La Biche County, inclusive of all the municipalities within its boundaries deploys an open-access, lit fibre-optic network that will make world-class, fully scalable broadband infrastructure available to every home and business in the small urban centres of Lac La Biche, Plamondon, Beaver Lake, and Rich Lake. In the analysis below, the business structure, opto-electronics and backhaul, operations, drop capital, and markets and revenues assumed are those outlined in the default implementation scenario presented in Section 6.5. In this case, the local network entity established to house the local fibre operation will be referred to as L-Net.

8.4.3 Deployment Capital

Deploying an inclusive regional network involves both laying fibre to connect all communities and enable connections to key ISP towers (towers that the ISPs would upgrade if a fibre connection became available) as well as deploying access, FTTP networks in the urban centres.

The intercommunity network laid out for Lac La Biche county is shown in yellow in Figure 87. The network provides connections from the hamlet of Lac La Biche to Plamondon, Beaver Lake (and a landfill site east of Beaver Lake), Hylo, and Rich Lake. In the figure, key ISP towers are shown by blue and red triangles. The fibre routes shown in white extend off the intercommunity network and provide connections to these towers. Within the urban centres, the proposed access networks shown have two components – the feeder routes are shown in magenta and the distribution routes in cyan. An enlarged version of the FTTP network for the hamlet of Lac La Biche appears in Figure 88.

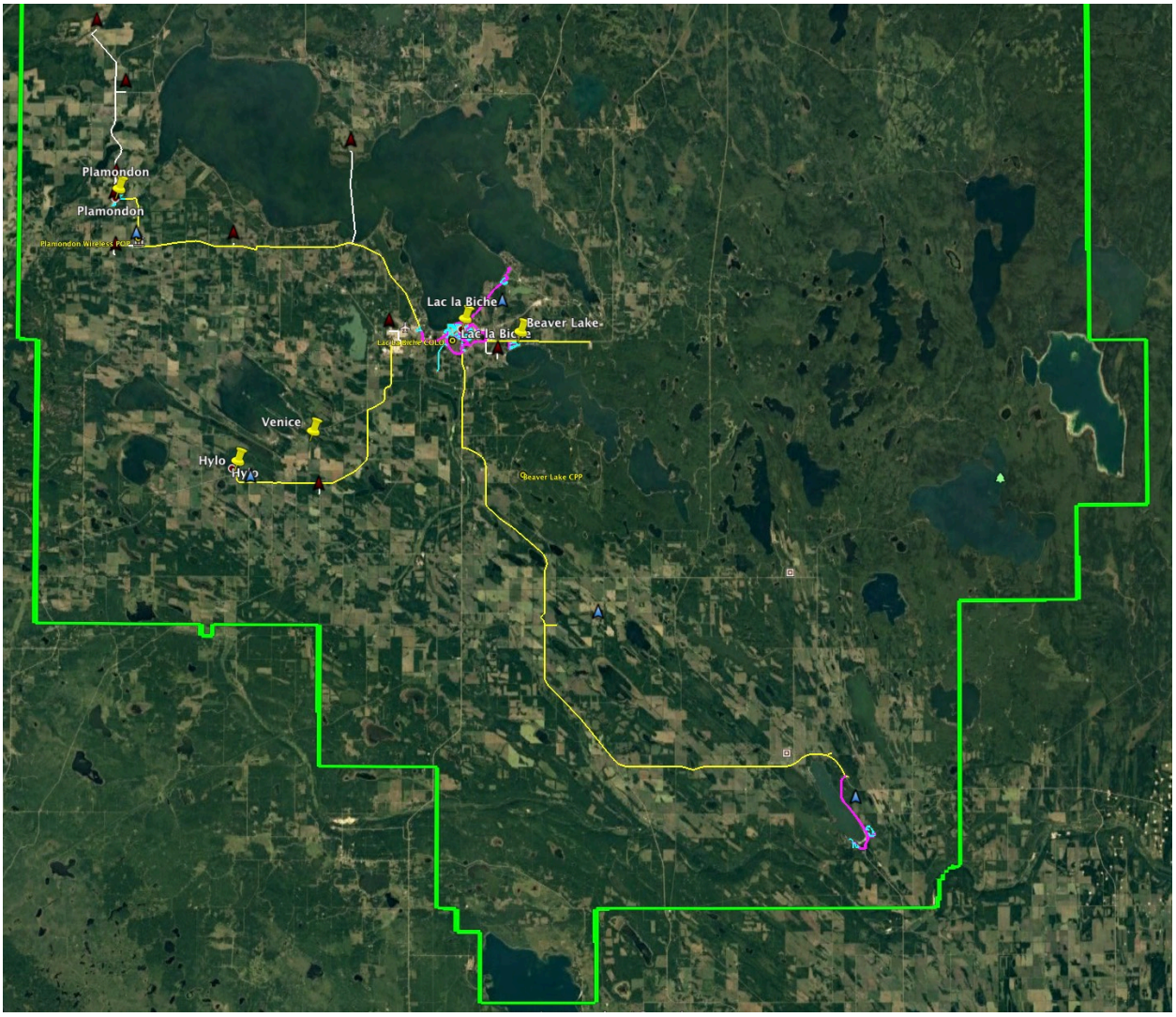


Figure 87 – Utility fibre network for Lac La Biche.

The capital costs to deploy both the inter-community network and access networks in each community are shown in Table 31. In this context, access refers to laying fibre that passes every premise in a community. Overall cost, should the entire network be deployed, comes to about $9.12M. To become functional, additional capital will then be needed to cover the costs of the drop connections to those premises subscribing to ISP services and the network electronics that will be needed.

Given the low overall population and the miles of fibre that are needed, the county-wide business case, based strictly on potential wholesale revenue is negative – both a capital recovery perspective and operational sustainability. To lower upfront deployment costs and increase cashflow by initially deploying only to population centres and using SuperNet access points in those centres to save on the intercommunity deployment only works for the hamlet of Lac La Biche as SuperNet access points are not available in BeaverLake, Plamondon, or Rich Lake.

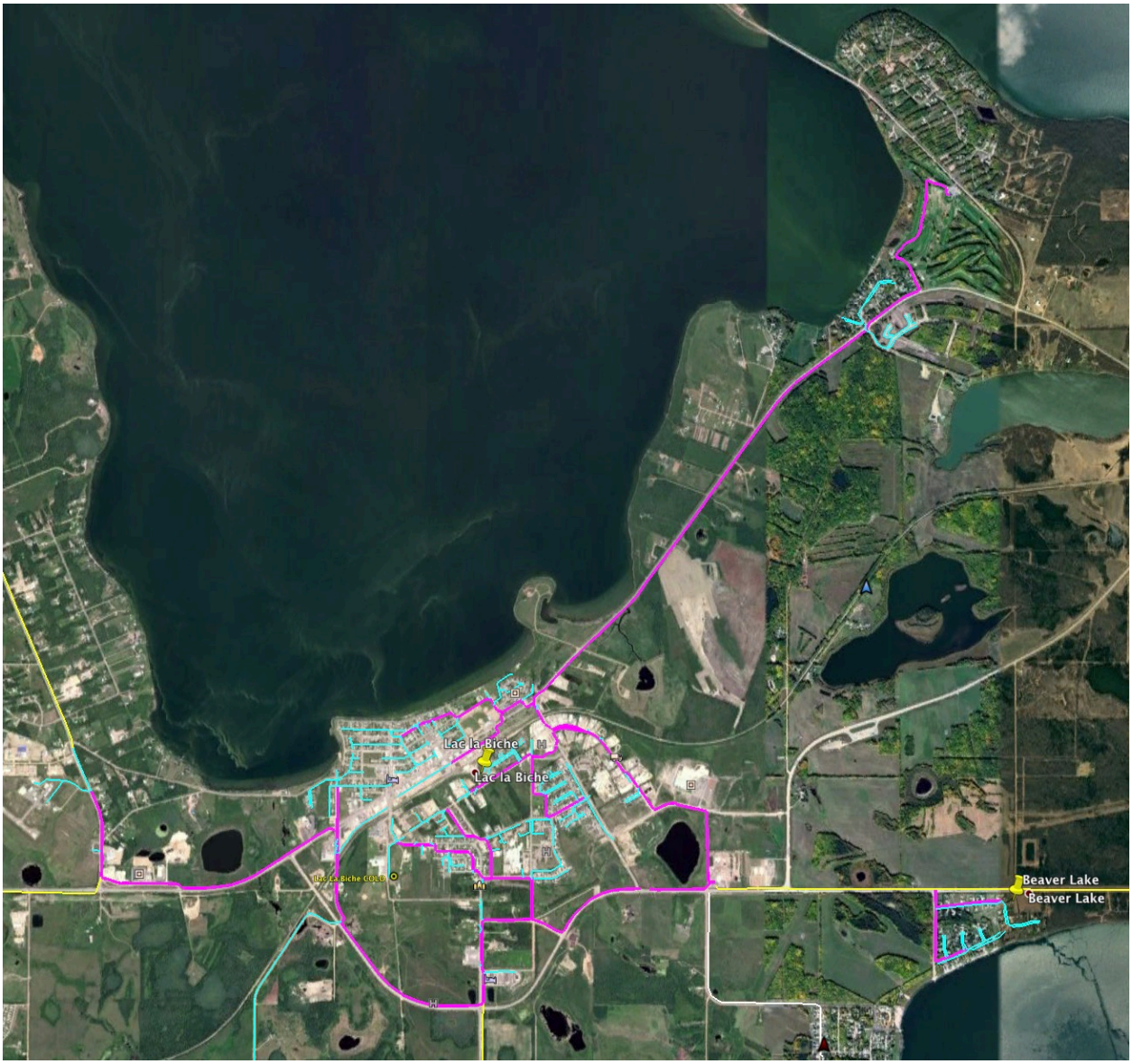


Figure 88 – Utility FTTP network for the Hamlet of Lac La Biche.

Table 31 – Deployment Cost Summary for Lac La Biche

	County Backbone Routes					Hamlets and Localities				
Network Component	LLB Airport to Plamondon	LLB Airport to Hylo	Cnty Office to Beaver Lk Landfill	LLB to Rich Lake Landfill	Spurs to Priority towers	Lac La Biche	Plamondon	Beaver Lake	Rich Lake	
Year of Deployment			2018			2020				
Feeder	535,745	468,210	131,480	772,890	983,575	1,254,533	29,623	124,004	235,931	
Distribution	-	-	-	-	-	1,254,625	222,845	233,200	444,440	
Subtotal - civil construction	535,745	468,210	131,480	772,890	983,575	2,509,158	252,468	357,204	680,371	6,691,101
Mobilization/De-mobilization	10,715	9,364	2,630	15,458	19,672	50,183	5,049	7,144	13,607	133,822
Engineering, Permitting, and Planning	53,575	46,821	13,148	77,289	98,358	270,493	26,728	41,921	79,834	708,165
Activation: Fibre Micro-cabling	188,601	147,896	50,232	359,338	187,530	518,252	6,482	18,046	107,772	1,584,149
Grand-total, deployment	788,635	672,291	197,490	1,224,975	1,289,134	3,348,086	290,727	424,315	881,584	9,117,237

In an effort to get a sustainable business case, assume that a fibre network is just deployed in the hamlet of Lac La Biche and to reduce costs further, the fibre run NE to the golf course is removed. This leaves the network footprint shown in Figure 89. The capital costs for this option is $3.01M or $2,355/premise.

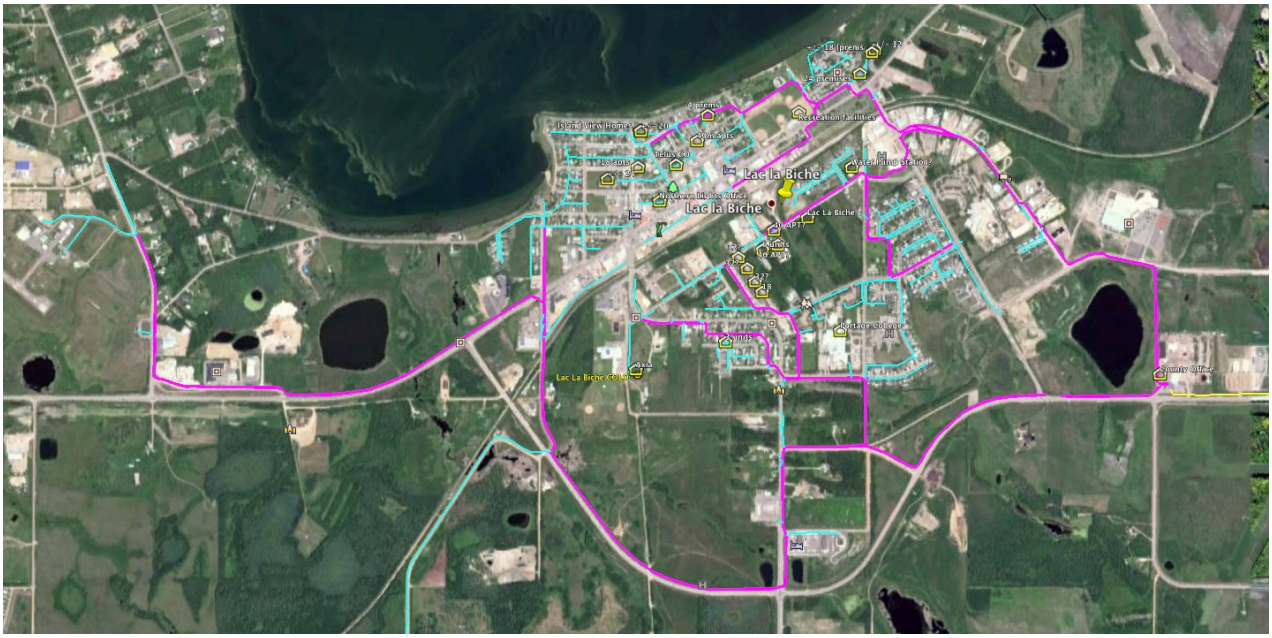


Figure 89 – Scaled down utility FTTP network for the Hamlet of Lac La Biche.

A breakdown of the capital expenditures over the first five years of operation appears in the pie chart in Figure 90. The pie chart represents expenditures of $5.62M and assumes that the ISPs using the network obtain a collective market penetration of 50% of the residential and 70% of the business communities.

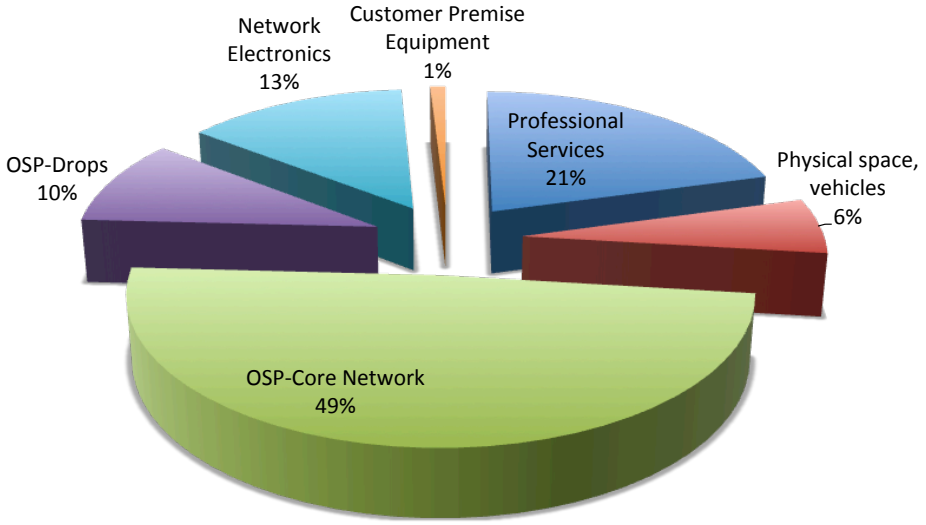


Figure 90 – Cumulative capital expenditures from 2018 to 2022.

8.4.4 Operations

Operational costs include payments to O-Net for network management and monitoring services and for local technical staff required to maintain the network. A breakdown of the expenses, as estimated for the 2022 operating year, appears in Figure 91 for the scenario proposed. In the chart, Admin, ops, o-e, and mktng refer to administration, operations, opto-electronics, and marketing respectively. All service-related costs are zero as responsibility for those remains with the ISPs.

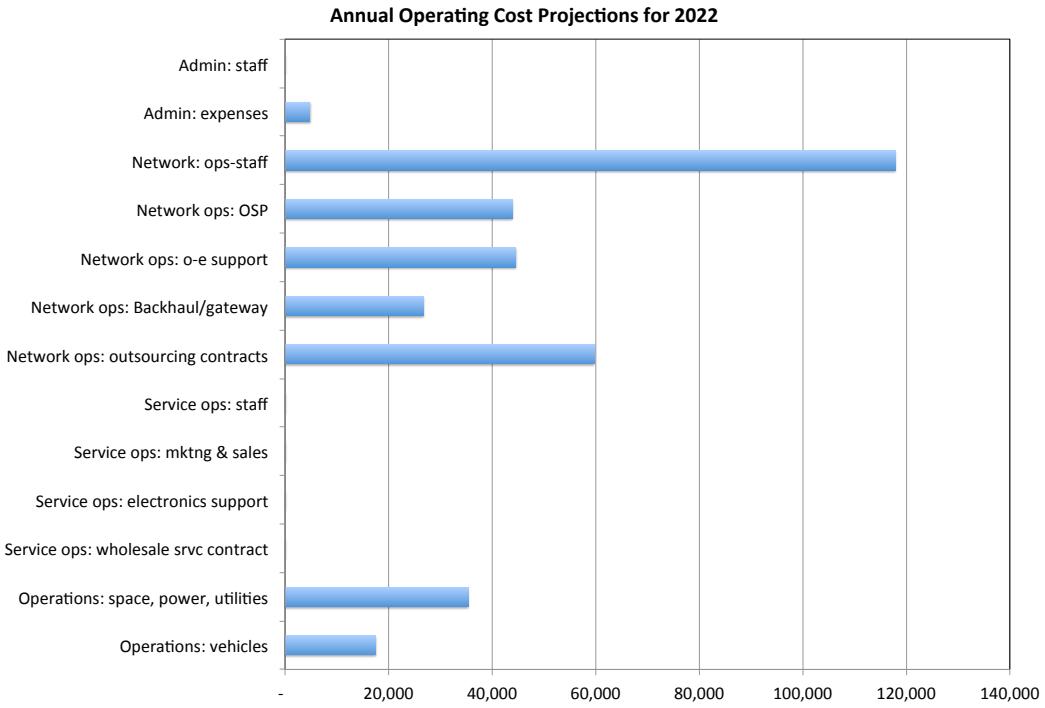


Figure 91 – Annual operational cost projections for the Lac La Biche fibre network in 2022.

8.4.5 Financial Projections

The cashflow results for this scenario are summarized on the left side of Table 32. Though the operation goes cashflow positive in year 5,[131] with debt servicing considered, the overall financials does not go cashflow positive and the operations runs at a deficit. As the required capital must therefore be sufficient to cover a 15-year deficit, some $7.09M in capital will be required to fund the operation.

Table 32 – Utility Model Results Summary for the hamlet of Lac La Biche

Lac La Biche – Debt Financing Only

	Results
Years to positive cashflow	
Operating	4
With debt servicing (p&i)	16
Financing	
Start-up capital required	7,086,399
Net Cashflow - before debt servicing	
Profit - annual at 10 yr	110,507
Profit - annual at 15 yr	212,857
Net Cashflow - after debt servicing	
Profit - annual at 10 yr	0
Profit - annual at 15 yr	0

Lac La Biche – $2.5M Grant

	Results
Years to positive cashflow	
Operating	3
With debt servicing (p&i)	4
Financing	
Start-up capital required	3,127,262
Net Cashflow - before debt servicing	
Profit - annual at 10 yr	195,056
Profit - annual at 15 yr	286,928
Net Cashflow - after debt servicing	
Profit - annual at 10 yr	106,547
Profit - annual at 15 yr	183,824

On the other hand, if a $2.5M grant or cash infusion were available, the principle repayments decrease sufficiently that the operation goes cashflow positive overall in year 5 – as shown in the summary results

[131] With four years to positive cashflow, the project goes cashflow positive in year 5.

on the left side of Table 32. Required capital reduces to $3.13M and by year 10, some $106,547 is being returned to the hamlet annually.

In graphical form, the non-discounted cashflow chart for the debt-financed deployment appears in Figure 92. As the margin is negative, the operation would require an annual infusion of cash to be sustainable. The cashflow chart for $2.5M grant funded scenario appears in Figure 93.

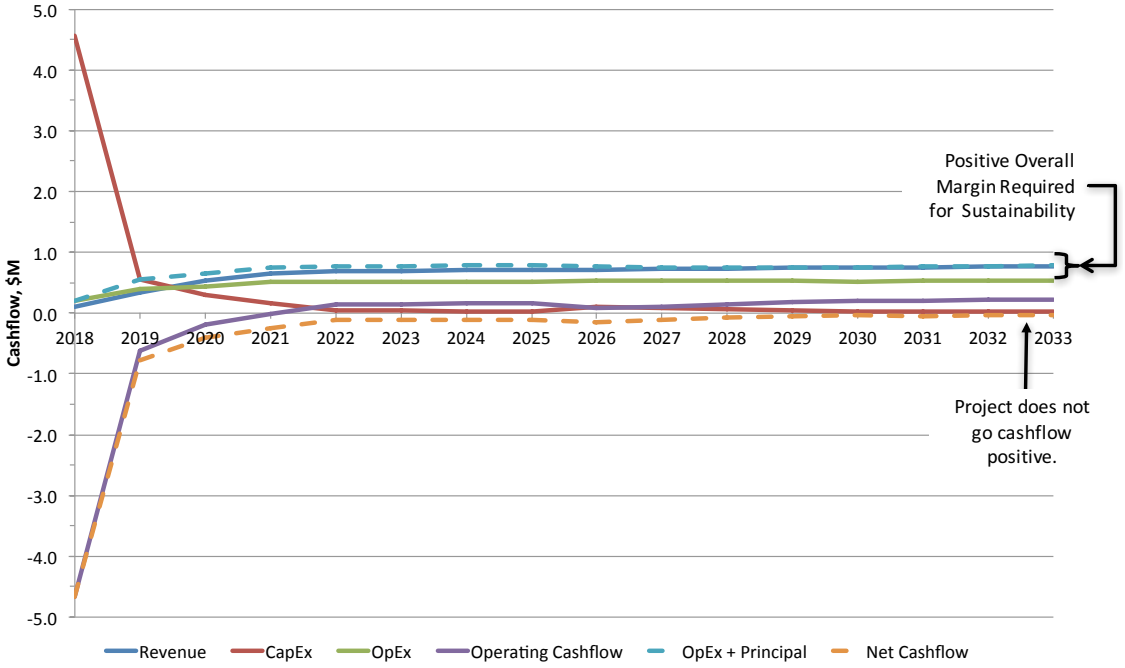


Figure 92 – Non-discounted cashflow projections for the Lac La Biche network.

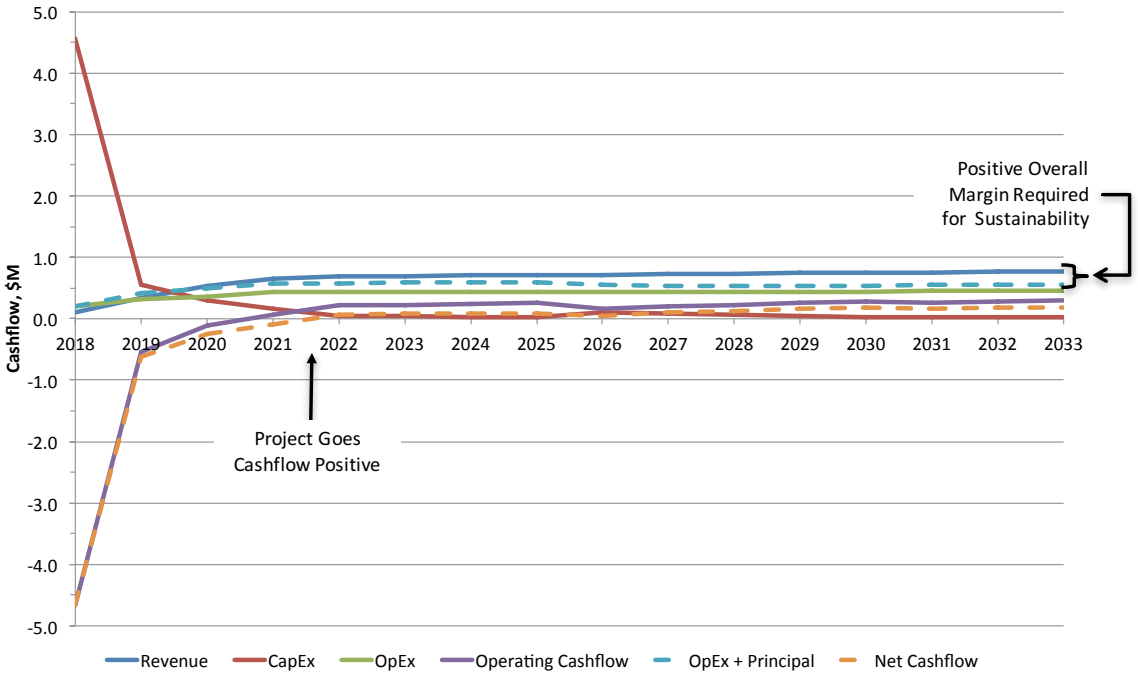


Figure 93 – Non-discounted cashflow projections assuming a $2.5M grant.

Options to improve margins further and decrease risk were discussed in the Sub-section 6.5.10.

8.5 Vermilion River Regional Alliance – An Inclusive Regional Network

8.5.1 Context

Within the Alberta HUB, the Vermilion River Regional Alliance (VRRA) and its partner communities are the most advanced in recognizing the importance of broadband and looking for solutions to move forward. A map of the Alliance Region appears in Figure 94. Towns and hamlets are marked with orange and yellow pins. SuperNet access sites are shown with yellow text and circles. SuperNet access sites enable connections back to Internet exchanges in Edmonton and Calgary without the need for additional fibre deployment. Each community network must at least indirectly connect back to an Internet Exchange.

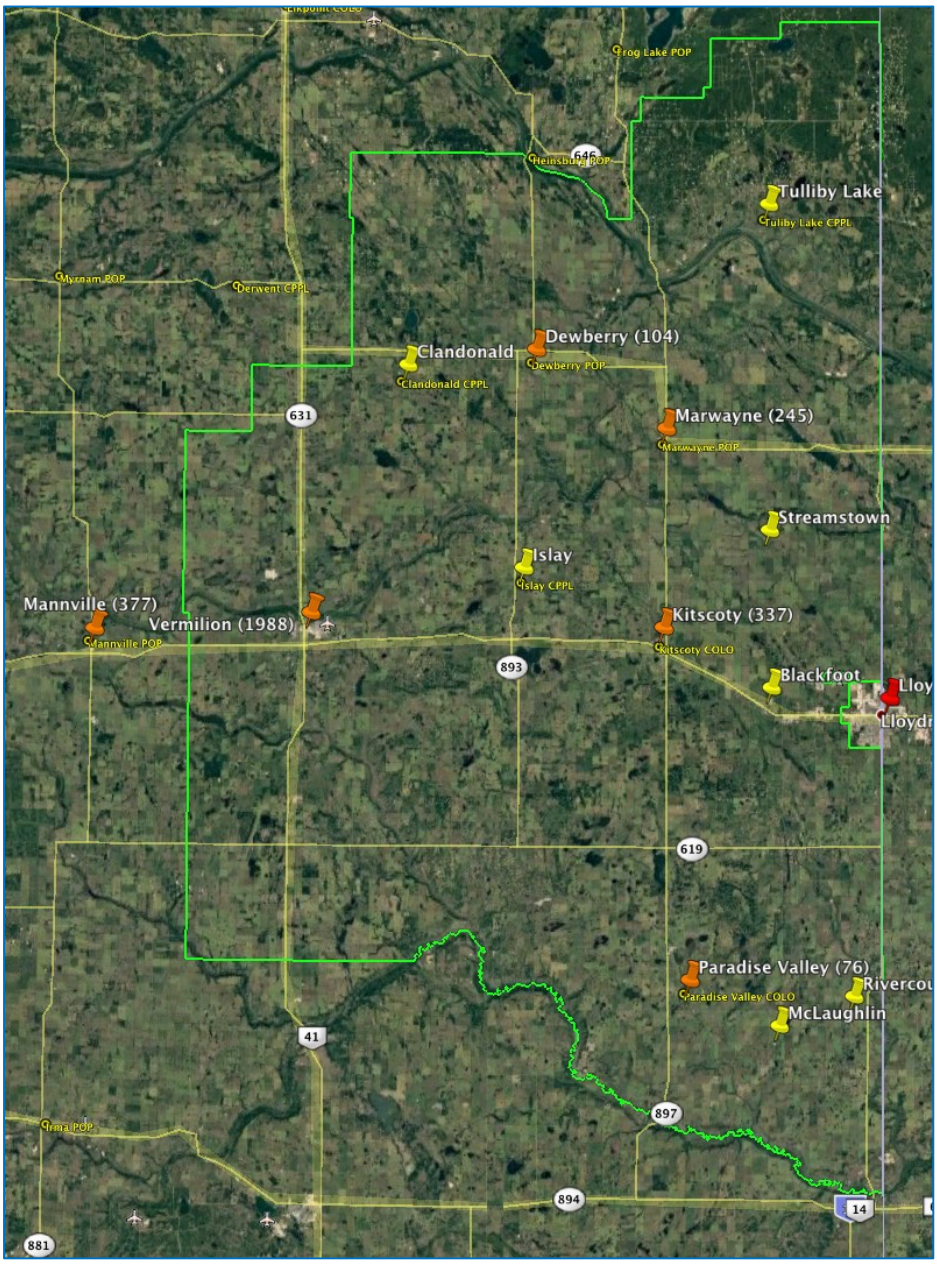


Figure 94 – The Vermilion River Regional Alliance.

The VRRA took the initiative to apply for CARES funding for a detailed study for the region, inclusive of the municipalities within its boundaries – specifically Town of Vermilion (lead), Dewberry, Kitscoty, Mannville,

Marwayne, and Paradise Valley. The study – *VRRA Broadband Research Project* – will leverage the results of this work and then develop more detailed financials to evaluate the options of most interest to the region. As the more detailed financials have already been developed, they will be used in the analyses presented – thereby increasing both the accuracy and credibility of the financial results presented.

8.5.2 Business Structure

Assume that the VRRA, inclusive of all the municipalities within its boundaries deploys an open-access, lit fibre-optic network that will make world-class, fully scalable broadband infrastructure available to every home and business in the town of Vermilion (lead), the villages of Dewberry, Kitscoty, Mannville, Marwayne, and Paradise Valley, and the hamlets of Blackfoot, Clandonald, Islay, McLaughlin, Rivercourse, Streamstown, and Tulliby Lake. In the analysis below, the business structure, opto-electronics and backhaul, operations, drop capital, and markets and revenues assumed are those outlined in the default implementation scenario presented in Section 6.5. In this case, the local network entity established to house the local fibre operation will be referred to as V-Net.

8.5.3 Deployment Capital

Deploying an inclusive regional network involves both laying fibre to connect all communities and enable connections to key ISP towers (towers that the ISPs would upgrade if a fibre connection became available) as well as deploying access, fibre-to-the-premise networks in all towns, villages, and hamlets.

Normally this would be done over a number of years and staged in a way as to minimize impact on cashflow and capital requirements. For simplicity here, assume that the full intercommunity network and the fibre access network are deployed in 2018 and FTTP networks in the remaining villages are completed in 2019. The intercommunity network is shown in yellow in Figure 95. In the figure, the red balloons represent key ISP towers. An example of the FTTP network, that for the Town of Vermilion, appears in Figure 96. The core feeder ring is in blue, the distribution feeder routes are in magneta and the distribution network is in cyan.

The capital costs to deploy both the connection network and access networks in each community are shown in Table 33. In this context, access refers to laying fibre that passes every premise in a municipality. Later, when a premise orders service, a fibre drop connection from the premise to the fibre running past the premise will be needed. Overall cost, should the entire network be deployed, comes to about $10.3M. In the financial projections which follow, the year of deployment for each community is shown in the tan coloured row. Overall, the network will be deployed over the two-year period from 2018 to 2019.

Table 33 – Deployment Cost Summary

	County Backbone Routes					Towns	Villages				
Network Component	From Kitscoty SN POP	From Dewberry SN POP	From Marwayne SN POP	From Paradise Valley SN PO	From Town of Vermilion	Vermilion	Dewberry	Kitscoty	Marwayne	Paradise Valley	Mannville (Minburn)
Year of Deployment	2018	2018	2018	2018	2018	2018	2019	2019	2019	2019	2019
Feeder	629,502	76,640	180,839	247,400	60,135	1,093,164	46,255	140,621	111,988	49,062	152,397
Distribution	-	-	-	-	-	2,011,550	166,800	512,430	289,465	157,560	314,090
Subtotal - civil construction	629,502	76,640	180,839	247,400	60,135	3,104,714	213,055	653,051	401,453	206,622	466,487
Mobilization/De-mobilization	12,590	1,533	3,617	4,948	1,203	21,863	4,261	13,061	8,029	4,132	9,330
Engineering, Permitting, and Planning	94,425	11,496	27,126	37,110	9,020	262,513	27,584	116,814	106,120	14,209	14,928
Activation: Fibre Micro-cabling	1,202,100	229,920	500,745	742,200	180,405	262,513	10,125	28,845	28,920	11,130	40,110
Grand-total, deployment	1,938,617	319,589	712,327	1,031,658	250,763	3,651,603	255,025	811,771	544,522	236,094	530,854
					4,252,954						6,029,871

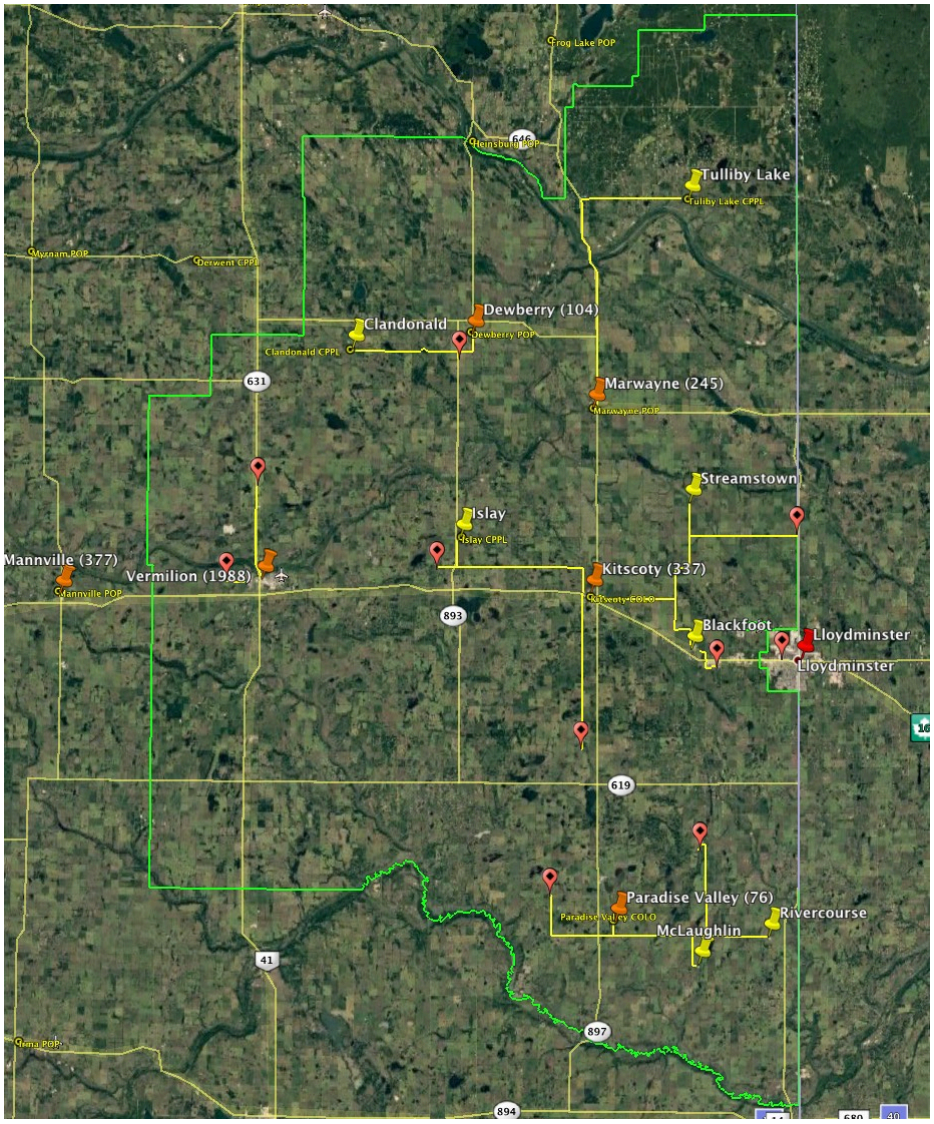


Figure 95 – Utility fibre network for the VRRA.

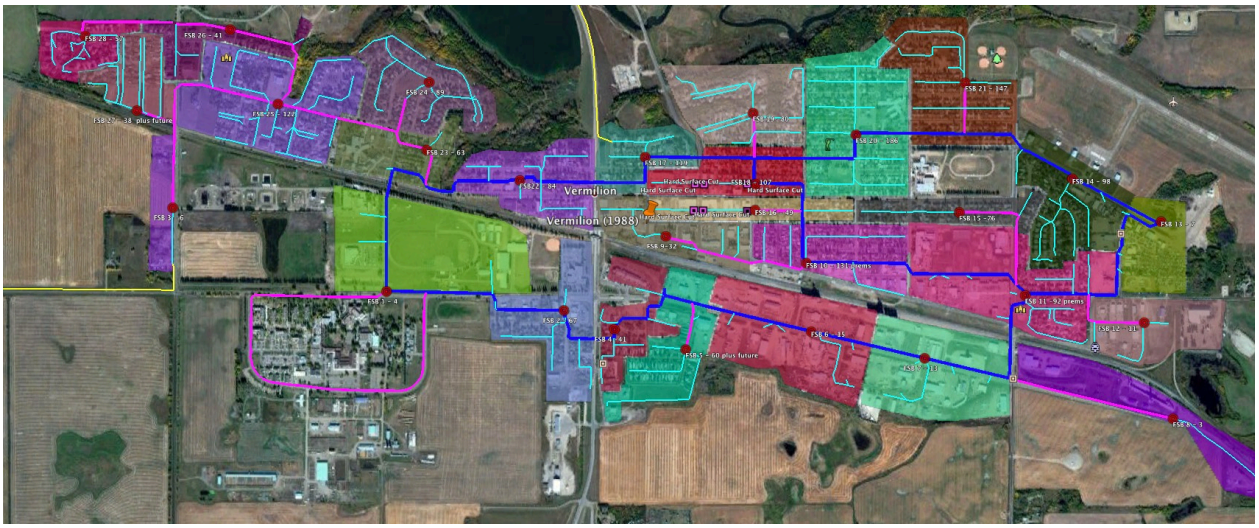


Figure 96 – Utility FTTP network for the Town of Vermilion.

A breakdown of the capital expenditures over the first five years of operation appears in the pie chart in Figure 97. The pie chart represents expenditures of $14.0M and assumes that the ISPs using the network obtain a collective market penetration of 50% of the residential and 70% of the business communities.

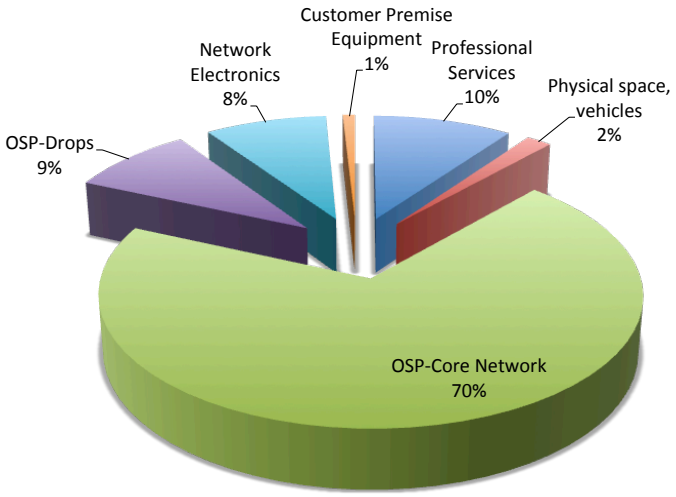


Figure 97 – Cumulative capital expenditures from 2018 to 2022.

8.5.4 Operations

Operational costs include payments to O-Net for network management and monitoring services and for local technical staff required to maintain the network. A breakdown of the expenses, as estimated for the 2022 operating year, appears in Figure 98 for the scenario proposed. In the chart, Admin, ops, o-e, and mktng refer to administration, operations, opto-electronics, and marketing respectively. All service-related costs are zero as responsibility for those remains with the ISPs.

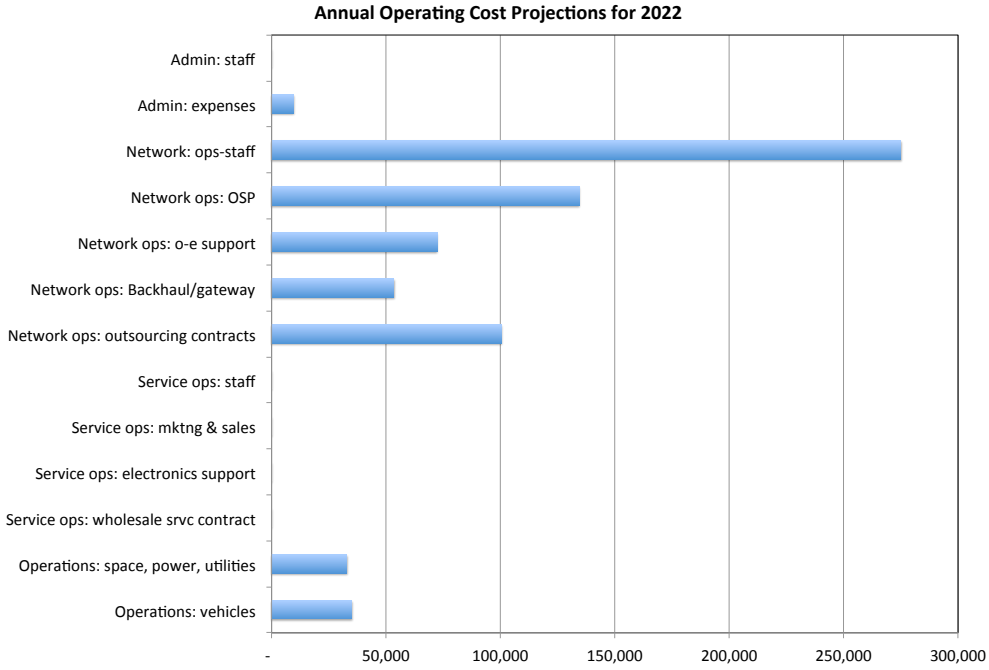


Figure 98 – Annual operational cost projections for the utility fibre network in 2022.

8.5.5 Financial Projections

Cashflow results for this scenario are summarized in Table 34. Though the operation goes cashflow positive in year 5,[132] with debt servicing considered, the overall financials do not go cashflow positive until year 13. As the required capital must therefore be sufficient to cover a 12-year deficit, some $15.7M in capital will be required to fund the operation. By year 15, approximately $63,319 is being returned to the Town annually.

Table 34 – Utility Model Results Summary for the VRRA – all in

	Results
Years to positive cashflow	
Operating	4
With debt servicing (p&i)	12
Financing	
Start-up capital required	15,707,746
Net Cashflow - before debt servicing	
Profit - annual at 10 yr	398,832
Profit - annual at 15 yr	639,363
Net Cashflow - after debt servicing	
Profit - annual at 10 yr	0
Profit - annual at 15 yr	63,319

In graphical form, the non-discounted cashflow chart for the proposed deployment appears in Figure 99. While technically these numbers work, operationally, the risk is too high due to the negligible margins and resulting deficits. Given the small client base available, the assumption to deploy everything upfront – particularly the intercommunity network, and the importance of scale to operational sustainability, these initial results are typical but very encouraging. Basically, with worst-case deployment assumptions, no leverage from other linear infrastructure projects, and an extensive intercommunity network, the business case '*works'*. Wow!

Options to improve margins sufficiently that a community might elect to pursue a deployment are many and varied. To start with, the deployment schedule would be staged – much of the intercommunity network, for instance could be deployed later once the operation was up and running. Let's say that the intercommunity network is delayed or covered by grant funding. The new summary financials appear in Table 35 and the cashflow chart in Figure 100. With these results, the project is financially sound. The project now goes cashflow positive overall by year 4 and by year 10, some $257,289/yr is being returned to the Alliance.

[132] With four years to positive cashflow, the project goes cashflow positive in year 5.

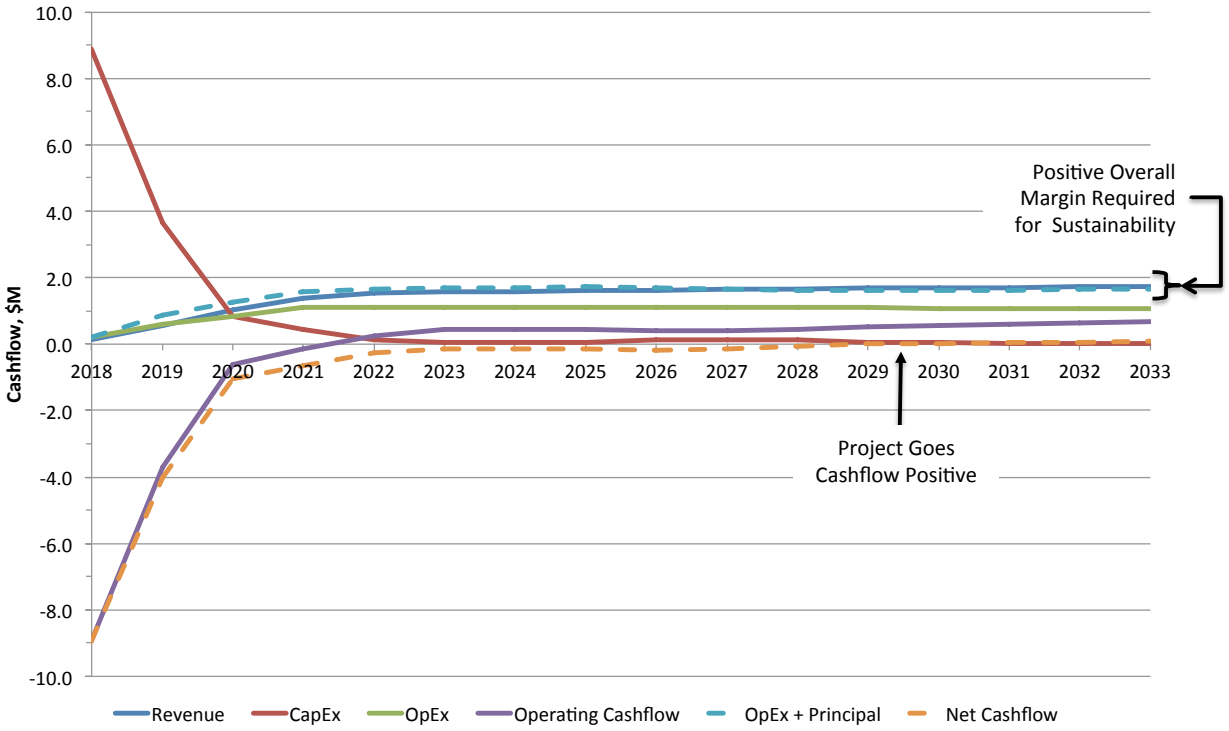


Figure 99 – Non-discounted cashflow projections for the VRRA network.

Table 35 – Utility Model Results Summary for the VRRA – delayed Intercommunity Build

	Results
Years to positive cashflow	
Operating	3
With debt servicing (p&i)	4
Financing	
Start-up capital required	9,487,035
Net Cashflow - before debt servicing	
Profit - annual at 10 yr	586,853
Profit - annual at 15 yr	799,653
Net Cashflow - after debt servicing	
Profit - annual at 10 yr	257,289
Profit - annual at 15 yr	464,312

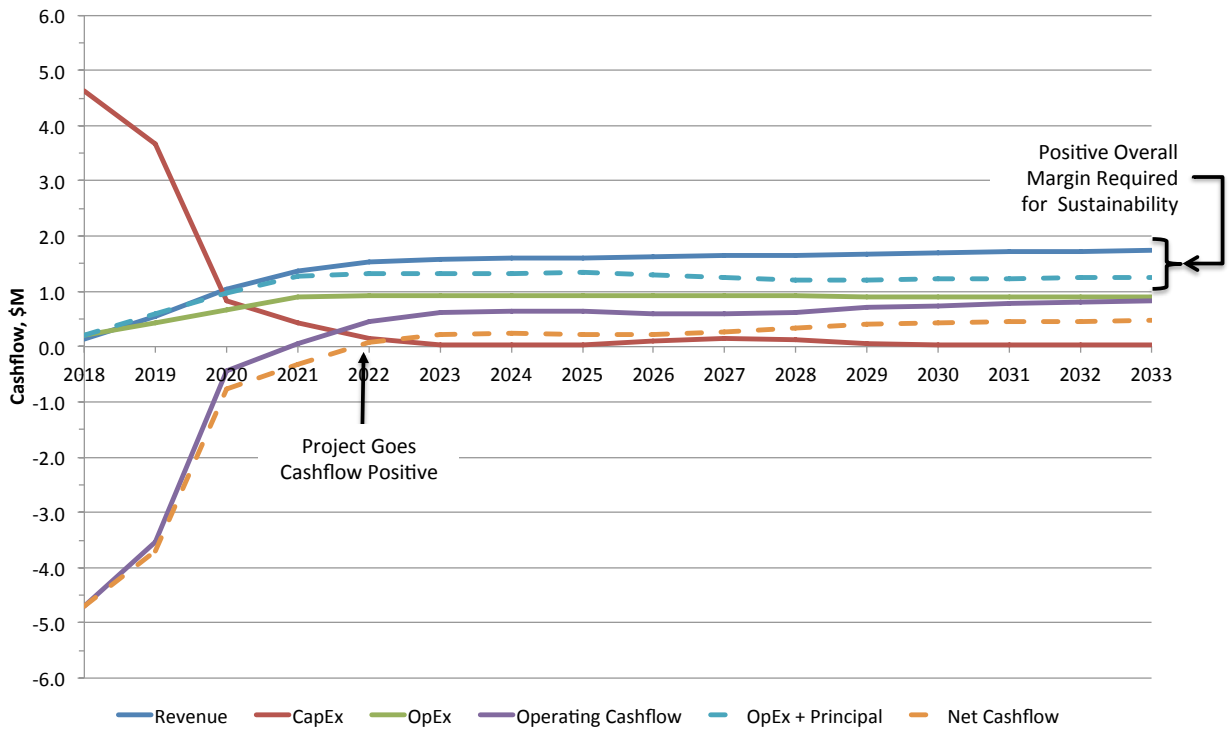


Figure 100 – Non-discounted cashflow projections for the VRRA network.

Other options to consider to improve margins were discussed in Sub-section 6.5.10.

8.6 Extrapolating the Results

8.6.1 Municipal Networks

Though representative financials were only provided for one urban centre – a town with just over 600 premises – financials for urban centres both larger and smaller are available for consideration in the other reports. As outlined in Table 7, comparative results for communities ranging in size from 4,250 premises down to 725 are available in both the GROWTH Alberta and NADC reports. Whereas financials for centres with in excess of some 2,000 premises are sustainable out of the gate, to reduce risk and improve sustainability, urban centres with less than 2,000 premises will need to collaborate and/or incorporate additional options to make the numbers work.

8.6.2 Regional Networks

As the low densities and small communities found in Lac La Biche County are typical of many in the northern Alberta region, the issues faced by Lac La Biche will be similar to those faced by others. Even though the urban centres are concentrated in the southern half of Lac La Biche and an intercommunity network could be deployed for $4.17M, the densities are too low to establish a sustainable business case for fibre. Hence, either grant funding, a cash infusion, or a staged rollout over many years will be needed. Other options to improve the financials include cost sharing with local ISPs, leveraging linear infrastructure projects, and/or moving some of the cost to the tax roll, as is done for road and water infrastructure.

Even with worst-case deployment assumptions and no leverage from other linear infrastructure projects, the increased population numbers for the VRRA area help ensure that the financials for an extensive, inclusive, open-access fibre network in the VRRA area, ‘work’. The result is very encouraging.

9 Grizzly Regional Economic Alliance Society (GROWTH Alberta)

9.1 Current State

9.1.1 Regional Profile

As shown in Table 36, the study examines the current state of broadband within the Grizzly Regional Economic Alliance Society (GROWTH Alberta) region, a region encompassing 6 towns, 3 villages, 13 summer villages, 4 counties, and the Alexia Nakota First Nation. A map of the GROWTH Alberta region is shown in Figure 101. Please visit GROWTH Alberta's website for more information http://growthalberta.com/.

Table 36 – GROWTH Alberta Communities

Towns	Villages	Summer Villages	Counties	First Nations
Barrhead Mayerthorpe Onoway Swan Hills Westlock Whitecourt*	Alberta Beach▲ Clyde Wabamun	Birch Cove Castle Island Larkspur Nakamun Park Ross Haven Sandy Beach Silver Sands South View Sunrise Beach Sunset Point Val Quentin West Cove Yellowstone	Barrhead Lac Ste. Anne Westlock Woodlands	Alexis Nakota▲

*Community resides within the northern Alberta study area and the NADC region but is not presently a member of a REDA.
▲ Community resides within the northern Alberta study area but is not presently a member of a REDA.

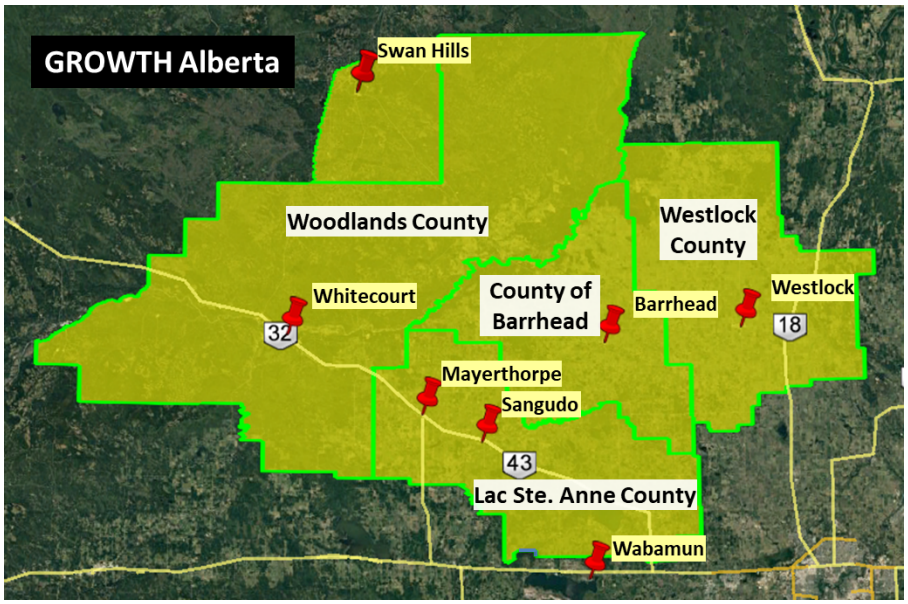


Figure 101 – GROWTH Alberta region.

TELUS has made a generational investment in fibre in the Town of Westlock. AxiaConnect (Axia) was in the Barrhead in mid-December 2016 soliciting expressions of interest for Axia fibre.

The region is home to approximately 57,000 residents.[133] Table 37 provides a breakdown by municipality (rural and urban) and First Nation as well as five-year population growth trends and CAGRs. Lac Ste. Anne County is the most populated municipality in the GROWTH Alberta region, with a population of 10,899. The 13 summer villages have grown significantly (approximately 26%) during the five-year period between 2011 and 2016. Clyde, after undergoing a viability review, decided to remain a village and implement the changes (directives) recommended by Alberta Municipal Affairs to achieve viability.

Table 37 – GROWTH Alberta Population & Population Growth Trends

Municipality	Rural				Urban					First Nations (FN)				
	Popu-lation (2016)	CAGR (%) (2011-2016)	5-Year Trend (%) & Direction		City/ Town/ Village	Popu-lation (2016)	CAGR (%) (2011-2016)	5-Year Trend (%) & Direction		Reserve / Settlement	Popu-lation (2016)	CAGR (%) (2011-2016)	5-Year Trend (%) & Direction	
Barrhead, County	6,288	0.6	3.1	▲	Barrhead	4,579	0.7	3.3	▲					
Big Lakes, County					Swan Hills	1,301	-2.3	-11.2	▼					
Lac Ste. Anne, County	10,899	1.2	6.2	▲	AB Beach Mayerthorpe Onoway SV[1] (12)	1,018 1,320 1,029 1,538	3.3 -1.1 -0.2 5.5	17.7 -1.1 -1.0 30.9	▲ ▼ ▼ ▲					
					Sub-total	4,905								
Parkland, County	Study only included Wabamun				Wabamun	682	0.6	3.2	▲					
Westlock, County	7,220	-1.1	-5.5	▼	Clyde Westlock SV[1] (1)	430 5,101 44	-3.1 1.1 15.8	-14.5 5.8 3.0	▼ ▲ ▲					
					Sub-total	5,575								
Woodlands, County	4,754	2.0	10.4	▲	Whitecourt	10,204	1.2	6.2	▲	Alexis Nakota	755	-1.6	-7.6	▼
Total	29,161					27,246				**Total - FN**	755			

CAGR – Compound Annual Growth Rate

Note 1: SV - Summer Village: Birch Cove, Birch Cove, Larkspur, Nakamun Park, Ross Haven, Sandy Beach, Silver Beach, South View, Sunrise Beach, Sunset Beach, Val Quentin, West Cove, Yellowstone

Total Population = **57,162**

Source: Statistics Canada Federal Census 2011 and 2016.

The GROWTH Alberta region is home to 2,949 businesses (with employees). The top 10 industries in which they operate is shown in Table 38 and Figure 102 (industry classification system: NAICS). These data confirm a diverse economy with approximately 17% of businesses with employees engaged in the construction industry. The sector with the second highest ranking for number of businesses is the other services (except public administration) sector.[134] These two sectors makeup approximately 29% of

[133] Calculations based on Statistics Canada's 2016 Census of Population.

[134] Comprised of businesses primarily engaged in repairing and maintenance on motor vehicles, machinery, and other products; providing personal care, funeral, and laundry services; organizing and promoting religious activities; and supporting causes such as grant making and advocacy.

businesses with employees in the region. The *'Other Industries'* segment (14.9%) shown in the Figure 102 chart includes industries that individually contribute between 3.7% and 0.3% to the category.[135]

Table 38 – GROWTH Alberta Number of Businesses (with employees) by Industry

Industry	Businesses	Percent (%)
Construction	515	17.5
Other services (except public administration)	337	11.4
Transportation and warehousing	300	10.2
Retail trade	286	9.7
Professional, scientific and technical services	257	8.7
Mining, quarrying, and oil and gas extraction	240	8.1
Agriculture, forestry, fishing, and hunting	224	7.6
Administration and support, waste management and remediation	126	4.3
Accommodation and food services	114	3.9
Health care and social assistance	110	3.7

Source: Calculations based on dataset provided by Alberta Economic Development & Trade, Economic Information & Analytics, Feb. 13, 2017.

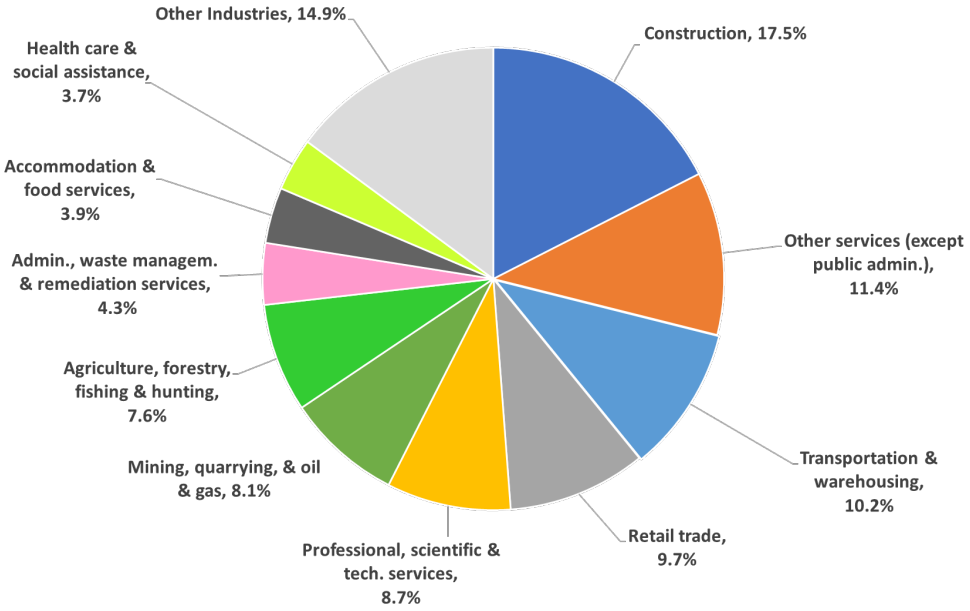


Figure 102 – GROWTH Alberta mix (based on business counts).

A cross-section of businesses in the region were surveyed by GROWTH Alberta as part of the study. When asked how important broadband connectivity was to their business, all respondents indicated it was *'very'* important. The owner of an accounting firm said broadband connectivity was crucial for their communications with clients and the Canada Revenue Agency as well as for keeping up to date with tax changes.

[135] Real estate and rental and leasing; wholesale trade; manufacturing; finance and insurance; information and cultural industries; arts, entertainment and recreation; educational services; public administration; management of companies and enterprises; and utilities.

The majority of respondents indicated that the current connectivity speeds they were getting from their ISP were *'poor'* (Figure 103).

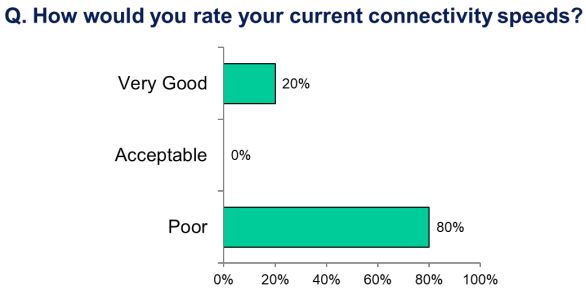


Figure 103 – Satisfaction with current connectivity speeds.

As shown in Figure 104, almost all businesses felt their business communities as well as their businesses would grow with increased broadband connectivity. Also, better connectivity would improve the way they do business. An association delivering an adult literacy program deemed high-speed broadband connectivity as *'vital'* to the delivery of these services to their community.

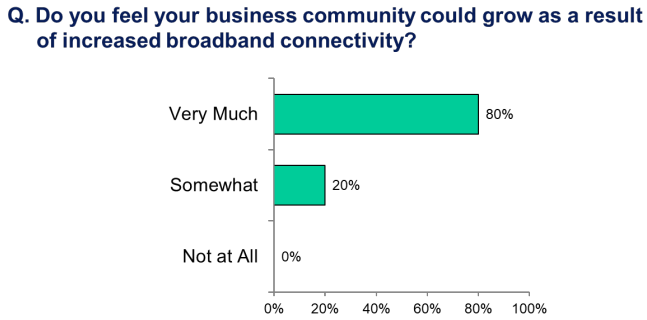


Figure 104 – Increased broadband connectivity's impact on growth of business' business community.

The GROWTH Alberta region offers convenient access to the major energy centres in the North and is well positioned near major corridors for access to other parts of North America.[136] The Swan Hills Treatment Centre is a world-class waste treatment facility. It processes all wastes with the exceptions of pathological, explosive, and radioactive materials.

9.1.2 Municipal and First Nations Broadband Interests

Communities within GROWTH Alberta are at different stages in recognizing the importance of broadband services and connectivity to economic diversification, municipal sustainability, regional competitiveness, public service delivery, and quality of life.[137]

Woodland County has been interest in improving cellular and Internet coverage for its community for a number of years, however, population density and terrain (trees) pose challenges. They have investigated building towers for ISPs to use (May 2016 timeframe, they were going to build three towers with help from an *Alberta Community Partnership (ACP)* grant ($350,000 of the total cost $850,000)). In the fall of 2016, the County decided to hold off on building their own towers and see how TELUS' new 700 MHz

[136] GROWTH Alberta; 2017-02-15.

[137] The five elements of broadband's importance were identified by the Calgary Regional Partnership, Economic Prosperity Steering Committee, *Request for Decision*; 2016-09-08.

technology, using SmartHubs, would penetrate mobility and Internet coverage dead spots. One option now being considered is to construct fibre access in the shadow areas and use point-to-point radios for backhaul from each area.

Whitecourt is in the preliminary stages of designing their fibre-based Wide Area Network, linking the Town's buildings and facilities. Wireless solutions will be deployed for remote facilities, where fibre solutions are cost prohibitive. Communications infrastructure will be going into their new residential development of Athabasca Flats East.

Table 39 identifies the awareness and current state of municipal involvement and interest in broadband and fibre network deployments. Most municipalities in the GROWTH Alberta region are at a relatively early stage, except for the Town of Whitecourt and Woodlands County. Whitecourt plans to deploy their own wide area network in 2017. Since about 2014, Woodlands County has been searching for a solution to fill broadband coverage gaps, which exist in their county.

Table 39 – GROWTH Alberta Involvement & Interest in Broadband[138]

Community	Enthusiastic	Interested *'Maybe'*	Need Help Too Small	Too Expensive	Status Quo	Don't Know[139]	No Response[140]
Towns							
Barrhead						X	
Mayerthorpe			X	X	X		
Onoway							X
Swan Hills	X						
Westlock (TELUS Fibre)					X		
Whitecourt							X
Villages							
Alberta Beach							X
Clyde							X
Wabamun		X					
Counties/MDs							
Barrhead			X				
Lac Ste. Anne	X						
Westlock							X
Woodlands	X						
First Nations							
Alexis Nakota							X

[138] Communities were asked to rate their involvement and interest in broadband. Broadband was defined as follows: In telecommunications, broadband is a wide bandwidth data transmission with an ability to simultaneously transport multiple signals and traffic types - the medium can be twisted-pair copper wiring, optical fibre, coaxial cable, or radio. Broadband service is characterized as offering symmetric bandwidth between 50 Mb/s and 1 gigabit (Gb/s)/1,000 Mb/s and higher (really unlimited bit rates) (symmetric meaning the upload bit rate is as fast as the download bit rate).

[139] Don't Know – the respondent was unable to rate their community's interest and involvement in broadband.

[140] No Response – the community did not respond to the inquiries regarding their community's interest and involvement in broadband.

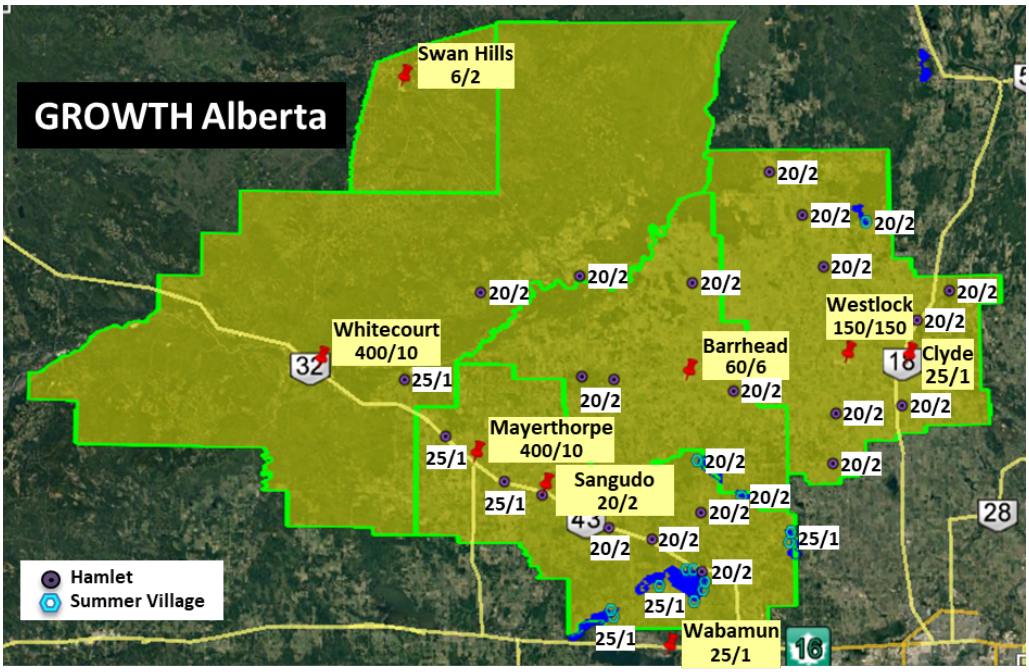
9.1.3 Current Service Providers, Services, and Infrastructure

9.1.3.1 Fixed Wireless-based

Current Internet Service Providers using fixed wireless technology in the GROWTH Alberta region include the following:

- Alberta Communications Cable Services,
- Arrow Technology Group,
- Broadband Surfer,
- Clearwave Broadband Networks,
- Corridor Communications (CCI),
- First Broadband,
- MCSNet,
- Slave Lake Communications,
- Tera-Byte Wireless,
- Whitecourt Communications, and
- XplorNet (fixed wireless and satellite-based).

The advertised maximum download and upload *'up to'* speeds (expressed in Mb/s) available for the residential market in both the urban and rural areas are shown on Figure 105. Speeds available in Swan Hills are a stark contrast to those available in the other urban centres. As well, speeds available in the smaller urban centres and rural areas of the REDA are significantly lower compared to those in the larger urban centres. Other than Eastlink's higher speeds in Mayerthorpe and Whitecourt, most Internet service offerings cost approximately $100 or less. Eastlink's top tier offerings are priced higher. Appendix 16.2 provides the details of the service offerings (Internet only – no bundling unless otherwise stated) and geographic coverage. The coverage maps of the individual service providers are those that were available on their websites at the time of the writing of this report.

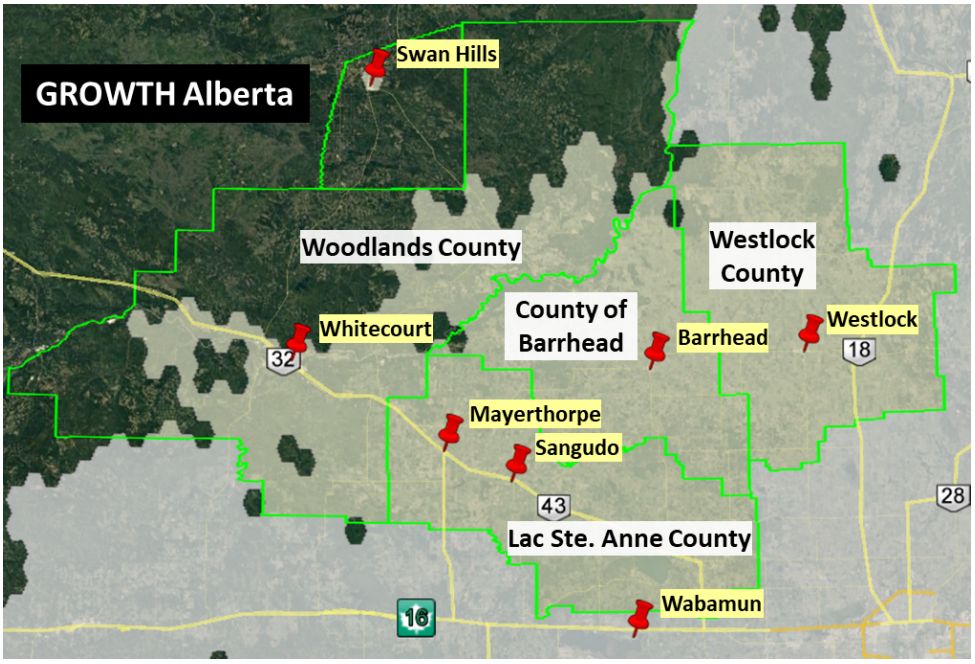


Some customers in GROWTH Alberta are successfully using the SmartHub.
Internet download and upload speeds are expressed in Mb/s. There are a number of issues that determine whether a customer can actually attain the speeds identified (e.g., line-of-sight, the number of clients being served on the network or by a tower, time of day).

Figure 105 – GROWTH Alberta – advertised maximum residential download/upload speeds.

According to the CRTC website[141], minimal 5 Mb/s down (toward the end-client) by 1 Mb/s up (from the end-client to the network) service is almost ubiquitously available throughout the GROWTH Alberta region, except for the Swan Hills area. A combined view of the fixed wireless coverage is shown in Figure 106 (light gray areas).

XplorNet Communications' (XplorNet's) new satellites will allow them to offer download speeds of 25 Mb/s across their customer base by July 2017.



Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

Figure 106 – GROWTH Alberta fixed wireless coverage.

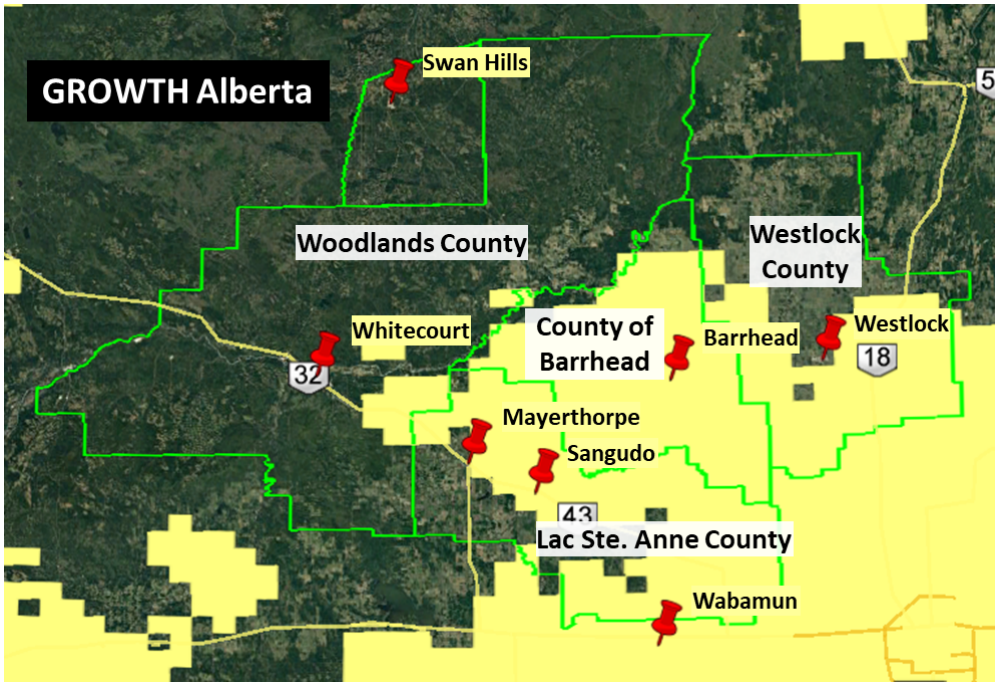
9.1.3.2 Mobility

Shown as yellow areas in Figure 107, mobility data services are available from TELUS/Bell and Rogers. Appendix 16.4.2 provides the coverage maps for each of the providers of mobility services. As discussed earlier Bell, TELUS, and Rogers are now using cellular towers and SmartHubs to provide Internet services.

9.1.3.3 Wireline-based – DSL

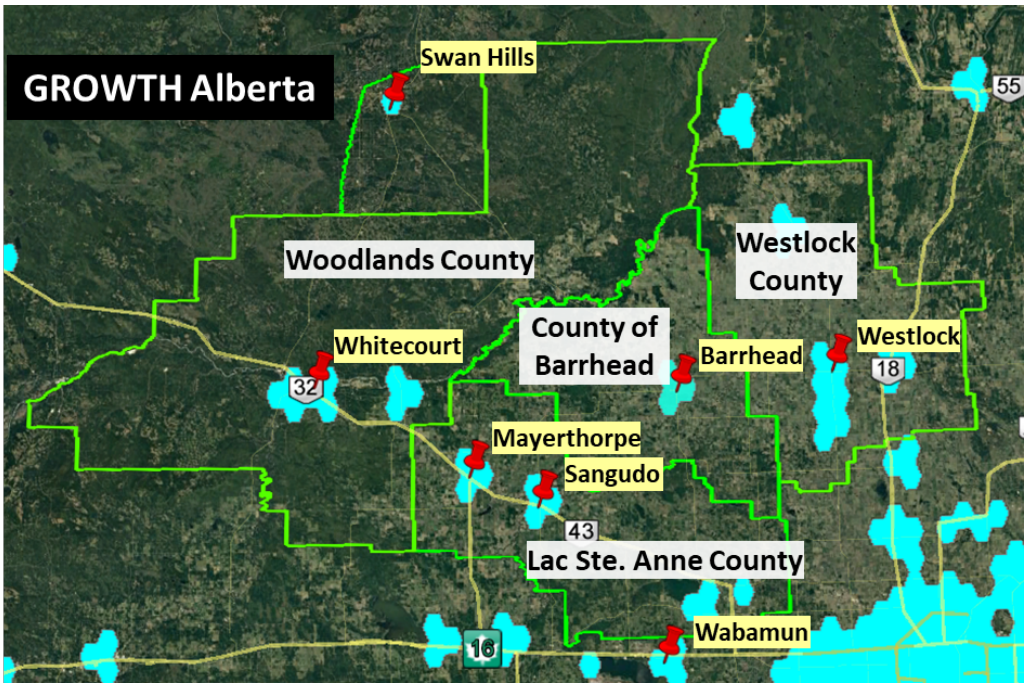
Digital Subscriber Line (DSL) refers to a group of last mile technologies that are used by wireline-based service providers such as TELUS in Alberta to provide broadband services over twisted-pair copper wiring. The local copper wire loop is a remnant from the days when (and how) the telephone company connected residential and business premises to the telephone company's network for the purposes of providing local and long distance telephone services (and dial-up Internet services). Since DSL's performance degrades with distance, the technology is only deployed in urban areas where access distances are less than about two miles. In Figure 108, areas served via DSL technologies are shown in blue.

[141] http://crtc.gc.ca/eng/internet/internetcanada.htm



Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

Figure 107 – GROWTH Alberta mobility data coverage.

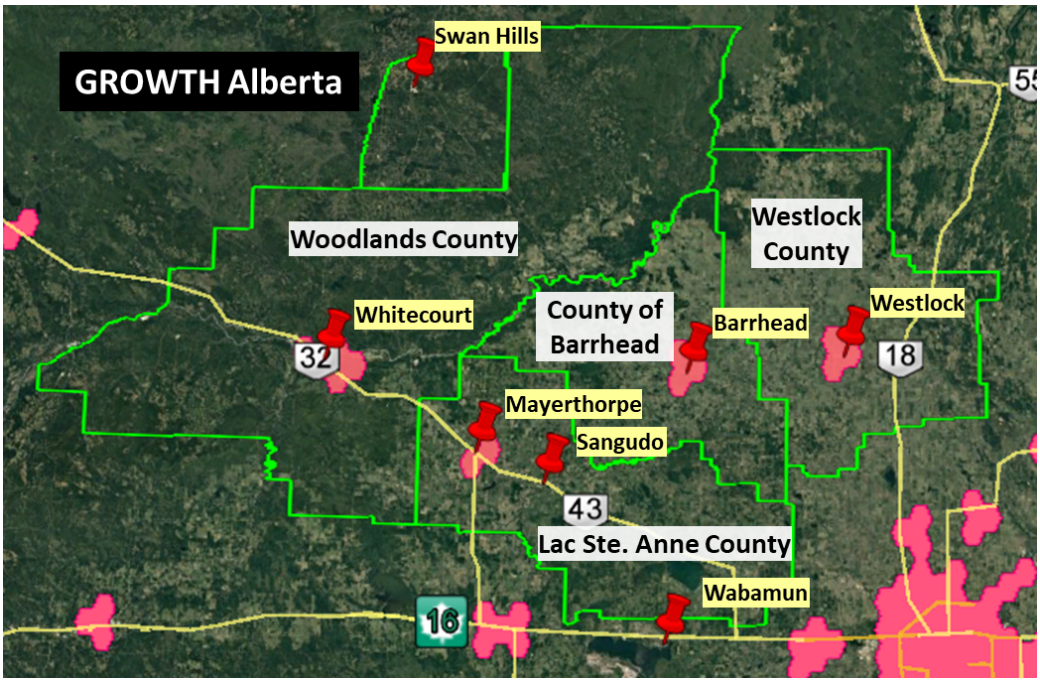


Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

Figure 108 – GROWTH Alberta DSL coverage.

9.1.3.4 Wireline-based – Coaxial Cable

Eastlink and Shaw Communications (Shaw), originally television broadcast companies, use coaxial cable and modern cable modem technology to provide broadband services in the GROWTH Alberta region (red areas in Figure 109). The cable companies currently use the DOCSIS 3.0 standard to achieve broadband speeds of 100 Mb/s or more over coaxial cable. Shaw expects to complete its DOCSIS 3.1 upgrade by the end of August 2017.[142] According to the Cybera, *State of Alberta Infrastructure Report*, *"The next-generation DOCSIS 3.1 standard is expected to revolutionize hybrid fibre-coaxial cable connections by providing up to 10 Gb/s download and 1 Gb/s upload network throughput and significant improvements in latency."*[143]



Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

Figure 109 – GROWTH Alberta coaxial cable coverage.

Maximum advertised wireline offerings are shown in Appendix 16.3. Since these are *'up to'* bit rates, during high usage periods, actual bit rates will be less – Eastlink and Shaw more so than TELUS due to the way the aggregation is implemented. In both cases, the offerings are highly asymmetric – upload and download bit rates differ significantly.

9.1.3.5 Internet Service Provider Wi-Fi

TELUS, Shaw, and Bell WiFi services are available in the GROWTH Alberta region. In Westlock, TELUS offers three locations compared to Bell's single location. There are 19 TELUS and four Bell locations in Whitecourt. Bell offers a single WiFi location in Valleyview. Shaw offers 26 Go WiFi locations in Barrhead and another 26 locations in Westlock.

[142] *Shaw Announces Third Quarter and Year-to-Date Results.*

[143] *State of Alberta Digital Infrastructure Report;* Cybera; 2016-09-13.

9.1.3.6 Axia Fibre

Axia NetMedia provides retail services to corporate clients and, through AxiaConnect, provides fibre-based retail Internet services in a number of smaller communities. In exchange for access to a community's rights-of-way, Axia will consider investing in fibre-to-the-premise (FTTP) infrastructure in communities that can demonstrate that at least 30% of its residences and businesses are interested in purchasing Internet services from Axia once the '*closed-access*' network is built. To date, Axia has not announced any plans for FTTP deployments in any GROWTH Alberta community.

9.1.4 Backhaul Availability

9.1.4.1 Alberta SuperNet

The extent of the SuperNet within the GROWTH Alberta region is shown in Figure 110. The green lines represent the Bell-operated BAN portion while the blue lines represent the Axia-operated EAN segments. A more general discussion about the SuperNet is presented in Appendix 16.5.



Figure 110 – GROWTH Alberta SuperNet infrastructure.

9.1.4.2 Shaw Wholesale

Given the uncertainty associated with the next iteration of the SuperNet contract by June 30, 2018, municipalities, First Nations, and Métis Settlements requiring access to fibre transport for backhaul to Edmonton may want to approach Shaw, Bell, or TELUS. Shaw has fibre to Westlock.

9.1.4.3 TELUS Wholesale

Except under a non-disclosure agreement, TELUS does not provide maps of fibre assets.

9.1.4.4 Hybrid Wireless

Hybrid Wireless offers scalable high-speed Internet solutions - both dedicated and burstable solutions to meet business needs. Hybrid Wireless also offers support fibre for remote locations across Western Canada.

9.1.5 Existing Infrastructure

9.1.5.1 Tower and Other Tall Structures

When planning a broadband build-out it is important to build on what is already in place. The key inquiry for the current state analysis is what assets does the community have that can be provided at little or no incremental cost that improve the economics of the broadband deployment and operations? Assets include existing towers, fibre and community networks, which the community might be using for communications or asset management. Existing and possible access to tall structures or buildings are also important to inventory for potential placement of wireless equipment.

In the 2012 to 2013 timeframe, Lac Ste. Anne County received a $500,000 grant from the Alberta Agriculture and Forestry *Final Mile Rural Community Program*. Table 40 shows existing MD- and county-owned tower infrastructure.

Table 40 – GROWTH Alberta Existing MD- and County-owned Towers

	Towers	Details
Barrhead	2	1, 70' at public works shop; 1, 30' at Town of Barrhead office building
Lac Ste. Anne	6	Own fibre to their Darwell, Glenevis, and Mayerthorpe towers and from the SuperNet point-of-presence in Sangudo to the County's new office site, which is two kilometres east of Sangudo
Wabamun	4	3, small on pump houses (line-of-sight would be an issue); 1, on water plant
Woodlands	?	Unclear if they own towers

Various towns and villages identified other tall structures that could potentially be leveraged for community broadband. They include the following:

- Mayerthorpe – RCMP detachment communication tower; emergency response building hose tower;
- Onoway – 2, 30' radio towers located at the town administration building;
- Swan Hills – 1, 100' tower (is in good condition and located at the town office);
- Westlock – tall buildings: Westlock Place apartment building; Spirit Centre Multiplex (for the placement of broadband equipment); and
- Alberta Beach – 2 towers (currently use for patrol department at administration building; for fire services department at village fire hall).

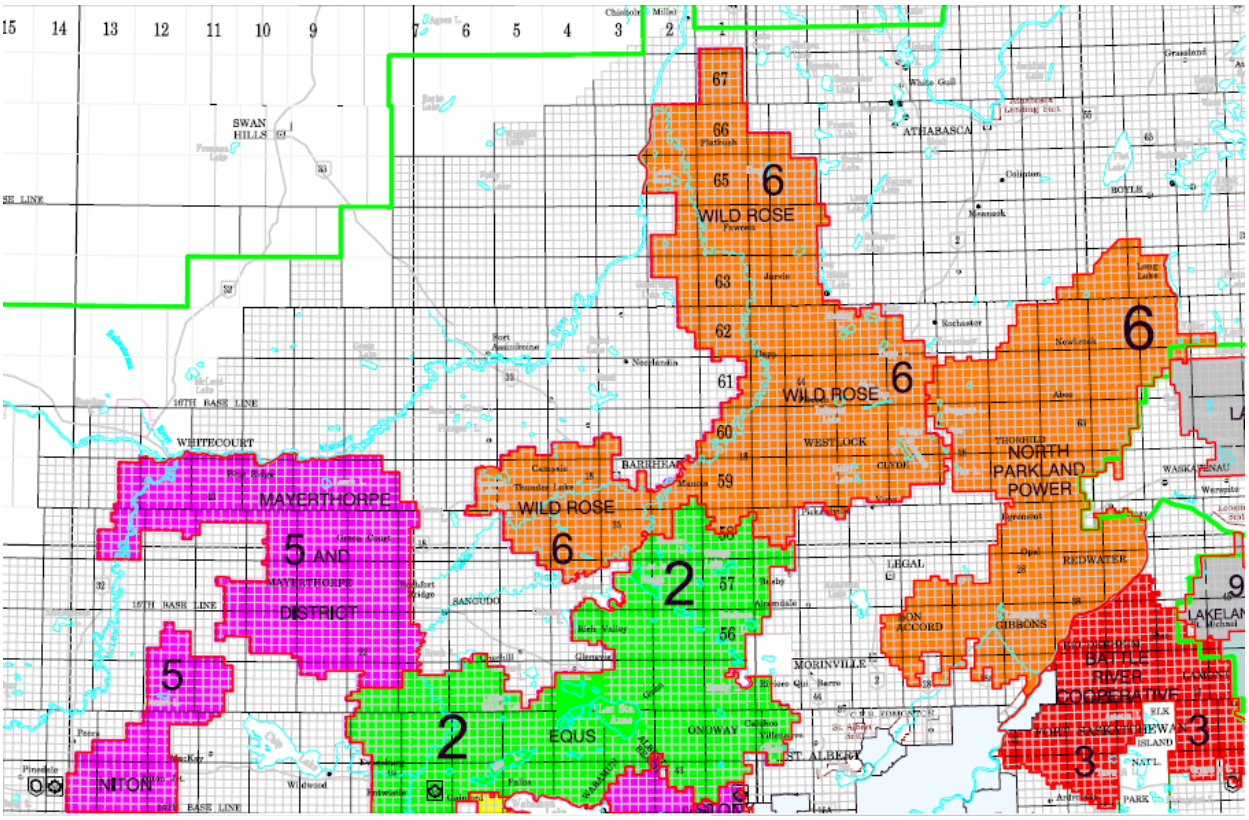
9.1.5.2 Utility Infrastructure

The existing overhead and underground transmission and distribution lines of electric utility companies (ATCO, Fortis), REAs, and natural gas co-operatives (co-ops) present deployment options for community broadband builds - access to and installing fibre cables to travel along utility poles, in ducts and conduit, and along rights-of-way can significantly improve the economics of broadband service expansion projects and network deployments. Inquiries about the availability of communications spaces on utility providers'

poles and where multi-party trench agreements exist will be made during the preliminary infrastructure design phase of a broadband network.

9.1.5.3 Rural Electrification Associations (REAs)

REAs are member-owned electric distribution systems that provide electricity service to farm members within a specific geographic boundary. Each REA has an elected board of directors that is responsible for the business operations of the REA. Construction, operations, and maintenance is done by the investor-owned electric utility company (through contracts with the REAs) for the EQUS REA Ltd., Mayerthorpe & District REA Ltd., and the Wild Rose REA Ltd. Figure 111 shows their respective service areas



Source: Rural Electrification Associations Service Areas. Accessed Nov. 2016.

Figure 111 – GROWTH Alberta REA service areas.

Appendix 16.6 shows ATCO Electric's and Fortis Alberta's respective service areas in northern Alberta. REA and distribution company systems are intertwined in the REA service area as shown in Figure 112, and they work together to ensure there is reliable service and no duplication of distribution lines and service.[144] In Alberta, most rural areas are radial networks. A radial distribution line may serve both distribution entity and REA customers and different parts of the same line maybe owned by one or the other party.

[144] Alberta Utilities Commission (AUC); *Notice of Hearing, Application 21148-A001*.

9.1.5.4 Gas Co-operatives – Zone 2

In the 1960s, non-profit gas co-ops were formed to supply natural gas to rural Alberta - franchise areas were designated. The following three Zone 2 gas co-ops currently operate in the GROWTH Alberta region. Figure 112 provides a map showing the group's geographic coverage.

- Pembina River Natural Gas Co-op Ltd. (Jarvie, Alberta – Westlock area)
- Ste. Anne Natural Gas Co-op Ltd. (Onoway)
- TRL Gas Co-op Ltd (Whitecourt)



Source: Federation of Alberta Gas Co-ops, http://www.fedgas.com/Map. Accessed Feb. 1, 2017.

Figure 112 – GROWTH Alberta gas co-operatives.

9.1.6 Planned Infrastructure

9.1.6.1 Major Projects

The GROWTH Alberta region has several private and public sector capital projects planned. Where possible these projects maybe leveraged to reduce the costs associated with the deployment of broadband infrastructure. Figure 113 shows the capital projects in GROWTH Alberta valued at $5 million or greater.[145]

9.1.6.2 Electricity Transmission Development Plans

Construction of a major electricity transmission line, the Fort McMurray West 500 kV, is scheduled to begin in summer 2017. It is being built by Alberta PowerLine, a partnership between ATCO and Quanta Services.[146] The line will run from Wabamun to the Fort McMurray area, and is designed to help meet increased electricity demand in the Fort McMurray area. The line will pass through the GROWTH Alberta region (construction south of the Athabasca River will begin in 2018). Appendix 16.9 shows a map of the route, which was approved on February 10, 2017. The facilities will be completed and operational by June 2019.

[145] Alberta Major Projects, Economic Development and Trade; 2017-08. http://majorprojects.alberta.ca/.

[146] Alberta PowerLine; 2017-03-24. www.albertapowerline.com.

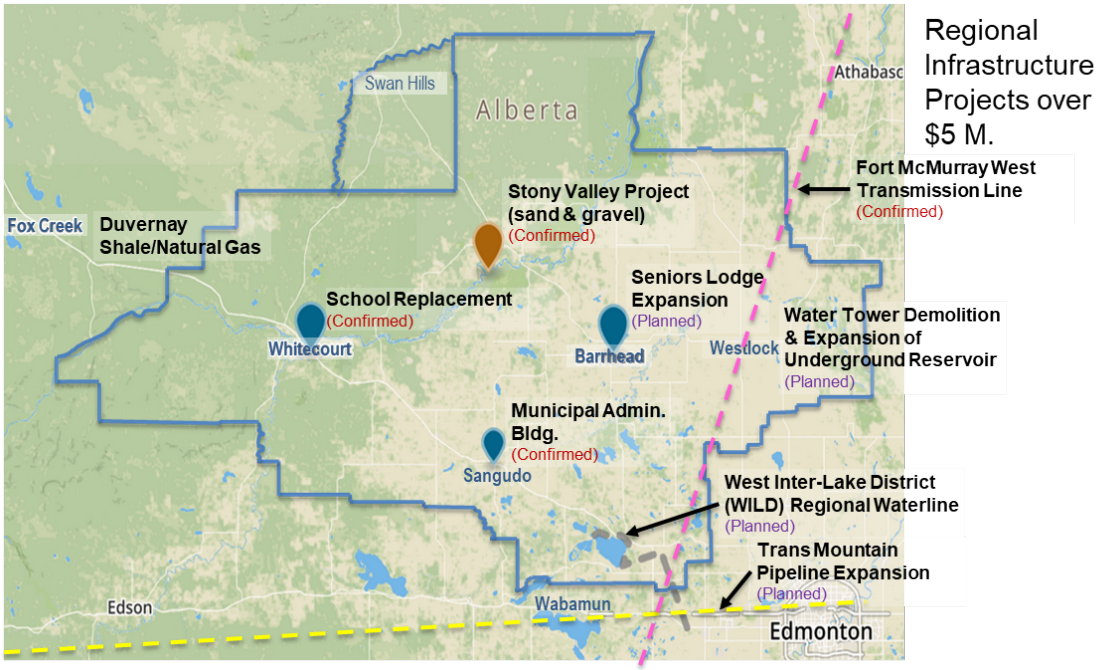


Figure 113 – Major projects – GROWTH Alberta.

9.1.6.3 Municipal Capital and Civil Works Projects

Leveraging civil infrastructure projects can reduce broadband deployment costs by 75%. Given civil infrastructure costs typically account for 70% of buried deployment costs, this is significant. Capital projects that involve trenching or erecting towers or poles such as during the development of new subdivisions, road construction, or the construction of rehabilitation of water or sewer lines are typical projects that can improve the economics of community broadband projects.

Onoway received a total of $1.6 million for sanitary sewer forcemain replacement from Alberta Transportation's *Alberta Municipal Water/Wastewater Partnership (AMWWP).* Lac Ste. Anne also received funding – for the Darwell effluent disposal line ($2.2 million).

The Federal *Small Communities Fund* (part of the New Building Canada Fund) for infrastructure projects, now includes a *'Connectivity and Broadband'* category. 2016 approved non-broadband projects within the Barrhead area include (figures shown are the Total Eligible Project Cost - Federal, Provincial, and Municipal):

- Mayerthorpe – Interim production well and associated works $2 million,
- Whitecourt – Water system upgrading $6.7 million, and
- Westlock County – Water treatment plant and supply system upgrading – Hamlet of Jarvie $1.9 million.

The Federal *Clean Water and Wastewater Fund (CWWF)* provided funding of $3.2 million to the Westlock Regional Water Services Commission for Phase 3 of the Westlock to Fawcett water transmission line. Phase 2 of the West Inter-Lake District (WILD) Water Commission's water transmission extension project will supply potable water to Onoway, the Lac Ste. Anne County summer villages, Alberta Beach, and the Alexis Nakota First Nations. Federal funding for this phase was $10 million while provincial funding was

approximately $7 million.[147] Extensions to the summer villages of Seba Beach, Sandy Beach, and Nakamun Park will comprise Phase 3 of this project.[148]

Table 41 shows the capital and civil works projects that either the municipalities self-reported or were identified by another source. TELUS has made a fibre investment to the home/premise in Town of Westlock.

Table 41 – GROWTH Alberta Municipal Capital & Civil Works Projects

Towns	
Barrhead	• AltaGas Utilities upgrading natural gas distribution (confirmed 2017) • Preliminary engineering to take place for water reservoir and lagoon upgrades (planned)
Mayerthorpe	• Highway commercial development (20 lots, shallow utilities to be installed) • Manufactured home subdivision (8 lots, spring 2017) • Potential residential development (Phase One – 21 lots) • Street paving (summer 2017) • Water main rehabilitation (summer 2017)
Onoway	Reconstruction of sewer main (spring-summer 2017)
Swan Hills	• Sanitary sewer improvement (confirmed spring-summer 2017) • 11-lot industrial/commercial development (planned)
Westlock	• Road work • Potential commercial subdivision (26 acres) • Westlock Regional Water Services Commission water line from the Town of Westlock to the Hamlet of Fawcett within County of Westlock
Whitecourt	• Athabasca Flats East development (winter to spring 2017) - shallow utilities • Phase 3 of fibre Wide Area Network (2017)
Villages	
Alberta Beach	Storm drainage
Clyde	Did not respond to project inquiries and no information was available on the village's website
Wabamun	• Re-subdividing a former housing site into a 42-lot subdivision (41 single homes and 35 condo units), underground electrical to be installed (other utility services are already in place) (spring 2017) • 400 plus lot waterfront development (planned)

[147] *Ministers Announce Clean Water Coming to Alexis*; Mayerthorpe Freelancer; 2017-07-10.

[148] West Inter-Lake District (WILD) Regional Water Services Commission Opening Ceremony, Parkland County website https://www.parklandcounty.com/Modules/News/index.aspx?feedId=751d9bfa-fef1-4f2d-8753-b63088db86eb&newsId=e6469a23-9619-4244-b82d-e5de11e72c15; 2016-06-10; 2017-08-09.

Counties	
Barrhead	• Barrhead to Thunder Lake/Campsie regional water transmission line • Water transmission for Barrhead, Lac Ste. Anne, and the summer villages of Birch Cove and Nakamun Park • Various annual road construction projects • Industrial Park (160 contiguous acres) confirmed – interest in fibre expressed • Kiln replacement (addition to building) confirmed
Lac Ste. Anne	• See second item under Barrhead County • Ongoing trenching projects • North 43 Lagoon Commission construction of sewer lines along northeast shore of Lac Ste. Anne • West Lake District Regional Water Services Commission construction of water line
Westlock	Road rehabilitation, bridge replacement, water supply – industrial park[149]
Woodlands	Road and bridge construction[150]
First Nations	
Alexis Nakota	Did not respond to project inquiries and no information was available on the community's website

9.2 Desired State

The range of interest in broadband varies considerably throughout the region, but even the most enthusiastic of the municipalities are still in the early stages of deciding which options to pursue and how. While a formal *'Desired State'* has not yet been agreed to in any of the municipalities, what follows is based on the assumption that, over the next five years, the majority may choose to facilitate the deployment of infrastructure to support a fully scalable broadband network ubiquitously available throughout their municipality and, if possible, the region as a whole. This would typically include a combination of an underlying fibre infrastructure with upgraded wireless services where fibre is not yet practical. Market-wise, the infrastructure would be available on an open-access basis to all service providers interested in serving municipal and regional businesses and residents. Whereas the municipalities do not wish to interfere with private enterprise in the services marketplace, they will entertain options relative to facilitating the underlying lit open-access fibre utility infrastructure.

The communities demonstrating the most interest in broadband in GROWTH Alberta and where near-term action is likely are as the following:

Town of Swan Hills – The Town of Swan Hills is a partner in the Big Lakes County *Inter-Municipal Broadband Discovery Project*, which is being led by Big Lakes and recently received funding from the *Alberta Community Partnership (APC) Program*. The project will assess the options available to enhance broadband in the region. With several oil and gas operations located in the Swan Hills area, Swan Hills is home to a number of industry field offices. The presence of high-speed Internet is a factor in retaining those offices and company bases within and near Swan Hills. Within three years the Town of Swan Hills envisions the initial deployment of broadband infrastructure and within a decade access to high-speed broadband would be assumed.

[149] Westlock County; *2017 Capital Budget.*

[150] Woodlands County; *2017 Budget;* 2017-03-13.

Barrhead County – Barrhead County would like to secure consistent Internet service levels and pricing for their residents and businesses – affordable is an important criterion as well. Recognizing their small size and their need to prioritize and align broadband capital expenditures with other infrastructure projects, the county is interested in devising a strategy and plan to achieve Internet access to all citizens and businesses within three years. The County is interested in learning what role especially rural municipalities should assume in achieving the CRTC's targets of 50 Mb/s download and 10 Mb/s upload, with deployment targets of 90% of Canadian households by 2021 and 100% by 2031. They also welcome guidance on how to achieve these targets.

Lac Ste. Anne County – When people move to Lac Ste. Anne County (often from urban centres), they expect available broadband services to be comparable to the urban service levels they may have become accustomed to. Since 2010, the county Council has adopted a utility model for broadband expansion. Since that time, the county's fixed wireless tower deployment has been funded through grant programs. It is anticipated that a similar strategy would be executed to fund fibre/broadband service to all unserved areas within five years.

The above communities are depicted in Figure 114. Appendix 16.11 provides further details about each of the community's issues and challenges; whether fibre/broadband is on their Council's agenda; the factors impacting their community's capability to pursue a fibre/broadband initiative; and their 3-, 5-, and 10-year visions for broadband.

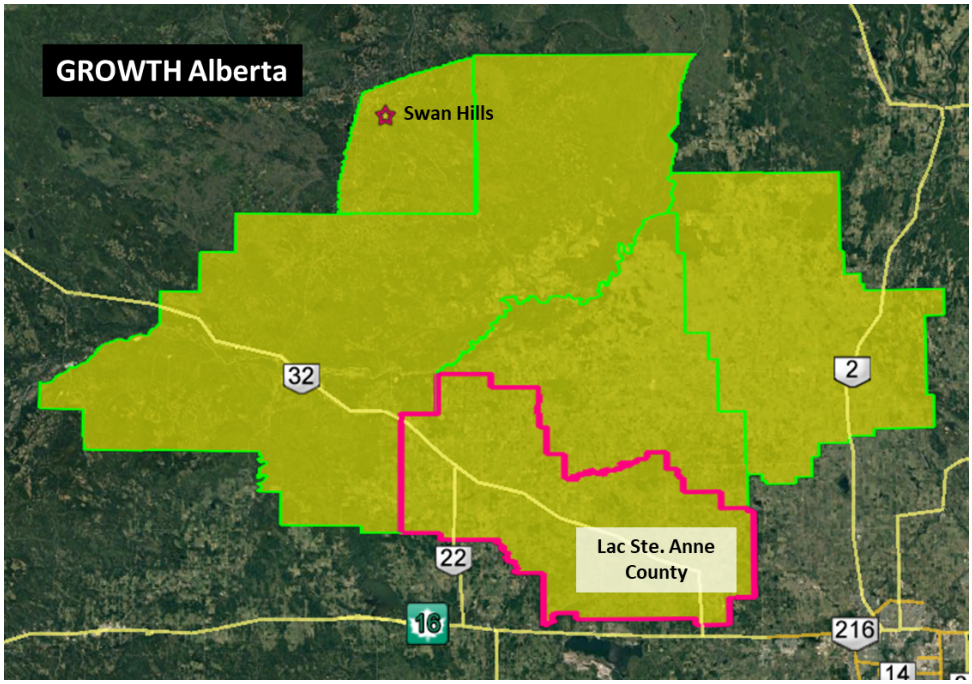


Figure 114 – Communities with near-term broadband plans.

9.3 Town of Whitecourt – A 4,250+ Premise Utility Network

9.3.1 Business Structure

Assume that the Town of Whitecourt deploys an open-access, lit fibre-optic network that will make world-class, fully scalable broadband infrastructure available to every home and business in the town. In the analysis below, the business structure, opto-electronics and backhaul, operations, drop capital, and markets and revenues assumed are those outlined in the default implementation scenario presented in

Section 6.5. In this case, the local network entity established to house the local fibre operation will be referred to as W-Net.

9.3.2 Deployment Capital

Assuming deployment conditions similar to those experienced in Olds, a buried fibre deployment that passes every residence and business in Whitecourt would cost about $8.93M.

9.3.3 Deployment Schedule

The financials below assume that the network would be deployed throughout Whitecourt over a three-year period commencing spring, 2018 – a third of the town would be completed each year.

9.3.4 Opto-electronics and Backhaul

A breakdown of the capital expenditures over the first five years of operation appears in the pie chart in Figure 115. Capital cost estimates over the first five years of operation for the proposed scenario come to $13.4M. In the chart, the $9.32M outside plant (OSP) deployment estimate (core and drops) includes the feeder and distribution plant required to pass every premise and provide drop connections to those premises that take service.

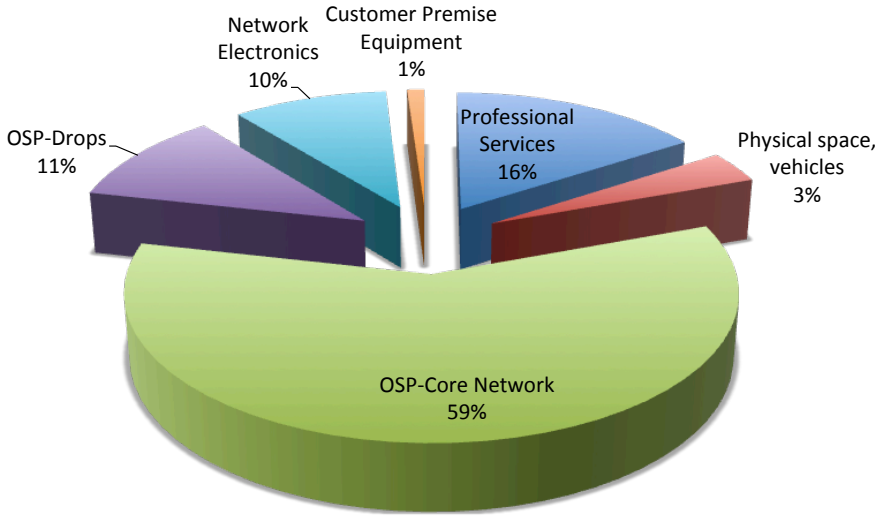


Figure 115 – Cumulative capital expenditures from 2018 to 2022.

9.3.5 Operations

The operational costs for wholesale network operation are straightforward as most are handled via outsourced contracts. Once the network build is completed in 2020 and the target penetration rates are realized, operational costs stabilize and a view of those calculated for 2024 are shown in Figure 116. In the chart, Admin, ops, o-e, and mktng refer to administration, operations, opto-electronics, and marketing respectively. The numbers assume that the Town provides both equipment and storage space at no charge.

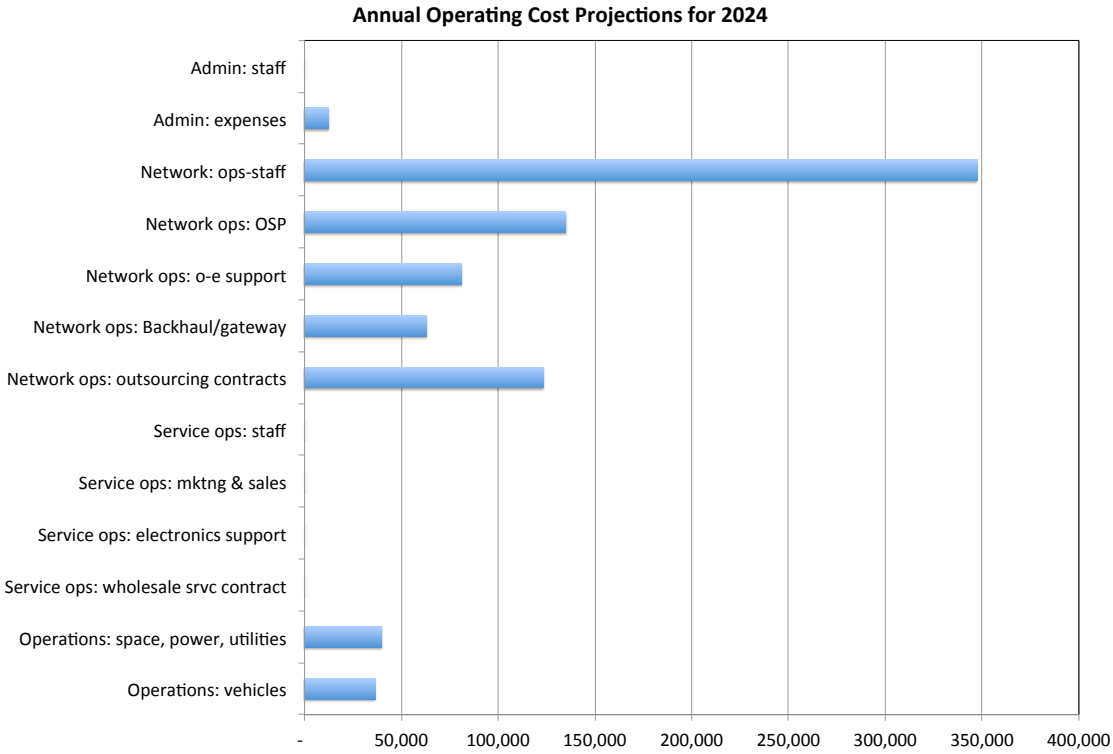


Figure 116 – Projected operational costs in 2024.

9.3.6 Financial Projections

Cashflow results for this scenario are summarized in Table 42. Though the operation goes cashflow positive in year 5 and, with debt servicing considered, the overall financials do go cashflow positive in year 7. As the required capital must therefore be sufficient to cover a 6-year deficit, some $14.0M in capital will be required to fund the operation. By year 15, approximately $561,587 is being returned to the Town annually.

Table 42 – Utility Model Results Summary for Whitecourt

	Results
Years to positive cashflow	
Operating	4
With debt servicing (p&i)	6
Financing	
Start-up capital required	14,047,080
Net Cashflow - before debt servicing	
Profit - annual at 10 yr	697,444
Profit - annual at 15 yr	1,060,028
Net Cashflow - after debt servicing	
Profit - annual at 10 yr	182,873
Profit - annual at 15 yr	561,587

In graphical form, the non-discounted cashflow chart for the proposed utility appears in Figure 117. The capital (red) required to finance the project is shown to pretty much all be required upfront during the network build and the financing must be sufficient to maintain a net cashflow of at least zero. Operational sustainability is determined by the gap or difference between the revenue (blue) and operational expenditure (green) lines whereas overall sustainability, which includes principal repayment, is the

difference between the revenue (blue) and the operational + principal repayment (dotted blue) lines. The bigger the gap, the better. The net overall cashflow line is the dotted orange line.

Though margins are slim during the network deployment, once the build completes, the operation goes cashflow positive and margins gradually increase. With sufficient financing, the endeavor would be financially sustainable.

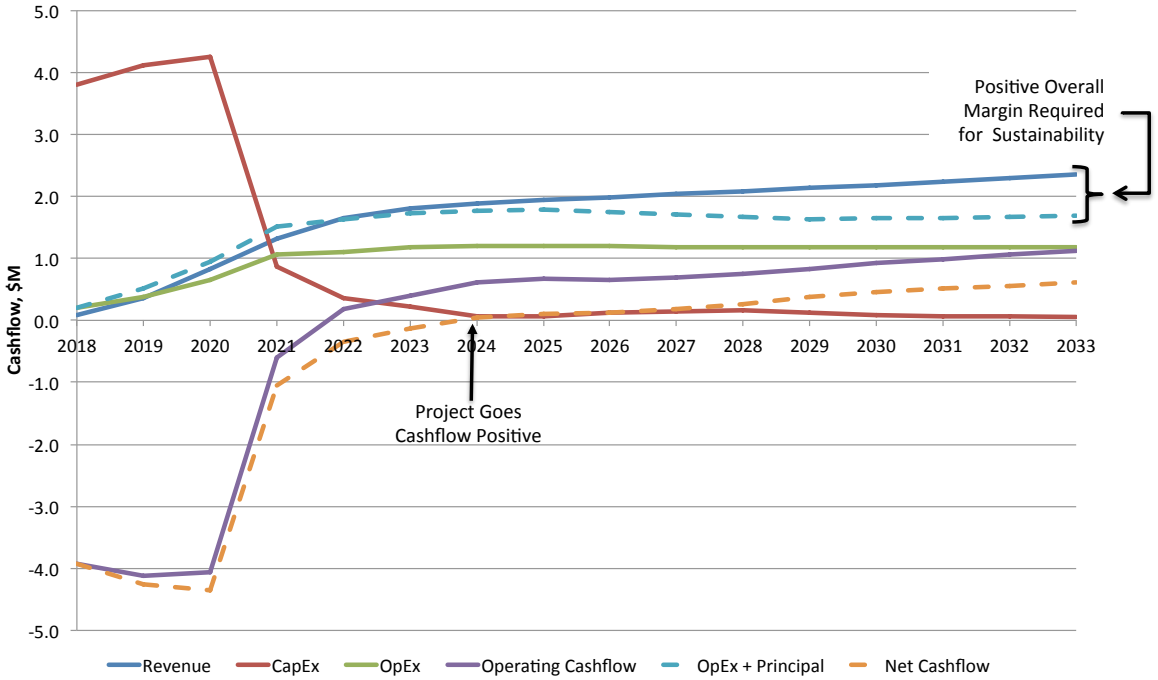


Figure 117 – Non-discounted cashflow projections for Whitecourt.

9.4 Town of Barrhead – A 2,000+ Premise Utility Network

9.4.1 Default Scenario

In the analysis for Barrhead below, the business structure, opto-electronics and backhaul, operations, drop capital, and markets and revenues assumed are those outlined in the default implementation scenario presented in Section 6.5. In this case, the local network entity established to house the local fibre operation will be referred to as B-Net. As Barrhead is half the size of Whitecourt, operational sustainability on a stand-alone basis will likely be an issue

9.4.2 Deployment Capital

Assuming deployment conditions similar to those experienced in Olds, a buried fibre deployment that passes every residence and business in Whitecourt would cost about $4.22M.

9.4.3 Deployment Schedule

This business case assumes that the network would be deployed throughout the Town of Barrhead over a 2-year period commencing spring, 2018 – half of the town would be completed each year.

9.4.4 Opto-electronics and Backhaul

A breakdown of the capital expenditures over the first five years of operation appears in the pie chart in Figure 118. Capital cost estimates over the first five years of operation for the proposed scenario come to

$6.65M. In the chart, the $4.428M outside plant (OSP) deployment estimate (core and drops) includes the feeder and distribution plant required to pass every premise and provide drop connections to those premises that take service.

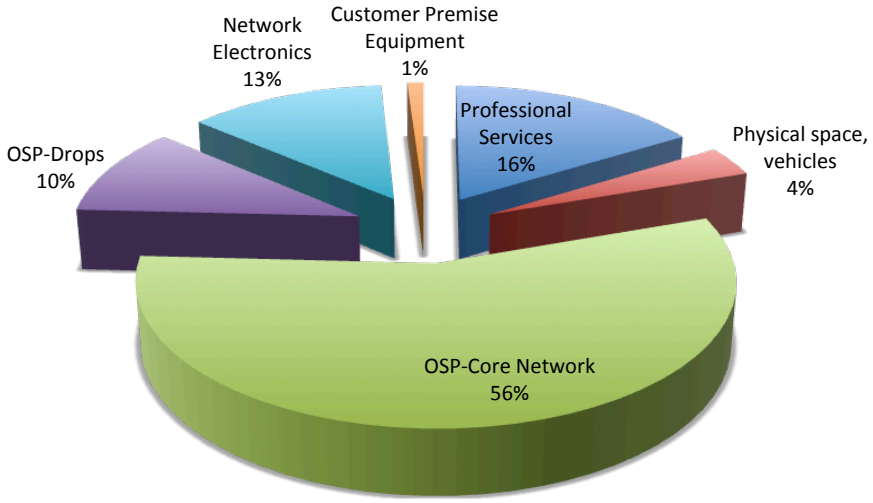


Figure 118 – Cumulative capital expenditures from 2018 to 2022.

9.4.5 Operations

The operational costs for wholesale network operation are straightforward as most are handled via outsourced contracts. Once the network build is completed in 2018 and the target penetration rates are realized, operational costs stabilize and a view of those calculated for 2024 are shown in Figure 119. In the chart, Admin, ops, o-e, and mktng refer to administration, operations, opto-electronics, and marketing respectively. The numbers assume that the Town provides both equipment and storage space at no charge.

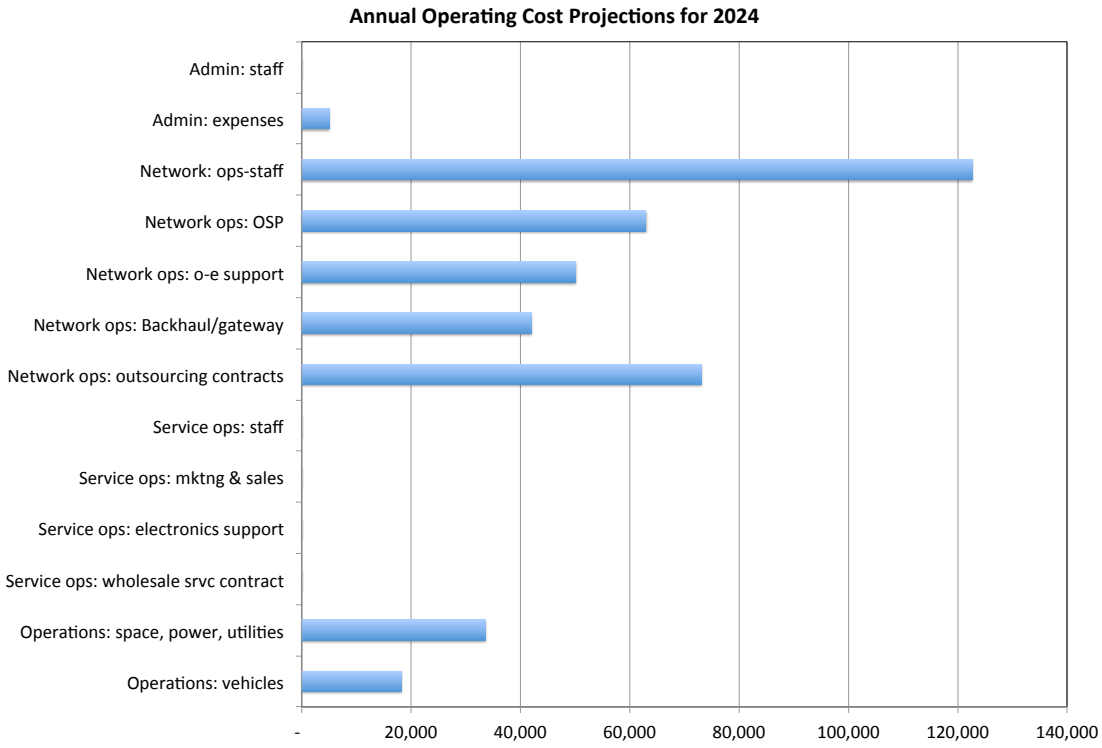


Figure 119 – Projected operational costs in 2024.

9.4.6 Financial Projections

Cashflow results for this scenario are summarized in Table 43. Though the operation goes cashflow positive two years after the network deployment completes, with debt servicing considered, the overall financials do not go cashflow positive until year 11. As the required capital must therefore be sufficient to cover an 11-year deficit, some $7.6M in capital will be required to fund the operation. By year 15, approximately $121,221 is being returned to the Town annually.

Table 43 – Utility Model Results Summary for Barrhead

	Results
Years to positive cashflow	
Operating	4
With debt servicing (p&i)	10
Financing	
Start-up capital required	7,578,553
Net Cashflow - before debt servicing	
Profit - annual at 10 yr	226,189
Profit - annual at 15 yr	389,971
Net Cashflow - after debt servicing	
Profit - annual at 10 yr	0
Profit - annual at 15 yr	121,221

In graphical form, the non-discounted cashflow chart for the proposed utility appears in Figure 120. The capital (red) required to finance the project is shown to pretty much all be required upfront and the financing must be sufficient to maintain a net cashflow of at least zero. Operational sustainability is determined by the gap or difference between the revenue (blue) and operational expenditure (green) lines whereas overall sustainability, which includes principal repayment, is the difference between the

revenue (blue) and the operational + principal repayment (dotted blue) lines. The bigger the gap, the better. The net overall cashflow line is the dotted orange line.

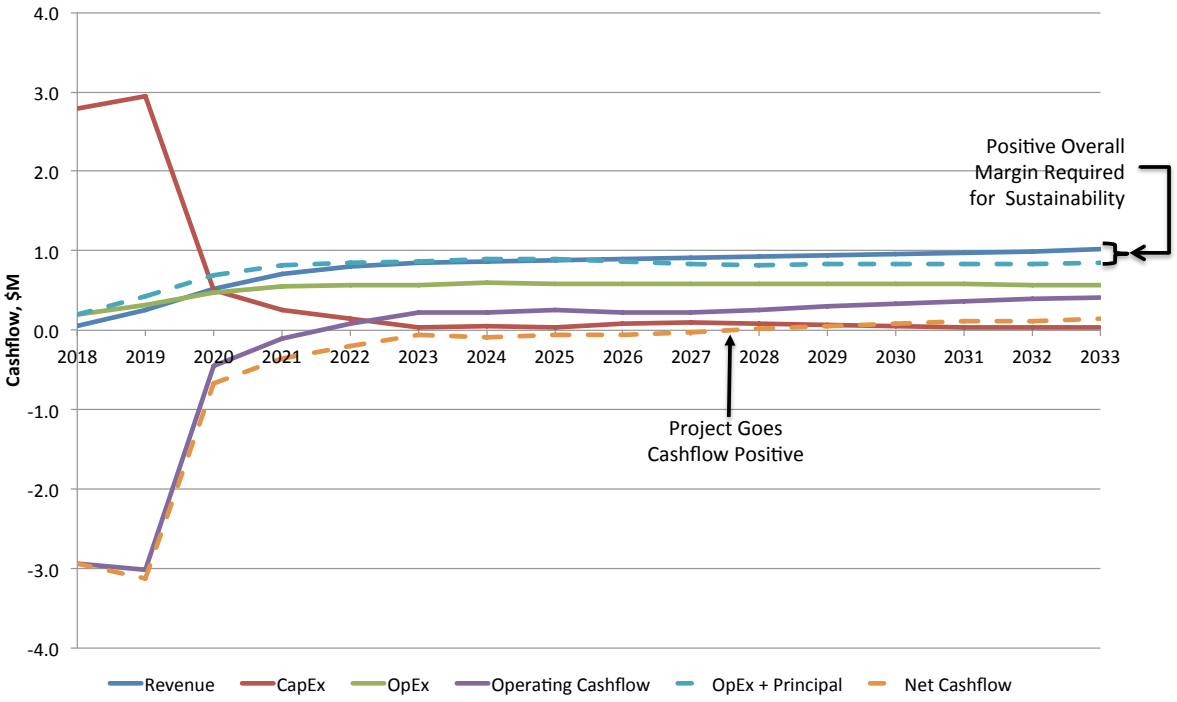


Figure 120 – Non-discounted cashflow projections for Barrhead.

The operating margin is positive in year 4 and, with debt service payments, the operation goes cashflow positive in year 12. While technically these numbers work, operationally, the risk is too high due to the negligible margins and resulting deficits. Given the small client base available in Barrhead and the importance of scale to operational sustainability, these initial results are typical for communities with populations less than around 4-5 thousand people.

Options to improve margins sufficiently that a community might elect to pursue a deployment are many and varied. With only 900 premises, for example, Valleyview now has a model in which their numbers work. Options to be considered are outlined in Sub-section 6.5.10.

9.5 Town of Swan Hills – A 725 Premise Utility Network

9.5.1 Business Structure

With 4,000+ premises, the stand-alone business case for an FTTP play in Whitecourt made financial sense. At half the population, the financials for Barrhead were marginal. With under half the population of Barrhead, the financials for Swan Hills are even worse, so partnering with other communities will likely be required.

In the analysis below, the business structure, opto-electronics and backhaul, operations, drop capital, and markets and revenues assumed are those outlined in the default implementation scenario presented in Section 6.5. In this case, the local network entity established to house the local fibre operation will be referred to as S-Net.

9.5.2 Deployment Capital

A pre-conceptual buried fibre design was completed for the Town of Swan Hills was complete as part of the Big Lakes Broadband project. The design appears in Figure 121. In the map, feeder lines are in magenta and the distribution cabling in cyan. The estimated deployment cost to pass every home and business is $2.14M which comes to about $2,300/premise.

9.5.3 Deployment Schedule

This business case assumes that the network would be deployed throughout Swan Hills over the spring, summer, and fall of 2018.

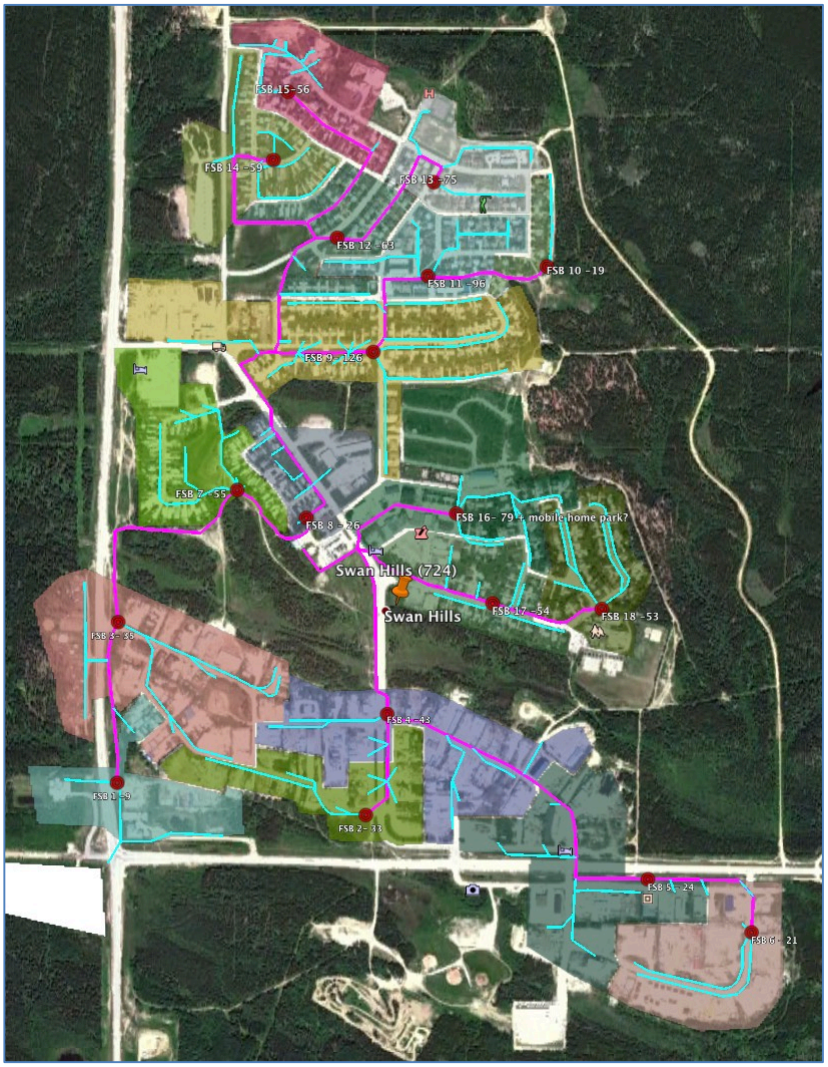


Figure 121 – A pre-conceptual fibre plan for Swan Hills.

9.5.4 Opto-electronics and Backhaul

Capital cost estimates over the first five years of operation for the proposed scenario come to $3.47M – the breakdown appears in Figure 122. In the chart, the $2.21M outside plant (OSP) deployment estimate (core and drops) includes the feeder and distribution plant required to pass every premise and provide drop connections to those premises that take service.

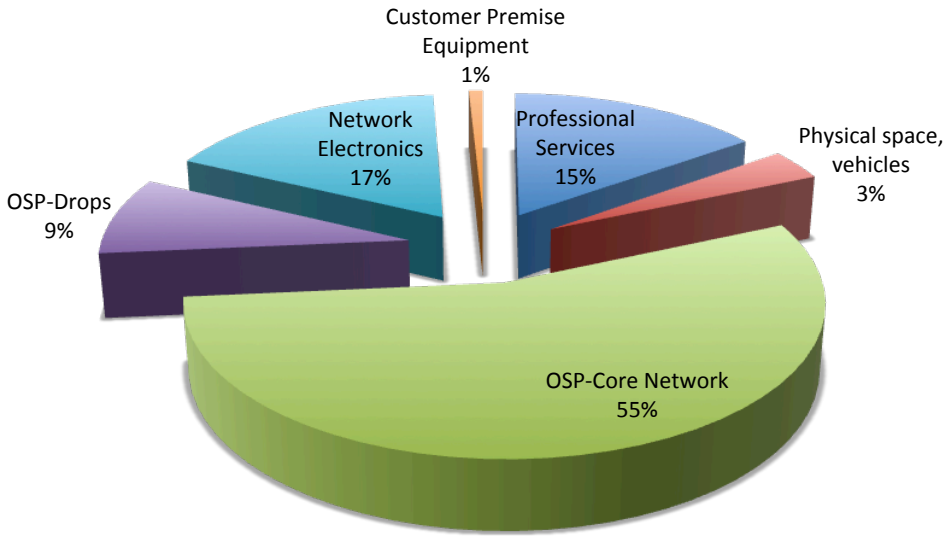


Figure 122 – Cumulative capital expenditures from 2018 to 2022.

9.5.5 Operations

The operational costs for wholesale network operation are straightforward as most are handled via outsourced contracts. Once the network build is completed in 2018 and the target penetration rates are realized, operational costs stabilize and a view of those calculated for 2024 are shown in Figure 123. The numbers assume that the Town provides both equipment and storage space at no charge.

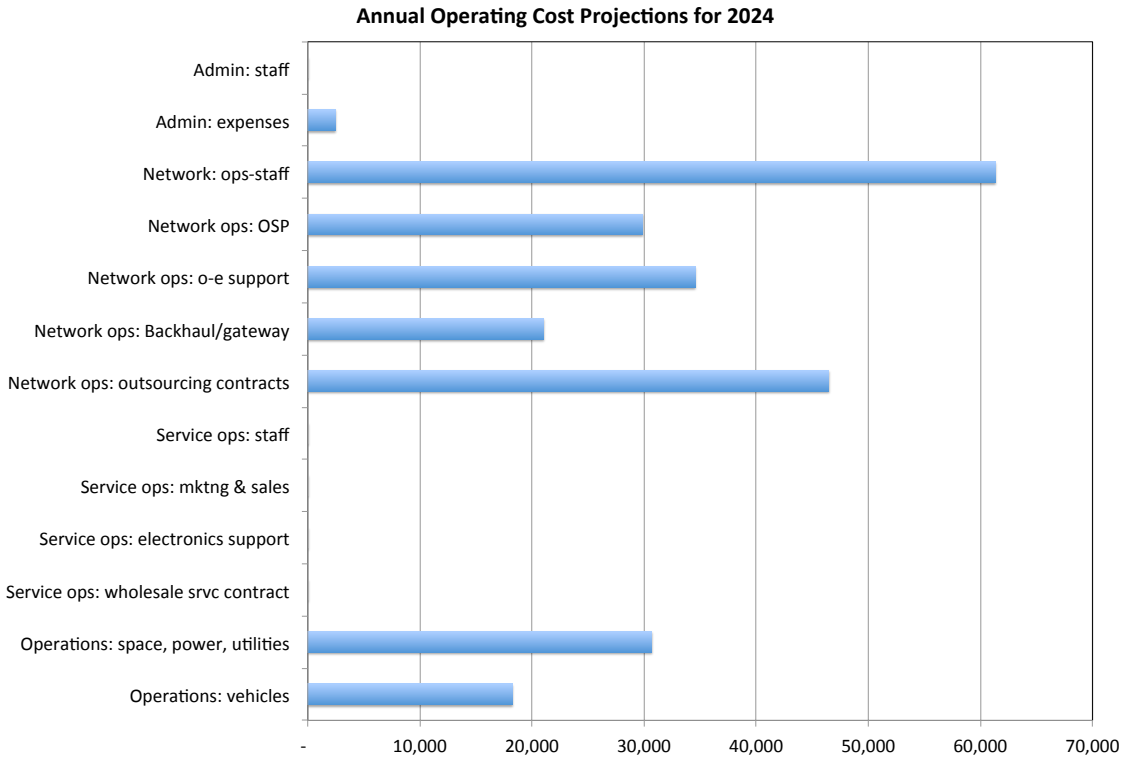


Figure 123 – Projected operational costs in 2024.

9.5.6 Financial Projections

In graphical form, the non-discounted cashflow chart for the proposed utility appears in Figure 124. The capital (red) required to finance the project is shown to pretty much all be required upfront and the financing must be sufficient to maintain a net cashflow of at least zero. Operational sustainability is determined by the gap or difference between the revenue (blue) and operational expenditure (green) lines whereas overall sustainability, which includes principal repayment, is the difference between the revenue (blue) and the operational + principal repayment (dotted blue) lines. The bigger the gap, the better. The net overall cashflow line is the dotted orange line.

As is evident, the client base in Swan Hills is insufficient to sustain the operation. The overall margin remains negative and the operation runs an on-going deficit.

Options to improve margins sufficiently that a community might elect to pursue a deployment are many and varied. Options to be considered were discussed in Sub-section 6.5.10.

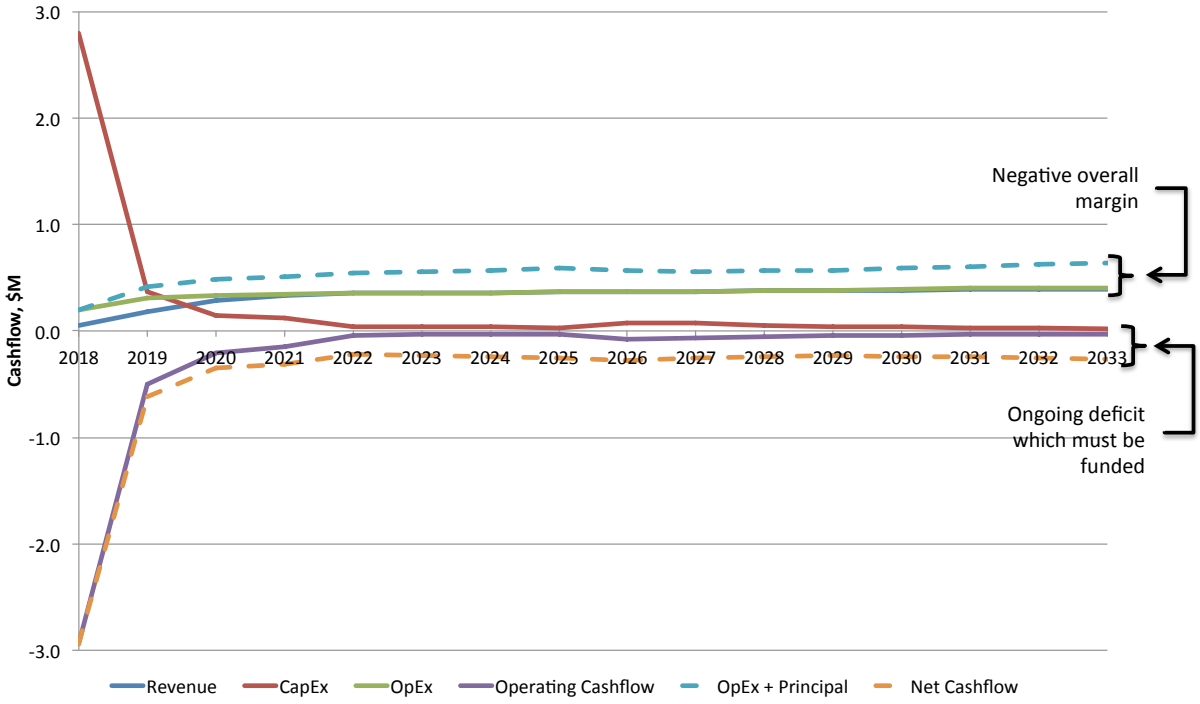


Figure 124 – Non-discounted cashflow projections for Swan Hills.

9.6 Woodlands County – An Inclusive Regional Network

As an example County within GROWTH Alberta, consider Woodlands County – the least dense, but with the largest population centre. Broadband has been on the Woodlands agenda for some time and the County is currently considering various ways in which it might play a role in helping fill the coverage gaps. Approaches include working with TELUS and local ISPs.

The approach taken here involved developing cost estimates to lay fibre to key ISP towers (towers that the ISPs would upgrade if their connected bandwidth could be increased) but routing the conduit/fibre in such a way as to pass through every town/village/hamlet so that when any of them are ready, they can easily connect. Draft routes appear in Figure 125. In the map, towns are marked with orange pins while hamlets are shown with yellow. ISP towers are represented by the green triangles. SuperNet access sites are shown with yellow text and circles. Proposed fibre routes to connect both the key ISP towers and provide a fibre access point in each hamlet are shown in yellow.

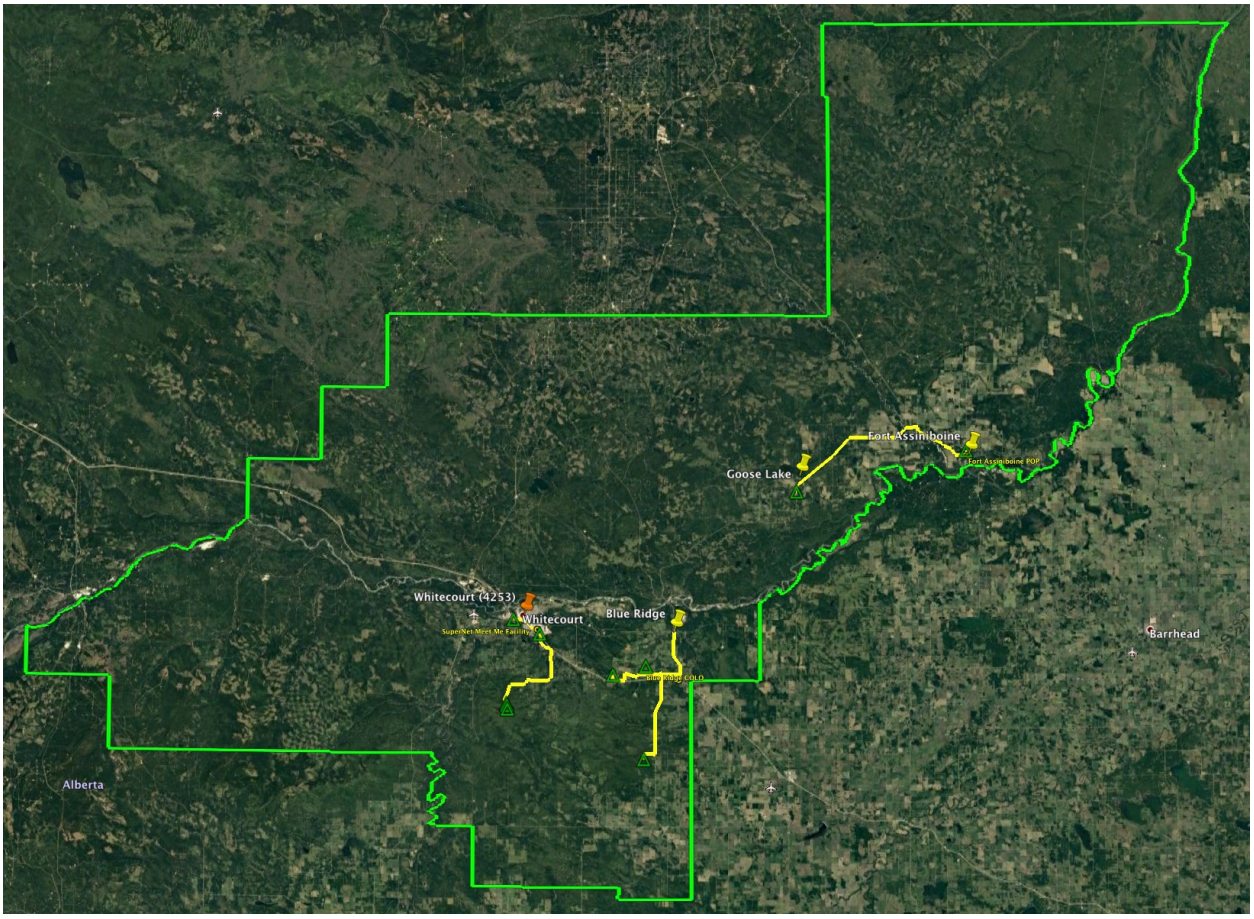


Figure 125 – Woodlands County.

Should the County elect to deploy the three fibre routes shown, they'd be looking at a capital cost of approximately $3M. if just the higher priority southern two routes were deployed, the cost reduces to approximately $2.0M. Either way, as the hamlets are small, a business case for deploying fibre to both the hamlets and the ISP towers is negative. Deployment then becomes a function of County priorities. Options include cost sharing with local ISPs, leveraging linear infrastructure projects, obtaining grant funding, and/or moving some of the cost to the tax roll. Should a utility network be established in Whitecourt, the operation could fund the build, but the required capital to initially float the operation would increase.

9.7 Extrapolating the Results

9.7.1 Municipal Networks

As representative financials have been provided for a range of community sizes, extrapolating the results to other communities with GROWTH Alberta is straightforward. As all others are much smaller than Whitecourt, partnering between communities will be needed to make fibre available to all.

As an example, say Whitecourt, Barrhead, and Swan Hills partnered and built out their own access networks over a period of three years. Assuming a utility-based, lit, open-access network, the summary financials for this scenario appear on the left side of Table 44 and the non-discounted cashflow chart appears in Figure 126. Overall, the combined financials are excellent.

Table 44 – Utility Model Results Summary for Whitecourt, Barrhead, and Swan Hills

Whitecourt, Barrhead, and Swan Hills

	Results
Years to positive cashflow	
Operating	4
With debt servicing (p&i)	5
Financing	
Start-up capital required	22,160,346
Net Cashflow - before debt servicing	
Profit - annual at 10 yr	1,434,593
Profit - annual at 15 yr	1,948,939
Net Cashflow - after debt servicing	
Profit - annual at 10 yr	742,271
Profit - annual at 15 yr	1,242,919

Regional Network with Whitecourt, Barrhead, and Swan Hlls

	Results
Years to positive cashflow	
Operating	4
With debt servicing (p&i)	5
Financing	
Start-up capital required	25,731,364
Net Cashflow - before debt servicing	
Profit - annual at 10 yr	1,410,301
Profit - annual at 15 yr	1,925,722
Net Cashflow - after debt servicing	
Profit - annual at 10 yr	711,464
Profit - annual at 15 yr	1,212,112

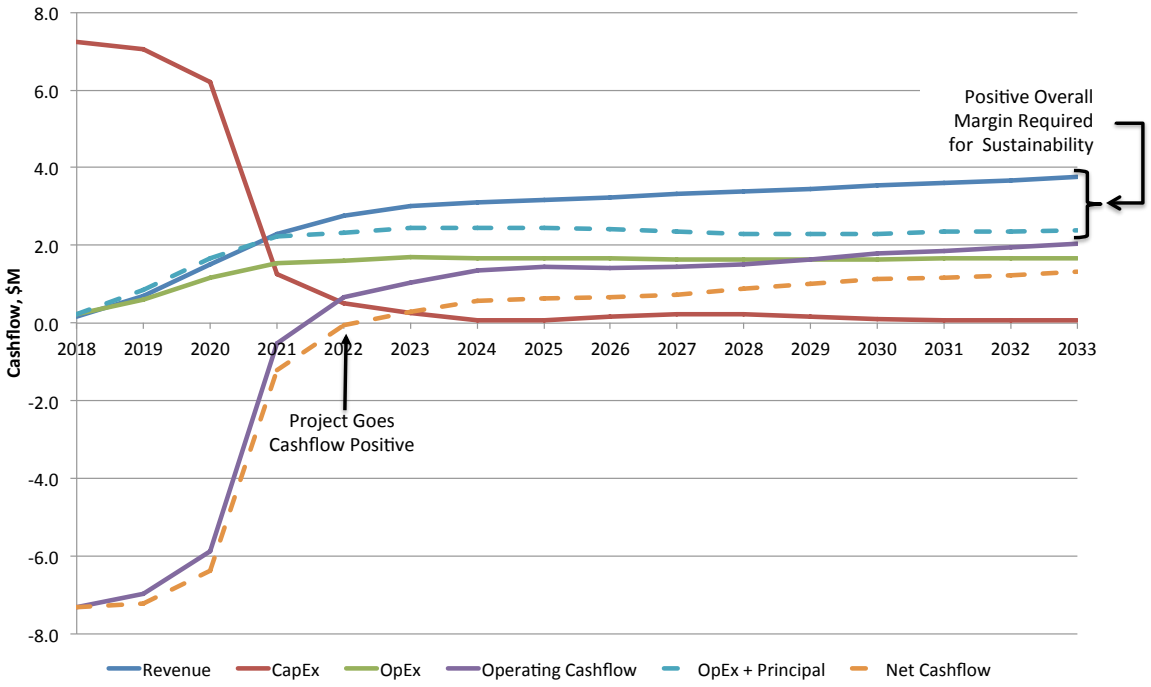


Figure 126 – Non-discounted cashflow projections for Whitecourt, Barrhead, and Swan Hills.

9.7.2 Regional Networks

As low densities and small communities are typical of the GROWTH Alberta region, the issues faced by Lac Ste Anne, Barrhead, and Westlock will be similar to those faced by Woodlands. Business cases for fibre deployment will be difficult and deployment will largely become a function of County priorities. Options include cost sharing with local ISPs, leveraging linear infrastructure projects, obtaining grant funding, and/or moving some of the cost to the tax roll. Another option is to increase the scale of the undertaking. If a regional network were deployed to cover Whitecourt, Barrhead, Swan Hills, and Woodlands County, the business case – as shown by the summary financials on the right side of Table 44, work.

10 Lesser Slave Lake Economic Alliance (LSLEA)

10.1 Current State

10.1.1 Regional Profile

As shown in Table 45, the current state regional assessment for the Lesser Slave Lake Regional Economic Alliance (LSLEA) focuses on two towns, three counties or municipal districts (MDs), nine First Nations, and three Métis Settlements. Please visit LSLEA's website for more information http://www.lslea.ca/. The map shown in Figure 127 shows the reach of the LSLEA. It should be noted that Big Lakes County, the Town of Slave Lake, and MD of Lesser Slave River as well as some First Nations are not LSLEA members. They are part of the broader Northern Alberta Development Council (NADC) region or a member of a neighbouring Regional Economic Development Alliance (REDA).

TELUS has made a generational investment in fibre in the Town of Slave Lake; however, businesses in the town indicate that Internet capacity and coverage fall short.

Table 45 – LSLEA Communities

Towns	Counties/MDs	First Nations	Métis Settlements
Towns	Counties/MDs	First Nations	Métis Settlements
High Prairie Slave Lake*	Big Lakes▲ Lesser Slave River* Opportunity	Bigstone Cree* Driftpile* Kapawe'no* Loon River* Peerless Trout* Sawridge* Sucker Creek Swan River* Whitefish Lake (Atikameg)	East Prairie Gift Lake Peavine

*Community resides within the northern Alberta study area and the NADC region but is not presently a member of a REDA.

▲Member of Peace Region Economic Development Alliance (PREDA).

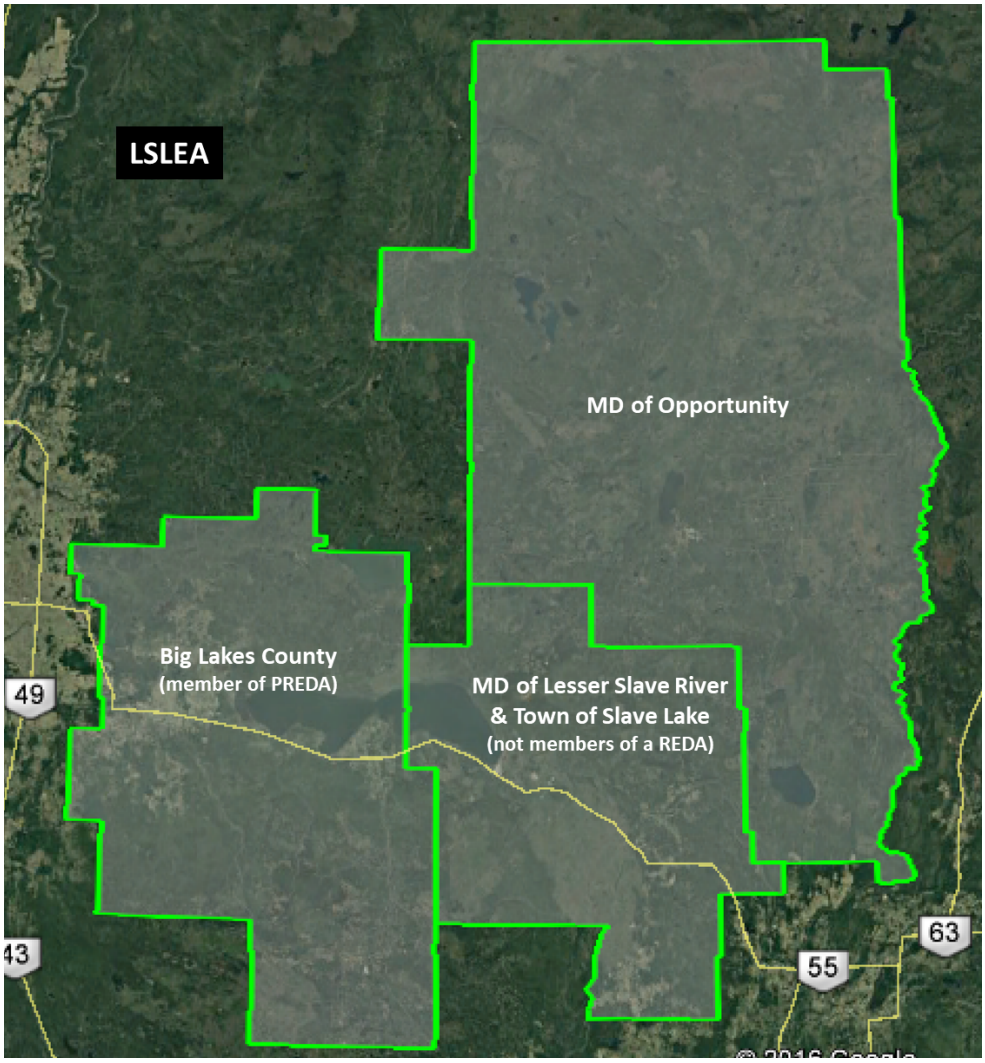


Figure 127 – LSLEA Region.

The 2011 wildfires swept through the Town of Slave Lake, the Sawridge First Nation, and the MD of Lesser Slave River. In the town, 333 single family homes and 169 apartment units were destroyed as were 3 churches, 10 businesses, and a local radio station (approximately one third of the town and mostly concentrated in the southeast corner and centre of the town). The government centre, including the provincial offices, the town hall, and the library, was lost as well. In the MD, 56 homes and a fire hall were destroyed. The Alberta government offered considerable assistance. Much of the rebuild is now complete.[151] [152]

The Slave Lake Regional Tri-Council, which formed following the 2011 wildfires, still have separate jurisdictions and collaborate on matters of regional importance.

[151] Town of Slave Lake; http://www.slavelake.ca/150/History.

[152] Young, Leslie; *Slave Lake Fire Damage Map: Satellite Map of Destroyed Homes;* Global News; 2011-05-20. http://globalnews.ca/news/117728/.

The LSLEA region is home to approximately 29,000 residents.[153] Table 46 provides a breakdown by municipality (rural and urban), First Nation, and Métis Settlement as well as five-year population growth trends and CAGRs - population data are from Statistics Canada. The Town of Slave Lake and Big Lakes County are the most populated municipalities in the LSLEA region, with populations of 6,651 and 5,672, respectively. The populations of Kapawe'no and Swan River First Nations have grown significantly (each approximately 32%) during the five-year period between 2011 and 2016. Statistics Canada's 2016 Census of Population data indicate that the Sawridge First Nation population have declined significantly over the five-year period.

Table 46 – LSLEA Population & Population Growth Trends

Municipality	Rural				Urban					First Nations (FN)/Métis Settlements				
	Population (2016)	CAGR (%) (2011-2016)	5-Year Trend (%) & Direction		City/Town/ Village	Population (2016)	CAGR (%) (2011-2016)	5-Year Trend (%) & Direction		Reserve / Settlement	Population (2016)	CAGR (%) (2011-2016)	5-Year Trend (%) & Direction	
Big Lakes, County	5,672	-0.8	-4.1	▼	High Prairie	2,564	-0.3	-1.4	▼	Driftpile	828	0.7	3.5	▲
										Kapawe'no	159	5.8	32.5	▲
										Sucker Creek	689	0.4	1.8	▲
										Swan River	413	5.8	32.4	▲
										Whitefish Lake	850	2.1	11.1	▲
										East Prairie (Métis)	304	-3.6	-16.6	▼
										Gift Lake (Métis)	658	-0.1	-0.6	▼
										Peavine (Métis)	607	-2.5	-12.0	▼
					Sub-total	2,564				**Sub Total - FN**	2,939			
										Sub Total - Métis	1,589			
Lesser Slave River, MD	2,803	-0.9	-4.3	▼	Slave Lake	6,651	-0.4	-1.9	▼	Sawridge	30	-15.1	-55.9	▼
Opportunity, MD	3,181	0.7	3.5	▲						Bigstone Cree	2,515	-0.6	-2.3	▼
										Loon River	555	1.7	8.6	▲
										Peerless Trout	334	3.7	19.7	▲
										Sub Total - FN	3,404			
Total	11,656					9,215				**Total - FN**	6,373			
										Total - Métis	1,569			

CAGR – Compound Annual Growth Rate

Total Population = **28,813**

Source: Statistics Canada Census 2011 and 2016.

There are 1,230 businesses (with employees) in the LSLEA region. The top 10 industries in which they operate is shown in Table 47 and Figure 128 (industry classification system: NAICS). The industry mix is diverse with approximately 17% of businesses with employees engaged in the construction industry. The second largest industry on a total number of businesses basis is retail trade. These two sectors makeup approximately 29% of businesses with employees in the region. The *'Other Industries'* segment (14.6%) shown in the Figure 128 chart includes industries that individually contribute between 4.2% and 0.6% to the category.[154]

[153] Calculations based on Statistics Canada's 2016 Census of Population.

[154] Administrative and support, waste management and remediation; wholesale trade; public administration; manufacturing; finance and insurance; educational services; arts, entertainment and recreation; management of companies and enterprises; information and cultural industries; and utilities;

The region is spread over a vast geographic area comprised of boreal forest, lakes, and plains in the south.[155] Tolko Industries plans to reopen its Oriented Standard Board (OSB) facility in High Prairie. Production at the mill is expected to begin in the first quarter of 2018.[156]

Table 47 – LSLEA Number of Businesses (with employees) by Industry

Industry	Businesses	Percent (%)
Construction	207	16.8
Retail trade	149	12.1
Other services (except public administration)	125	10.2
Mining, quarrying, and oil and gas extraction	125	9.9
Transportation and warehousing	122	9.3
Professional, scientific and technical services	94	7.6
Healthcare and social assistance	65	5.3
Accommodation and food services	64	5.2
Agriculture, forestry, fishing, and hunting	58	4.7
Real estate and rental and leasing	53	4.3

Source: Calculations based on dataset provided by Alberta Economic Development & Trade, Economic Information & Analytics, Feb. 13, 2017.

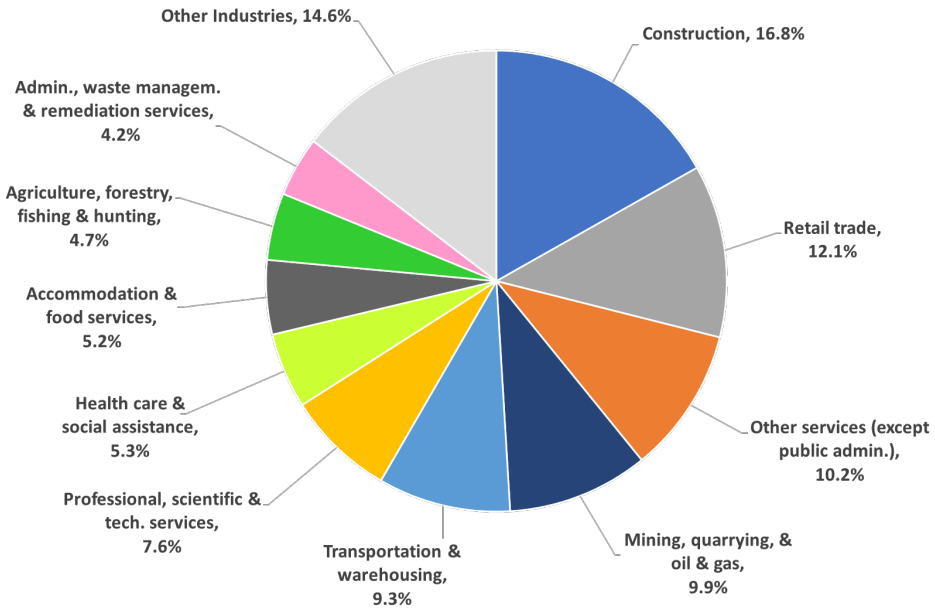


Figure 128 – LSLEA mix (based on business counts).

10.1.2 Municipal, First Nations and Métis Settlements Broadband Interests

Communities within LSLEA are at different stages in recognizing the importance of broadband services and connectivity to economic diversification, municipal sustainability, regional competitiveness, public

[155] LSLEA; 2017-02-15.

[156] Baroldi, Lisa; *Tolko to Restart High Prairie Oriented Strand Board Mill*; Big Lakes County; 20 June 2017.

service delivery, and quality of life.[157] Table 48 identifies the awareness and current state of municipal involvement and interest in broadband. Big Lakes County, High Prairie, MD of Lesser Slave River, and Slave Lake are advanced in recognizing the importance of broadband and looking for solutions to move forward.

Table 48 – LSLEA Involvement & Interest in Broadband[138]

Community	Enthusiastic	Interested *'Maybe'*	Need Help Too Small	Too Expensive	Status Quo	Don't Know[158]	No Response[159]
Towns							
High Prairie	X						
Slave Lake – business areas	X						
Slave Lake	TELUS Fibre predominately in residential areas; partner in the *Inter-Municipal Broadband Discovery Project*						
Counties/MDs							
Big Lakes	X						
Lesser Slave River	X						
Opportunity							X
First Nations							
Bigstone Cree		X					
Driftpile							X
Kapawe'no							X
Loon River		X					X
Peerless Trout							X
Sawridge	X						
Sucker Creek		X					
Swan River							X
Whitefish Lake (Atikameg)							X
Métis Settlements							
East Prairie		X					
Gift Lake	X			X			
Peavine					X		

Big Lakes County and its partner communities recently took the initiative to obtain *Alberta Community Partnership (ACP)* funding for a detailed broadband study for the County, inclusive of the municipalities, First Nations, and Métis settlements within its boundaries – specifically High Prairie, Swan Hills, the hamlets of Enilda, Faust, Grouard, Joussard, and Kinuso, the Kapewe'no First Nation, and the Gift Lake Métis Settlement. The study – *Inter-municipal Broadband Discovery Project* – will leverage the results of this work and then develop more detailed financials to evaluate the options of most interest to the

[157] The five elements of broadband's importance were identified by the Calgary Regional Partnership, Economic Prosperity Steering Committee; *Request for Decision*; 2016-09-08.

[158] Don't Know – the respondent was unable to rate their community's interest and involvement in broadband.

[159] No Response – the community did not respond to the inquiries regarding their community's interest and involvement in broadband.

County. As the more detailed financials have already been developed, they will be used in the analyses presented here – thereby increasing both the accuracy and credibility of the financial results presented.

The Northern Alberta Broadband Society is an independent voluntary organization and a legal entity, created to build broadband infrastructure (i.e., fibre/hybrid) and provide broadband services to residents in the immediate Slave Lake region and along a trajectory to the Peace River area.

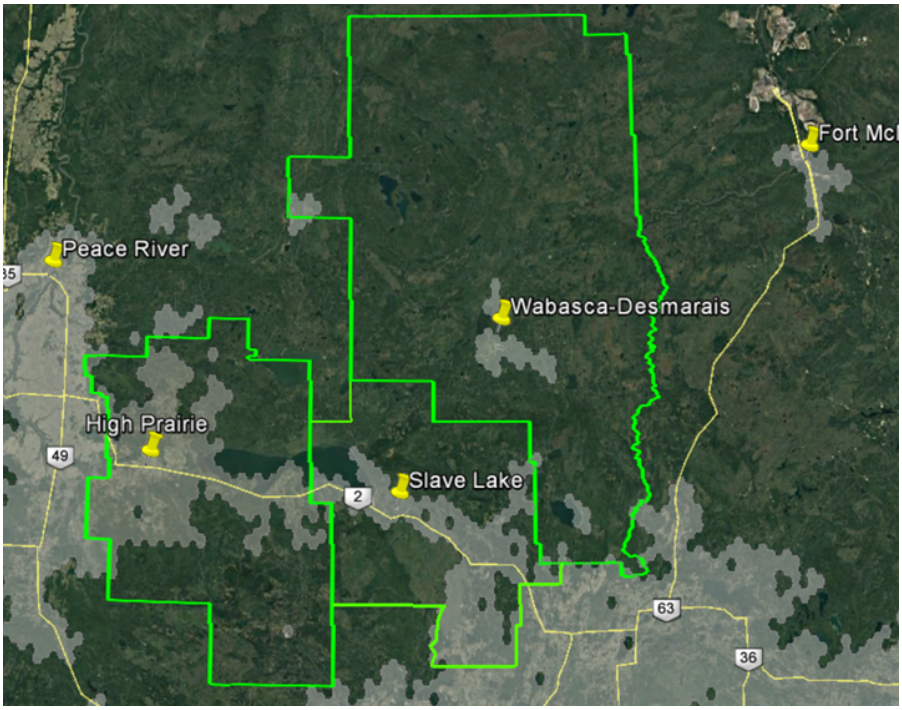
10.1.3 Current Service Providers, Services, and Infrastructure

10.1.3.1 Fixed Wireless-based

Current Internet Service Providers using fixed wireless technology in the LSLEA region include the following. Appendix 16.3 provides the details of their service offerings (Internet only – no bundling unless otherwise stated) and geographic coverage. The coverage maps of the individual service providers are those that were available on their websites at the time of the writing of this report.

- Arrow Technology Group,
- Boreal Wireless,
- Corridor Communications (CCI),
- I Want Wireless,
- Infinity Internet Solutions Alberta,
- Lakeshore Internet Services,
- Slave Lake Communications,
- Sniper Communications, and
- XplorNet (fixed wireless and satellite-based).

According to the CRTC website[160], minimal 5 Mb/s down (toward the end-client) by 1 Mb/s up (from the end-client to the network) service is available in the LSLEA region. A combined view of the fixed wireless coverage is shown in Figure 129 (light gray areas).



Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

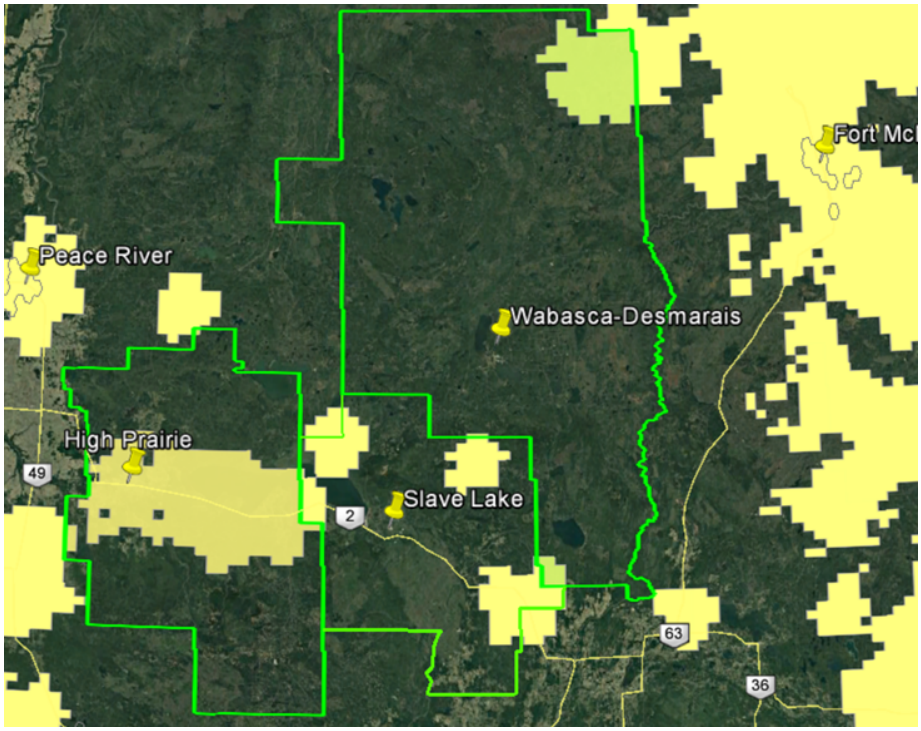
Figure 129 – LSLEA fixed wireless coverage.

[160] http://crtc.gc.ca/eng/internet/internetcanada.htm .

Since 2005, Lakeshore Internet Services (Lakeshore) has provided fixed wireless-based Internet services to First Nations and the communities in the Lesser Slave Lake area. Lakeshore's owner, the Lesser Slave Lake Indian Regional Council, is governed by its eight member/shareholder First Nations. They would like to deploy fibre to their membership – potentially starting as a pilot project. For those living on reserves, the social implications of the services and applications broadband would enable would be very significant. For example, the enhanced training and education alone would change peoples' lives.[161]

10.1.3.2 Mobility

Shown as yellow areas in Figure 130, mobility data services are available from TELUS/Bell and Rogers. Appendix 16.4.2 provides the coverage maps for each of the providers of mobility services. As discussed earlier Bell, TELUS, and Rogers are now using cellular towers and SmartHubs to provide at-home Internet services.



Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

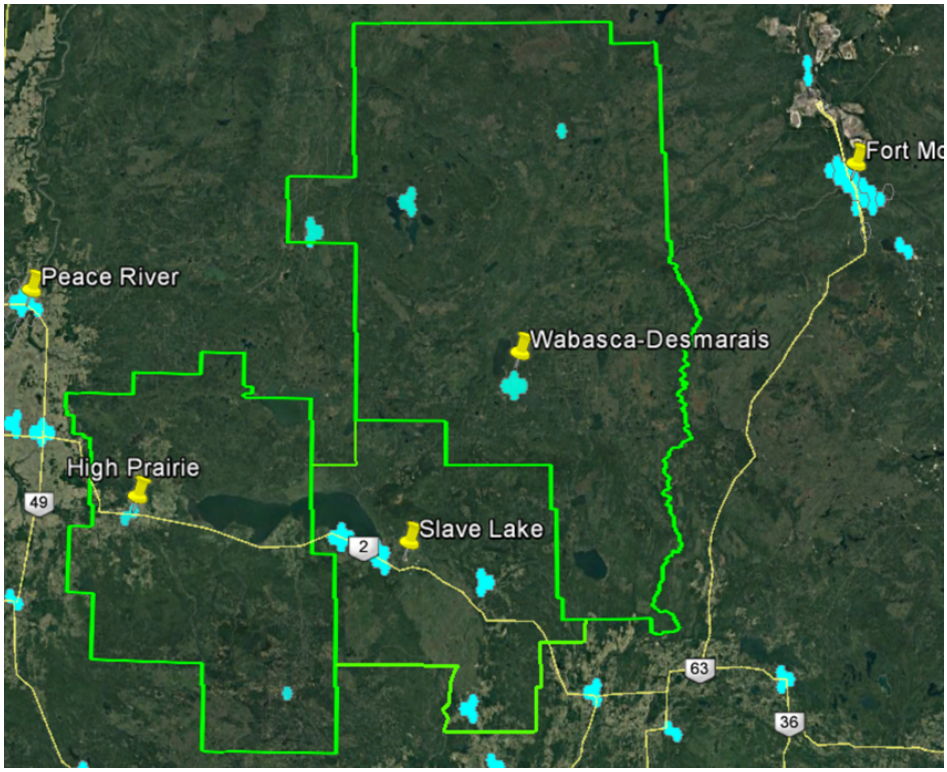
Figure 130 – LSLEA mobility data coverage.

10.1.3.3 Wireline-based – DSL

Digital Subscriber Line (DSL) refers to a group of last mile technologies that are used by wireline-based service providers such as TELUS in Alberta to provide broadband services over twisted-pair copper wiring. The local copper wire loop is a remnant from the days when (and how) the telephone company connected residential and business premises to the telephone company's network for the purposes of providing local and long distance telephone services (and dial-up Internet services). Since DSL's performance degrades

[161] Aulenback, Jaye – Network Manager, Lakeshore Internet Services; Telephone conversation; 2016-12-15.

with distance, the technology is only deployed in urban areas where access distances are less than about two miles. In Figure 131, areas served via DSL technologies are shown in blue.



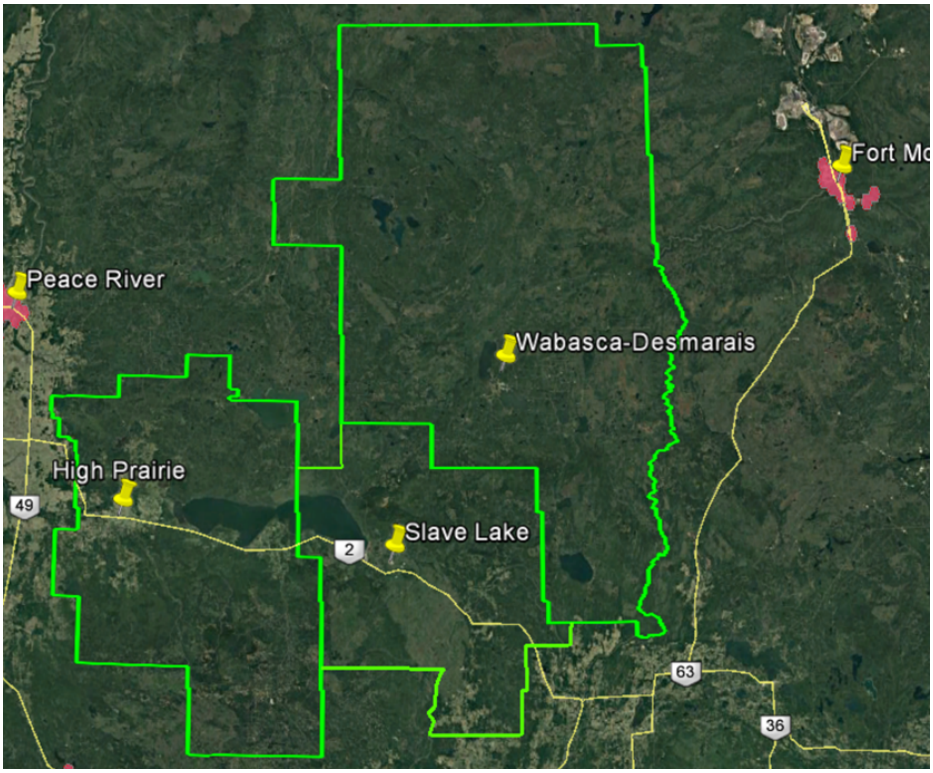
Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

Figure 131 – LSLEA DSL coverage.

10.1.3.4 Wireline-based – Coaxial Cable

Eastlink, originally a television broadcast company, uses coaxial cable and modern cable modem technology to provide broadband services. Wireline coaxial-based Internet services are available from Eastlink in Slave Lake (although it does not appear as a red area in Figure 132). The cable companies currently use the DOCSIS 3.0 standard to achieve broadband speeds of 100 Mb/s or more over coaxial cable. According to the Cybera, *State of Alberta Infrastructure Report*, *"The next-generation DOCSIS 3.1 standard is expected to revolutionize hybrid fibre-coaxial cable connections by providing up to 10 Gb/s download and 1 Gb/s upload network throughput and significant improvements in latency."*[162]

[162] *State of Alberta Digital Infrastructure Report;* Cybera; 2016-09-13.



Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

Figure 132 – LSLEA coaxial cable coverage.

Maximum advertised wireline offerings are shown in Appendix 16.2. Since these are *'up to'* bit rates, during high usage periods, actual bit rates will be less – Eastlink more so than TELUS due to the way the aggregation is implemented. In both cases, the offerings are highly asymmetric – upload and download bit rates differ significantly.

10.1.3.5 Internet Service Provider Wi-Fi

TELUS and Bell WiFi services are available in the LSLEA region - two TELUS locations in High Prairie as well as four TELUS and two Bell locations in Slave Lake.

10.1.3.6 Axia Fibre

Axia NetMedia provides retail services to corporate clients and, through AxiaConnect, provides fibre-based retail Internet services in a number of smaller communities. In exchange for access to a community's rights-of-way, Axia will consider investing in fibre-to-the-premise (FTTP) infrastructure in communities that can demonstrate that at least 30% of its residences and businesses are interested in purchasing Internet services from Axia once the '*closed-access*' network is built. To date, Axia has not announced any plans for FTTP deployments in any LSLEA community.

10.1.4 Backhaul Availability

10.1.4.1 Alberta SuperNet

The extent of the SuperNet within the LSLEA region is shown in Figure 133. The green lines represent the Bell-operated BAN portion while the blue lines represent the Axia-operated EAN segments. A more general discussion about the SuperNet is presented in Appendix 16.5.

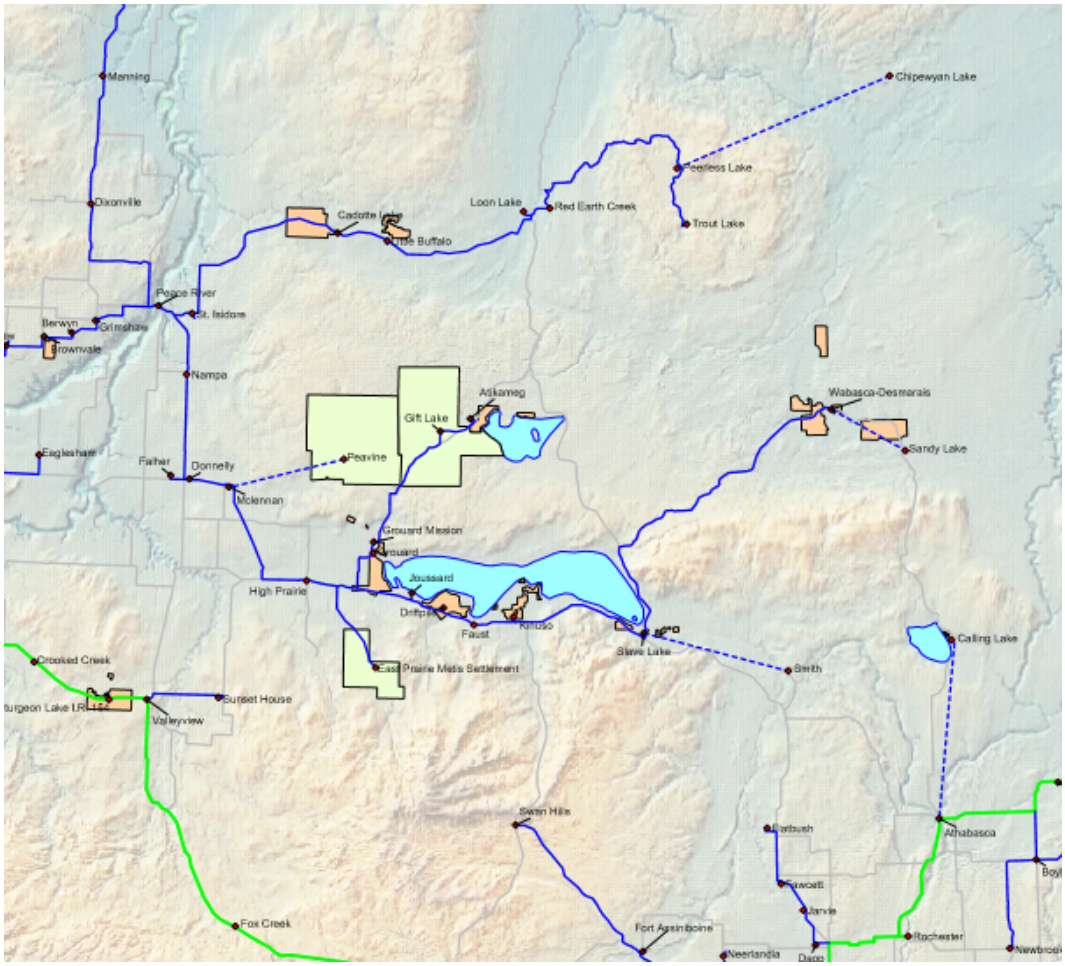


Figure 133 – LSLEA SuperNet infrastructure.

Given the uncertainty associated with the next iteration of the SuperNet contract by June 30, 2018, municipalities, First Nations, and Métis Settlements requiring access to fibre transport for backhaul to Edmonton may want to consider Bell or TELUS.

10.1.4.2 TELUS Wholesale

Except under a non-disclosure agreement, TELUS does not provide maps of fibre assets.

10.1.5 Existing Infrastructure

10.1.5.1 Towers and Other Tall Structures

When planning a broadband build-out it is important to build on what is already in place. The key inquiry for the current state analysis is what assets does the community have that can be provided at little or no incremental cost that improve the economics of the broadband deployment and operations? Assets include existing towers, fibre and community networks, which the community might be using for communications or asset management. Existing and possible access to tall structures or buildings are also important to inventory for potential placement of wireless equipment.

The only towers potentially available to leverage for a community broadband project are likely the ones owned by Kapawe'no First Nation. The First Nation received funding in the amount of $62,250 from Alberta Agriculture and Forestry's 2012-2013 *Final Mile Rural Community Program.* Two towers are

privately owned by a band member of the Bigstone Cree First Nation. There is a CBC tower at Grouard in Big Lakes County.

10.1.5.2 Utility Infrastructure

The existing overhead and underground transmission and distribution lines of electric utility companies (ATCO, Fortis) and natural gas co-operatives (co-ops) present deployment options for community broadband builds - access to and installing fibre cables to travel along utility poles, in ducts and conduit, and along rights-of-way can significantly improve the economics of broadband service expansion projects and network deployments. Inquiries about the availability of communications spaces on utility providers' poles and where multi-party trench agreements exist will be made during the preliminary infrastructure design phase of a broadband network. Appendix 16.6 shows ATCO Electric's and Fortis Alberta's respective service areas in northern Alberta.

10.1.5.3 Gas Co-operatvies – Zone 1

In the 1960s, non-profit gas co-ops were formed to supply natural gas to rural Alberta - franchise areas were designated. The following three Zone 1 gas co-ops currently operate in the LSLEA region. Figure 134 provides a map showing the group's geographic coverage in the Lesser Slave Lake area.

- Town of High Prairie
- Prairie River Gas Co-op Ltd. (High Prairie)
- Swan River Gas Co-op Ltd. (Kinuso)



Source: Federation of Alberta Gas Co-ops, http://www.fedgas.com/Map. Accessed Feb. 1, 2017.

Figure 134 – LSLEA gas co-operatives.

There are several rural water co-operatives operating in the LSLEA area, as shown in Table 49.[163] Big Lakes County owns eight water co-ops – see Appendix 16.10 for their approximate locations.

Table 49 – LSLEA Water Co-operatives

Water Co-op	Vicinity/Service Area	Owner/Operator
8 co-ops: Big Meadow, Heart River, High Prairie East, North End, Northwest, Riverbend, Southside, West End	High Prairie	Big Lakes County
Kinuso	Southshore of Lesser Slave Lake	Members
Poplar Lane	Lesser Slave River	MD

10.1.5.4 First Nations Fibre Infrastructure

First Nations Technical Services Advisory Group (TSAG) is a non-profit organization established by the Chiefs of Alberta to provide technical support and training to First Nations in the Treaty 6, 7, and 8 regions. In 2008, TSAG partnered with Health Canada to develop the network components (fibre connections) at First Nations health centres to support First Nations' telemedicine. With Health Canada funding and TSAG project management, community fibre networks connections were made to the Alberta SuperNet points-of-presence on each or close to each First Nations in 2011. Upon completion, each First Nations became the owner of its local fibre network. As shown in Figure 135, First Nations' schools, health centres, band administration offices, and water treatment plants are now connected.

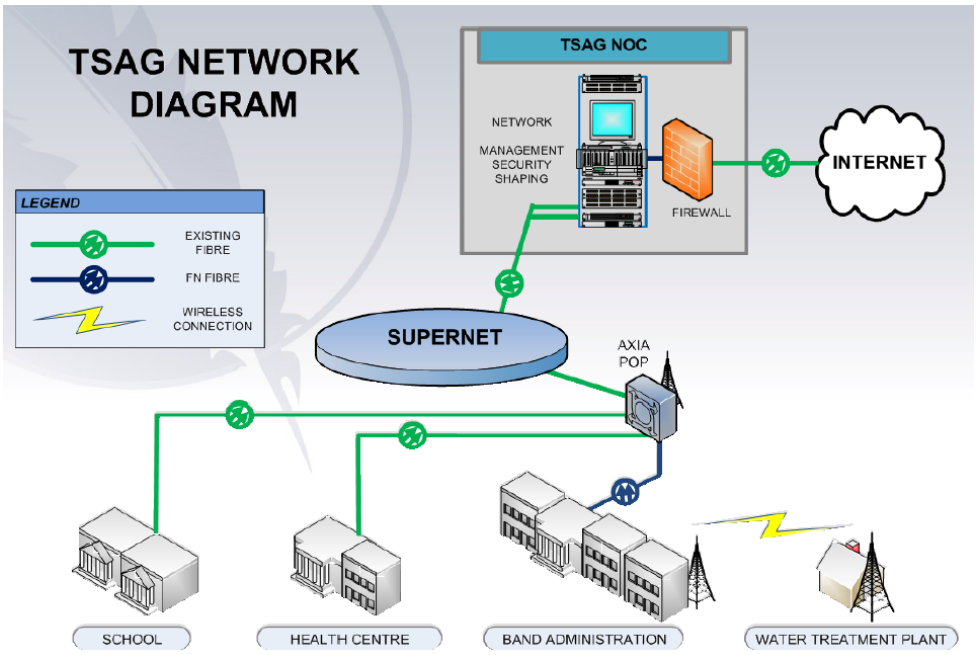


Figure 135 – TSAG network diagram.

TSAG operates a state-of-the-art Network Operations Centre (NOC). The NOC's real time network monitoring ensures availability, network security/SPAM filtering, telehealth bridge management, and support, and applications (high-speed connectivity and remote water monitoring system for water

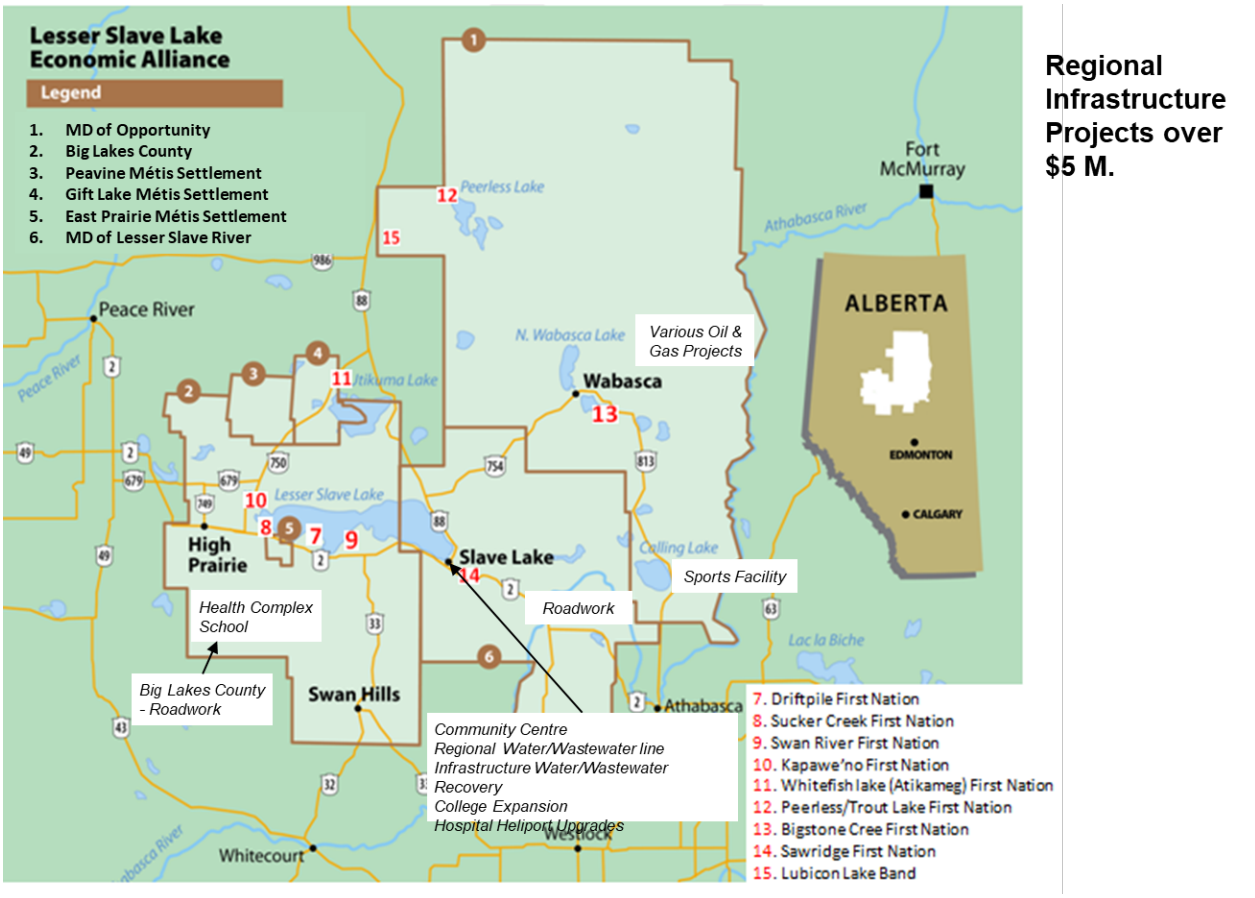
[163] Regula, Doris; *Market Opportunity Analysis;* Regula & Associates Consulting Ltd; 15 May 2015-05-15.

treatment plants, OneHealth.ca, and FirstNationsTH.ca). Onehealth.ca is a national health portal that provides information and services to health care professionals working in First Nations communities. FirstNationsTH.ca – Telehealth provides education and travel-free patient and health care assessments via video-conferencing.

10.1.6 Planned Infrastructure

10.1.6.1 Major Projects

The LSLEA region has several private and public sector capital projects planned (Figure 136).[164] Where possible these projects maybe leveraged to reduce the costs associated with the deployment of broadband infrastructure.



This map shows the reach of the LSLEA. Big Lakes County, MD of Lesser Slave River, the towns of Swan Hills and Slave Lake, and some First Nations are not LSLEA members.

Figure 136 – LSLEA major projects.

[164] Alberta Major Projects, Economic Development and Trade; 2016-12. http://majorprojects.alberta.ca/.

10.1.6.2 Electricity Transmission Development Plans

Alberta PowerLine, a partnership between ATCO and Quanta Services, is about to begin construction north of the Athabasca River on the Fort McMurray West 500 kV transmission line.[165] Designed to address increased electricity demand in the Fort McMurray area, the line will run from Wabamun to the Fort McMurray area. The line will pass through the LSLEA region, see map in Appendix 16.9. The route was approved on February 10, 2017, and the facilities will be completed and operational by June 2019.

10.1.6.3 Municipal Capital and Civil Works Projects

Leveraging civil infrastructure projects can reduce broadband deployment costs by 75%. Given civil infrastructure costs typically account for 70% of buried deployment costs, this is significant. Capital projects that involve trenching or erecting towers or poles such as during the development of new subdivisions, road construction, or the construction of rehabilitation or water or sewer lines are typical projects that can improve the economics of community broadband projects.

The Federal *Small Communities Fund* (part of the New Building Canada Fund) for infrastructure projects, now includes a *'Connectivity and Broadband'* category. 2016 approved non-broadband projects within the LSLEA region include (figures shown are the Total Eligible Project Cost - Federal, Provincial, and Municipal):

- Slave Lake – Wastewater treatment modernization $13.5 million, and
- Big Lakes County – House Mountain connector road and bridge construction $9 million.

Big Lakes County's Joussard water treatment plant upgrades grant application was approved for $3.6 million from the *Alberta Municipal Water/Wastewater Partnership (AMWWP).*[166] The MD of Opportunity received the following funding from the same program:

- Regional SCADA system $2.0 million,
- Regional wastewater SCADA system $262,000,
- Calling Lake lagoon upgrades $2.5 million, and
- Sandy Lake water treatment plant upgrades, $5.8 million.

Table 50 shows the capital and civil works projects that either the municipalities self-reported or were identified by another source.

[165] Alberta PowerLine; 2017-03-24. www.albertapowerline.com.

[166] Froese, Richard; *County Set to Engineer Four Water Projects*; South Peace News; 2017-08-21.

Table 50 – LSLEA Municipal Capital & Civil Works Projects

Towns	
High Prairie	52nd Avenue water and sewer line, curb, gutter, sidewalks replacement (2017)
Slave Lake	Wastewater treatment modernization
Counties/MDs	
Big Lakes	Kinuso reservoir and pumping station; bridge replacement; High Prairie airport upgrades[167] Joussard reservoir extension; Enilda and Grouard water reservoir expansions
Opportunity	Did not respond to project inquiry regarding civil and capital projects and no information was available on the town's website
Lesser Slave River	Road paving, force main, and lift station replacement[168]

10.2 Desired State

The range of interest in broadband varies considerably throughout the region, but even the most enthusiastic of the municipalities are still in the early stages of deciding which options to pursue and how. While a formal *'Desired State'* has not yet been agreed to in any of the municipalities, what follows is based on the assumption that, over the next five years, the majority may choose to facilitate the deployment of infrastructure to support a fully scalable broadband network ubiquitously available throughout their municipality and, if possible, the region as a whole. This would typically include a combination of an underlying fibre infrastructure with upgraded wireless services where fibre is not yet practical. Market-wise, the infrastructure would be available on an open-access basis to all service providers interested in serving municipal and regional businesses and residents. Whereas the municipalities do not wish to interfere with private enterprise in the services marketplace, they will entertain options relative to facilitating the underlying lit open-access fibre utility infrastructure.

Within the LSLEA, Big Lakes County and its partner communities are advanced in recognizing the importance of broadband and looking for solutions to move forward.

Big Lakes County, the towns of High Prairie and Slave Lake, the MD of Lesser Slave River, and the Gift Lake Métis Settlement – Big Lakes County recently received funding from the *Alberta Community Partnership (APC) Program* for its *Inter-Municipal Broadband Discovery Project* to assess the best ways to enhance broadband in the region. Big Lakes County will lead the project. At the time of the writing of this report, the project team is in the early stages of organizing and defining their broadband project.

Northern Alberta Broadband Society – The Northern Alberta Broadband Society, an independent voluntary organization, plans to improve broadband connectivity between the immediate Slave Lake region and the Peace River region.

Southshore Area First Nations and Lakeshore Internet Services – Lakeshore Internet Services (Lakeshore) provides fixed wireless-based Internet services to the First Nations and the communities in the Lesser Slave Lake area. Lakeshore's owner, the Lesser Slave Lake Indian Regional Council, is governed by its eight member/shareholder First Nations. The eight members include Driftpile, Duncan's, Horse Lake, Kapawe'no, Sawridge, Sturgeon Lake, Swan River, and Sucker Creek First Nations. Lakeshore strongly believes broadband will provide the infrastructure needed to develop and deliver advanced applications and services that will bring greater economic and social benefits to their communities and bridge the gaps

[167] *Big Lakes County Council Meeting Minutes*; Big Lakes County; 2017-04-26, 2017-05-10, 2017-05-24.

[168] MD of Lesser Slave River; *2017 Capital Budget*.

that exist in employment, learning (online education), and healthcare. They would like to deploy fibre to their membership – they envision a pilot project as a way forward.

Figure 137 shows the communities within LSLEA that have near-term broadband plans. The details of each community's issues and challenges and 3-, 5-, and 10-year visions for broadband can be found in the Appendix 13.11.

10.3 Town of High Prairie – A 1,000+ Premise Utility Network

10.3.1 Context

Within the LSLEA, Big Lakes County and its partner communities are the most advanced in recognizing the importance of broadband and looking for solutions to move forward. Indeed, Big Lakes County took the initiative to obtain Alberta Community Partnership (ACP) funding for a detailed study for the County, inclusive of the municipalities, First Nations, and Métis settlements within its boundaries. The study – *Inter-municipal Broadband Discovery Project* – will leverage the results of this work and then develop more detailed financials to evaluate the options of most interest to the County.

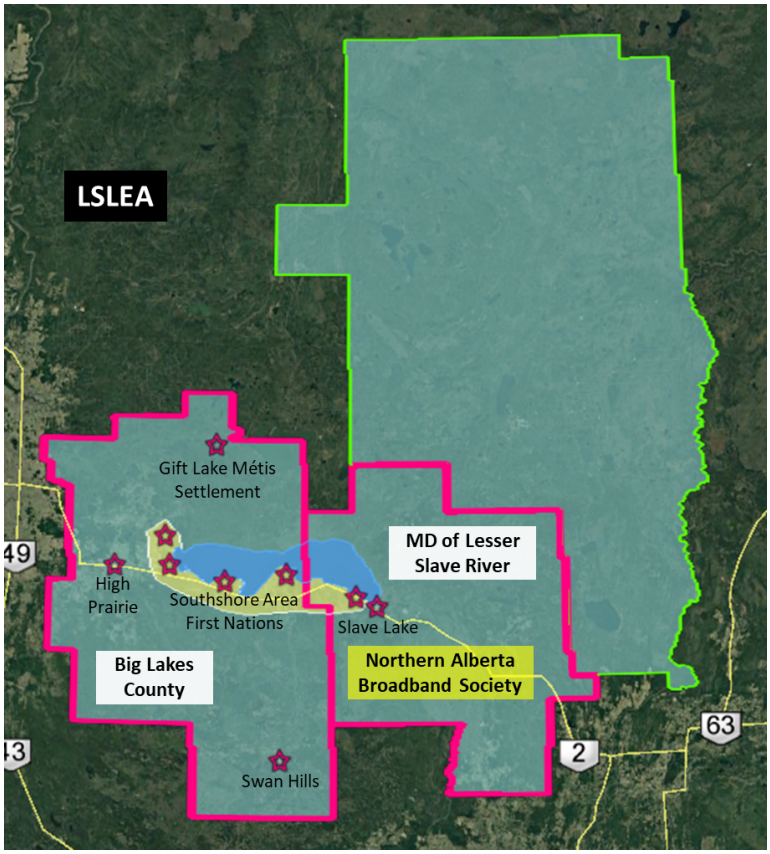


Figure 137 – Communities with near-term broadband plans.

At the time of writing, neither the MD of Lesser Slave River nor the MD of Opportunity were ready for such a study. As such, the analyses below will focus on the results for Big Lakes County. As will be seen, the business case for an inclusive, open-access utility network focused on providing both FTTP networks in each of these communities as well as an inter-community connecting network within Big Lakes County, goes cashflow positive after seven years. Going forward, the model could be expanded to encompass options for both the MD of Lesser Slave River and the MD of Opportunity.

It is hoped that the Big Lakes work will be leveraged by the Southshore Area First Nations and Lakeshore Internet Services as both realize the importance of broadband to deliver advanced applications and services that will bring greater economic and social benefits to their communities and bridge the gaps that exist in employment, learning (online education), and healthcare. They would like to deploy fibre to their membership – they envision a pilot project as a way forward. The models developed for Big Lakes should help make that possible. Partnering with Big Lakes would improve the financials for both.

10.3.2 Business Structure

In the analysis for High Prairie below, the business structure, opto-electronics and backhaul, operations, drop capital, and markets and revenues assumed are those outlined in the default implementation scenario presented in Section 6.5. In this case, the local network entity established to house the local fibre operation will be referred to as HP-Net.

10.3.3 Deployment Capital

A pre-conceptual buried fibre design was completed for the Town of High Prairie. For this, the town was divided into four parts as shown in Figure 138. In the map, feeder lines are in magenta and the distribution cabling is in cyan.

The estimated deployment costs appear in the Table 61. Assuming reasonable ground conditions, a buried fibre deployment that passes every premise in the Town of High Prairie would cost about $2.46M. For the Central area, this amounts to approximately $1,683 per premise. In the industrial East district, the comparable cost increases to $10,300/premise because the distances are greater and the density lower.

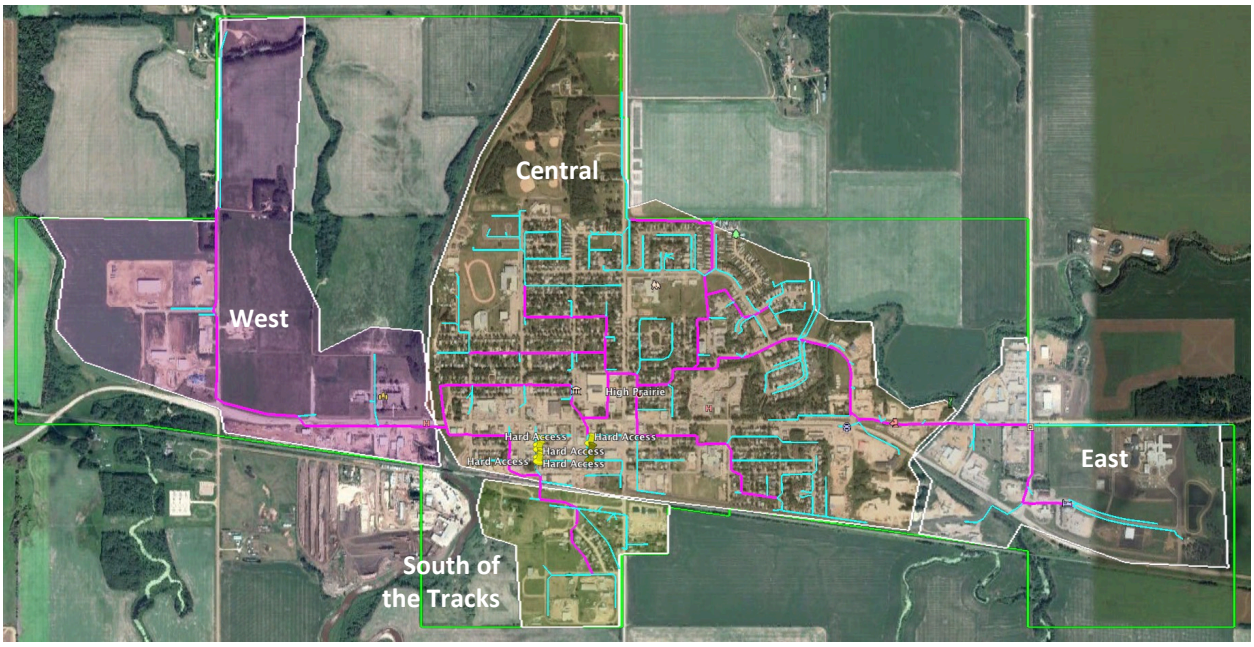


Figure 138 – A pre-conceptual fibre plan for High Prairie.

10.3.4 Deployment Schedule

This business case assumes that the network would be deployed throughout High Prairie over the spring, summer, and fall of 2018.

10.3.5 Opto-electronics and Backhaul

Capital cost estimates over the first five years of operation for the proposed scenario come to $4.26M – the breakdown appears in Figure 139. In the chart, the $2.68M outside plant (OSP) deployment estimate (core and drops) includes the feeder and distribution plant required to pass every premise and provide drop connections to those premises that take service.

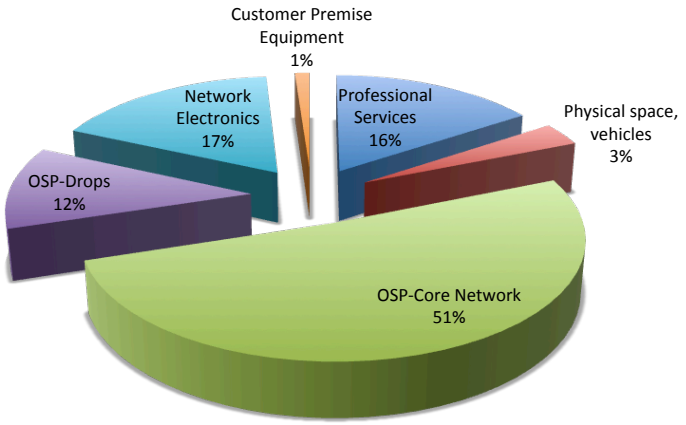


Figure 139 – Cumulative capital expenditures from 2018 to 2022.

10.3.6 Operations

The operational costs for wholesale network operation are straightforward as most are handled via outsourced contracts. Once the network build is completed in 2018 and the target penetration rates are realized, operational costs stabilize and a view of those calculated for 2022 are shown in Figure 140. In the chart, Admin, ops, and o-e refer to administration, operations, and opto-electronics, respectively. The numbers assume that the Town provides both equipment and storage space at no charge.

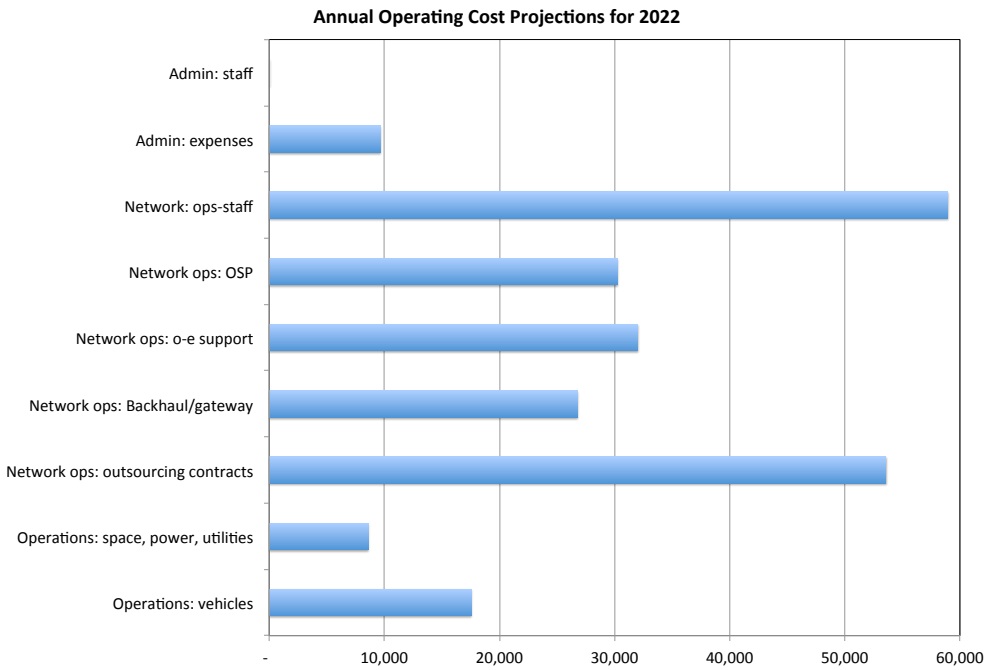


Figure 140 – Projected operational costs in 2022.

10.3.7 Financial Projections

Cashflow results for this scenario are summarized in Table 51. Though the operation goes cashflow positive in year 4[169], with debt servicing considered, the overall financials do not go cashflow positive until year 12. As the required capital must therefore be sufficient to cover an 11-year deficit, some $4.98M in capital will be required to fund the operation. By year 15, approximately $19,371 is being returned to the Town annually.

Table 51 – Utility Model Results Summary for High Prairie

	Results
Years to positive cashflow	
Operating	3
With debt servicing (p&i)	11
Financing	
Start-up capital required	4,984,587
Net Cashflow - before debt servicing	
Profit - annual at 10 yr	104,498
Profit - annual at 15 yr	190,381
Net Cashflow - after debt servicing	
Profit - annual at 10 yr	0
Profit - annual at 15 yr	19,371

In graphical form, the non-discounted cashflow chart for the proposed utility appears in Figure 141. The capital (red) required to finance the project is shown to pretty much all be required upfront and the financing must be sufficient to maintain a net cashflow of at least zero. Operational sustainability is determined by the gap or difference between the revenue (blue) and operational expenditure (green) lines whereas overall sustainability, which includes principal repayment, is the difference between the

[169] With three years to positive cashflow, the project goes cashflow positive in year 4.

revenue (blue) and the operational + principal repayment (dotted blue) lines. The bigger the gap, the better. The net overall cashflow line is the dotted orange line.

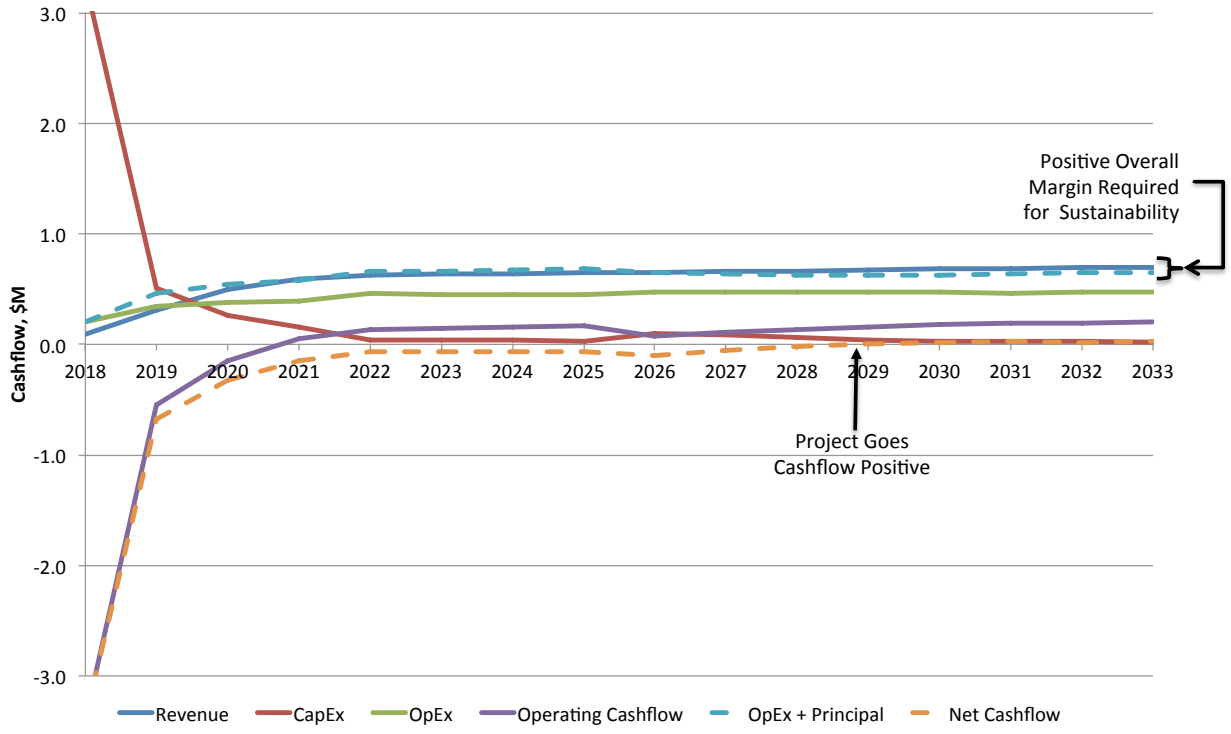


Figure 141 – Non-discounted cashflow projections for High Prairie.

The operating margin is positive in year 4 and, with debt service payments, the operation goes cashflow positive in year 12. While technically these numbers work, operationally, the risk is too high due to the negligible margins and resulting deficits. Given the small client base available in High Prairie and the importance of scale to operational sustainability, these initial results are typical for communities with populations less than around five thousand people.

Options to improve margins sufficiently that a community might elect to pursue a deployment are outlined in Sub-section 6.5.10.

10.4 An Inclusive Regional Network

Within the LSLEA, Big Lakes County and its partner communities are the most advanced in recognizing the importance of broadband and looking for solutions to move forward. Indeed, Big Lakes County took the initiative to obtain Alberta Community Partnership (ACP) funding for a detailed study for the County, inclusive of the municipalities, First Nations, and Métis settlements within its boundaries. The study – *Inter-municipal Broadband Discovery Project* – will leverage the results of this work and then develop more detailed financials to evaluate the options of most interest to the County. The results may be found in Section 11.3.2.

10.5 Extrapolating the Results

10.5.1 Municipal Networks

Being over twice the size of High Prairie, a utility fibre operation in the Town of Slave Lake has the potential to be considerably more sustainable than that for High Prairie. More importantly, though, as TELUS has

already deployed fibre to the residential areas, a municipal fibre operation in Slave Lake could focus solely on the business community – enabling a relatively small deployment footprint to serve high value business clients.

As all other communities within the LSLEA region are smaller than even High Prairie, establishing a sustainable, stand-alone access network in any of them will be a challenge. Partners or a regional network as proposed above, however, provides them with a valuable option.

10.5.2 Regional Networks

Given the importance of scale, should Big Lakes County proceed to establish a regional network operation, the operation could easily be expanded to encompass both the MD of Lesser Slave River and the MD of Opportunity – to mutual benefit of all communities involved.

11 Peace Region Economic Development Alliance (PREDA)

11.1 Current State

11.1.1 Regional Profile

As shown in Table 52, the Peace Region Economic Development Alliance (PREDA) region is made-up of several communities – the City of Grande Prairie, 13 towns, 7 villages, 11 counties or MDs, and 4 First Nations. A map of the PREDA region is shown in Figure 142. Please visit PREDA's website for more information http://peacecountrycanada.com/.

Table 52 – PREDA Communities

City	Towns	Villages	Counties/MDs	First Nations
Grande Prairie*	Beaverlodge* Fairview Falher Fox Creek Grande Cache* Grimshaw Manning McLennan Peace River Sexsmith Spirit River Valleyview Wembley*	Berwyn Donnelly* Girouxville* Hines Creek Hythe Nampa Rycroft	Birch Hills Clear Hills Fairview Grande Prairie Greenview Northern Lights Northern Sunrise Peace 135 Saddle Hills Smoky River Spirit River	Duncan's* Horse Lake* Lubicon Lake* Sturgeon Lake Cree* Woodland Cree*

*Community resides within the northern Alberta study area and the NADC region but is not presently a member of a REDA.

Of the communities within PREDA, TELUS has made long-term fibre investments in the City of Grande Prairie and the Town of Peace River. The Town of Fairview selected Axia to construct a fibre optic network for their community. The network is to be completed in the fall 2017 timeframe. An Axia engagement process took place, beginning with community polling, in Grande Cache in November of 2016 – the 30% interest threshold from residents and businesses was not achieved.

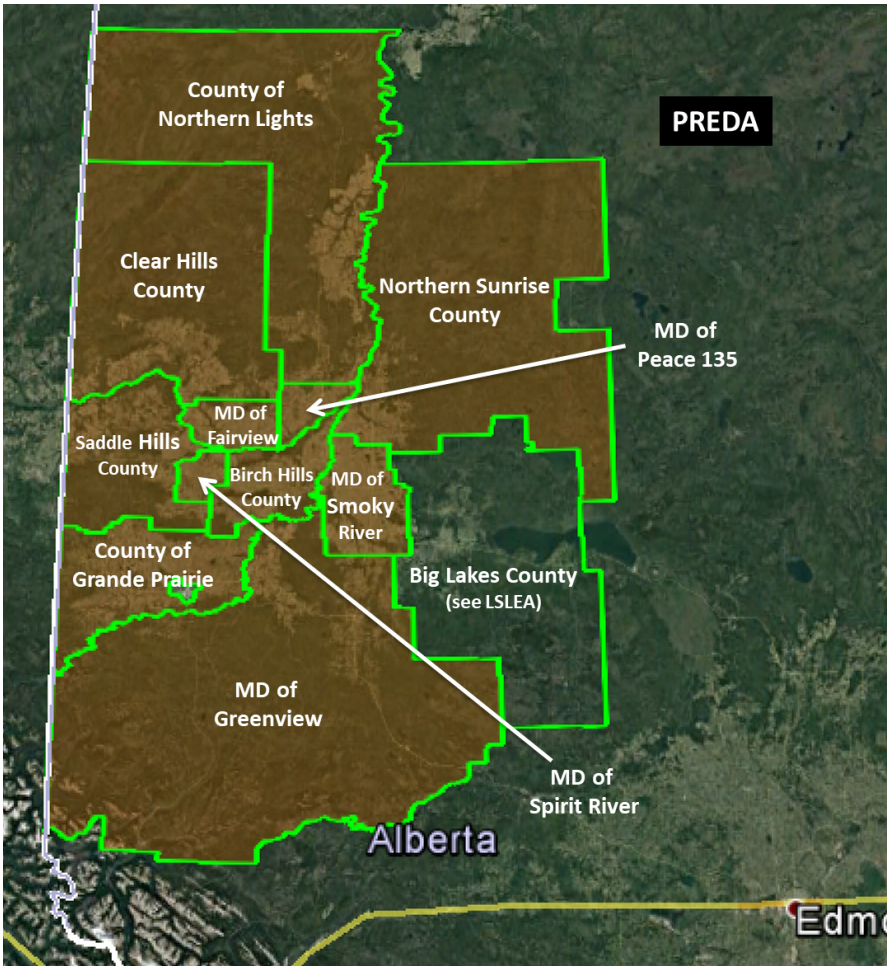


Figure 142 – PREDA region.

The region is home to approximately 147,000 residents.[170] Table 53 provides a breakdown by municipality (rural and urban), First Nation, and Métis Settlement as well as five-year population growth trends and CAGRs. The County of Grande Prairie and City of Grande Prairie are the most populated municipalities in the PREDA region, with populations of 22,303 and 63,166, respectively. Both have grown significantly (approximately 13% each) during the five-year period between 2011 and 2016; however, the population growth of the MD of Peace 135 has outpaced their growth (20.8%). The Town of Grande Cache's population has declined by approximately 17%, largely due to the closing of Grande Cache Coal, which may resume operations in 2017. Grande Cache has requested a viability review. Statistics Canada's 2016 Census of Population data indicate that the Sturgeon Lake First Nation has grown significantly over the five-year period. It should be noted that the villages of Berwyn and Rycroft are currently undergoing viability reviews. A Viability Team was formed in Berwyn in January 2017.

[170] Calculations based on Statistics Canada's 2016 Census of Population.

Table 53 – PREDA Population & Population Growth Trends

Municipality	Rural				Urban					First Nations (FN)/Métis Settlements				
	Population (2016)	CAGR (%) (2011-2016)	5-Year Trend (%) & Direction		City/ Town/ Village	Population (2016)	CAGR (%) (2011-2016)	5-Year Trend (%) & Direction		Reserve / Settlement	Population (2016)	CAGR (%) (2011-2016)	5-Year Trend (%) & Direction	
Birch Hills, County	1,553	-0.4	-1.8	▼										
Clear Hills, County	3,023	1.5	7.9	▲	Hines Creek	346	-1.9	-8.9	▼					
Fairview, MD	1,604	-0.8	-4.1	▼	Fairview	2,998	-1.1	-5.2	▼					
Grande Prairie, County	22,303	2.5	13.1	▲	Beaverlodge	2,465	0.8	4.2	▲	Horse Lake	469	3.1	16.7	▲
					Grande Pr.	63,166	2.6	13.5	▲					
					Hythe	827	0.2	0.9	▲					
					Sexsmith	2,620	1.6	8.4	▲					
					Wembley	1,516	1.9	9.6	▲					
					Sub-total	70,594								
Greenview, MD	5,583	1.0	5.4	▲	Fox Creek	1,971	0.0	0.1	▲	Sturgeon Lake	1500	4.8	26.5	▲
					Grande C.	3,571	-3.7	-17.3	▼					
					Valleyview	1,863	1.1	5.8	▲					
					Sub-total	7,405								
Northern Lights, County	4,200	0.4	2.0	▲	Manning	1,183	0.3	1.6	▲					
Northern Sunrise, County	1,891	1.1	5.6	▲	Nampa	364	0.1	0.6	▲	Lubicon Lake	452	3.2	16.8	▲
					Peace River	6,842	0.3	1.7	▲	Woodland Cree	873	0.6	2.8	▲
					Sub-total	7,206				**Sub Total - FN**	1,325			
Peace, MD	1,747	3.9	20.8	▲	Berwyn	538	0.5	2.3	▲	Duncan's	150	-1.8	-8.5	▼
					Grimshaw	2,718	1.6	8.1	▲					
					Sub-total	3,256								
Saddle Hills, County	2,225	-0.6	-2.8	▼										
Smoky River, MD	2,023	-1.0	-4.8	▼	Donnelly	342	2.3	12.1	▲					
					Falher	1,047	-0.5	-2.6	▼					
					Girouxville	219	-3.8	-17.7	▼					
					McLennan	701	-2.8	-13.3	▼					
					Sub-total	2,309								
Spirit River, MD	700	-0.4	-1.8	▼	Spirit River	995	-0.6	-2.9	▼					
					Rycroft	612	-0.5	-2.5	▼					
					Sub-total	1,607								
Total	46,852					96,904				**Total - FN**	3,444			

CAGR – Compound Annual Growth Rate

Total Population = **147,200**

Source: Statistics Canada Census 2011 and 2016.

In February 2017, the Heart of the Peace Economic Development Committee, formed between the MD of Fairview and the Town of Fairview, hired an Economic Development Officer.

There are 8,330 businesses (with employees) in the PREDA region. The top 10 industries in which they operate is shown in Table 54 and Figure 143. The industry classification system was the NAICS. The industry mix is diverse with approximately 16% of businesses with employees engaged in the construction industry. As observed in several of the other REDAs in northern Alberta, the second largest industry on a

business count basis is other services (except public administration).[171] The three Top sectors makeup approximately 37% of businesses with employees in the region.

Resource extraction, primarily oil and gas, is the primary industry in a region spread over a vast geographic area comprising boreal forest, lakes, and land suitable for agriculture stretching from the Grande Prairie area in the south to the Peace River area in the north. Hydraulic fracturing activity in the Montney and Duvernay plays in the Grande Prairie area is expected to continue to grow (fourth ranked industry sector). Ironstone Resources is developing the Clear Hills Project, an iron and vanadium extraction venture.

Oil and gas activity in Saddle Hills County has started to pick up, and there is still growth in gas plants. Pipeline activity, especially by TransCanada, is expected to draw a significant number of workers to the county. In anticipation of additional pressure on mobility services in the county, Saddle Hills and TELUS have entered into a cost-sharing (50/50) agreement to build new cellular towers in the county.

The *'Other Industries'* segment (14.8%) shown in the Figure 143 chart includes industries that individually contribute between 3.9% and 0.3% to the category.[172]

Table 54 – PREDA Number of Businesses (with employees) by Industry

Industry	Businesses	Percent (%)
Construction	1,356	16.3
Other services (except public administration)	910	10.9
Professional, scientific and technical services	851	10.2
Mining, quarrying, and oil and gas extraction	817	9.8
Transportation and warehousing	765	9.2
Retail trade	653	7.8
Agriculture, forestry, fishing, and hunting	609	7.3
Healthcare and social assistance	387	4.6
Administrative and support, waste management and remediation	375	4.5
Real estate and rental and leasing	372	4.5

Source: Calculations based on dataset provided by Alberta Economic Development & Trade, Economic Information & Analytics, Feb. 13, 2017.

[171] Comprised of businesses primarily engaged in repairing and maintenance on motor vehicles, machinery, and other products; providing personal care, funeral, and laundry services; organizing and promoting religious activities; and supporting causes such as grant making and advocacy.

[172] Accommodation and food services; wholesale trade; manufacturing; finance and insurance; arts, entertainment and recreation; management of companies and enterprises; information and cultural industries; educational services; public administration; and utilities.

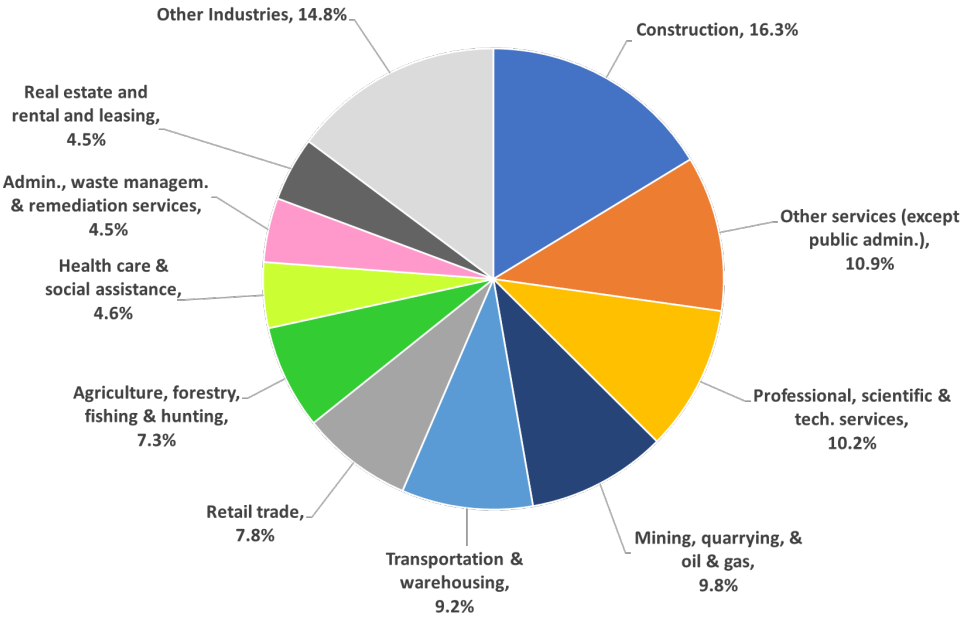


Figure 143 – PREDA mix (based on business counts).

11.1.2 Municipal and First Nations Broadband Interests

Communities within PREDA are at different stages in recognizing the importance of broadband services and connectivity to economic diversification, municipal sustainability, regional competitiveness, public service delivery, and quality of life.[173]

After building over 300 communications towers over the past decade, the County of Grande Prairie is now focused on bringing greatly improved broadband speeds available to its residents and businesses – speeds that fibre-based infrastructure is capable of. Saddle Hills County has undertaken initiatives to address the lack of broadband services within their county by building a communications network (i.e., utility grade communications towers for ISP use).

The councils of five municipalities (Birch Hills County, Saddle Hills County, MD of Spirit River, Town of Spirit River, and Village of Rycroft, also known as the G5) have been working together for a number of years on matters of regional needs and inter-municipal cooperation. Of the projects the G5 municipalities are working on, the most prominent one is the Central Peace Health Centre, which is under construction in Spirit River. The Centre was funded and constructed by the G5 to provide increased medical and dental services as well as certainty about the long-term availability of these services in the Central Peace area. Plans for the building include fibre deployment and, potentially, a point-of-presence (POP). Forward-looking Rycroft is planning to install fibre conduit during its summer 2017 street curb and gutter project. It is proactively positioning for a future deployment of FTTP. Potentially, a community fibre project would see Rycroft and Spirit River leverage the construction of a new water pipeline between the two communities to bring fibre to both communities.

Valleyview is pursing fibre optic infrastructure in their community. A fibre broadband plan will be part of the Town's next economic development plan.

[173] The five elements of broadband's importance were identified by the Calgary Regional Partnership, Economic Prosperity Steering Committee, *Request for Decision*; 2016-09-08

Table 55 identifies the awareness and current state of municipal involvement and interest in broadband.

Table 55 – PREDA Involvement & Interest in Broadband[174]

Community	Enthusiastic	Interested *'Maybe'*	Need Help Too Small	Too Expensive	Status Quo	Don't Know[175]	No Response[176]
City							
Grande Prairie					X		
Towns							
Beaverlodge							X
Fairview, (Axia)					X		
Falher			X	X			
Fox Creek							X
Grande Cache						X	
Grimshaw		X	X				
Manning							X
McLennan							X
Peace River (TELUS Fibre)					X		
Sexsmith			X				
Spirit River							X
Valleyview	X						
Wembley					X		
Villages							
Berwyn							X
Donnelly	X						
Girouxville	X						X
Hines Creek							X
Hythe	Broadband deployment should be left to the private sector						
Nampa							X
Rycroft	X						

[174] Communities were asked to rate their involvement and interest in broadband. Broadband was defined as follows: In telecommunications, broadband is a wide bandwidth data transmission with an ability to simultaneously transport multiple signals and traffic types - the medium can be twisted-pair copper wiring, optical fibre, coaxial cable, or radio. Broadband service is characterized as offering symmetric bandwidth between 50 Mb/s and 1 gigabit (Gb/s)/1,000 Mb/s and higher (really unlimited bit rates) (symmetric meaning the upload bit rate is as fast as the download bit rate).

[175] Don't Know – the respondent was unable to rate their community's interest and involvement in broadband.

[176] No Response – the community did not respond to the inquiries regarding their community's interest and involvement in broadband.

Community	Enthusiastic	Interested *'Maybe'*	Need Help Too Small	Too Expensive	Status Quo	Don't Know	No Response
Counties/MDs							
Birch Hills							X
Clear Hills					X		
Fairview				X			
Grande Prairie	X						
Greenview							X
Northern Lights				X			
Northern Sunrise		X	X	X			
Peace 135		X					
Saddle Hills	X						
Smoky River			X	X			
Spirit River							X
First Nations							
Duncan's							X
Horse Lake							X
Lubicon Lake							X
Sturgeon Lake Cree							X
Woodlands Cree							

11.1.3 Current Service Providers, Services, and Infrastructure

11.1.3.1 Fixed Wireless-based

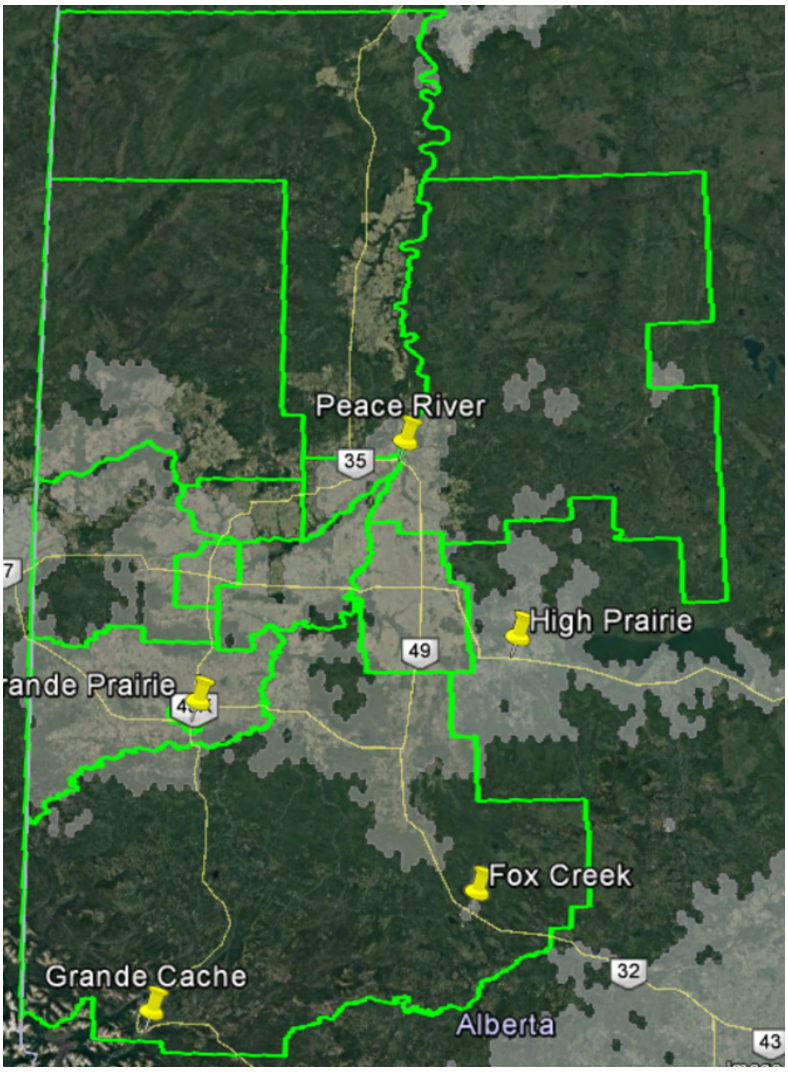
Current Internet Service Providers using fixed wireless technology in the PREDA region include the following. Appendix 16.3 provides the details of their service offerings (Internet only – no bundling unless otherwise stated) and geographic coverage. The coverage maps of the individual service providers are those that were available on their websites at the time of the writing of this report.

- AB North,
- Arrow Technology Group,
- Corridor Communications (CCI) (fixed wireless and wired Digital Subscriber Line (DSL)-based),
- Crossover Networks,
- First Broadband,
- GPNetworks (fixed wireless) and GPOptiX (fibre),
- I Want Wireless,
- Mighty Peace Wireless,
- NexxCom Technologies,
- Peace River Internet Service Society (PRiS),
- Slave Lake Communications,
- Whitecourt Communications,
- Wispernet.ca,
- XplorNet (fixed wireless and satellite-based), and
- Xtremewave Services.

Through its DSL partnership with TELUS, CCI offers wired service in the Village of Nampa. GPNetworks' sister company, GPOptiX, has begun rolling out an FTTP network in the City of Grande Prairie and surrounding area.

The PRiS, a not-for-profit organization, was formed in 1994 to *'bridge the wireless divide'* that then existed in the Dawson Creek, British Columbia area. PRiS has placed wireless Internet equipment on three towers in the Saddle Hills Utility Communications Network (UTN) and plans to co-locate on the remaining six towers in the future. In June 2016, PRiS received funding from the Canadian Internet Registration Authority (CIRA) to equip three towers in Saddle Hills County.

According to the CRTC website[177], minimal 5 Mb/s down (toward the end-client) by 1 Mb/s up (from the end-client to the network) service is available north to the Peace River area, in select areas west to the B.C. border, and to the communities along Highway 2. There is not any service in the Grande Cache area and coverage is very limited along Highway 40 to Grande Cache. A combined view of the fixed wireless coverage is shown in Figure 144 (light gray areas).



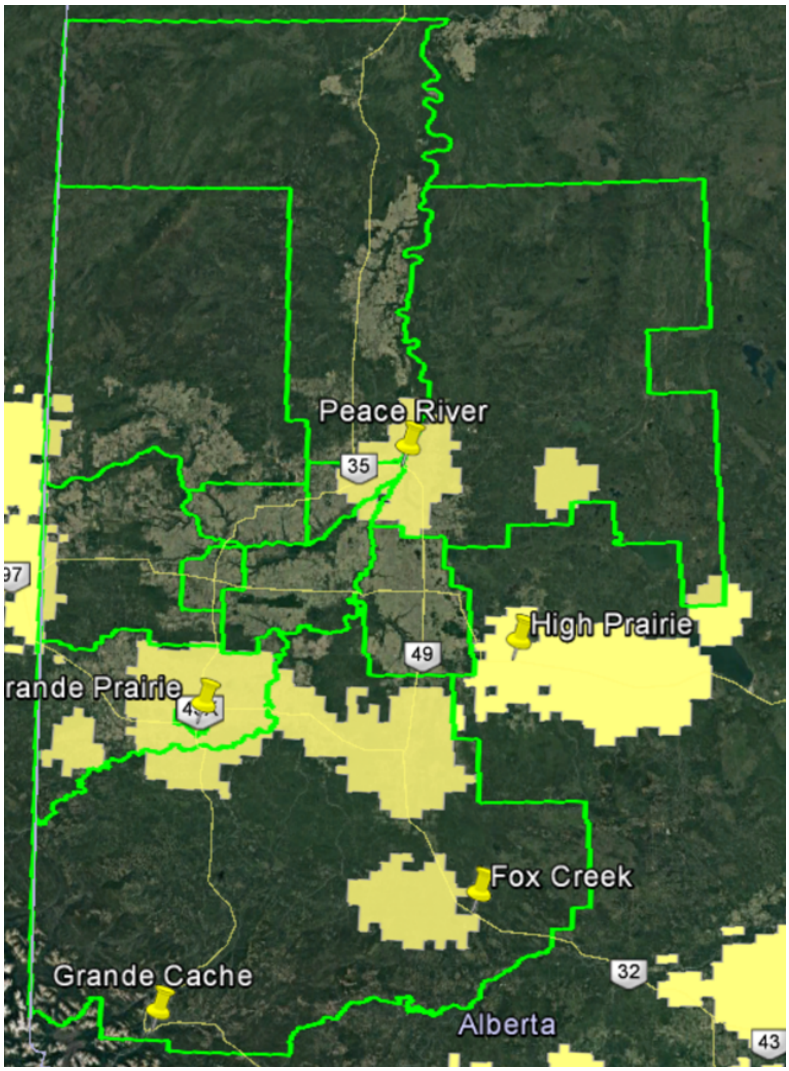
Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

Figure 144 – PREDA fixed wireless coverage.

[177] http://crtc.gc.ca/eng/internet/internetcanada.htm

11.1.3.2 Mobility

Shown as yellow areas in Figure 145, mobility data services are available from TELUS/Bell and Rogers, however, the absence of coverage is noticeable in some areas, especially in the Grande Cache area (along Highway 40) and in the northern portion of PREDA. Appendix 16.4.2 provides the coverage maps for each of the providers of mobility services. As discussed earlier Bell, TELUS, and Rogers are now using cellular towers and SmartHubs to provide at-home Internet services.

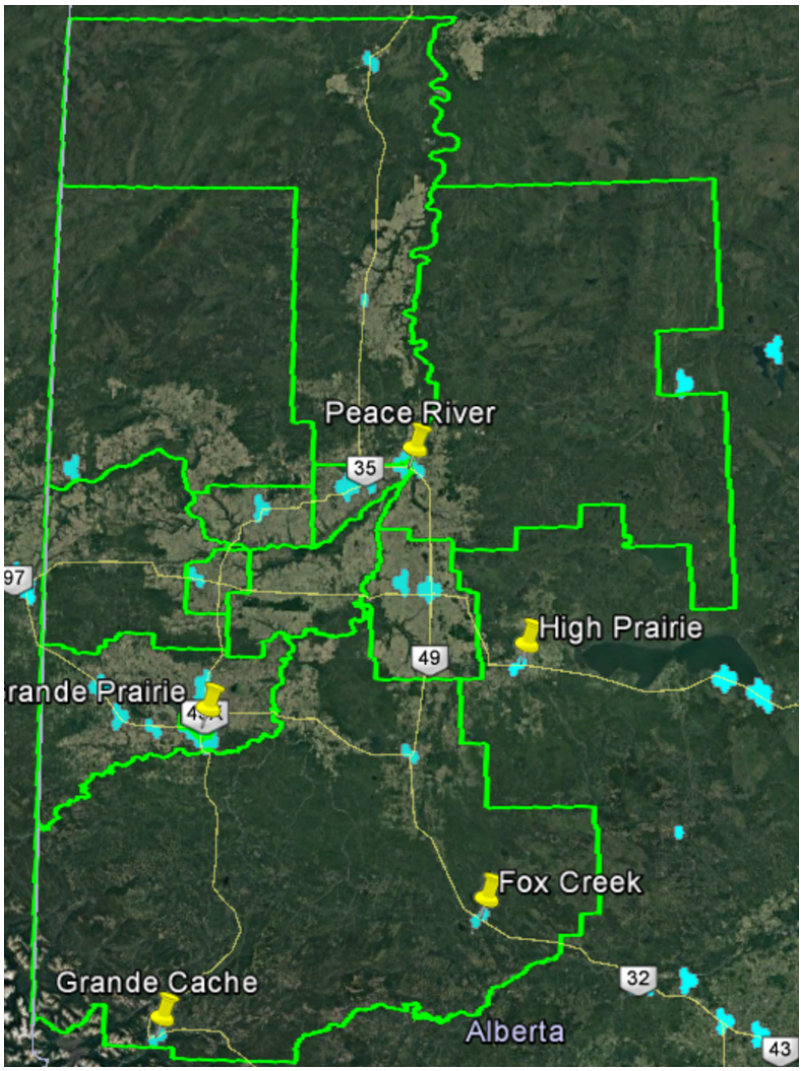


Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

Figure 145 – PREDA mobility data coverage.

11.1.3.3 Wireline-based – DSL

DSL refers to a group of last mile technologies that are used by wireline-based service providers such as TELUS in Alberta to provide broadband services over twisted-pair copper wiring. The local copper wire loop is a remnant from the days when (and how) the telephone company connected residential and business premises to the telephone company's network for the purposes of providing local and long distance telephone services (and dial-up Internet services). Since DSL's performance degrades with distance, the technology is only deployed in urban areas where access distances are less than about two miles. In Figure 146, areas served via DSL technologies are shown in blue.



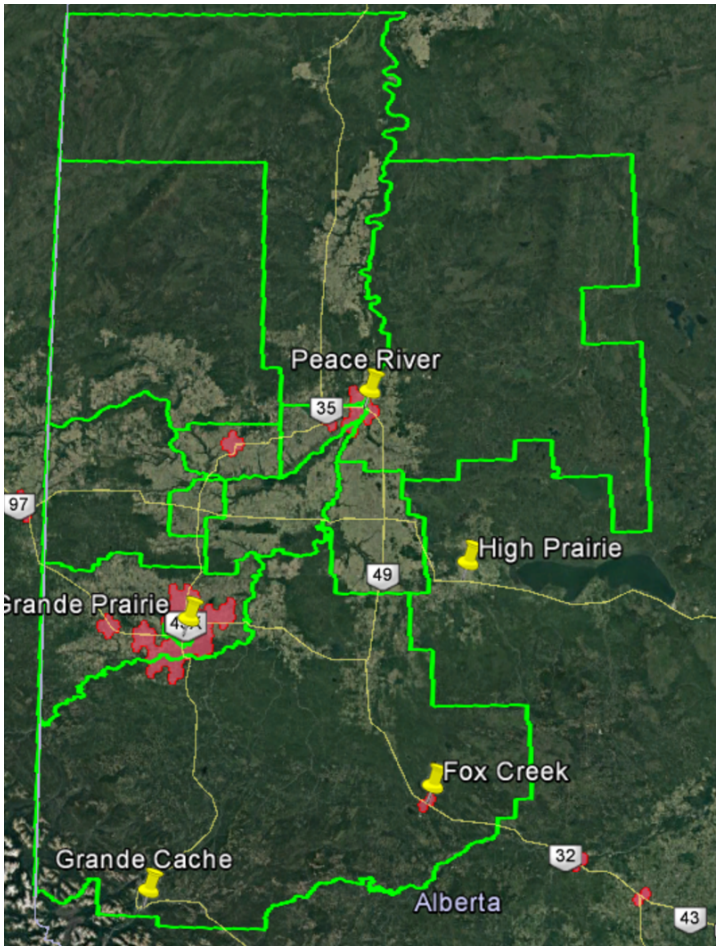
Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

Figure 146 – PREDA DSL coverage.

11.1.3.4 Wireline-based – Coaxial Cable

Eastlink, originally a television broadcast company, uses coaxial cable and modern cable modem technology to provide broadband services in the PREDA region (red areas in Figure 147). The cable companies currently use the DOCSIS 3.0 standard to achieve broadband speeds of 100 Mb/s or more over coaxial cable. According to the Cybera, *State of Alberta Infrastructure Report*, *"The next-generation DOCSIS 3.1 standard is expected to revolutionize hybrid fibre-coaxial cable connections by providing up to 10Gb/s download and 1 Gb/s upload network throughput and significant improvements in latency."*[178]

[178] *State of Alberta Digital Infrastructure Report;* Cybera; 2016-09-13.



Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

Figure 147 – PREDA coaxial cable coverage.

Maximum advertised wireline offerings are shown in Appendix 16.3. Since these are *'up to'* bit rates, during high usage periods, actual bit rates will be less – Eastlink more so than TELUS due to the way the aggregation is implemented. In both cases, the offerings are highly asymmetric – upload and download bit rates differ significantly.

11.1.3.5 Internet Service Provider Wi-Fi

TELUS and Bell WiFi services are available in the PREDA region. As shown in Table 56, TELUS has multiple sites in the City of Grande Prairie and Town of Peace River. WiFi services are **not** available in Grande Cache. As well the City of Grande Prairie provides free public WiFi at public facilities for Grande Prairie residents.

Table 56 – PREDA Wi-Fi Availability

City/Town	TELUS	Bell
Fairview	2	0
Grande Prairie	Multiple	7
Peace River	Multiple	2
Valleyview	0	1

11.1.3.6 Axia Fibre

Axia NetMedia provides retail services to corporate clients and, through AxiaConnect, provides fibre-based retail Internet services in a number of smaller communities. In exchange for access to a community's rights-of-way, Axia will consider investing in fibre-to-the-premise (FTTP) infrastructure in communities that can demonstrate that at least 30% of its residences and businesses are interested in purchasing Internet services from Axia once the '*closed-access*' network is built. In January, 2017, Axia announced plans to deploy an FTTP network in Fairview. The build is scheduled to complete this fall.

11.1.4 Backhaul Availability

11.1.4.1 Alberta SuperNet

The extent of the SuperNet within the PREDA region is shown in Figure 148. The green lines represent the Bell-operated BAN portion while the blue lines represent the Axia-operated EAN segments. A more general discussion about the SuperNet is presented in Appendix 16.5. As can be seen on map in Figure 148, an EAN segment serves the community of Grande Cache. This is the only middle mile service for the community, meaning the community does not have resiliency/redundancy, which is critical for emergency services.

11.1.4.2 Shaw Wholesale

Given the uncertainty associated with the next iteration of the SuperNet contract by June 30, 2018, municipalities, First Nations, and Métis Settlements requiring access to fibre transport for backhaul to Edmonton may want to approach Shaw Communications (Shaw), Bell, or TELUS.

11.1.4.3 TELUS Wholesale

Except under a non-disclosure agreement, TELUS does not provide maps of fibre assets.

11.1.5 Existing Infrastructure

11.1.5.1 Towers and Other Tall Structures

When planning a broadband build-out it is important to build on what is already in place. The key inquiry for the current state analysis is what assets does the community have that can be provided at little or no incremental cost that improve the economics of the broadband deployment and operations? Assets include existing towers, fibre and community networks, which the community might be using for communications or asset management. Existing and possible access to tall structures or buildings are also important to inventory for the potential placement of wireless equipment.

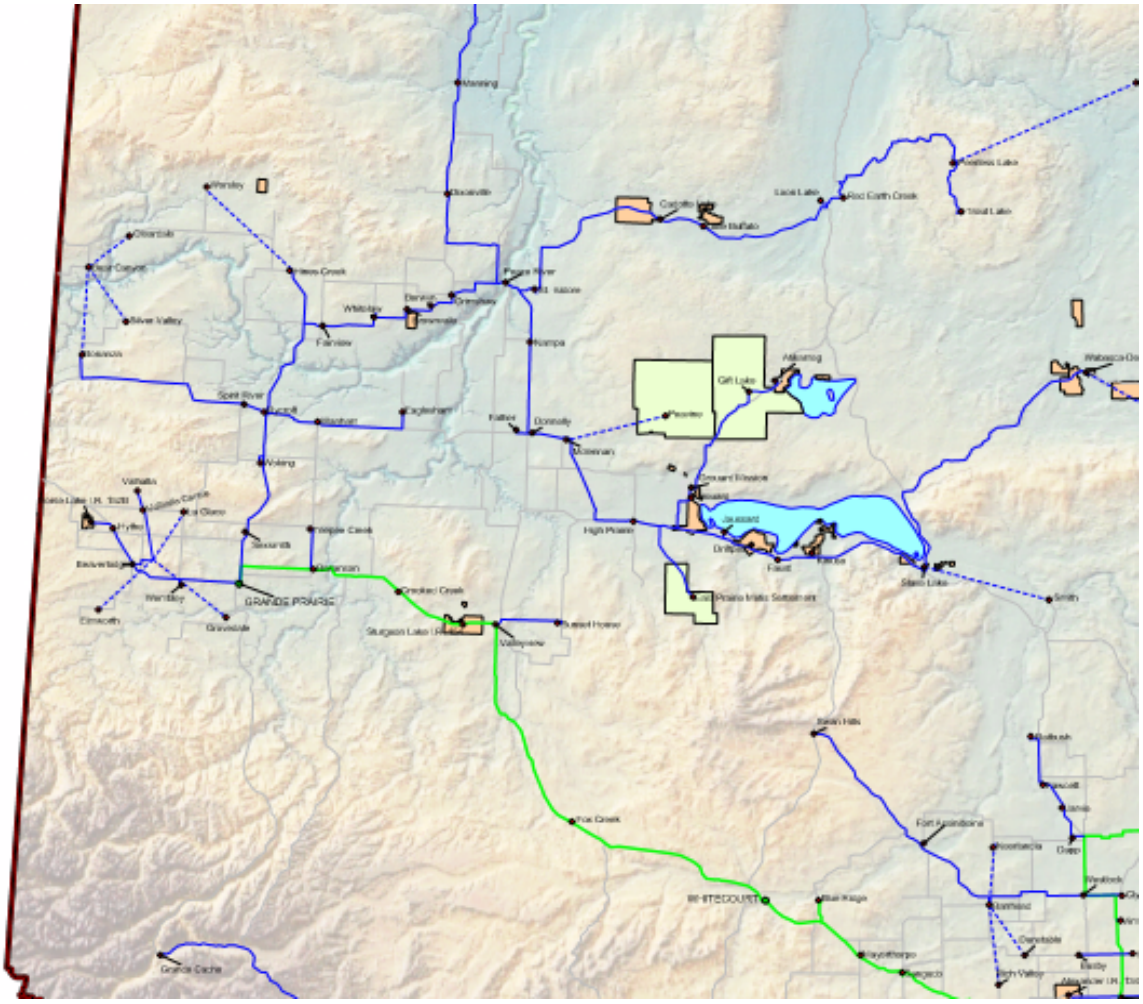


Figure 148 – PREDA SuperNet infrastructure.

Clear Hills County, the MD of Peace 135, and Saddle Hills County received grant funding to expand high-speed Internet access to unserved areas and address gaps in coverage from Alberta Agriculture and Forestry's *Final Mile Rural Community Program* in the 2012/2013 timeframe. Over the past decade, the County of Grande Prairie built over 300 county-sponsored towers and partnered with GPNetworks and other local ISPs to provide Internet services to its residents and businesses. Table 57 shows existing MD- and county-owned tower infrastructure.

Table 57 – PREDA Existing MD- and County-owned Towers

	Towers	Details
Clear Hills	6	Unconfirmed
Grande Prairie	300+	Majority are 68'
Northern Sunrise	3	At water fill stations, 50'
Peace 135	4	3, 120' 1, 80'
Saddle Hills	9	7, 250' 2, 200' possibly 2 more to be built
Smoky River	1	60' shop tower

Other tall structures that could be leveraged include Northern Sunrise County - St. Isidore Fire Hall hose tower and the Nampa Seed Cleaning Plant (owned by Northern Sunrise), which has 60-foot legs. The County of Spirit River has three grain elevators.

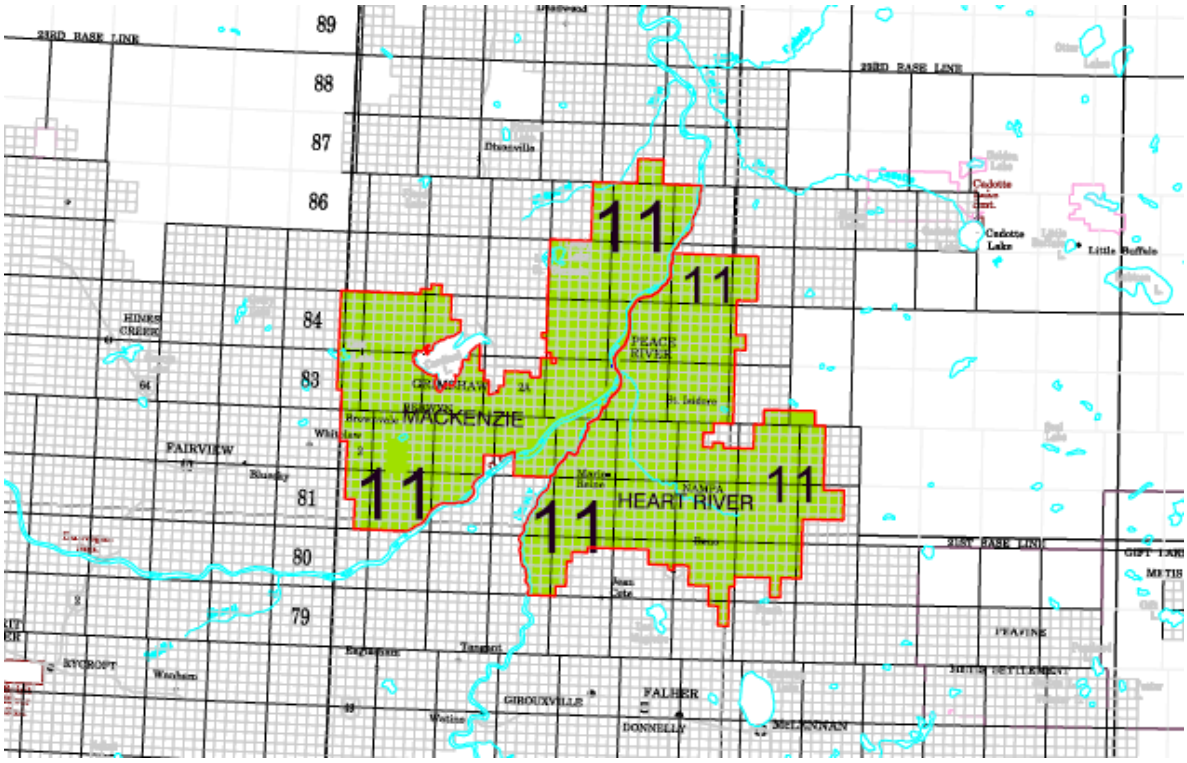
11.1.5.2 Utility Infrastructure

The existing overhead and underground transmission and distribution lines of electric utility companies (ATCO Electric) and natural gas co-operatives (co-ops) present deployment options for community broadband builds - access to and installing fibre cables to travel along utility poles, in ducts and conduit, and along rights-of-way can significantly improve the economics of broadband service expansion projects and network deployments. Inquiries about the availability of communications spaces on utility providers' poles and where multi-party trench agreements exist will be made during the preliminary infrastructure design phase of a broadband network.

11.1.5.3 Rural Electrification Associations (REAs)

REAs are member-owned electric distribution systems that provide electricity service to farm members within a specific geographic boundary. Each REA has an elected board of directors that is responsible for the business operations of the REA. Construction, operations, and maintenance is done by ATCO Electric (through contracts with the REAs) for following REAs within the PREDA region: Figure 149 shows their coverage.

- Heart River REA Ltd. (Peace River)
- MacKenzie REA Ltd. (Grimshaw)



Source: Rural Electrification Associations Service Areas. Accessed Nov. 2016.

Figure 149 – PREDA REA service areas.

Appendix 16.6 shows ATCO Electric's and Fortis Alberta's respective service areas in northern Alberta. REA and distribution company systems are intertwined in the REA service area as shown in Figure 150, and they work together to ensure there is reliable service and no duplication of distribution lines and service.[179] In Alberta, most rural areas are radial networks. A radial distribution line may serve both distribution entity and REA customers and different parts of the same line maybe owned by one or the other party.

11.1.5.4 Gas Co-operatives – Zone 1

In the 1960s, non-profit gas co-ops were formed to supply natural gas to rural Alberta - franchise areas were designated. Several gas co-ops operate in the PREDA region as shown in Figure 151, namely:

- Birch Hills Gas Co-op Ltd (Wanham)
- Central Peace Natural Gas Co-op Ltd. (Spirit River)
- East Peace Gas Co-op Ltd. (Donnelly)
- East Smoky Gas Co-op Ltd. (Crooked Creek – near DeBolt)
- Horse Lake Indian Band (Hythe)
- North Peace Gas Co-op Ltd. (Fairview)
- Paddle Prairie Gas Co-op Ltd.
- Town of Manning
- Town of Valleyview



Source: Federation of Alberta Gas Co-ops, http://www.fedgas.com/Map. Accessed Feb. 1, 2017.

Figure 150 – PREDA gas co-operatives.

[179] AUC.

In 2010, the East Smoky Gas Co-op Ltd. received a grant of $500,000 from the *Rural Connections: Community Broadband Infrastructure Pilot Program* to assist in the deployment of a wireless broadband network and allow for automated meter readings within the co-op's franchise area including the DeBolt, Little Smoky, and Fox Creek areas.

There are several rural water co-operatives operating in the PREDA area, as shown in Table 58.[180] Appendix 16.10 provides their approximate locations.

Table 58 – PREDA Water Co-operatives

Water Co-op	Vicinity/Service Area	Owner/Operator
5 co-ops: East Grimshaw, Griffin Creek, Shaftsbury, Weberville, West Grimshaw	Grimshaw	Members
East Peace River	Peace River (communities of Harmon Valley, St. Isadore, Three Creeks)	Northern Sunrise/NEW Water Ltd.
Fairview Rural Water Project	Fairview	Members
Little Burnt River	Fairview (North of Whitelaw)	Members
Northern Lights	MD of Northern Lights	MD
Smoky River	Smoky River	Members

11.1.5.5 First Nations Fibre Infrastructure

First Nations Technical Services Advisory Group (TSAG) is a non-profit organization established by the Chiefs of Alberta to provide technical support and training to First Nations in the Treaty 6, 7, and 8 regions. In 2008, TSAG partnered with Health Canada to develop the network components (fibre connections) at First Nations health centres to support First Nations' telemedicine. With Health Canada funding and TSAG project management, community fibre networks connections were made to the Alberta SuperNet points-of-presence on each or close to each First Nations in 2011. Upon completion, each First Nations became the owner of its local fibre network. As shown in Figure 151, First Nations' schools, health centres, band administration offices, and water treatment plants are now connected.

TSAG operates a state-of-the-art Network Operations Centre (NOC). The NOC's real time network monitoring ensures availability, network security/SPAM filtering, telehealth bridge management, and support, and applications (high-speed connectivity and remote water monitoring system for water treatment plants, OneHealth.ca, and FirstNationsTH.ca). Onehealth.ca is a national health portal that provides information and services to health care professionals working in First Nations communities. FirstNationsTH.ca – Telehealth provides education and travel-free patient and health care assessments via video-conferencing.

11.1.6 Planned Infrastructure

11.1.6.1 Major Projects

The PREDA region has several private and public sector capital projects planned. Where possible these projects maybe leveraged to reduce the costs associated with the deployment of broadband infrastructure. Figure 152 shows the capital projects in the within the County of Grande Prairie.[181] Besides the projects show in this figure, other major projects in the PREDA region include a new regional hospital,

[180] Regula, Doris; *Market Opportunity Analysis;* Regula & Associates Consulting Ltd; 2015-05-15.

[181] Alberta Major Projects, Economic Development and Trade; 2016-12. http://majorprojects.alberta.ca/.

new schools, a seniors' complex, highway and sewer upgrades, and the Canfor sawmill modernization in the City of Grande Prairie (map in Appendix 16.7).

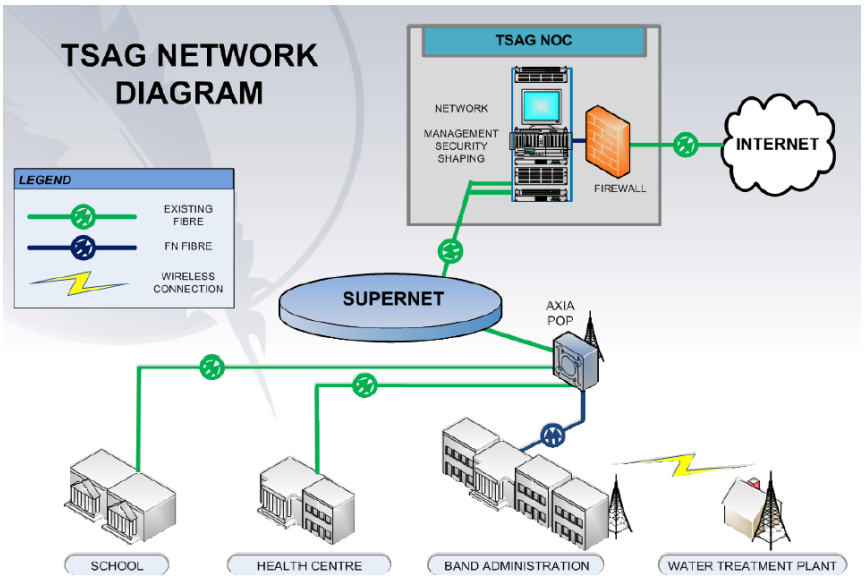


Figure 151 – TSAG network diagram.



Figure 152 – PREDA major projects – County of Grande Prairie.

11.1.6.2 Electric Transmission Development Plans

Industrial load in the PREDA region (within the AESO's) Northwest Planning region) primarily comes from the forestry industry as well as oil and gas developments, including recent oilsands development in the Peace River area.[182] The Northwest Planning region, which is primarily served by a 240 kV network that moves power into the region from generation in the Wabamun area and from cogeneration in the northeast. Local load is supplied by a 144 kV network from the 240 kV substations while a 69/72 kV network serves some of the load in the Swan Hills, High Prairie and Peace River areas, as seen in Figure 153.

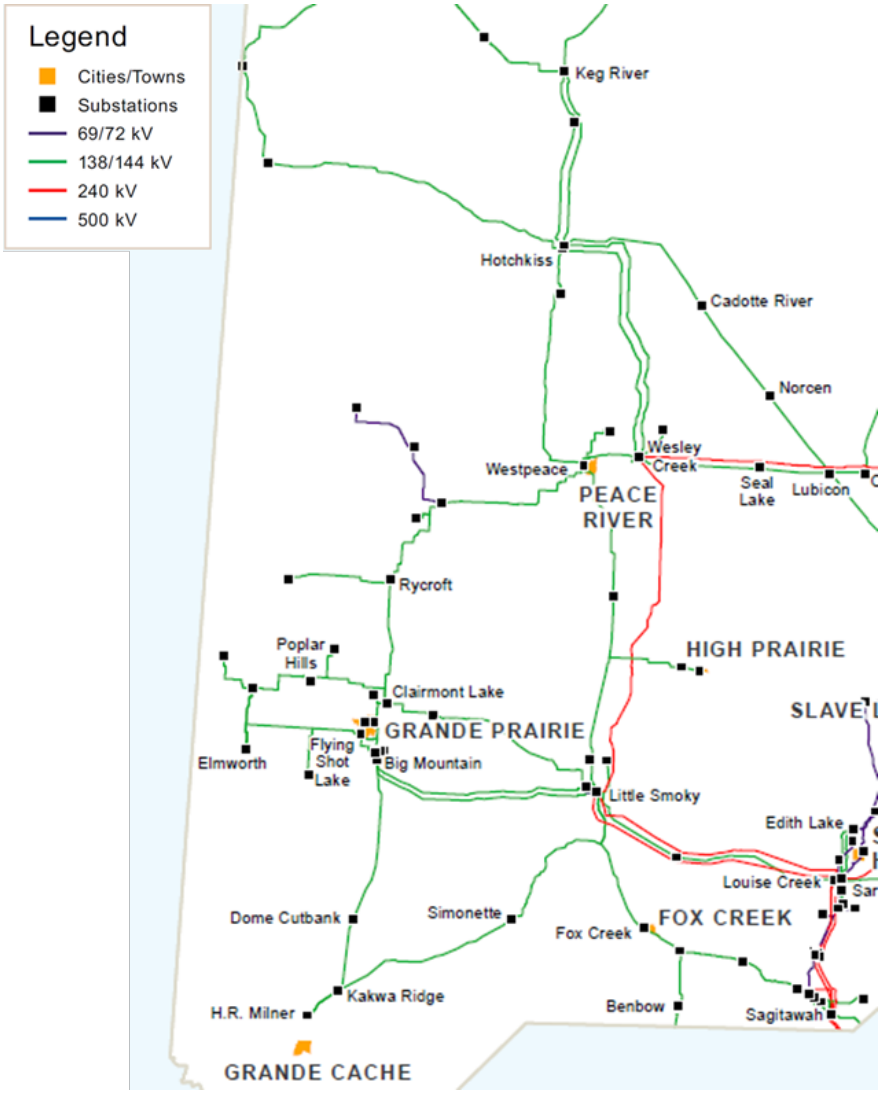


Figure 153 – PREDA existing electricity transmission system.

With large generation development and oilsands load growth near Peace River, 240 kV and 138 kV enhancements will likely be required in the future. Continued strong load growth in and around the Grande Prairie and Fox Creek areas will require the development of a 240 kV supply to those areas. Load

[182] *AESO 2015 Long-term Transmission Plan*; AESO.

growth and the potential for major generation development in the Grande Cache area is expected to drive 240 kV and 138 kV enhancements in that area. Specific proposed transmission developments relevant to potential fibre deployment include the following, over three planning horizons: near-term (to 2020); medium term (to 2025); or long-term (to 2035) are shown in the Table 59.

Table 59 – Proposed Transmission Developments

Peace River – North	• New single-circuit 240 kV line Wesley Creek (east of Peace River) to Little Smoky (near Valleyview) (*near-term*) • Rebuild 144 kV line from Wesley Creek substation to West Peace River substation to a higher capacity (*near-term*) • New 144 kV lines east of Peace River: Cranberry Lake to Nipisi; Seal Lake to Norcen (*long-term*)
Swan Hills – High Prairie	• Rebuild 144 kV line from Louise Creek to Sarah Lake to a higher capacity (*long-term*)
Fox Creek - Valleyview	• New 240 kV lines from Little Smoky to Fox Creek (ATCO) (*near-term*) • New 240 KV lines from Fox Creek to Bickerdike near Edson (*near-term*) • Additional 240 kV circuit from Little Smoky to Fox Creek and onto Bickerdike (*long-term*)
Grande Prairie – Grande Cache	• New 240 kV line from Little Smoky to Big Mountain south of Grande Prairie (*near-term*) • New 144 kV line from Big Mountain to Poplar Hill northwest of Grande Prairie (*near-term*) • Second line 240 kV from Little Smoky to Big Mountain south of Grande Prairie (*medium-term*) • New 144 kV line from Big Mountain to Clairmont Lake or other suitable location near Clairmont Lake (*long-term*) • For forecast new generation development at existing H.R. Milner site in the Grande Cache area (*long-term*): • Single-circuit 240 kV line from H.R. Milner to Big Mountain and from H.R. Milner to Fox Creek • Local 144 kV loop from H.R. Milner by building a new 144 kV line to connect to new substation north of Dome Cutbank substation • 144 kV line from Fox Creek to Simonette

11.1.6.3 Municipal Capital and Civil Works Projects

Leveraging civil infrastructure projects can reduce broadband deployment costs by 75%. Given civil infrastructure costs typically account for 70% of buried deployment costs, this is significant. Capital projects that involve trenching or erecting towers or poles such as during the development of new subdivisions, road construction or the construction of rehabilitation of water or sewer lines are typical projects that can improve the economics of community broadband projects.

The County of Grande Prairie received approximately $9.1 million from the *Alberta Municipal Water/Wastewater Partnership (AMWWP)* for the sewage discharge construction in the Hamlet of Clairmont. The Ridgevalley water treatment plant in the MD of Greenview will be upgraded, expanded, and a new supply well will be drilled with AMWWP funds ($2.1 million). With the MD's additional funding the total is now $4.2M (2016-17 Capital Budget).

Wembley received funding from the *Alberta Community Partnership (APC)* for the preliminary design and $1.8 million from the *Water for Life Program* for *d*etailed design work for Phase 1 of the West Corridor Water Transmission Line. Phase 1 will link Beaverlodge and Hythe to the City of Grande Prairie's water supply system (total cost of project $22.6 million).

The Federal *Small Communities Fund* (part of the New Building Canada Fund) for infrastructure projects, now includes a *'Connectivity and Broadband'* category. 2016 approved non-broadband projects within the PREDA region include (figures shown are the Total Eligible Project Cost - Federal, Provincial, and Municipal).

- Beaverlodge – Water treatment plant upgrades $5.5 million;
- Fox Creek – Water treatment plant upgrades, raw water wells, and raw water pipeline construction $15.5 million.
- Grande Cache – Water treatment plant upgrade $12.8 million.
- Town of Peace River – Sanitary upgrades $11.5.
- County of Grande Prairie – Trunk sewer and Clairmont lagoon discharge piping $26.3 million; and
- County of Northern Lights – Dixonville water distribution system rehabilitation $1.5 million.

The County of Grande Prairie successfully applied to the Federal *Clean Water and Wastewater Fund (CWWF)* for the West Corridor Water Transmission Line, Phase 1 – Wembley $9.1 million. Northern Sunrise County also received funding for its Nampa regional water line, Phase 3, Stage 2, from St. Isidore to Nampa. The amount received was $3.5 million.

On February 22, 2017, the MD of Greenview, the County of Grande Prairie, and the City of Grande Prairie announced the Tri-Municipal Industrial Project, a large scale industrial development south of Grovedale. Using the Montney-Duvernay shale natural gas play, the project is expected to attract investors interested in processing. Table 60 shows this project as well as other capital and civil works projects that either the municipalities self-reported or were identified by another source.

Table 60 – PREDA Municipal Capital & Civil Works Projects

City	
Grande Prairie	68 Ave. twinning; downtown rehabilitation and streetscape upgrades; road rehabilitation and overlay program[183]
Towns	
Beaverlodge	Road network upgrades, Phase 1 water treatment plant upgrades[184]
Fairview	• Highway 732 (113 street) rehabilitation • 102 Avenue water, sewer, and road updating
Falher	Lift stations with SCADA at the hamlets of Guy and Jean Côté
Fox Creek	• Multiplex facility (partners: Fox Creek and MD of Greenview) • Water treatment plant – commencing development
Grande Cache	• New water treatment plant under construction • Road asphalting (Spring 2017)
Grimshaw	Some water service replacement involving individual digs
Manning	Side walks, water main and sewer replacement[185]t
McLennan	Road rehabilitation (Spring 2017)
Peace River	• Asphalt rehabilitation of streets south of Heart River bridge, to include potential trenchless rehabilitation of water, sewer, and storm infrastructure. All streets will have existing sidewalks, curbs, and gutters reviewed for selective replacement. (project maybe phased over multiple years depending on budget availability)[186] • Replacement sewer lines
Sexsmith	Nothing planned
Spirit River	Street improvements 2017: concrete curbs, sidewalks, asphalt paving, overlays and level course[187]

[183] City of Grande Prairie; *City of Grande Prairie Long-term Capital Plan Comparison – 2016 – 2018*; 2016-05-18.

[184] *Town of Beaverlodge Council Highlights*; 2017-05-08.

[185] Town of Manning; *2017 Capital Budget*.

[186] Town of Peace River; *Request for Proposals AB-2017-02006, Neighbourhood Infrastructure Renewal Project – 2018, Schedule E.*; 2017-03-25.

[187] *Town of Spirit River Street Improvements – 2017*; Canada's Business Network; July 2017-07.

Valleyview	Did not respond to project inquiry regarding civil and capital projects and no information was available on the town's website
Wembley	Did not respond to project inquiry regarding civil and capital projects and no information was available on the town's website
Villages	
Berwyn	• Sewer main repairs • Road surfacing
Donnelly	Nothing planned
Girouxville	Nothing planned
Hines Creek	Upgrade to water meters and repairs to arena
Hythe	Seniors housing facility (complete by March 2018)
Nampa	Did not respond to project inquiries and no information was available on the town's website
Rycroft	Paving, curb, and gutter project (summer 2017)
Counties/MDs	
Birch Hills	Refurbish water and sewer infrastructure
Clear Hills	Nothing planned
Fairview	• Possible new water transmission line from Whitelaw to Bluesky (late 2017 – 2018) • Road work: Realignment of road 812; paving a portion of road 820 • Bridge replacement • Asphalt overlay Bluesky (2017)
Grande Prairie	• Clairmont Heights, parkway to downtown core (spring 2017) • Water and lift station • West Corridor Regional water transmission line (connecting through County and into Town of Wembley) • Regional Community Cultural Centre to be built by the Bezanson Agricultural Society[188]
Greenview	• Grovedale – water treatment plant • Ridgevalley – Iosegun Lake road paving and water treatment plant upgrade • Potential Valleyview rural water line, west to Sturgeon Lake Cree Nation boundary • Tri-Municipal large scale industrial development south of Grovedale (partnership among the MD of Greenview, the County of Grande Prairie, and the City of Grande Prairie)
Northern Lights	• Rural water line (2017) likely to be bored not trenched • Rebuilding of roads
Northern Sunrise	Water line between St. Isidore and Nampa (tentative)
Peace 135	Nothing planned for 2017 or 2018
Saddle Hills	• Construction of 2 communications tower (tentative – spring 2018) • Development of 55 residential lots in the Hamlet of Woking[189]
Smoky River	• Lift station with SCADA • Road construction and bridge repairs (tentative)
Spirit River	Road reconstruction

11.2 Desired State

The range of interest in broadband varies considerably throughout the region, but even the most enthusiastic of the municipalities are still in the early stages of deciding which options to pursue and how. While a formal *'Desired State'* has not yet been agreed to in any of the municipalities, what follows is based on the assumption that, over the next five years, the majority may choose to facilitate the deployment of infrastructure to support a fully scalable broadband network ubiquitously available throughout their municipality and, if possible, the region as a whole. This would typically include a

[188] County of Grande Prairie; Council Highlights; 26 June 2017.

[189] Saddle Hills County; Request for Proposals Saddle Hills County Municipal Development Plan and Land Use Bylaw, Schedule; 1 March 2017. 13.

combination of an underlying fibre infrastructure with upgraded wireless services where fibre is not yet practical. Market-wise, the infrastructure would be available on an open-access basis to all service providers interested in serving municipal and regional businesses and residents. Whereas the municipalities do not wish to interfere with private enterprise in the services marketplace, they will entertain options relative to facilitating the underlying lit open-access fibre utility infrastructure.

Along a continuum of interest, county and community level interest in broadband within the Peace Region Economic Development Alliance (PREDA) can best be described as *'visionary'* to '*status quo'*. The County of Grande Prairie's vision, a decade ago, led to more than 300 county-sponsored fixed wireless towers being built in the county and through their partnership with GPNetworks, fibre is being deployed to subdivisions, towns, and villages. The County of Grande Prairie is poised to begin its next wave of enhancement to broadband services within their county. Its vision is to have greatly improved broadband speed available to its residents and businesses – speeds that fibre-based infrastructure is capable of. Also, creating an environment that fosters competition (and increases redundancy, meaning having one or more 'backup' systems available in case of a main system failure) is important to the county.

Big Lakes County and its partner communities recently took the initiative to obtain Alberta Community Partnership (ACP) funding for a detailed broadband study for the County, inclusive of the municipalities, First Nations, and Métis settlements within its boundaries – specifically High Prairie, Swan Hills, the hamlets of Enilda, Faust, Grouard, Joussard, and Kinuso, the Kapewe'no First Nation, and the Métis settlement of Gift Lake. The study – *Inter-municipal Broadband Discovery Project* – will leverage the results of this work and then develop more detailed financials to evaluate the options of most interest to the County. As the more detailed financials have already been developed, they will be used in the analyses presented here – thereby increasing both the accuracy and credibility of the financial results presented.

As will be seen, the business case for an inclusive, open-access utility network focused on providing both fibre-to-the-premise (FTTP) networks in each of these communities as well as an inter-community connecting network within Big Lakes County, goes cashflow positive after seven years. Given their average premise density of only 0.2 premises/km^2, the results are encouraging. Going forward, the model could be expanded to encompass options for other MDs and Counties in the region.

The Town of Valleyview completed Business Case for Broadband in July. Though they are a small community of some 1,000 premises, innovative approaches to both operations and financing have provided them with a positive business case. Valleyview is now moving on to the development of a business/implementation plan.

The councils of the five municipalities of Birch Hills County, Saddle Hills County, MD of Spirit River, Town of Spirit River, and Village of Rycroft are known as the G5 Municipalities. This group works together on matters of regional needs and inter-municipal cooperation, including broadband. Saddle Hills Utility Communications Network and the Peace River Internet Society (PRiS) provide fixed wireless-based Internet services in Saddle Hills County. Rycroft is planning to lay fibre conduit in conjunction with their upcoming curb and gutter project (summer 2017). Potentially, a community fibre project would see Rycroft and the Town of Spirit River leverage the construction of a new water pipeline between the two communities to bring fibre to both communities.

Saddle Hills County has undertaken the building of communications towers for the purposes of ISP co-location and, ultimately, the improvement of the quality of life for its residents and the success of its businesses. The construction of more towers is planned as they work toward their vision of having the county fully served. The county's view is long-term, and it is positioning for today's investments to still be beneficial in 10 to 20 years.

The MD of Smoky River as well as the towns of Falher and McLennan and the villages of Donnelly and Girouxville are poised to initiate a broadband plan.

Figure 154 show the communities within PREDA that have near-term broadband plans. More information is provided in the Appendix 13.11 about each community's issues and challenges; whether fibre/broadband is on their Council's agenda; the factors impacting their community's capability to pursue a fibre/broadband initiative; and their multi-year visions.

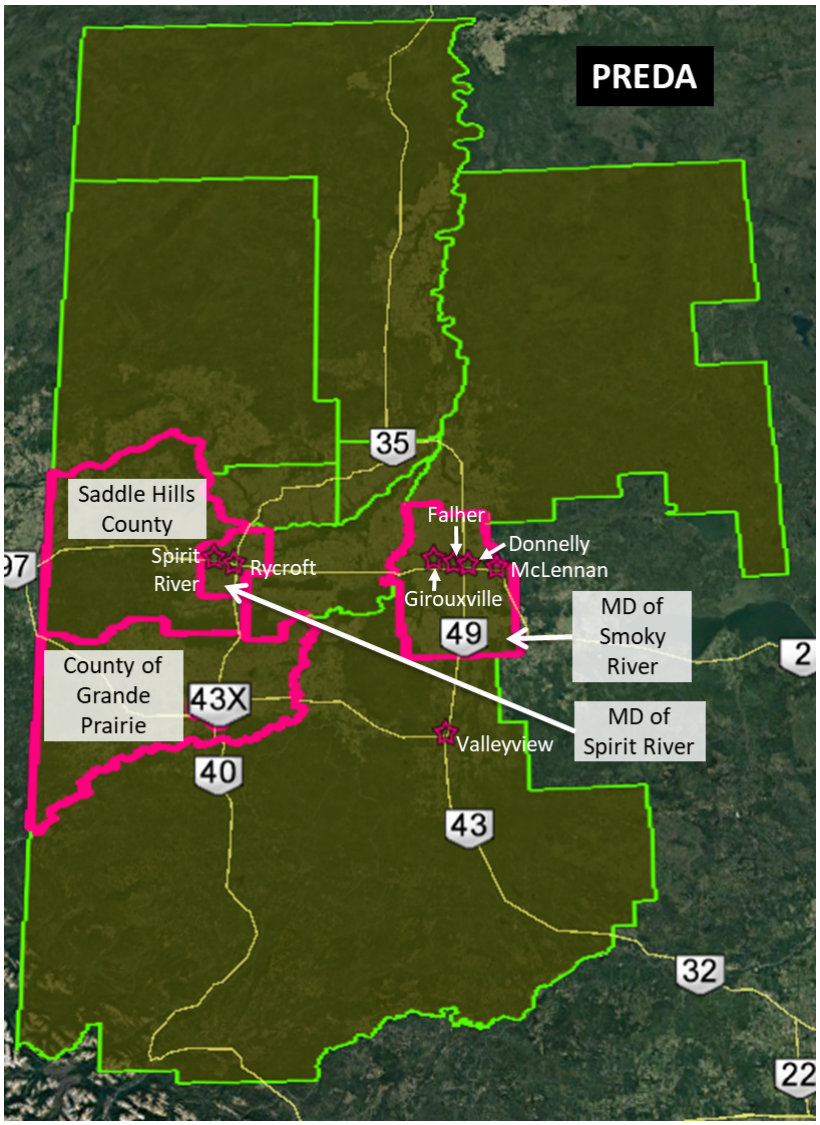


Figure 154 – Communities with near-term broadband plans.

11.3 Big Lakes County – An Inclusive Regional Network

11.3.1 Context

Within the PREDA, Big Lakes County and its partner communities have recognized the importance of broadband and looking for solutions to move forward. Indeed, Big Lakes County took the initiative to obtain Alberta Community Partnership (ACP) funding for a detailed study for the County, inclusive of the municipalities, First Nations, and Métis settlements within its boundaries. The study – *Inter-municipal Broadband Discovery Project* – will leverage the results of this work and then develop more detailed financials to evaluate the options of most interest to the County. As the results represent a sustainable option at the scale of a very rural County, the model presented will likely be replicable to other counties and MDs throughout Northern Alberta.

As will be seen, the business case for an inclusive, open-access utility network focused on providing both fibre-to-the-premise (FTTP) networks in each of these communities as well as an inter-community connecting network within Big Lakes County, goes cashflow positive after seven years. Given their average premise density of only 0.2 premises/km^2, the results are encouraging. Going forward, the model could be expanded to encompass options for other MDs and Counties in the region.

A map of the County appears in Figure 155. Towns and hamlets are marked with orange and yellow pins. First Nations areas are shaded yellow and Métis Settlements are shaded purple. SuperNet access sites are shown with yellow text and circles. SuperNet access sites enable connections back to Internet exchanges in Edmonton and Calgary without the need for additional fibre deployment. Each community network must at least indirectly connect back to an Internet Exchange.

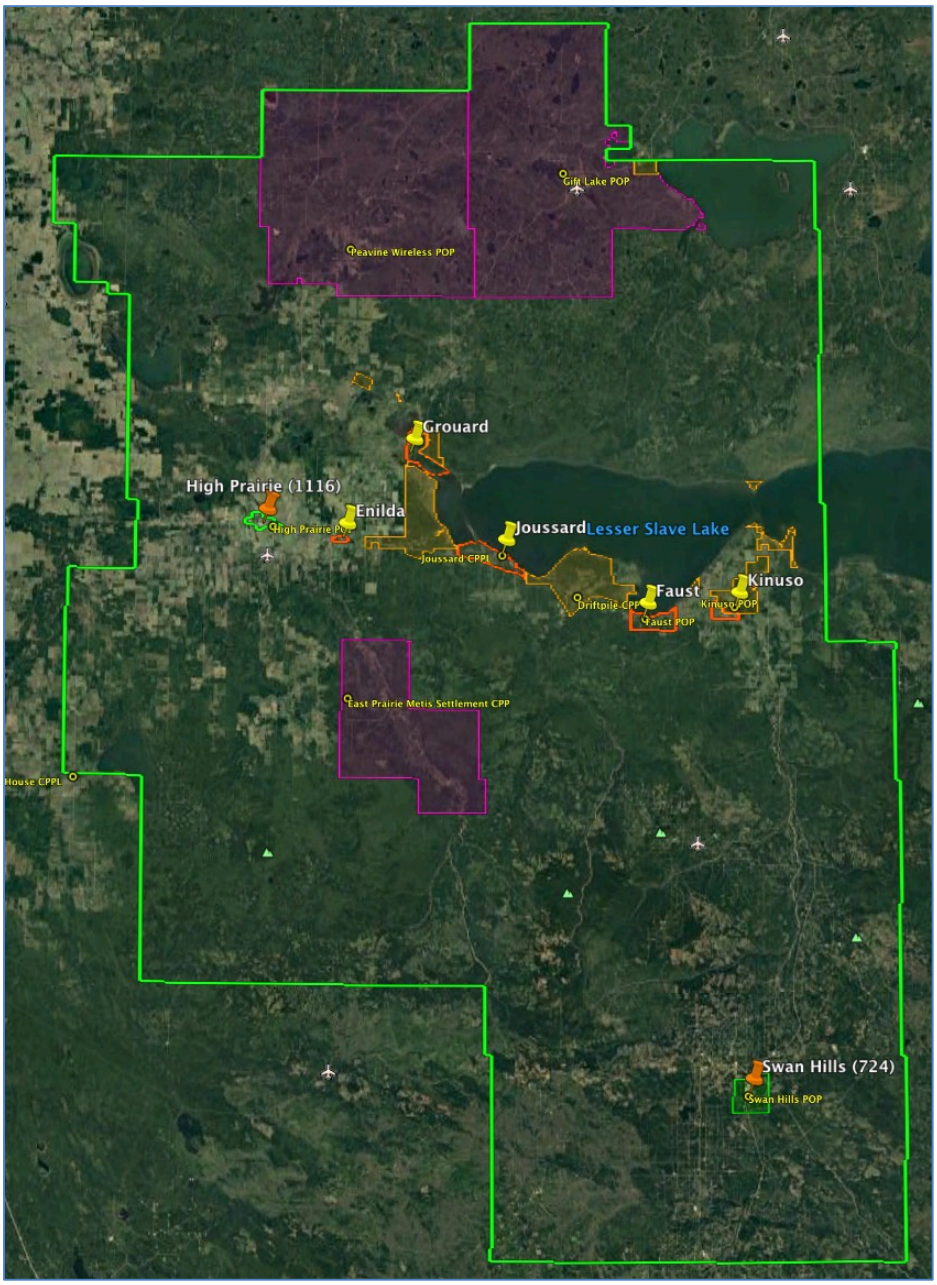


Figure 155 – Big Lakes County.

11.3.2 Business Structure

Assume that Big Lakes County, inclusive of all the municipalities, First Nations, and Métis settlements within its boundaries (hereinafter referred to collectively as *'Big Lakes'*) deploys an open-access, lit fibre-optic network that will make world-class, fully scalable broadband infrastructure available to every home and business in the towns of High Prairie, Swan Hills, the hamlets of Enilda, Faust, Grouard, Joussard, and Kinuso, the Kapewe'no First Nation, and the Métis settlement of Gift Lake.

In the analysis below, the business structure, opto-electronics and backhaul, operations, drop capital, and markets and revenues assumed are those outlined in the default implementation scenario presented in Section 6.5. In this case, the local network entity established to house the local fibre operation will be referred to as Big-Net.

11.3.3 Deployment Capital

Big Lakes has on and off plans to lay a new waterline from High Prairie to Joussard. Should the build proceed, it could be leveraged to deploy a fibre backbone that could connect to all communities along the way at a small marginal cost. The connection would save operational expenses associated with utilizing several SuperNet access points and also enable fibre connections to farms and ISP towers along the way. The route (yellow), along with the ISP towers (green triangles) is shown in Figure 156. Without the benefit of the waterline build, deployment cost for the fibre/conduit along the routes would run about $732k.



Figure 156 – Utility fibre network for Big Lakes.

The capital costs to deploy both the connection network and access networks in each community are shown in Table 61. In this context, access refers to laying fibre that passes every premise in a municipality. Later, when a premise orders service, a fibre drop connection from the premise to the fibre running past the premise will be needed. Overall cost, should the entire network be deployed, comes to about $12.9M. In the financial projections which follow, the year of deployment for each community is shown in the tan coloured row. Overall, the network will be deployed over the four-year period from 2018 to 2021.

Table 61 – Deployment Cost Summary

Network Component	County Backbone	Towns & Villages		Hamlets / First Nations / Métis Settlements						
		High Prairie	Swan Hills	Enilda	Faust	Gift Lake	Grouard	Joussard	Kinuso	County Near Kinuso
Year of Deployment		2018	2019	2019	2020	2020	2020	2021	2021	2021
Feeder	642,135	724,418	484,316	89,516	429,820	1,005,850	339,744	800,219	263,867	376,511
Distribution	-	1,358,445	1,336,975	208,530	453,575	740,340	413,015	578,365	322,930	514,240
Subtotal - civil construction	642,135	2,082,863	1,821,291	298,046	883,395	1,746,190	752,759	1,378,584	586,797	890,751
Mobilization/De-mobilization	12,843	41,657	36,426	5,961	17,668	34,924	15,055	27,572	11,736	17,815
Engineering, Permitting, and Planning	77,056	293,409	247,614	35,766	106,007	209,543	90,331	165,430	70,416	106,890
Activation: Fibre Micro-cabling	-	46,000	36,000	4,000	20,000	38,000	20,000	38,000	12,000	16,000
Grand-total, deployment	732,034	2,463,929	2,141,331	343,772	1,027,070	2,028,657	878,145	1,609,586	680,949	1,031,456
										12,936,929

Using the cumulative capital expenditures over the first five years of operation, a breakdown of the expenditures appears in the pie chart in Figure 157. Excluding the backbone connection[190], the pie chart represents expenditures of $17.1M and assumes that the ISPs using the network obtain a collective market penetration of 50% of the residential and 70% of the business communities.

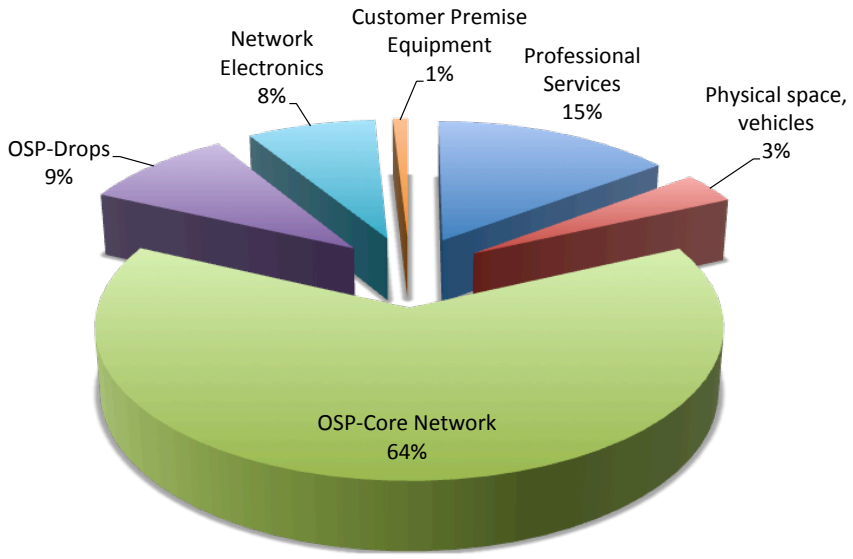


Figure 157 – Cumulative capital expenditures from 2018 to 2022.

11.3.4 Operations

Operational costs include payments to O-Net for network management and monitoring services and for local technical staff required to maintain the network. A breakdown of the expenses, as estimated for the 2022 operating year, appears in Figure 158 for the scenario proposed. In the chart, Admin, ops, o-e, and mktng refer to administration, operations, opto-electronics, and marketing respectively. All service-related costs are zero as responsibility for those remains with the ISPs.

[190] The financial projections assume the use of SuperNet connections in each 'urban' centre.

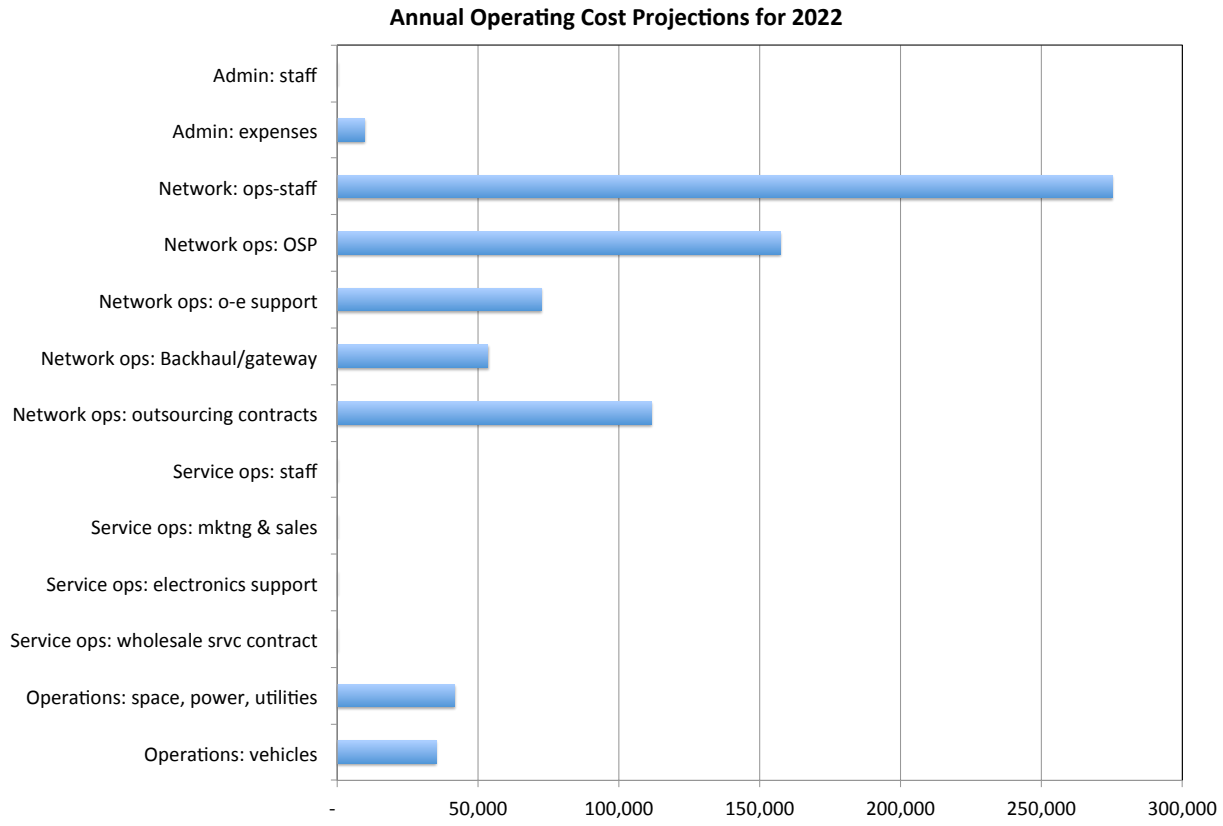


Figure 158 – Projected operational cost projections for the utility fibre network in 2022.

11.3.5 Financial Projections

As can be seen in the summary results shown in Table 62, the wholesale network operation for the County goes cashflow positive in year 6 and, with debt servicing included, year 7. Based on the deployment and operational models assumed, overall capitalization for the project would come to approximately $17.8M. Without access to grant funding or a cash infusion from either the County or the municipalities to finance the project, Big Lakes would need to arrange for both a short and a long-term loan from the Alberta Capital Finance Authority (ACFA) – an eight-year debenture to cover opto-electronics and a 25- year debenture to cover the longer term (fibre) assets and start-up costs. By year 10, approximately $277,359 is being returned to the County annually. By year 15, this has grown to $517,897. Overall, the operation would be both profitable and sustainable.

Table 62 – Utility Model Results Summary for Big Lakes

	Results
Years to positive cashflow	
Operating	5
With debt servicing (p&i)	6
Financing	
Start-up capital required	17,826,835
Net Cashflow - before debt servicing	
Profit - annual at 10 yr	906,529
Profit - annual at 15 yr	1,153,273
Net Cashflow - after debt servicing	
Profit - annual at 10 yr	277,359
Profit - annual at 15 yr	517,897

In graphical form, the non-discounted cashflow chart for the proposed deployment appears in Figure 159.

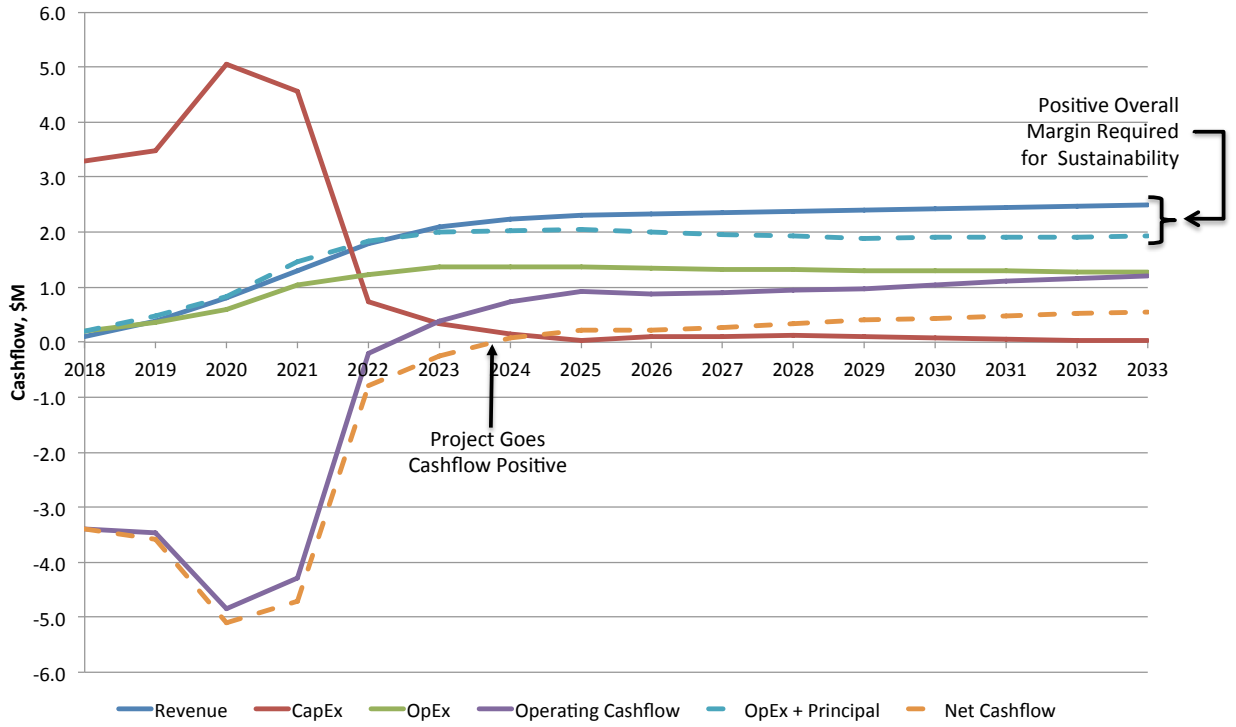


Figure 159 – Non-discounted cashflow projections for Big Lakes County regional network.

As before, the capital (red) required to finance the project is shown to pretty much all be required upfront to cover the deployment costs and initial operating deficits – financing must be sufficient to maintain a net cashflow of at least zero. Operational sustainability is determined by the gap or difference between the revenue (blue) and operational expenditure (green) lines whereas overall sustainability, which includes principal repayment, is the difference between the revenue (blue) and the operational + principal repayment (dotted blue) lines. The bigger the gap, the better. The net overall cashflow line is the dotted orange line.

Interestingly, though more expensive, the regional network represents a more sustainable business model than does that for High Prairie alone. The reason has to do with both scale – with more clients involved, operations of a regional network are more efficient that of a smaller operation such as proposed for High Prairie, and the fact that improved services in the truly rural areas come from enhanced ISP equipment on fibre connected towers as opposed to a fibre network designed to connect individual farms.

11.4 MD of Smoky River – An Inclusive Regional Network

11.4.1 Context

With under a third of the population of Big Lakes County and almost as low a premise density, establishing an inclusive fibre network in the MD of Smoky River is a challenge operationally. However, should the MD partner with Big Lakes, operational efficiencies would improve for both.

A map of the County appears in Figure 160. Towns and villages are shown with orange pins, hamlets with yellow. Fixed wireless towers are represented by green triangles and the proposed backbone fibre route to connect key ISP towers is shown in yellow.

Deploying the backhone fibre route shown would enable connections to the majority of ISP towers in the MD and enable connections to each hamlet. With the low densities, however, justifying the $3.1M needed to deploy it may be difficult [Table 63]. On the other hand, if the MD were to concentrate on FTTP in their three larger centres of Fahler, McLennan, and Donnelly, they could establish a good base from which to move further into the rural areas. Meanwhile, they could leverage linear civil infrastructure builds such as waterline deployments and road rehabilitation work to decrease the overall cost of deployment.

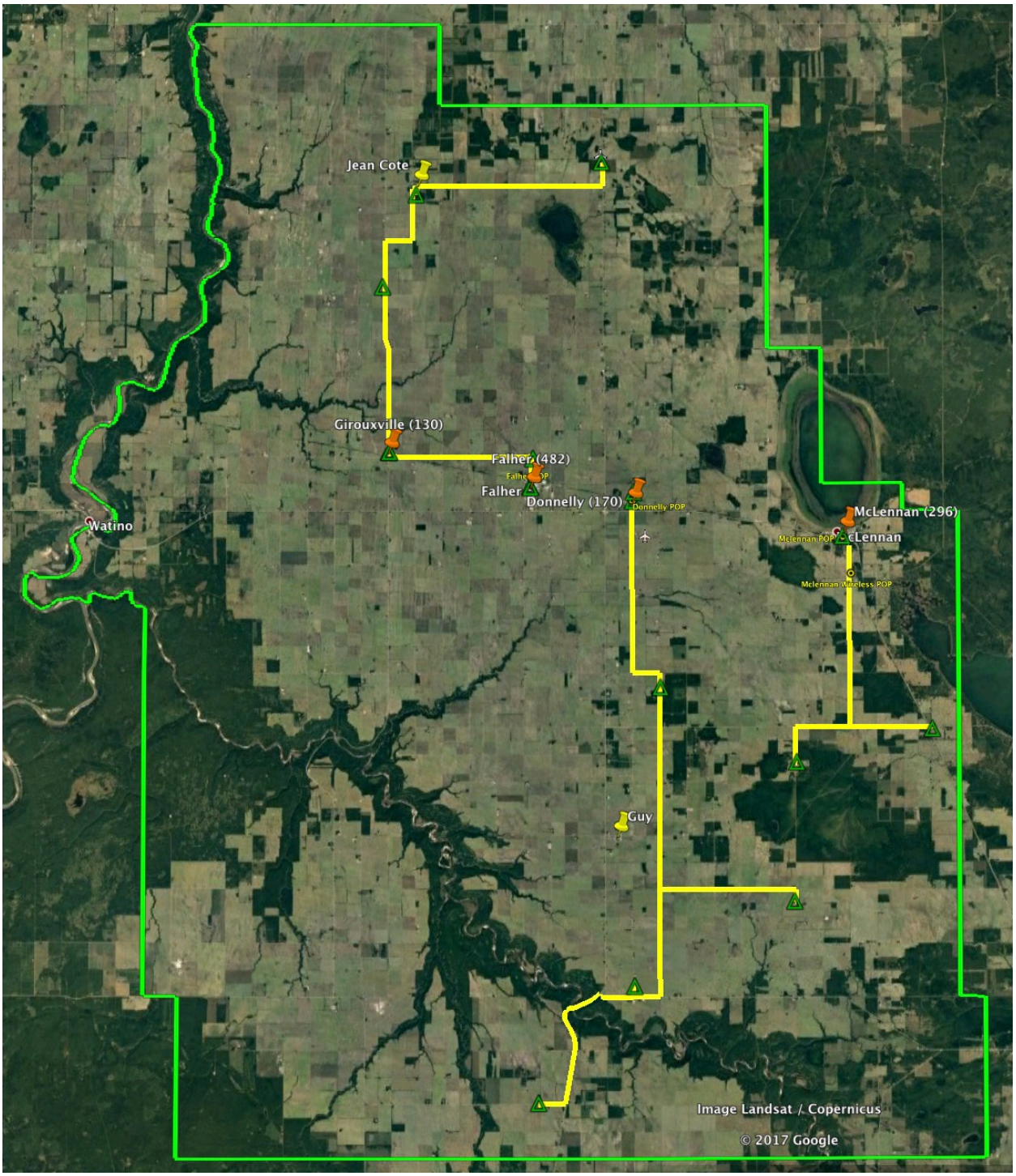


Figure 160 – MD of Smoky River.

11.4.2 Business Structure

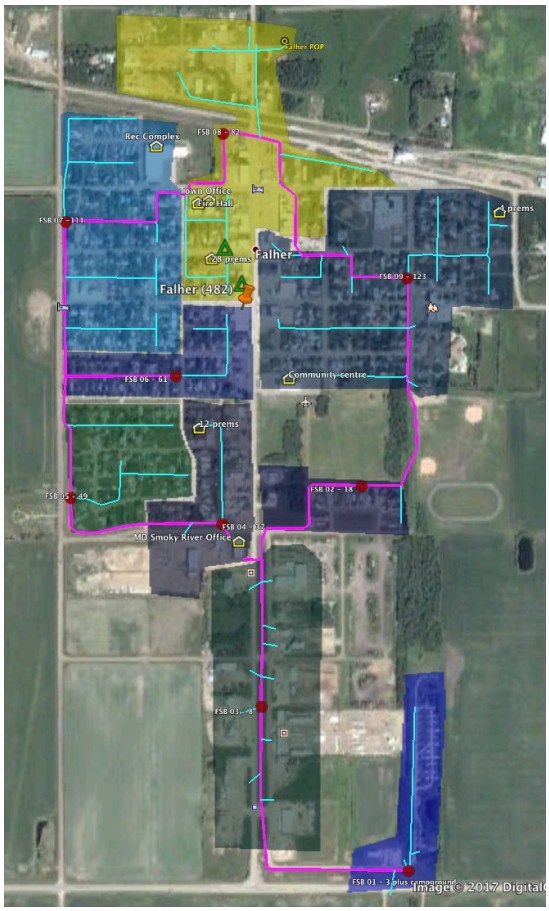
In the analysis below, the business structure, opto-electronics and backhaul, operations, drop capital, and markets and revenues assumed are those outlined in the default implementation scenario presented in Section 6.5. In this case, the local network entity established to house the local fibre operation will be referred to as SR-Net.

11.4.3 Deployment Capital

The capital costs to deploy both the connection network and access networks in each community are shown in Table 63. Overall cost, should the entire network be deployed, comes to about $4.88M. In the financial projections which follow, only the community deployments will be considered – which, based on the high-level designs in Figure 161, reduces the overall deployment cost to $1.72M. Assume the access networks are all deployed in 2018.

Table 63 – Deployment Cost Summary

	County Backbone Routes			Towns & Villages		
Network Component	From Fahler SN POP	From McLennan SN POP	From Donnelly SN POP	Fahler	McLennan	Donnelly
Year of Deployment				2018	2018	2018
Feeder	566,802	320,895	892,794	261,719	214,668	25,670
Distribution	-	-	-	366,170	308,350	228,160
Subtotal - civil construction	566,802	320,895	892,794	627,889	523,018	253,830
Mobilization/De-mobilization	8,502	4,813	13,392	12,558	10,460	5,077
Engineering, Permitting, and Planning	85,020	48,134	133,919	105,697	87,976	41,126
Activation: Fibre Micro-cabling	294,624	192,537	491,715	103,598	50,265	6,450
Grand-total, deployment	954,948	566,380	1,531,820	849,741	671,720	306,483
						4,881,092



Fahler



Donnelly



McLennan

Figure 161 – FTTP network layouts.

Using the cumulative capital expenditures over the first five years of operation, a breakdown of the expenditures appears in the pie chart in Figure 162. Excluding the backbone connection, the pie chart represents expenditures of $3.4M and assumes that the ISPs using the network obtain a collective market penetration of 50% of the residential and 70% of the business communities.

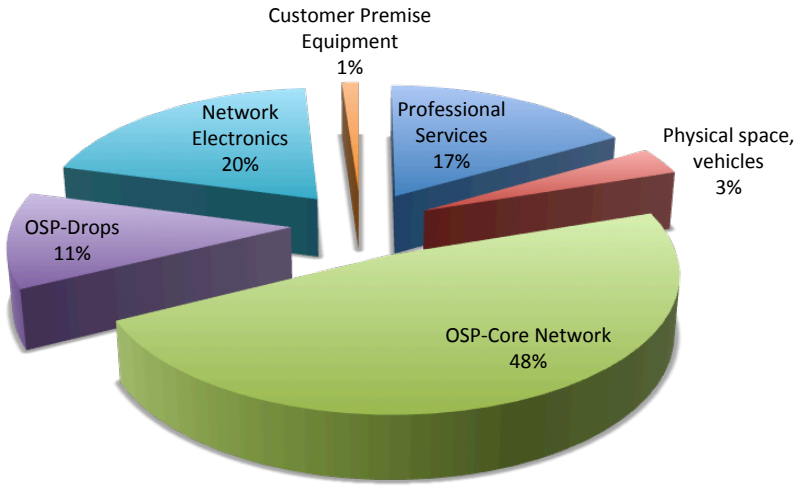


Figure 162 – Cumulative capital expenditures from 2018 to 2022.

11.4.4 Operations

Operational costs include payments to O-Net for network management and monitoring services and for local technical staff required to maintain the network. A breakdown of the expenses, as estimated for the 2022 operating year, appears in Figure 163 for the scenario proposed. In the chart, Admin, ops, o-e, and mktng refer to administration, operations, opto-electronics, and marketing respectively. All service-related costs are zero as responsibility for those remains with the ISPs.

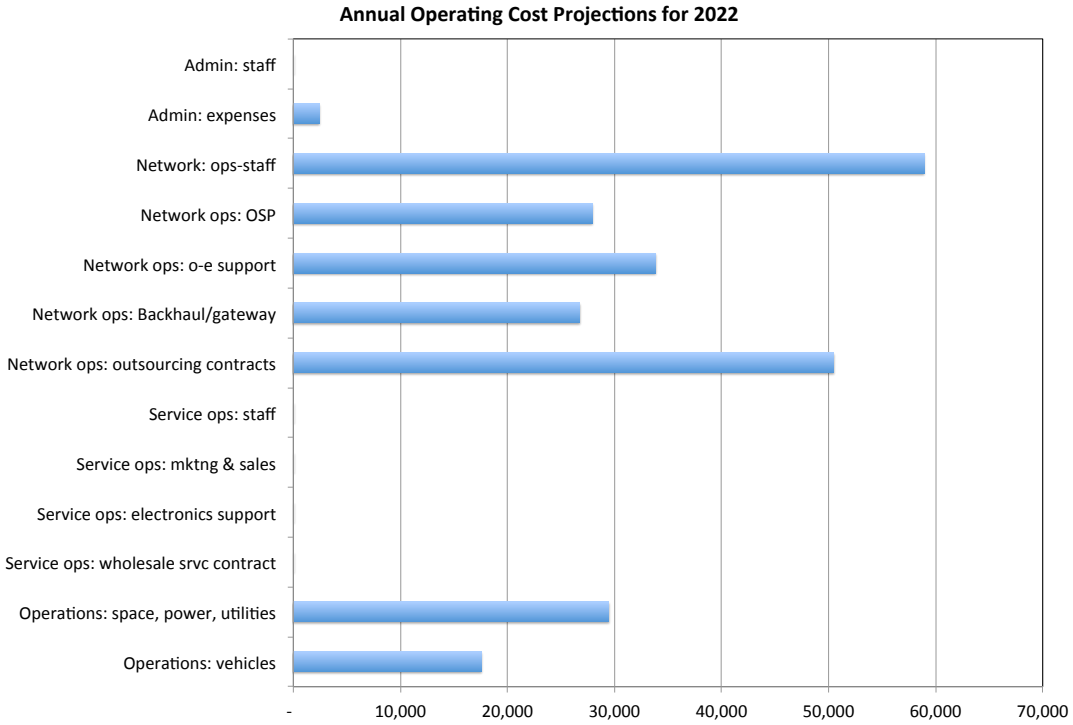


Figure 163 – Projected operational cost projections for the utility fibre network in 2022.

11.4.5 Financial Projections

As can be seen in the summary results shown in Table 64, the wholesale network operation for the MD goes cashflow positive three years after the network deployment completes. Based on the deployment and operational models assumed, overall capitalization for the project would come to approximately $4.1M – some of which has to do with the need to cover 11 years' worth of operational deficits. Without access to grant funding or a cash infusion to finance the project, the MD would need to arrange for both a short and a long-term loan from the Alberta Capital Finance Authority (ACFA) – an eight-year debenture to cover opto-electronics and a twenty-five-year debenture to cover the longer term (fibre) assets and start-up costs. By year 10, approximately 277k is being returned to the County annually. By year 15, this has grown to $518k. Overall, the operation would be both profitable and sustainable.

Cashflow results for this scenario are summarized in Table 64. Though the operation goes cashflow positive three years after the network deployment completes, with debt servicing considered, the overall financials do not go cashflow positive until year 12. As the required capital must therefore be sufficient to cover an 11-year deficit, some $4.1M in capital will be required to fund the operation. By year 15, approximately $45k is being returned to the Town annually.

Table 64 – Utility Model Results Summary for Big Lakes

	Results
Years to positive cashflow	
Operating	4
With debt servicing (p&i)	11
Financing	
Start-up capital required	4,055,364
Net Cashflow - before debt servicing	
Profit - annual at 10 yr	110,062
Profit - annual at 15 yr	182,934
Net Cashflow - after debt servicing	
Profit - annual at 10 yr	0
Profit - annual at 15 yr	45,846

In graphical form, the non-discounted cashflow chart for the proposed deployment appears in Figure 164. As before, the capital (red) required to finance the project is shown to pretty much all be required upfront to cover the deployment costs and initial operating deficits – financing must be sufficient to maintain a net cashflow of at least zero. Operational sustainability is determined by the gap or difference between the revenue (blue) and operational expenditure (green) lines whereas overall sustainability, which includes principal repayment, is the difference between the revenue (blue) and the operational + principal repayment (dotted blue) lines. The bigger the gap, the better. The net overall cashflow line is the dotted orange line.

The operating margin is positive in year 5 and, with debt service payments, the operation goes cashflow positive in year 12. While technically these numbers work, operationally, the risk is too high due to the negligible margins and resulting deficits. Given the small client base available in the MD and the importance of scale to operational sustainability, these initial results are typical for communities with aggregate populations less than around five thousand people.

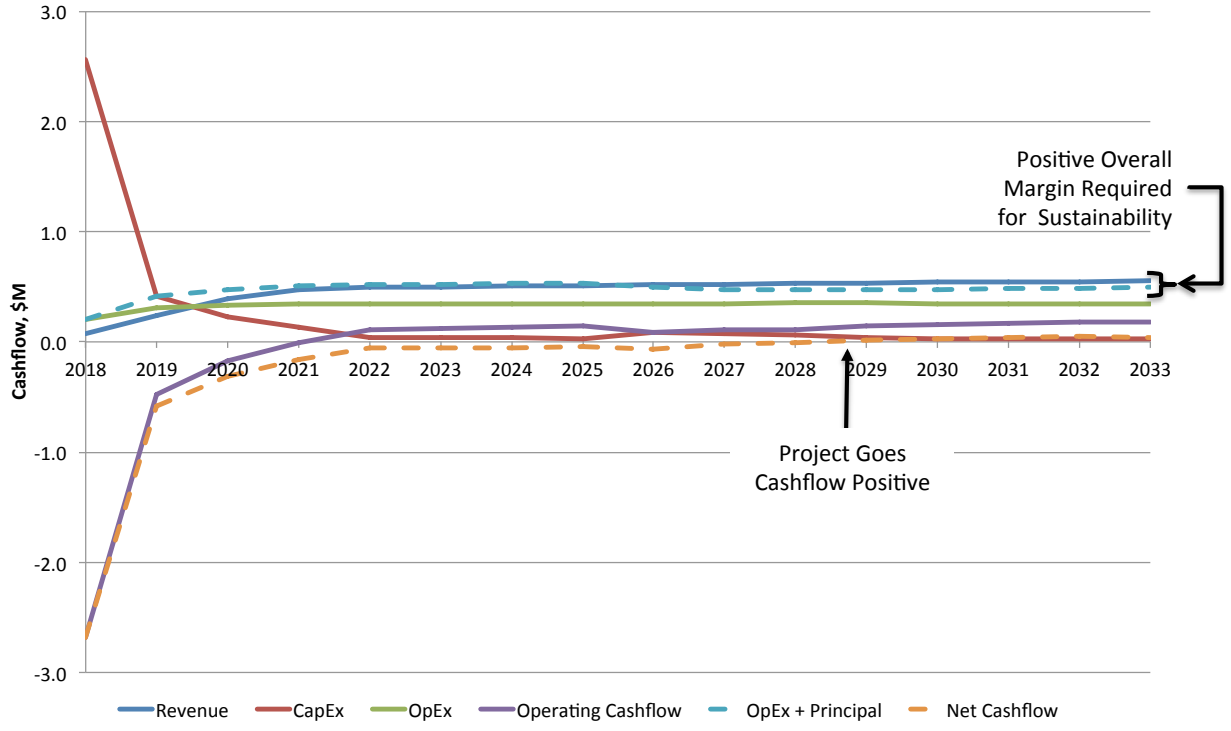


Figure 164 – Non-discounted cashflow projections for the Big Lakes County regional network.

Options to improve margins sufficiently that a community might elect to pursue a deployment are many and varied. With only 900 premises, for example, Valleyview now has a model in which their numbers work. Options to be considered were outlined in Section 6.5.10.

11.5 Extrapolating the Results

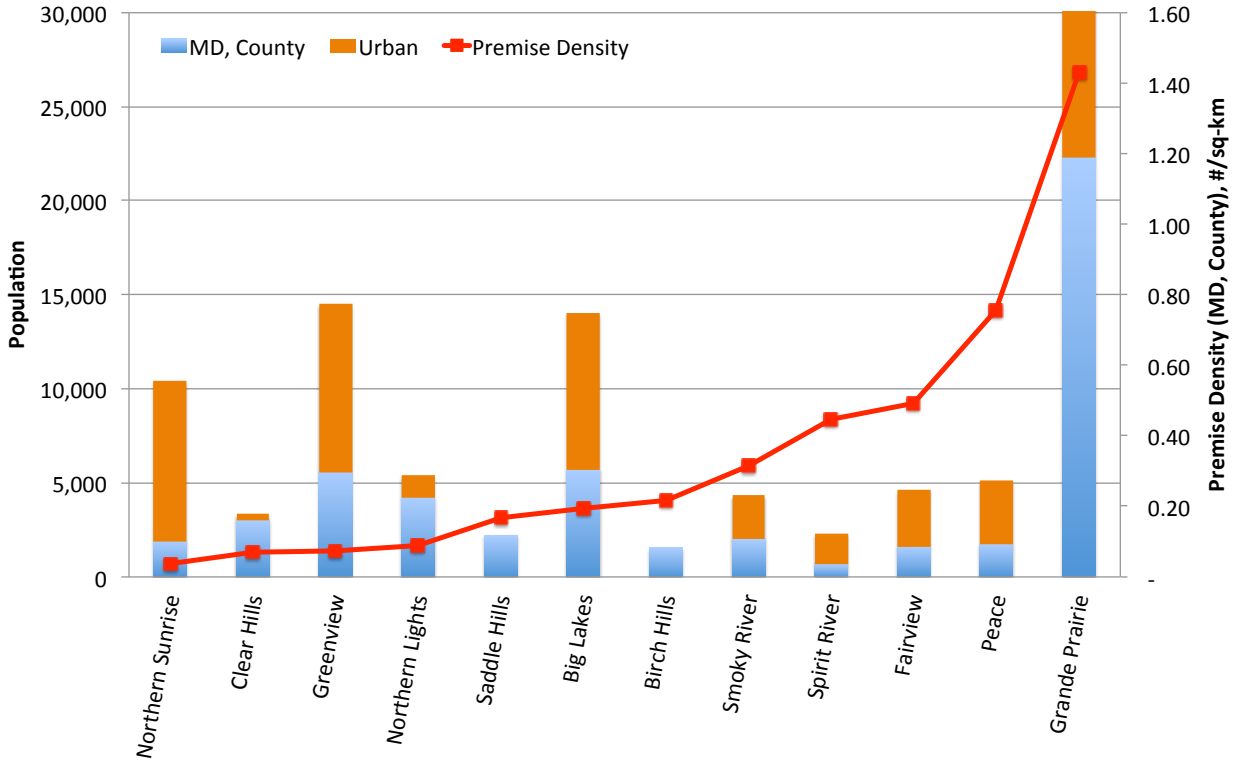
11.5.1 Municipal Networks

The financials presented for High Prairie illustrate the issues communities such as Fairview, Beaver Lodge, Sexsmith, and Grimshaw will face when evaluating a community fibre access options. Financials for smaller communities such as Wembly, Manning, and Fahler can be found in the report for GROWTH Alberta – they are similar in size to Swan Hills. As High Prairie is large relative to most member communities and the financials are marginal, the idea will be to bring together several communities withinin reasonable proximity together and then leverage the larger client base to improve efficiency and margins. In general, the minimal aggregate size for buried builds is between 2 and 3 thousand premises. Other options to improve the financials for smaller centres were discussed in Sec. 9.2.

11.5.2 Regional Networks

Given the importance of scale, should Big Lakes County proceed to establish a regional network operation, the operation could easily be expanded to encompass both the MD of Smoky River and others within the PREDA footprint – to mutual benefit of all communities involved.

Figure 165 provides a view of the population and densities for each MD and county in PREDA. The blue bars show the population of each MD or county and red squares show the population density. The orange bars bring in the populations of the cities, towns, and villages within each MD or county.



(The orange bar for Grande Praire extends to a population of 93k.)

Figure 165 – Population and density profile for MDs and counties in PREDA.

The financials developed above for Big Lakes County indicate that a regional utility-based fibre network is possible and would be sustainable over the longer term. Though the county density is low, the population is concentrated along several corridors and with the urban centres involved, the operational scale is sufficient, but not by much.

Given the similarities in population and density, it would seem that a similar regional fibre option would work for Northern Sunrise and Greenview. This is not the case, though, and both will have difficulty making the numbers work. The primary urban centre in Northern Sunrise is Peace River, which has TELUS fibre. Greenview's issue is that Grande Cache is far enough from the other centres that pooling operations with them may not be practical.

With both lower densities and fewer population centres, without grant funding or aerial deployments, wireless will likely remain the dominant option for Clear Hills, Northern Lights, Saddle Hills, and Birch Hills. With a higher density, the numbers for Smoky River are promising. With higher densities, limited fibre networks focused on the urban centres are likely possible for Spirit River, Fairview, and Peace. Many options are available to the County of Grande Prairie.

12 Regional Economic Development Initiative for Northwest Alberta (REDI)

12.1 Current State

12.1.1 Regional Profile

As shown in Table 65, the current state data collection and analysis focuses on two towns, one county, four First Nations, and Paddle Prairie Métis Settlement within the Regional Economic Development Initiative for Northwest Alberta (REDI) region. A map of the REDI region is shown in Figure 166. Please visit REDI's website for more information http://www.rediregion.ca/.

The region is geographically located in the northwestern corner of Alberta. Its land supports boreal forest while the flat portions are suitable for agriculture in this remote part of Alberta. There are many active grain farmers in the La Crete area. The La Crete area has a unique growing climate, with extended daylight hours during the summer growing season, which result in improved crop yields.

Table 65 – REDI Communities

Towns	Counties	First Nations	Métis Settlement
High Level Rainbow Lake	Mackenzie	Beaver* Dene Tha'* Little Red River* Tallcree*	Paddle Prairie

*Community resides within the northern Alberta study area and the NADC region but is not presently a member of a REDA.

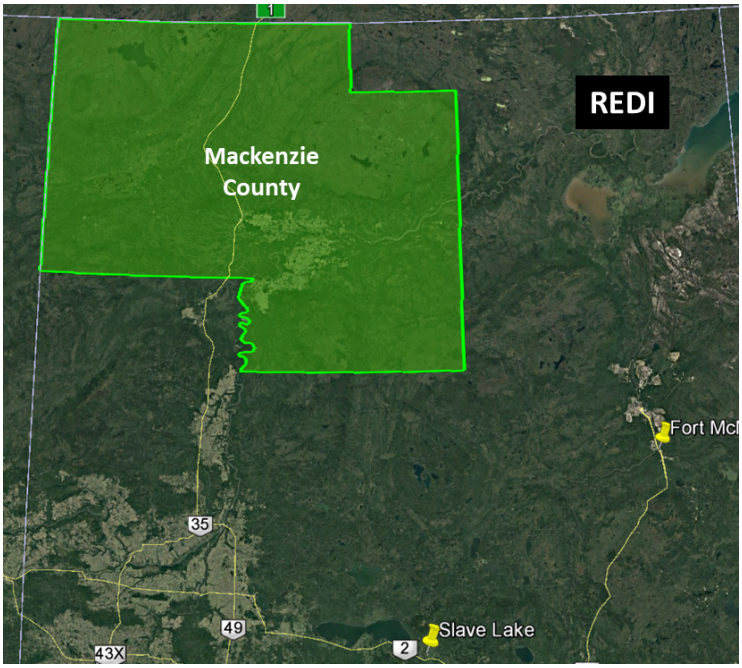


Figure 166 – REDI region.

The region is home to approximately 23,000 residents. Table 66 provides a breakdown by municipality (rural and urban), and First Nation as well as five-year population growth trends and CAGRs. Twenty-eight percent of the region's residents live on First Nations reserves.

Although the 2016 Statistics Canada Census indicates that the population of Mackenzie has increased slightly (2.2%), the County's own 2015 Census shows an increase of 7.5% over the five-year period of 2011 to 2015.[191] The Town of High Level completed its own population census subsequent to the Federal census. Population growth was 2.6% compared to its earlier municipal census in 2015.

The hamlet with the largest population is La Crete (3,376 people) and represents almost 30% of the population within the County. Realizing the rich farmland in the La Crete area, a large number of Mennonites relocated to the area in the early 1930s. They have large families - household size of 10 to 14 are common and population growth has been described as '*intense*'. Youth find employment within the community and, therefore, stay in La Crete. These factors fuel the demand for housing (50 to 80 houses are built annually), and the price of property in the La Crete area.[192]

Most of the First Nations populations have grown between 2011 and 2016, especially the Tallcree First Nation (approximately 30%). The Little Red River Cree First Nation is also growing and has a population comparable to High Level.

Table 66 – REDI Population & Population Growth Trends

Municipality	Rural				Urban					First Nations (FN)				
	Population (2016)	CAGR (%) (2011-2016)	5-Year Trend (%) & Direction		City/Town/ Village	Population (2016)	CAGR (%) (2011-2016)	5-Year Trend (%) & Direction		Reserve / Settlement	Population (2016)	CAGR (%) (2011-2016)	5-Year Trend (%) & Direction	
Mackenzie, County	11,171	0.4	2.2	▲	High Level Rainbow Lk.	3,922 795	na -1.8	na -8.6	▼	Beaver First Dene Tha' Little Red River Tallcree	434 1,900 3,530 484	1.6 na na 4.9	8.2 na na 29.9	▲ ▲
Northern Lights, County										Paddle Prairie (Métis)	544	-0.6	-3.2	▼
Total	11,171					4,717				**Total - FN**	6,348			
										Total - Métis	544			

CAGR – Compound Annual Growth Rate

Total Population = **22,780**

Source: Statistics Canada Census 2011 and 2016, High Level Municipal Census 2017, Little Red River Cree.

There are 826 businesses (with employees) in the REDI region. As shown in Table 67 and Figure 167, almost 50% of the businesses are involved in three industries: (1) construction; (2) agriculture, forestry, fishing, and hunting; and (3) transportation and warehousing. The NAICS was used to classify the industries. *'Other Industries'* segment (14.5%) shown in the Figure 167 chart includes industries that individually contribute between 3.0% and 0.1% to the category.[193] The Tolko Industries Ltd.'s lumber sawmill in the High Level area received a temporary permit from the government to operate its incinerator to burn their accumulating '*hog*' pile. Hog is a co-product of the lumber milling process. It is the bark that is removed

[191] Mackenzie County; *2015 Municipal Census*.

[192] Neufeld, Larry – Manager, La Crete and Area Chamber of Commerce; Telephone conversation; 2017-03-10.

[193] Real estate and rental and leasing; manufacturing; wholesale trade; finance and insurance; information and cultural industries; educational services; arts, entertainment and recreation; public administration; management of companies and enterprises; and utilities.

from the logs when they first come into the sawmill. The company now has a plan in place.[194] The provincial plan to protect caribou herds in the area will have a socioeconomic impact as 1.8 million hectares is being proposed for conservation and permanent protection by the end of 2017.[195]

Table 67 – REDI Number of Businesses (with employees) by Industry

Industry	Businesses	Percent (%)
Construction	143	17.3
Agriculture, forestry, fishing, and hunting	140	16.9
Transportation and warehousing	112	13.6
Retail trade	90	10.9
Other services (except public administration)	67	8.1
Healthcare and social assistance	34	4.1
Administrative and support, waste management and remediation	34	4.1
Accommodation and food services	31	3.8
Mining, quarrying, and oil and gas extraction	29	3.5
Professional, scientific and technical services	26	3.1

Source: Calculations based on dataset provided by Alberta Economic Development & Trade, Economic Information & Analytics, Feb. 13, 2017.

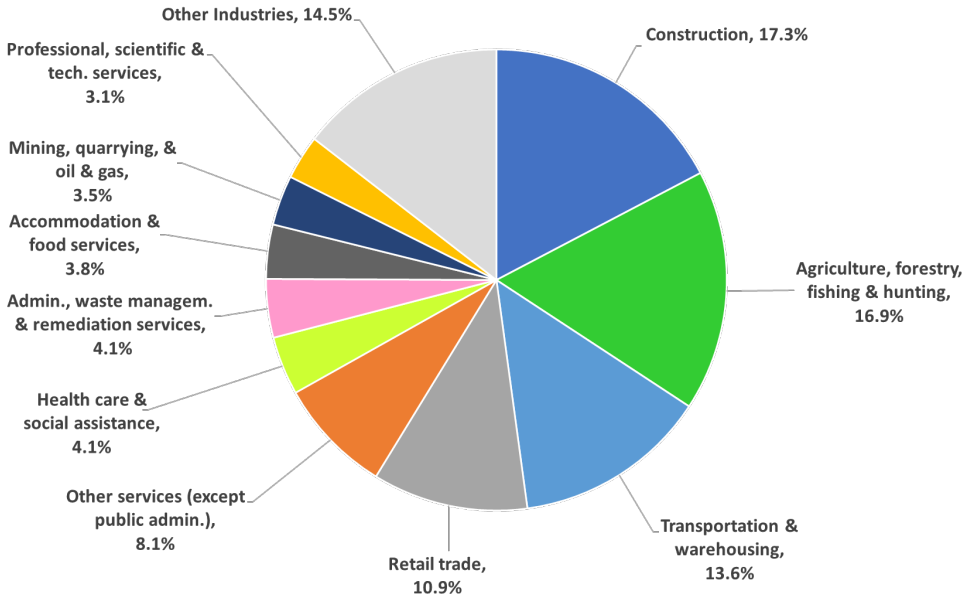


Figure 167 – REDI mix (based on business counts).

Agriculture and Agri-Food Canada has a research facility at Fort Vermilion. The site focuses primarily on the adaptation of technologies for this northern agricultural area. Additionally, the producer-sponsored Mackenzie Applied Research Association (MARA) conducts applied agricultural research and demonstration trials in the REDI region.

[194] Dolling, Joe, Woodlands – Manager, Tolko Industries Ltd. – High Level; 'Telephone conversation'; 2017-05-11.

[195] *High Level Mayor Wants Socioeconomic Impact Assessment of Alberta Caribou Plan;* YL Country; 2016-09-05.

Post-secondary and continuing education in the REDI region are provided by the Northern Alberta Institute of Technology (NAIT), Northern Lakes College, Kayas Cultural College, and Athabasca University. Kayas Cultural College is an adult academic upgrading and training center, operated by the Little Red River Cree Nation.

12.1.2 Municipal, First Nations, and Métis Settlements Broadband Interests

Communities within REDI are at different stages in recognizing the importance of broadband services and connectivity to economic diversification, municipal sustainability, regional competitiveness, public service delivery, and quality of life.[196] Table 68 identifies the awareness and current state of municipal involvement and interest in broadband.

Table 68 – REDI Involvement & Interest in Broadband[197]

Community	Enthusiastic	Interested *'Maybe'*	Need Help Too Small	Too Expensive	Status Quo	Don't Know[198]	No Response[199]
Towns							
High Level		X					
Rainbow Lake					X		
Counties/MDs							
Mackenzie	Very interested in improving Internet service delivery within the County. Its strategy is to support the local ISPs						
First Nations							
Beaver							X
Dene Tha'		X					
Little Red River	X						
Tall Cree	X						
Métis Settlement							
Paddle Prairie							X

12.1.3 Current Service Providers, Services, and Infrastructure

12.1.3.1 Fixed Wireless-based

Current Internet service providers using fixed wireless technology in the REDI region include the following. Appendix 16.3 provides the details of their service offerings (Internet only – no bundling unless otherwise

[196] The five elements of broadband's importance were identified by the Calgary Regional Partnership, Economic Prosperity Steering Committee, *Request for Decision*; 2016-09-08.

[197] Communities were asked to rate their involvement and interest in broadband. Broadband was defined as follows: In telecommunications, broadband is a wide bandwidth data transmission with an ability to simultaneously transport multiple signals and traffic types - the medium can be twisted-pair copper wiring, optical fibre, coaxial cable, or radio. Broadband service is characterized as offering symmetric bandwidth between 50 Mb/s and 1 gigabit (Gb/s)/1,000 Mb/s and higher (really unlimited bit rates) (symmetric meaning the upload bit rate is as fast as the download bit rate).

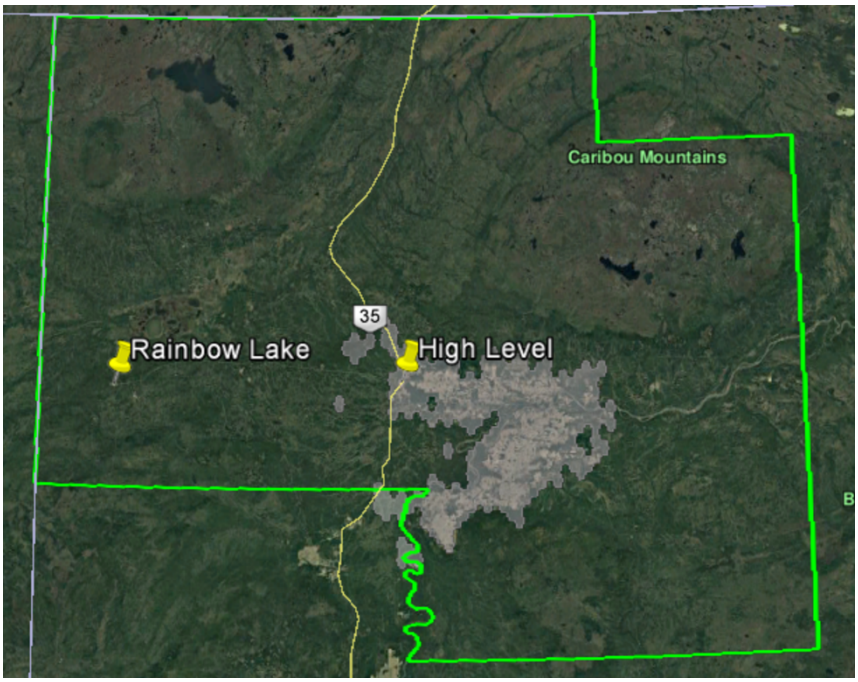
[198] Don't Know – the respondent was unable to rate their community's interest and involvement in broadband.

[199] No Response – the community did not respond to the inquiries regarding their community's interest and involvement in broadband.

stated) and geographic coverage. The coverage maps of the individual service providers are those that were available on their websites at the time of the writing of this report.

- Arrow Technology Group,
- Corridor Communications (CCI),
- Little Red River First Nations, and
- XplorNet (fixed wireless and satellite-based).

According to the CRTC website[200], minimal 5 Mb/s down (toward the end-client) by 1 Mb/s up (from the end-client to the network) service is only available in the High Level area (i.e., the Town of High Level and to the west and southwest of the town) of the REDI region. A combined view of the fixed wireless coverage is shown in Figure 168 (light gray areas).



Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

Figure 168 – REDI fixed wireless coverage.

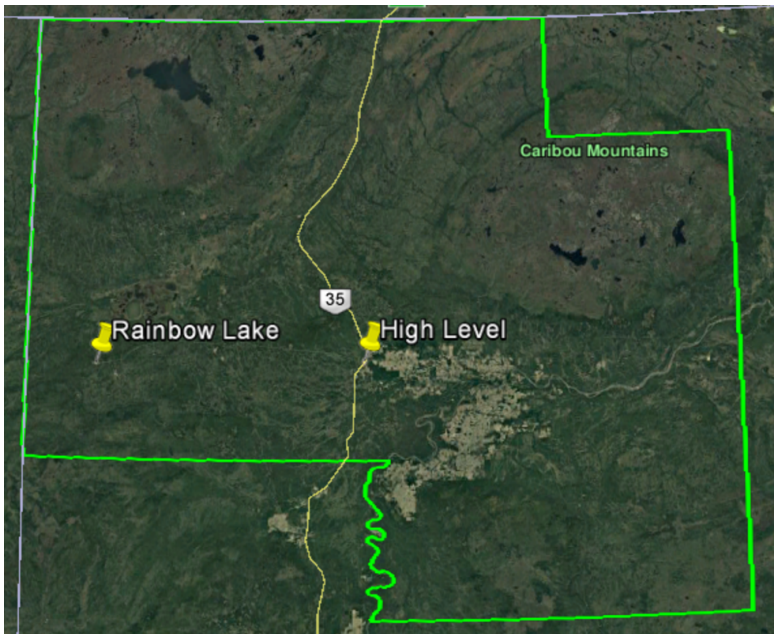
12.1.3.2 Mobility

The lack of yellow areas in Figure 169 indicates that mobility data services are not available; however, the coverage maps in Appendix 16.4.2 suggest there is some coverage.

12.1.3.3 Wireline-based – DSL

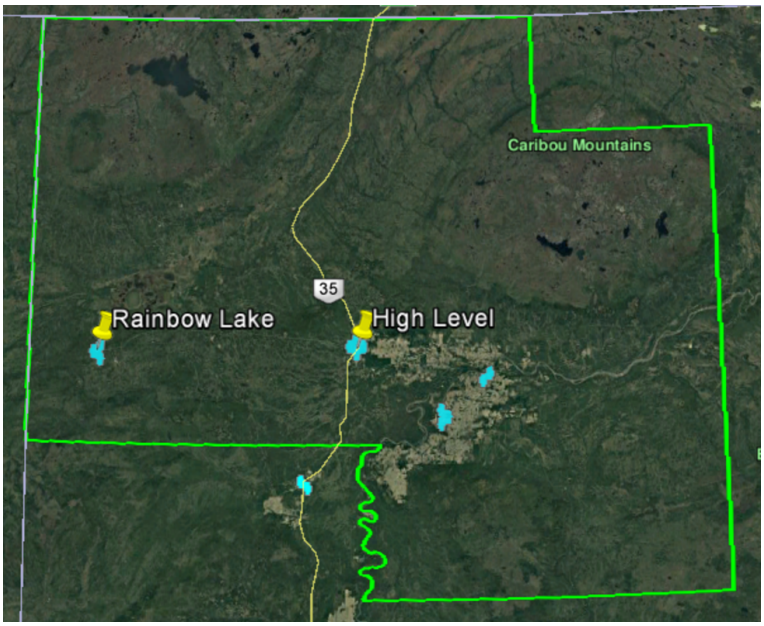
Digital Subscriber Line (DSL) refers to a group of last mile technologies that are used by wireline-based service providers such as TELUS in Alberta to provide broadband services over twisted-pair copper wiring. The local copper wire loop is a remnant from the days when (and how) the telephone company connected residential and business premises to the telephone company's network for the purposes of providing local and long distance telephone services (and dial-up Internet services). Since DSL's performance degrades with distance, the technology is only deployed in urban areas where access distances are less than about two miles. In Figure 170, areas served via DSL technologies are shown in blue.

[200] http://crtc.gc.ca/eng/internet/internetcanada.htm



Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

Figure 169 – REDI mobility data coverage.



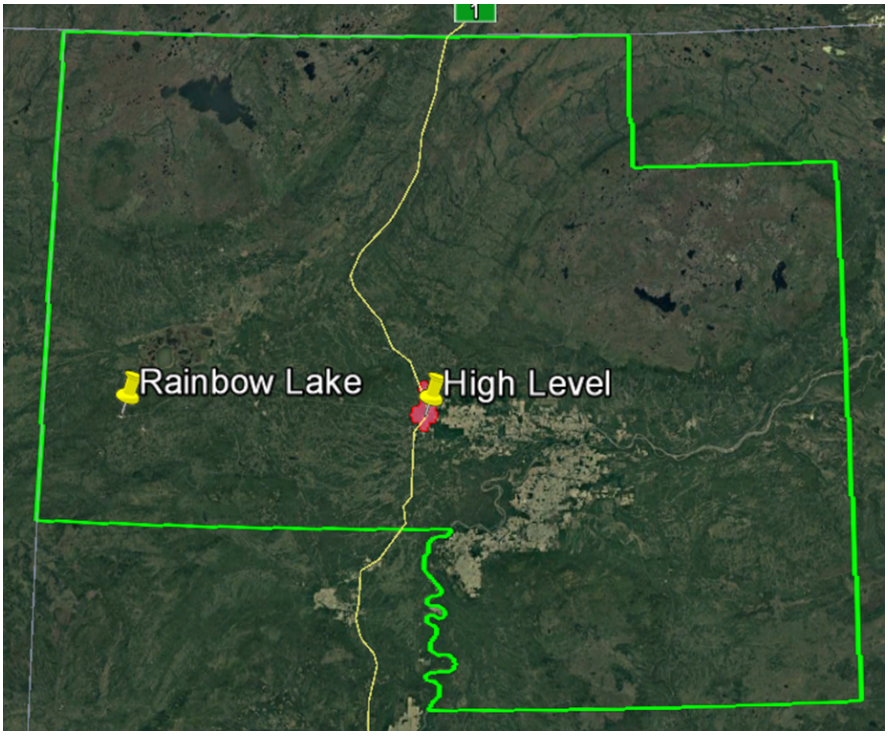
Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

Figure 170 – REDI DSL coverage.

12.1.3.4 Wireline-based – Coaxial Cable

NorthwesTel Inc. (NorthwesTel) and the Town of Rainbow Lake, originally television broadcast companies, use coaxial cable and modern cable modem technology to provide broadband services in the REDI region (red areas in Figure 171). The cable companies currently use the DOCSIS 3.0 standard to achieve broadband speeds of 100 Mb/s or more over coaxial cable. According to the Cybera, *State of Alberta*

Infrastructure Report, "The next-generation DOCSIS 3.1 standard is expected to revolutionize hybrid fibre-coaxial cable connections by providing up to 10 Gb/s download and 1 Gb/s upload network throughput and significant improvements in latency." [201]



Source: http://www.crtc.gc.ca/eng/internet/internetcanada.htm

Figure 171 – REDI coaxial cable coverage.

Maximum advertised wireline offerings are shown in Appendix 16.3. Since these are '*up to*' bit rates, during high usage periods, actual bit rates will be less. The offerings are highly asymmetric – upload and download bit rates differ significantly.

12.1.3.5 Internet Service Provider Wi-Fi

TELUS offers two WiFi locations in High Level and one location in Fort Vermilion.

12.1.3.6 Axia Fibre

Axia NetMedia provides retail services to corporate clients and, through AxiaConnect, provides fibre-based retail Internet services in a number of smaller communities. In exchange for access to a community's rights-of-way, Axia will consider investing in fibre-to-the-premise (FTTP) infrastructure in communities that can demonstrate that at least 30% of its residences and businesses are interested in purchasing Internet services from Axia once the '*closed-access*' network is built. In January, 2017, Axia announced plans to deploy an FTTP network in Fairview. The build is scheduled to complete this fall.

[201] *State of Alberta Digital Infrastructure Report;* Cybera; 2016-09-13.

12.1.4 Backhaul Availability

12.1.4.1 Alberta SuperNet

The extent of the SuperNet within the REDI region is shown in Figure 172. The green lines represent the Bell-operated BAN portion while the blue lines represent the Axia-operated EAN segments. A more general discussion about the SuperNet is presented in Appendix 16.5.

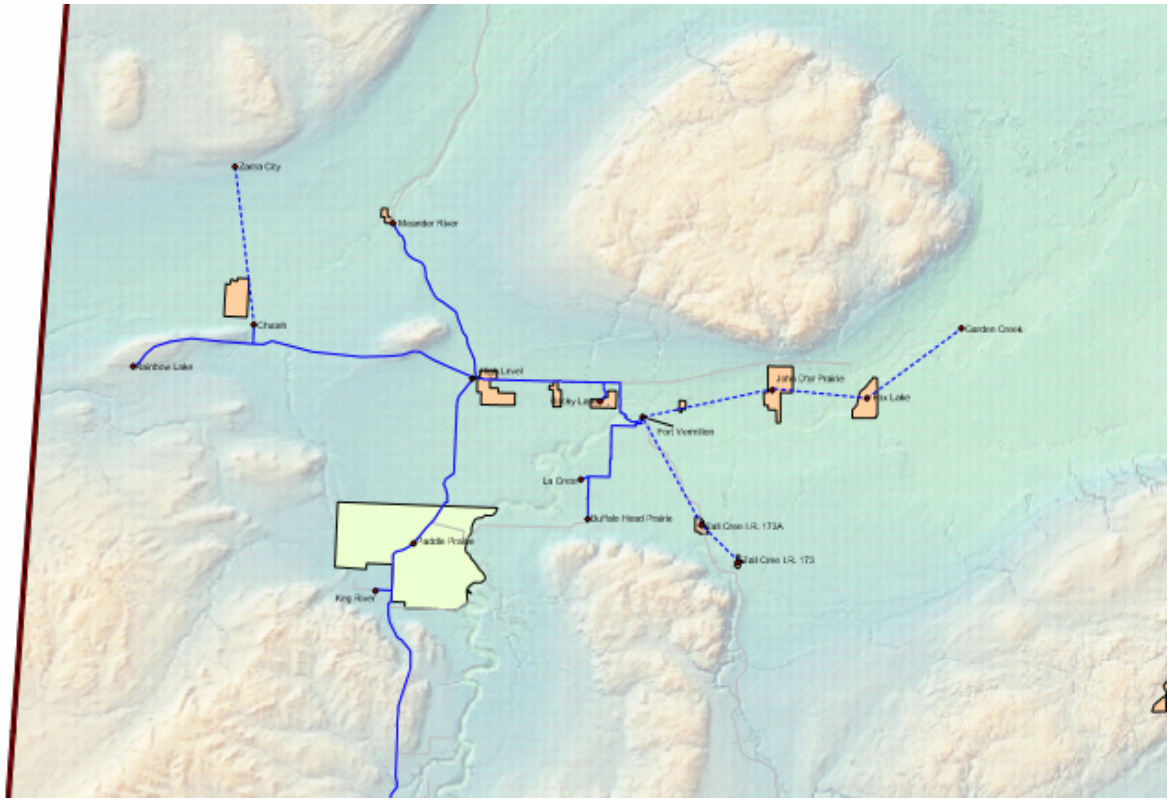


Figure 172 – REDI SuperNet infrastructure.

In 2018, municipalities, First Nations, and Métis Settlements requiring access to fibre transport for backhaul to Edmonton may want to consider Bell or TELUS.

Reliability of the Internet and cellular service are both big concerns for the region. There is only one fibre optic line feeding most of northwest Alberta including the entire County.

NorthwesTel is the only service provider that has their primary infrastructure north of the County and does not rely on backhaul fibre facilities coming from the South. This positions NorthwesTel uniquely as a possible alternative to the current service providers and offers potential redundancy solutions, especially in case of emergencies.[202]

12.1.4.2 TELUS Wholesale

Except under a non-disclosure agreement, TELUS does not provide maps of fibre assets.

[202] Mackenzie County; Mackenzie County, Sustainability Plan 2015 – January 2016, Approved January 12, 2017. 33.

12.1.5 Existing Infrastructure

12.1.5.1 Towers and Other Tall Structures

When planning a broadband build-out it is important to build on what is already in place. The key inquiry for the current state analysis is what assets does the community have that can be provided at little or no incremental cost that improve the economics of the broadband deployment and operations? Assets include existing towers, fibre and community networks, which the community might be using for communications or asset management. Existing and possible access to tall structures or buildings are also important to inventory for the potential placement of wireless equipment.

The Dene Tha' and Tallcree First Nations received grant funding to expand high-speed Internet access to unserved areas and address gaps in coverage from Alberta Agriculture and Forestry's *Final Mile Rural Community Program* in the 2012/2013 timeframe. High Level has the following taller buildings which can potentially be used to support broadband hardware: the High Level Arena Complex, the administration building, the swimming pool, and the fire hall.

12.1.5.2 Utility Infrastructure

The existing overhead and underground transmission and distribution lines of electric utility companies (ATCO Electric) and natural gas co-operatives (co-ops) present deployment options for community broadband builds - access to and installing fibre cables to travel along utility poles, in ducts and conduit, and along rights-of-way can significantly improve the economics of broadband service expansion projects and network deployments. Inquiries about the availability of communications spaces on utility providers' poles and where multi-party trench agreements exist will be made during the preliminary infrastructure design phase of a broadband network. Appendix 16.6 shows ATCO Electric's and Fortis Alberta's respective service areas in northern Alberta.

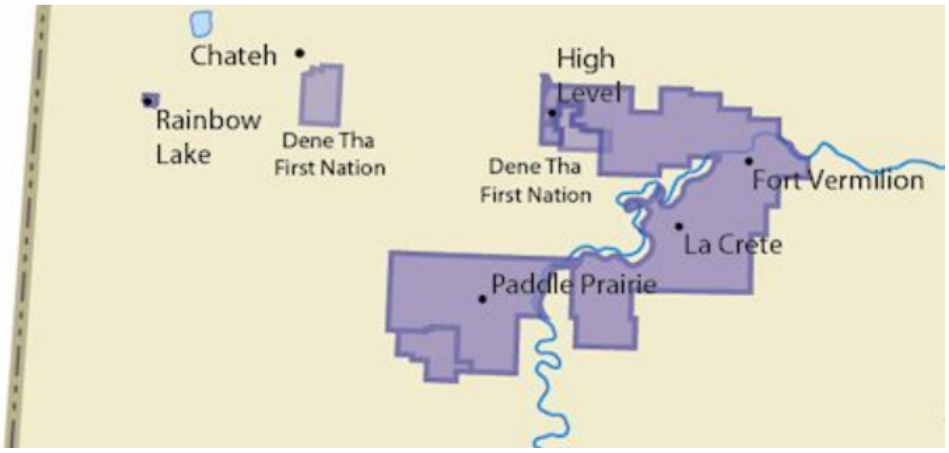
12.1.5.3 Gas Co-operatives

In the 1960s, non-profit gas co-ops were formed to supply natural gas to rural Alberta - franchise areas were designated. Mackenzie County's rural gas co-operative's distribution infrastructure is being used to expand broadband coverage throughout the county and its First Nations communities (Figure 173).

- Dena Tha Natural Gas Utility (Chateh)
- Northern Lights Gas Co-op Ltd. (La Crete)
- Town of Rainbow Lake

12.1.5.4 First Nations Fibre Infrastructure

First Nations Technical Services Advisory Group (TSAG) is a non-profit organization established by the Chiefs of Alberta to provide technical support and training to First Nations in the Treaty 6, 7, and 8 regions. In 2008, TSAG partnered with Health Canada to develop the network components (fibre connections) at First Nations health centres to support First Nations' telemedicine. With Health Canada funding and TSAG project management, community fibre networks connections were made to the Alberta SuperNet points-of-presence on each or close to each First Nations in 2011. Upon completion, each First Nations became the owner of its local fibre network. As shown in Figure 174, First Nations' schools, health centres, band administration offices, and water treatment plants are now connected.



Source: Federation of Alberta Gas Co-ops, http://www.fedgas.com/Map. Accessed Feb. 1, 2017.

Figure 173 – REDI gas co-operatives.

TSAG operates a state-of-the-art Network Operations Centre (NOC). The NOC's real time network monitoring ensures availability, network security/SPAM filtering, telehealth bridge management, and support, and applications (high-speed connectivity and remote water monitoring system for water treatment plants, OneHealth.ca, and FirstNationsTH.ca). Onehealth.ca is a national health portal that provides information and services to health care professionals working in First Nations communities. FirstNationsTH.ca – Telehealth provides education and travel-free patient and health care assessments via video-conferencing.

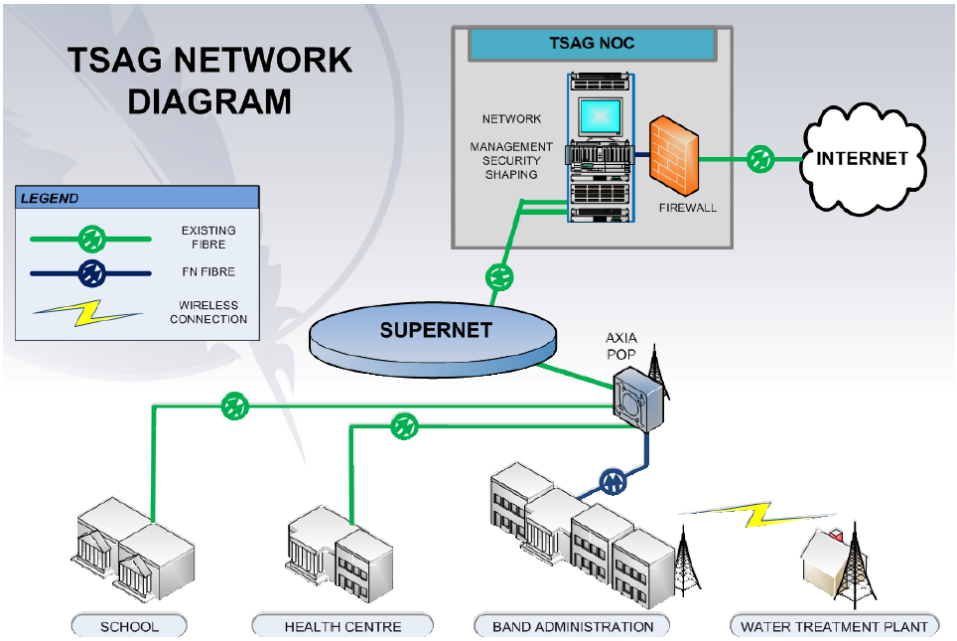


Figure 174 – TSAG network diagram.

12.1.6 Planned Infrastructure

12.1.6.1 Major Projects

Private and public sector capital projects in the REDI region include school modernization and road work. Where possible these projects maybe leveraged to reduce the costs associated with the deployment of broadband infrastructure. Figure 175 shows the capital projects in the within the REDI regions.[203]

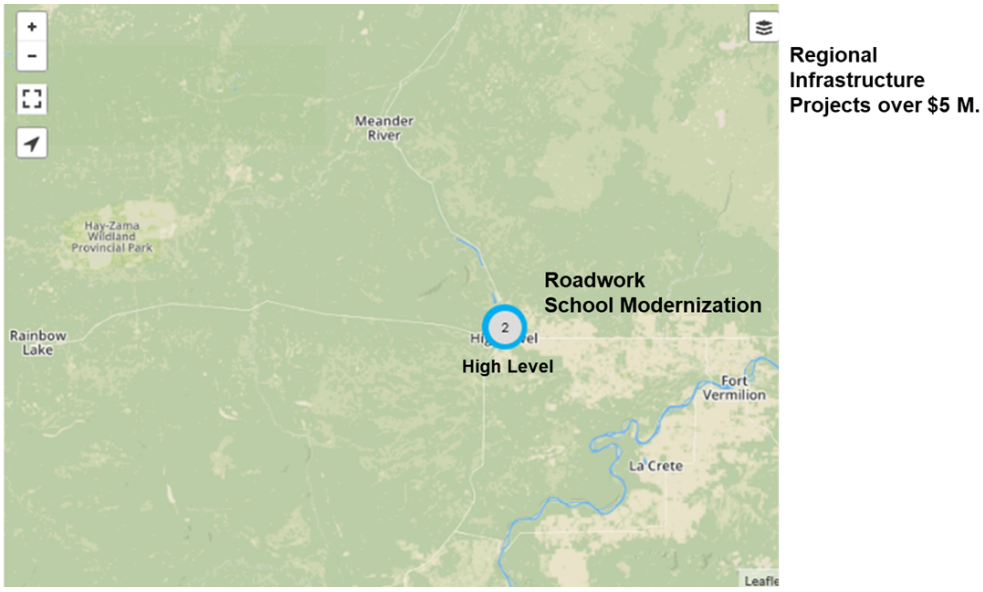


Figure 175 – Major projects.

12.1.6.2 Electricity Transmission Development Plans

As shown in Figure 176, local electricity load is supplied by 138/144 kV transmission lines in the REDI area.[204] In the long-term the rebuild the 144 kV line from Blumenort (near the Hamlet of La Crete) to High Level is proposed.

12.1.6.3 Municipal Capital and Civil Works Projects

Leveraging civil infrastructure projects can reduce broadband deployment costs by 75%. Given civil infrastructure costs typically account for 70% of buried deployment costs, this is significant. Capital projects that involve trenching or erecting towers or poles such as during the development of new subdivisions, road construction, or the construction of rehabilitation of water or sewer lines are typical projects that can improve the economics, of community broadband projects.

The County of Mackenzie received approximately $1.8 million from the *Alberta Municipal Water/Wastewater Partnership (AMWWP)* for the La Crete sewage lagoon expansion**.**

The Federal *Small Communities Fund* (part of the New Building Canada Fund) for infrastructure projects, now includes a *'Connectivity and Broadband'* category. 2016 approved non-broadband projects within the REDI region include (figures shown are the Total Eligible Project Cost - Federal, Provincial, and Municipal).

- Rainbow Lake – Water distribution system rehabilitation $2.1 million, and

[203] Alberta Major Projects, Economic Development and Trade; December 2016. http://majorprojects.alberta.ca/.

[204] *AESO 2015 Long-term Transmission Plan*; AESO.

- Mackenzie County – Rural potable water infrastructure $5.3 million.



Figure 176 - REDI - existing electricity transmission system.

Table 69 shows the capital and civil works projects that the municipalities self-reported.

Table 69 – REDI Municipal Capital & Civil Works Projects

Towns	
High Level	Road upgrades – on Highways 35 and 58 and on 100 Avenue
Rainbow Lake	Nothing planned
Counties	
Mackenzie	La Crete – commercial subdivision

12.2 Desired State

The range of interest in broadband varies considerably throughout the region, but even the most enthusiastic of the municipalities are still in the early stages of deciding which options to pursue and how. While a formal *'Desired Sta*te' has not yet been agreed to in any of the municipalities, what follows is based on the assumption that, over the next five years, the majority may choose to facilitate the deployment of infrastructure to support a fully scalable broadband network ubiquitously available throughout their municipality and, if possible, the region as a whole. This would typically include a combination of an underlying fibre infrastructure with upgraded wireless services where fibre is not yet practical. Market-wise, the infrastructure would be available on an open-access basis to all service providers interested in serving municipal and regional businesses and residents. Whereas the municipalities do not wish to interfere with private enterprise in the services marketplace, they will entertain options relative to facilitating the underlying lit open-access fibre utility infrastructure.

Within the Regional Economic Development Initiative for Northwest Alberta (REDI) the communities or community clusters shown in Figure 177 have the greatest near-term broadband aspirations (likely a community hybrid fibre/fixed wireless solution). Specifically, they are the Town of High Level and the First Nations' communities of Dene Tha', Beaver First, Little Red River Cree, and Tall Cree.

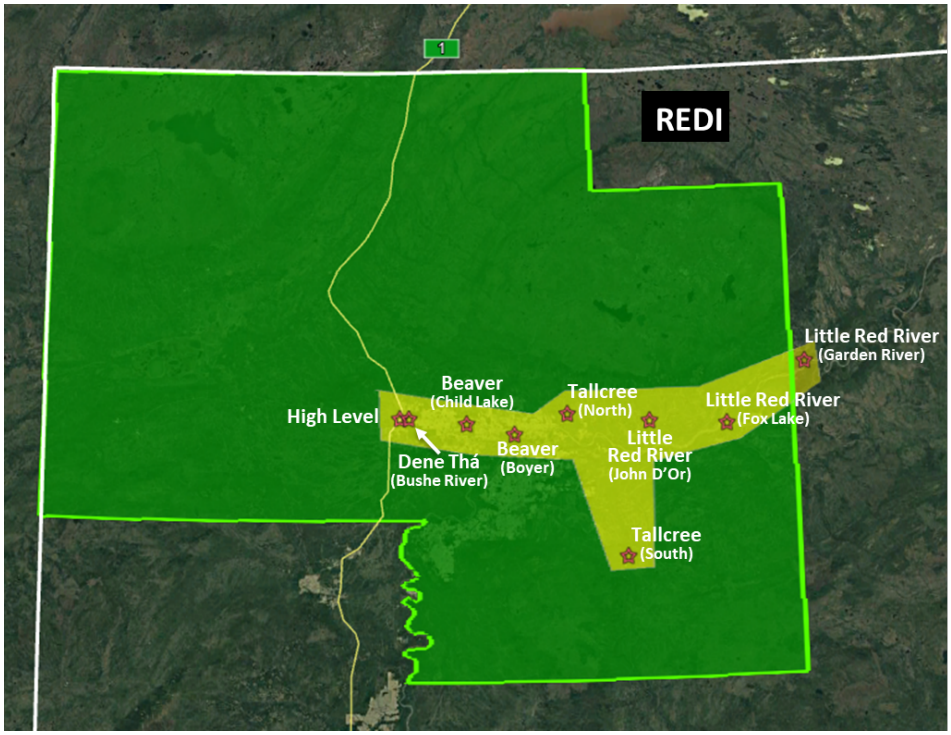


Figure 177 – Communities with near-term broadband plans.

Appendix 16.11 provides the details of each community's issues and challenges; whether fibre/broadband is on their Council's agenda; the factors impacting their community's capability to pursue a fibre/broadband initiative; and the 3-, 5-, and 10-year visions each community has as it relates to broadband.

12.3 A Multi-Community Utility Network

12.3.1 Context

A map of REDI/MacKenzie County is shown in Figure 178. In the map, towns and villages are shown with orange pins and hamlets are shown with yellow. Fixed wireless towers are marked by green triangles. SuperNet fibre routes are shown in black, wireless ones are brown. SuperNet connection points are shown with yellow circles and text.

As can be seen, each of the communities in REDI has access to SuperNet and the existing fibre routes do pass close to a number of fixed wireless towers. Hence, should the communities be interested in establishing an open-access utility network operation to enhance Internet services in the County, they'd be well advised to focus on FTTP solutions in the communities in combination with fibre to the key ISP towers to improve rural coverage.

As of this writing, the plans for SuperNet 2.0 had not been released so it will be assumed that the existing SuperNet connection sites will remain available and that the terms of their use will become more reasonable. With this approach, the more communities, hamlets, First Nations, and Métis Settlements involved, the better. As broadband needs increase and priorities evolve, this initial focus on the communities could move to a greater focus on the more rural areas. The high-level financials developed below indicate that a community focused FTTP play would be financially sustainable, but only if all communities were involved.

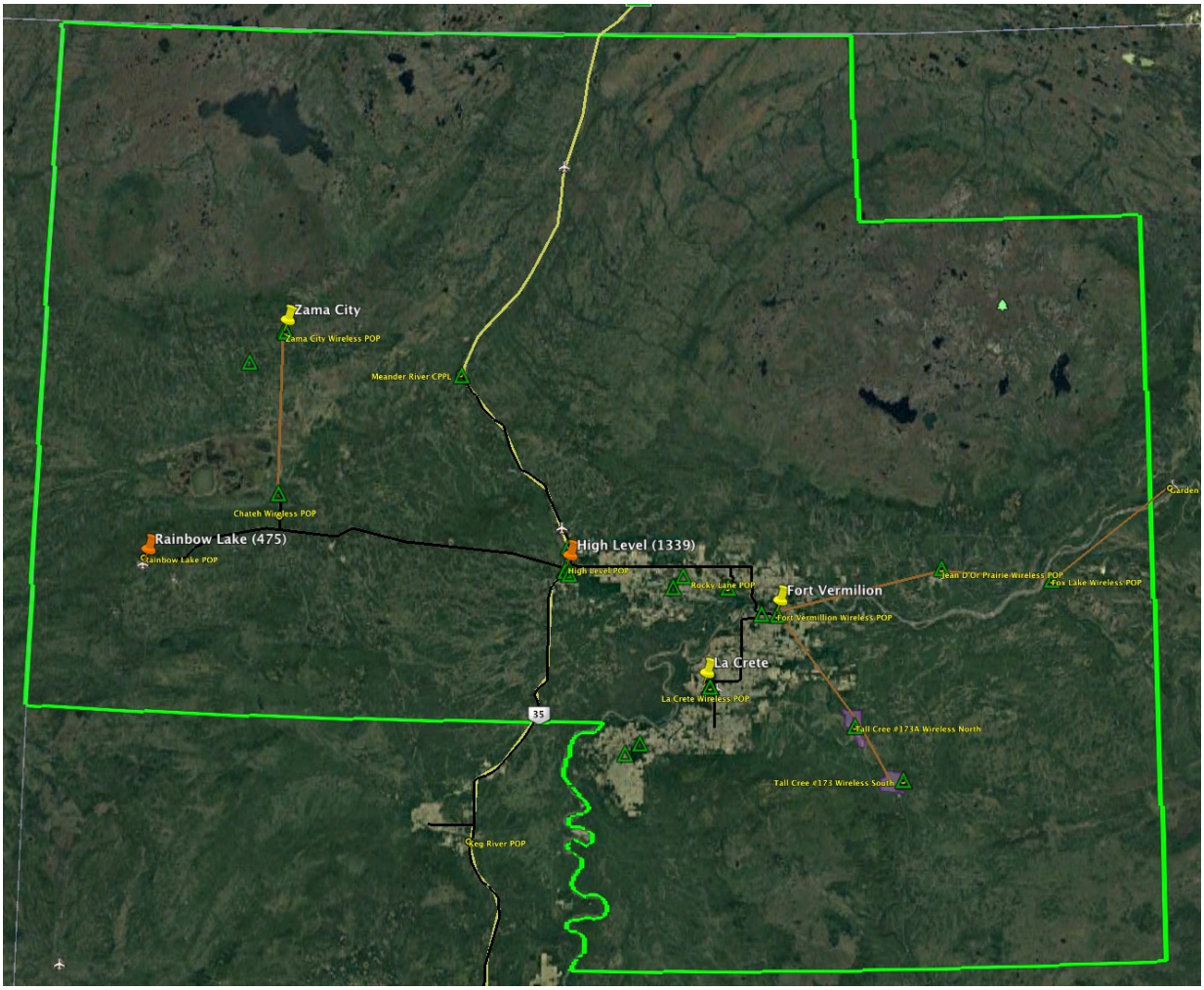


Figure 178 – McKenzie County.

12.3.2 Business Structure

Assume that communities across MacKenzie County jointly deployed an open-access, lit fibre-optic network that will make world-class, fully scalable broadband infrastructure available to all local homes and businesses. In the analysis below, the business structure, opto-electronics and backhaul, operations, drop capital, and markets and revenues assumed are those outlined in the default implementation scenario presented in Section 6.5. In this case, the local network entity established to house the local fibre operation will be referred to as Mac-Net.

12.3.3 Deployment Capital

Assuming deployment conditions similar to those experienced in Olds, and a 25% premium due to the remoteness of MacKenzie County, a buried fibre deployment that passes every residence and business in Whitecourt would cost about $7.77M.

12.3.4 Deployment Schedule

The financials below assume that the network would be deployed throughout the communities over the spring, summer, and fall of 2018.

12.3.5 Opto-electronics and Backhaul

Capital cost estimates over the first five years of operation for the proposed scenario come to $11.6M – see Figure 179. In the chart, the $8.1M outside plant (OSP) deployment estimate (core and drops) includes the feeder and distribution plant required to pass every premise and provide drop connections to those premises that take service.

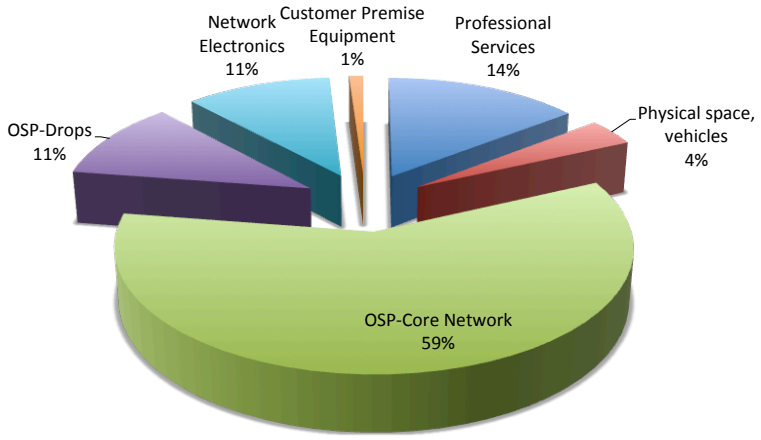


Figure 179– Cumulative capital expenditures from 2018 to 2022.

12.3.6 Operations

The operational costs for wholesale network operation are straightforward as most are handled via outsourced contracts. Once the network build is completed in 2018 and the target penetration rates are realized, operational costs stabilize and a view of those calculated for 2022 are shown in Figure 180. In the chart, Admin, ops, o-e, and mktng refer to administration, operations, opto-electronics, and marketing respectively. The numbers assume that the Town provides both equipment and storage space at no charge.

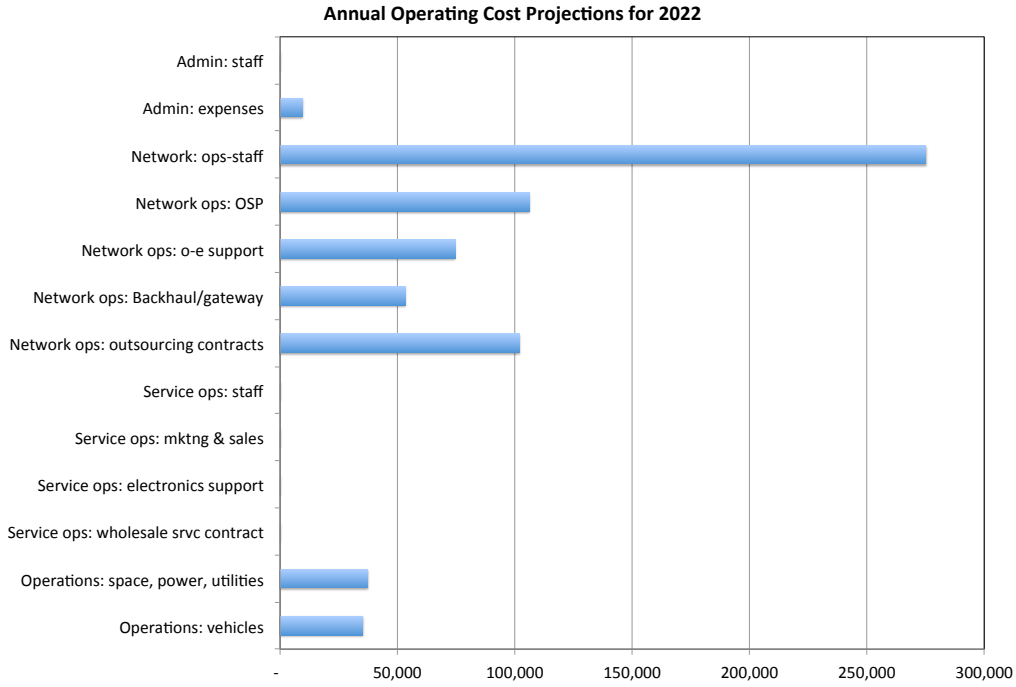


Figure 180 – Projected operational cost projections for the utility fibre network in 2022.

12.3.7 Financial Projections

Cashflow results for this scenario are summarized in Table 70. Though the operation goes cashflow positive two years after the network deployment completes, with debt servicing considered, the overall financials do not go cashflow positive until year 5. As the required capital must therefore be sufficient to cover the capital as well as a 4-year deficit, some $11.8M in capital will be required to fund the operation. By year 15, approximately 333k is being returned to the communities annually.

Table 70 – Utility Model Results Summary for REDI

	Results
Years to positive cashflow	
Operating	3
With debt servicing (p&i)	4
Financing	
Start-up capital required	11,784,506
Net Cashflow - before debt servicing	
Profit - annual at 10 yr	524,905
Profit - annual at 15 yr	763,473
Net Cashflow - after debt servicing	
Profit - annual at 10 yr	138,429
Profit - annual at 15 yr	332,922

In graphical form, the non-discounted cashflow chart for the proposed utility appears in Figure 181. The capital (red) required to finance the project is shown to pretty much all be required upfront and the financing must be sufficient to maintain a net cashflow of at least zero. Operational sustainability is determined by the gap or difference between the revenue (blue) and operational expenditure (green) lines whereas overall sustainability, which includes principal repayment, is the difference between the revenue (blue) and the operational + principal repayment (dotted blue) lines. The bigger the gap, the better. The net overall cashflow line is the dotted orange line.

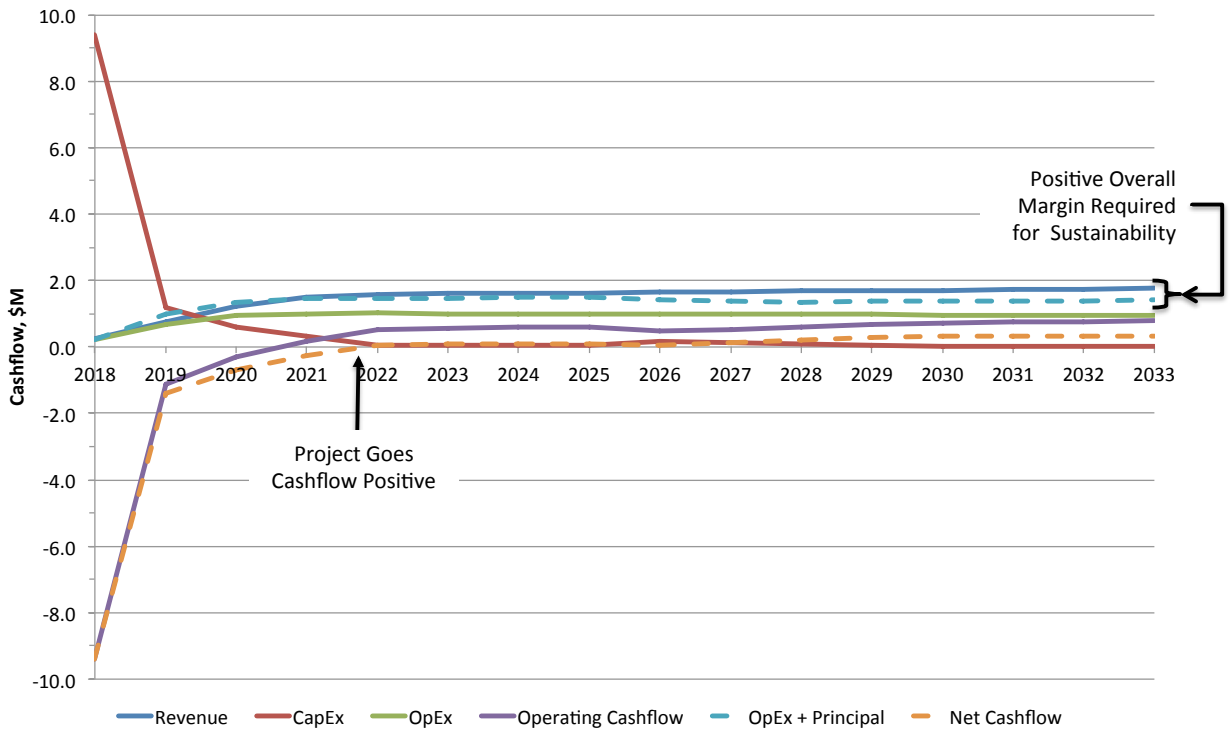


Figure 181 – Non-discounted cashflow projections for High Prairie.

The operating margin is positive in year 4 and, with debt service payments, the operation goes cashflow positive in year 5. While technically these numbers work, operationally, the risk rather high due to the small margins together with the possibility of unexpected issues. Even with all the communities involved, the aggregate client base available in the area is small. As operational efficiency is a scale game, these initial results are typical for communities with populations less than around five thousand people.

Options to improve margins sufficiently that the communities might elect to pursue a deployment are outlined in Sub-section 6.5.10.

13 Conclusions

Whereas wealth creation in the industrial era required significant physical resources, access to raw materials, manpower, and efficient transportation, wealth creation in knowledge-based economies is largely independent of place, local resources, and physical assets. In contrast, wealth now arises from human ingenuity, intellectual property, and novel business models. With growth and development timeframes in the new economy largely unconstrained by the building of physical infrastructure and the movement of goods and services, knowledge-based businesses often grow exponentially. As a foundational cornerstone of these emerging systems of wealth creation, access to information and communications technology has become critical to sustainable economic development in virtually every community and society on the planet.

To accommodate both present and future economic development needs, facilitate full citizen inclusion, and help eliminate any digital divides within the REDI region, regionally- or municipally-driven, utility-based, fibre-to-the-premise deployments capable of enabling symmetric access up to and beyond 1 Gb/s to all are recommended. The hybrid fibre wireless infrastructure suggested will cost-effectively scale to meet all future bandwidth requirements, minimize cost to all potential clients, and enable the region to maintain control of critical civic infrastructure.

The financial sustainability of stand-alone urban utility fibre operations is largely a function of size and the options a community decides to go with. In general, centres with populations of 4-5 thousand or greater can do what they wish. Smaller communities are typically more constrained and will require access to grant funding or other communities to partner with to make things work.

Figure 182 provides a view of the rural and urban populations and densities for each MD and county in the northern Alberta study region.

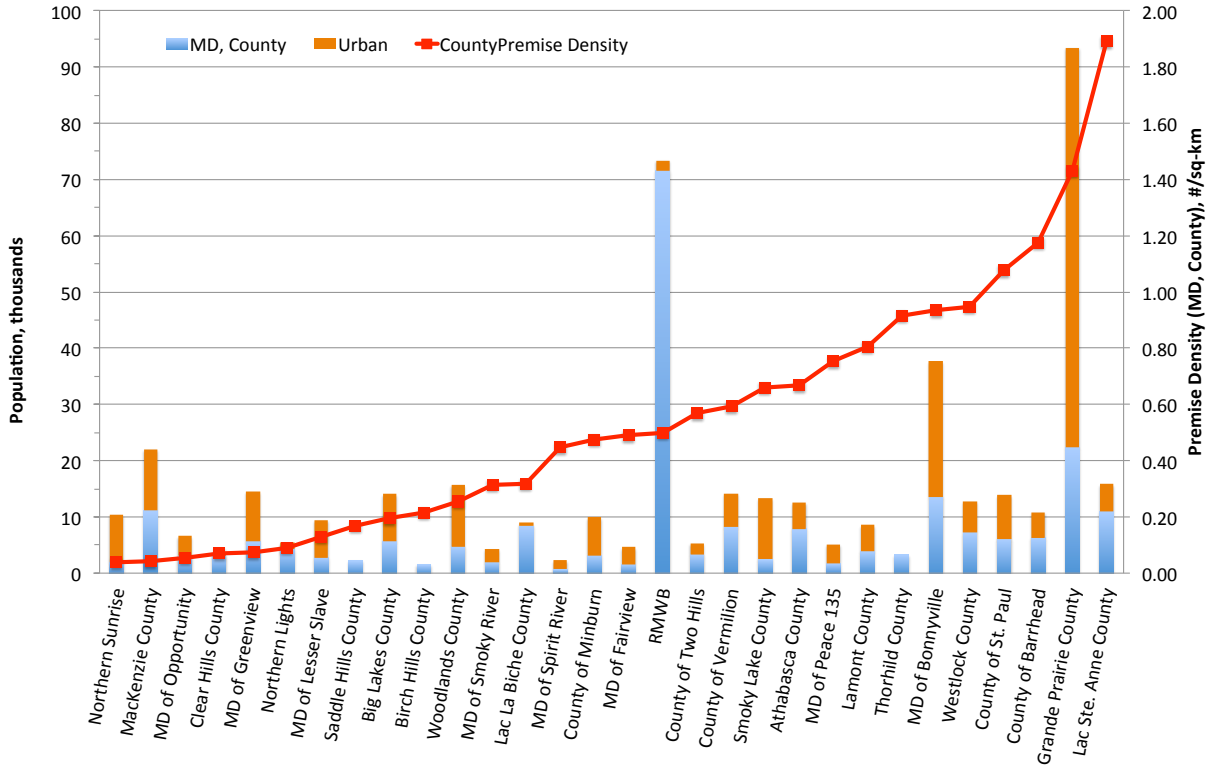


Figure 182 – Population and premise densities in northern Alberta.

The blue bars show the population of each MD or county and the orange bars, the aggregate population in the urban areas (cities, towns, and villages). Red squares show the rural premise density within each MD and county. In general, the larger the rural population and the lower the density, the more expensive a fibre deployment will be and the more difficult it will be to produce a financially sustainable operation. Should larger population centres (orange) be present in the area and partner with the MD or county, the increased operational scale will help ensure a sustainable operation for both.

The financials developed for Big Lakes County and the VRRA indicate that regional utility-based fibre networks are possible and would be sustainable in those counties over the longer term. The results bold well for MDs and counties with similar or higher density characteristics, rural populations concentrated in smaller areas of the MD or county, and several urban centres with similar or larger aggregate populations. Without grant funding or aerial deployments, those with both lower densities and fewer population centres will need to rely more on wireless and hybrid fibre/wireless solutions.

Through this work, REDA members (and non-members) are now in a better position to weigh their options and select those that best align with each's vision for the future of their area. Enhancing broadband has the potential to set the stage to dramatically and positively impact the fabric of life throughout the region by helping to enable exceptional network services; learn-in-place, work-in-place, and age-in-place opportunities for all generations; innovation and diversification in every economic sector; and positioning the region's brand as dynamic, progressive and relevant to the future.

14 Next Steps

This document provides a starting place for communities, sub-regions, and regions across northern Alberta looking to enhance the availability and quality of broadband services in their areas. A range of options, from staying with the status quo, to negotiating with private enterprise, to establishing a fibre utility are presented and discussed. For the latter options, illustrative financials are presented.

While regional and municipal options do involve more responsibilities and risks than simply transferring control to private enterprise, they come with significant advantages. As well, to manage the level of their involvement, close to turn-key options do exist and can be easily incorporated into regional, sub-regional, and community deployment programs – once the community has decided upon the business and governance structure, operational arrangements, and financing.

Some areas, such as Big Lakes County and the Vermilion River Regional Alliance have already chosen a direction and are evaluating their direction further. The initial next step for those communities not there yet, is to work with key stakeholders and determine if something beyond the status quo is required and, if so, which of the many options available to enhance broadband infrastructure, is most appropriate. Once consensus on a direction has been reached, the direction will need to be verified based on negotiation, feasibility studies, or businesses case development as appropriate.

Whether or not cities, towns, villages, First Nation communities, Métis settlements, counties and MDs elect to move (or, for those that already are, continue moving) forward with broadband now or not, in order to position for future broadband planning and expansion, the following interim straightforward and inexpensive approaches to enabling significant future cost-savings should be considered:

Municipal Planning:

- Work with your community, sub-region, or REDA to leverage planning/policy and financial resources;
- Develop a Broadband Services Strategic plan specific to your community;
- Embed fibre network requirements in internal IT planning processes; and
- Accelerate currently planned IT infrastructure deployment.

Leverage Planned Civil Works:

- Develop a policy for including installation of fibre conduit as part of applicable and appropriate town and county infrastructure projects, such as road (re)construction and water / wastewater projects.

Position for the future:

- Require that the inclusion of fibre conduit be a mandatory requirement in all applications for new residential and businesses development permits; and
- Adopt an inside wiring standard with Cat-5 wiring as the minimum standard.
- Whereas wealth creation in the industrial era required significant physical resources, access to raw materials, manpower, and efficient transportation, wealth creation in knowledge-based economies is largely independent of place, local resources, and physical assets. In contrast, wealth now arises from human ingenuity, intellectual property, and novel business models. With growth and development timeframes in the new economy largely unconstrained by the building of physical infrastructure and the movement of goods and services, knowledge-based businesses often grow exponentially. As a foundational cornerstone of these emerging systems of wealth creation, access to information and communications technology has become critical to sustainable economic development in virtually every community and society on the planet.
- Through this work, REDA members (and non-members) are now in a better position to weigh their options and select those that best align with each's vision for the future of their area. Enhancing broadband has the potential to set the stage to dramatically and positively impact the fabric of life throughout the region by helping to enable exceptional network services; learn-in-place, work-in-place, and age-in-place opportunities for all generations; innovation and diversification in every economic sector; and positioning the region's brand as dynamic, progressive and relevant to the future.
- As shown, the financial sustainability of stand-alone urban utility fibre operations is largely a function of size and the options a community decides to go with. In general, centres with populations of 4-5 thousand or greater can do what they wish. Smaller communities are typically more constrained and will require access to grant funding or other communities to partner with to make things work.
- With very small and uneven densities, generalizations are more difficult when evaluating MDs and counties. In general, the sustainability of MD or county-based, fibre-utility operations is a function of rural and municipal population and density and their variation across the study region. Scale, as in partnering with neighbouring communities helps.
- To accommodate both present and future economic development needs, facilitate full citizen inclusion, and help eliminate any digital divides within the NADC region, regional- or municipal-driven, utility-based, fibre-to-the-premise deployments capable of enabling symmetric access up to and beyond 1 Gb/s to all is recommended. The hybrid fibre wireless infrastructure suggested will cost-effectively scale to meet all future bandwidth requirements, minimize cost to all potential clients, and enable the region to maintain control of critical civic infrastructure.

15 Acronyms

AAMDC	Alberta Association of Municipal Districts & Counties
ABF	air blown fibre
ACE	Alberta Central East
ACFA	Alberta Capital Finance Corporation
admin	administration
AESO	Alberta Electric System Operator
Alberta HUB	Northeast Alberta Information HUB Ltd.
AlbertaSW	Alberta SouthWest Regional Alliance
AMWWP	Alberta Municipal Water/Wastewater Partnership
APC	Alberta Community Partnership
Arrow	Arrow Technology Group
AUMA	Alberta Urban Municipalities Association
AWS	Amazon Web Services
Axia	AxiaConnect
BAN	base area network
Bell	Bell Canada
B-Net	Bruderheim network entity or Barrhead network entity
Big-Net	Big Lakes network entity
BRAED	Battle River Alliance for Economic Development
CAD$	Canadian dollars
CAEP	Central Alberta Economic Partnership
CAGR	compounded annual growth rate
CARES	Community and Regional Economic Support (program)
CCI	Corridor Communications Inc.
CIRA	Canadian Internet Registration Authority
CRP	Calgary Regional Partnership
CRTC	Canadian Radio-television and Telecommunications Commission
CTI	Connect to Innovate
CWWF	Clean Water and Wastewater Fund
DIY	do it yourself
DOCSIS	Data Over Coaxial Cable Interface Specification
DSL	digital subscriber line
DWDM	Dense Wavelength Division Multiplexing
EAN	extended area network
ED	emergency department
EDT	(Alberta) Economic Development and Trade
EDU	education
EMR	electronic medical record
EQAO	education quality and accountability office

FCM	Federation of Canadian Municipalities
FDH	fibre distribution hub
FN	First Nation
FTTP	fibre to the premise
GB	giga (10^9) bits
Gb/s	giga (10^9) – bits per second
Gb/s	giga (10^9) – bits per second
GDP	gross domestic product
GLHLM	GoA, Learning, Health, Library, and Municipality
GoA	Government of Alberta
GPON	gigabit passive optical network
GPS	global positioning system
GROWTH Alberta	Grizzly Regional Economic Alliance Society
HDD	horizontal directional drilling
HP-Net	High Prairie network entity
ICMP	Inter-Municipal Collaborative Development Program
ICT	information and communications technology
ID 24	Improvement District No. 24
Infoway	Canada Health Infoway
IoT	internet of things
IRR	internal rate of return
ISED	Innovation, Science, and Economic Development (formerly Industry Canada)
ISP	internet service provider
IT	information technology
ITU	International Telecommunication Union
k	kilo (10^3) – thousand
K-12	kindergarten through 12th grade
kV	kilo-volt
L-Net	Lac La Biche network entity
LSLEA	Lesser Slave Lake Economic Alliance
LTE	long-term evolution
M	mega, million (10^6)
M2M	machine-to-machine
MARA	Mackenzie Applied Research Association
Mb/s	mega (10^6) - bits per second
Mac-Net	Mackenzie County network entity
MD	municipal district
MGA	Municipal Government Act
MGI	McKinsey Global Institute
MH	Medicine Hat

MHz	megahertz
mktng	marketing
MSI	Municipal Sustainability Initiative
na	not available
NADC	Northern Alberta Development Council
NAICS	North American Industry Classification System
NAIT	Northern Alberta Institute of Technology
NAP	network access point
NOC	Network Operations Centre
NorthwesTel	NorthwesTel Inc.
NPV	net present value
NTCA	National Telephone Co-operatives Association
o-e	opto-electronics
OICRD	Olds Institute for Community & Regional Development
ONT	optical network unit
ops	operations
OSB	oriented strand board
OSP	outside plant
PA	precision agriculture
PEP	Palliser Economic Partnership
p&i	principal and interest
PMP	point-to-multipoint
POP	point-of-presence
PREDA	Peace River Economic Development Alliance
PRiS	Peace River Internet Service Society
PTP	point-to-point
R2B2	Rural and Remote Broadband
REA	Rural Electrification Association
REDA	Regional Economic Development Alliance
REDI	Regional Economic Development Initiative for Northwest Alberta
RFP	request for proposal
RM	regional municipality
RMWB	Regional Municipality of Wood Buffalo
Rogers	Rogers Communications
RoI	return on investment
RoW	right of way
RPM	remote patient monitoring
Shaw	Shaw Communications
SLA	service level agreement
SMACi	social, mobile, analytics, cloud, IoT

S-Net	Swan Hills network entity
SR-Net	Smoky River network entity
SouthGrow	South Grow Regional Initiative
srvc	service
StatsCan	Statistics Canada
SU	Singularity University
SV	summer village
SWOT	strengths, weaknesses, opportunities, and threats
TAt-Net	Town of Athabasca network entity
Taylor Warwick	Taylor Warwick Consulting Limited
TECH/BW	technology/bandwidth
TELUS	TELUS Corporation
TSAG	First Nations Technical Services Advisory Group
US	United States (of America)
UTN	Utility Communications Network
vLE	virtual learning environment
V-Net	VRRA network entity
W4L	Water for Life
WILD	West Inter-Lake District Regional Water Services Commission
WISP	wireless internet service provider
W-Net	Whitecourt network entity
XplorNet	XplorNet Communications
yr	year

16 Appendices

16.1 Use of Technology in Farming Operations

Country/ Province/ County/ MD / RM	Automated Animal Feeding	Automated Environmental Controls for Animal Housing	Automated Steering (auto-steer)	Computers/ Laptops for Farm Management	GIS Mapping (e.g., soil mapping)	GPS Tech -nology	Greenhouse Automation	Other Tech -nologies	Robotic Milking	Smartphones/ Tablets for Farm Management
Canada	9,405	8,695	39,708	108,655	15,801	58,166	1,579	1,185	1,063	83,071
Alberta	669	680	10,462	23,725	2,589	13,684	143	164	62	19,093
Athabasca	9	8	101	334	25	143	-	1	2	247
Barrhead	17	23	183	359	40	242	3	1	1	276
Big Lakes	1	-	52	135	16	63	-	1	-	113
Birch Hills	2	1	101	120	19	111	-	-	-	106
Bonnyville	4	1	83	290	17	133	2	2	-	221
Clear Hills	1	-	86	171	13	124	-	-	-	139
Fairview	3	4	79	114	24	96	1	-	-	104
Grande Prairie	3	6	255	612	40	308	1	4	-	488
Greenview	8	3	74	268	15	116	-	1	-	208
Lac La Biche	-	-	31	105	8	56	-	-	-	86
Lac Ste. Anne	5	1	61	393	14	117	5	5	-	292
Lamont	4	4	181	380	36	231	1	3	-	286
Lesser Slave Rive	-	-	9	54	2	20	-	-	-	46
Mackenzie	1	1	196	185	14	236	1	2	-	179
Minburn	3	4	246	349	57	277	1	2	-	304
Northern Lights	-	1	84	199	18	119	1	-	-	154
Northern Sunrise	2	3	60	88	15	67	-	1	-	74
Opportunity	-	-	-	-	-	-	-	-	-	-
Peace	-	1	40	81	4	59	-	-	-	59
Saddle Hills	-	-	87	207	13	111	-	-	-	159
Smoky Lake	1	3	94	206	22	130	1	1	-	179
Smoky River	3	3	201	216	38	218	-	7	-	190
Spirit River	-	1	45	60	9	56	-	-	-	56
St. Paul	5	3	120	336	19	176	1	1	-	260
Thorhild	5	5	68	204	13	97	1	2	-	159
Two Hills	7	9	149	250	35	188	-	4	-	218
Vermilion River	11	8	315	624	77	416	-	2	-	549
Westlock	14	15	239	437	62	306	1	6	3	353
Wood Buffalo	-	-	-	1	-	-	1	-	-	1
Woodlands	1	2	17	110	4	29	-	-	-	80
Study Area Total	**110**	**110**	**3,257**	**6,888**	**669**	**4,245**	**21**	**46**	**6**	**5,586**

Source: Statistic Canada, Census of Agriculture, farms reporting having technologies used on the operation in the year prior to the census (Table 004-0243).

16.2 Business Model Options

Dark Fibre	Conduit	***E.g.,:*** Montreal ***Open access*** can be provided via conduit sharing or subducting, but is limited by the size of the existing conduit.
		Pro's: Simple operationally, can be handled by traditional utility departments. Takes 50-60% of the deployment expense off the table for service providers if well designed. ***Con's:*** Typically only includes feeder and some distribution routes; Limited breakout points; May restrict fibre architecture
	Fibre	***E.g.,:*** Stokab in Stockholm, Qnet in Coquitlam, OICRD in Olds, Calgary ***Open access*** is typically provided via home-run architecture and by provisioning multiple fibres per premise. If fibre counts are limited, a community may opt for first-come, first-served arrangements.
		Pro's: Simple operationally, but considerably more helpful than a conduit-only play. Takes 50-75% of the deployment expense off the table for service providers. Reduces disruption due to civic construction. Enables efficient conduit/fibre design and can be optimized for connectivity. Over-provisioning is required to ensure sufficient fibre and space for multiple sets of network equipment. ***Con's:*** Potential service providers must also deploy network equipment to light the fibres they wish to lease prior to providing services. In large metropolitan areas, this works, but in smaller communities, it will limit the number of service providers available to you. O-Net, for instance, is not likely to play, and if one does come in, it's likely that no-one else will, due to the limited market – giving them a defacto monopoly.

Lit Fibre		***E.g.,:*** *SuperNet* in Alberta (backbone only). Common in Europe and would work well here. ***Open access*** can be provided via an independent network operator and a well-managed routing centre.
		Pro's: Facilitates unencumbered services-based competition amongst pure-play service providers and thus opens up services innovation to all players. ***Con's:*** Goes against long standing (if not antiquated) federal policy of facilities-based competition. A services-based eco-system has not yet developed in Canada and current incumbents will boycott your network.
Integrated		***E.g.,:*** Bell, Rogers, Shaw, TELUS; Traditional business model. All incumbents.
		Pro's: Good for single-purpose networks and universal service.

		Con's: Inhibits competition and innovation is only with permission from the network operators. Results in defacto monopoly control of critical civic infrastructure. Interests of the incumbent shareholders do not align with the needs of the communities they serve.

16.3 Broadband Service Availability

16.3.1 Background

To minimize provider costs, wireless services in rural areas are typically provided using point-to-multipoint (PMP) equipment. In this configuration, a *'host'* tower transmits and receives signals to a specified geographic area. Each client has dedicated reception equipment that homes on the host tower. All users in the area share the host signal.

Higher-end business services may use dedicated point-to-point (PTP) systems that are typically engineered to deliver higher quality, higher bandwidth services. Pricing is installation specific and depends on the service parameters and equipment selected.

16.3.2 Athabasca and Wood Buffalo Regions

16.3.2.1 Town of Athabasca

	Wireline Provider			Fixed Point-to-Multipoint Wireless					
	TELUS (copper)			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Athabasca									
Residential							4G LTE Fixed Wireless		
Option 1	63.00	up to 6	up to 1	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	73.00	up to 25	up to 5	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G LTE Fixed Wireless		
Option 1	60.00	up to 15	up to 1	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	85.00	up to 25	up to 5	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3				59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

16.3.2.2 Village of Boyle

	Wireline Provider			Fixed Point-to-Multipoint Wireless					
	TELUS (copper)			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Boyle									
Residential							4G LTE Fixed Wireless		
Option 1	63.00	up to 6	up to 1	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3				59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G LTE Fixed Wireless		
Option 1				39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2				49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3				59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

16.3.2.3 Athabasca County

	Fixed Point-to-Multipoint Wireless					
	MCSNet (licensed/unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Summer Villages - Bondiss, Island Lake, Island Lake South, Mewatha, South Baptiste, Sunset Beach, West Baptiste, Whispering Hills						
Residential				4G LTE Fixed Wireless		
Option 1	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4	79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			
Business				4G LTE Fixed Wireless		
Option 1	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3	59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4	79.95	up to 12	up to 1			
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless					
	MCSNet (licensed/unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Hamlets - Atmore, Breynat, Wondering River						
Residential				4G Satellite		
Option 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4	79.95	up to 12	up to 1			
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			
Business				4G Satellite		
Option 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4	79.95	up to 12	up to 1			
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			

CCL Networks offers Commercial services in Mariana Lake and Wandering River (Highway 63)

	Fixed Point-to-Multipoint Wireless					
	MCSNet (licensed/unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Hamlets - Caslan, Colinton, Donatville, Ellscott, Grassland, Meanook						
Residential				4G LTE Fixed Wireless		
Option 1	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4	79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			
Business				4G LTE Fixed Wireless		
Option 1	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3	59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4	79.95	up to 12	up to 1			
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			
Hamlets - Perryvale, Rochester						
Residential				Fixed Wireless Expedience		
Option 1	39.95	up to 1.7	up to 0.5	51.99	up to 1.5	up to 0.3
Option 2	49.95	up to 3.2	up to 0.8	71.99	up to 3	up to 0.5
Option 3	59.95	up to 6	up to 1	91.99	up to 5	up to 0.5
Option 4	79.95	up to 12	up to 1			
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			
Business				Fixed Wireless Expedience		
Option 1	39.95	up to 1.7	up to 0.5	104.99	up to 3	up to 0.8
Option 2	49.95	up to 3.2	up to 0.8	149.99	up to 5	up to 1
Option 3	59.95	up to 6	up to 1			
Option 4	79.95	up to 12	up to 1			
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			

16.3.2.4 Regional Municipality of Wood Buffalo – Urban Service Area

	Wireline Providers						Fixed Point-to-Multipoint Wireless								
	TELUS (copper & fibre)			Shaw (coaxial cable)			Bell			CCL Networks			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Urban Service Area															
Residential													4G Satellite		
Option 1	63.00	up to 6	up to 1	55.00	up to 5	up to 0.5	65.00	up to 5	up to 1	49.95	up to 3.5	up to 1	69.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	66.00	up to 15	up to 0.5				59.95	up to 6	up to 1.5	79.99	up to 5	up to 1
Option 3	73.00	up to 25	up to 5	75.00	up to 30	up to 5				79.95	up to 12	up to 2	89.99	up to 5	up to 1
Option 4	80.00	up to 50	up to 10	100.00	up to 150	up to 15				99.95	up to 18	up to 3			
Option 5	85.00	up to 150	up to 150							199.95	up to 18	up to 3			
Business													4G Satellite		
Option 1	60.00	up to 15	up to 1	51.95	up to 5	up to 0.5				189.00	up to 20	up to 4	69.99	up to 5	up to 1
Option 2	85.00	up to 25	up to 5	60.95	up to 20	up to 1.5							79.99	up to 5	up to 1
Option 3	100.00	up to 50	up to 10	78.95	up to 30	up to 5							89.99	up to 5	up to 1
Option 4	125.00	up to 100	up to 20	102.95	up to 60	up to 6									
Option 5	150.00	up to 150	up to 150	119.95	up to 150	up to 15									

16.3.2.5 Regional Municipality of Wood Buffalo – Rural Communities

	Fixed Point-to-Multipoint Wireless					
	Arrow (unlicensed)			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Fort Chipewyan						
Residential				4G Satellite		
Option 1	65.00	up to 5	up to 1.5	69.99	up to 5	up to 1
Option 2				79.99	up to 5	up to 1
Option 3				89.99	up to 5	up to 1
Option 4						
Option 5						
Business				4G Satellite		
Option 1	250.00	up to 1.5	up to 1	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5	79.99	up to 5	up to 1
Option 3				89.99	up to 5	up to 1
Option 4						
Option 5						

	Wireline Provider						Fixed Point-to-Multipoint Wireless					
	TELUS (copper)			Shaw (coaxial cable)			w (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	ndwidth - Mb/s		Cost	ndwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Gregoire Lake Estates												
Residential										4G Satellite		
Option 1	63.00	up to 6	up to 1	55.00	up to 5	up to 0.5	65.00	up to 5	up to 1.5	69.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	66.00	up to 15	up to 0.5				79.99	up to 5	up to 1
Option 3	73.00	up to 25	up to 5	75.00	up to 30	up to 5				89.99	up to 5	up to 1
Option 4	80.00	up to 50	up to 10	100.00	up to 150	up to 15						
Option 5												
Business										4G Satellite		
Option 1				51.95	up to 5	up to 0.5	250.00	up to 1.5	up to 1	69.99	up to 5	up to 1
Option 2				60.95	up to 20	up to 1.5	500.00	up to 3	up to 1.5	79.99	up to 5	up to 1
Option 3				78.95	up to 30	up to 5				89.99	up to 5	up to 1
Option 4				102.95	up to 60	up to 6						
Option 5				119.95	up to 150	up to 15						

	Fixed Point-to-Multipoint Wireless					
	Arrow (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Janvier South						
Residential				4G Satellite		
Option 1	65.00	up to 5	up to 1.5	69.99	up to 5	up to 1
Option 2				79.99	up to 5	up to 1
Option 3				89.99	up to 5	up to 1
Option 4						
Option 5						
Business				4G Satellite		
Option 1	250.00	up to 1.5	up to 1	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5	79.99	up to 5	up to 1
Option 3				89.99	up to 5	up to 1
Option 4						
Option 5						

CCL Networks offers Commercial services

	Wireline Providers						Fixed Point-to-Multipoint Wireless					
	TELUS (copper)			Shaw (coaxial cable)			Bell			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Saprae Creek												
Residential										4G Satellite		
Option 1	63.00	up to 6	up to 1	55.00	up to 5	up to 0.5	65.00	up to 5	up to 1	69.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	66.00	up to 15	up to 0.5				79.99	up to 5	up to 1
Option 3	73.00	up to 25	up to 5	75.00	up to 30	up to 5				89.99	up to 5	up to 1
Option 4	80.00	up to 50	up to 10	100.00	up to 150	up to 15						
Option 5												
Business										4G Satellite		
Option 1	60.00	up to 15	up to 1							69.99	up to 5	up to 1
Option 2	85.00	up to 25	up to 5							79.99	up to 5	up to 1
Option 3										89.99	up to 5	up to 1
Option 4												
Option 5												

	Wireline Provider			Fixed Point-to-Multipoint Wireless					
	TELUS (copper)			Arrow (unlicensed)			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	ndwidth - Mb/s Down	Up
Anzac									
Residential							4G Satellite		
Option 1	63.00	up to 6	up to 1	65.00	up to 5	up to 1.5	69.99	up to 5	up to 1
Option 2							79.99	up to 5	up to 1
Option 3							89.99	up to 5	up to 1
Option 4									
Option 5									
Business							4G Satellite		
Option 1	60.00	up to 15	up to 1	250.00	up to 1.5	up to 1	69.99	up to 5	up to 1
Option 2	85.00	up to 25	up to 5	500.00	up to 3	up to 1.5	79.99	up to 5	up to 1
Option 3							89.99	up to 5	up to 1
Option 4									
Option 5									

	Wireline Provider			Fixed Point-to-Multipoint Wireless					
	TELUS (copper)			Arrow (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Conklin									
Residential							4G Satellite		
Option 1	63.00	up to 6	up to 1	65.00	up to 5	up to 1.5	69.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1				79.99	up to 5	up to 1
Option 3	73.00	up to 25	up to 5				89.99	up to 5	up to 1
Option 4	80.00	up to 50	up to 10						
Option 5									
Business							4G Satellite		
Option 1				250.00	up to 1.5	up to 1	69.99	up to 5	up to 1
Option 2				500.00	up to 3	up to 1.5	79.99	up to 5	up to 1
Option 3							89.99	up to 5	up to 1
Option 4									
Option 5									

	Fixed Point-to-Multipoint Wirel		
	XplorNet (licensed)		
	Cost	Bandwidth - Mb/s	
	$/mo	Down	Up
Fort MacKay			
Residential	4G Satellite		
Option 1	69.99	up to 5	up to 1
Option 2	79.99	up to 5	up to 1
Option 3	89.99	up to 5	up to 1
Option 4			
Option 5			
Business	4G Satellite		
Option 1	69.99	up to 5	up to 1
Option 2	79.99	up to 5	up to 1
Option 3	89.99	up to 5	up to 1
Option 4			
Option 5			

CCL Networks offers Commercial services

16.3.2.6 First Nations (Athabasca and Wood Buffalo Regions)

	Fixed Point-to-Multipoint Wireless					
	Arrow (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Athabasca Chipewyan						
Residential				4G Satellite		
Option 1	65.00	up to 5	up to 1.5	69.99	up to 5	up to 1
Option 2				79.99	up to 5	up to 1
Option 3				89.99	up to 5	up to 1
Option 4						
Option 5						
Business				4G Satellite		
Option 1	250.00	up to 1.5	up to 1	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5	79.99	up to 5	up to 1
Option 3				89.99	up to 5	up to 1
Option 4						
Option 5						

	Fixed Point-to-Multipoint Wireless					
	Arrow (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Chipewyan Prairie						
Residential				4G Satellite		
Option 1	65.00	up to 5	up to 1.5	69.99	up to 5	up to 1
Option 2				79.99	up to 5	up to 1
Option 3				89.99	up to 5	up to 1
Option 4						
Option 5						
Business				4G Satellite		
Option 1	250.00	up to 1.5	up to 1	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5	79.99	up to 5	up to 1
Option 3				89.99	up to 5	up to 1
Option 4						
Option 5						

	Fixed Point-to-Multipoint Wireless					
	CCL Networks			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Fort McKay						
Residential				4G Satellite		
Option 1				69.99	up to 5	up to 1
Option 2				79.99	up to 5	up to 1
Option 3				89.99	up to 5	up to 1
Option 4						
Option 5						
Business				4G Satellite		
Option 1	189.00	up to 20	up to 4	69.99	up to 5	up to 1
Option 2				79.99	up to 5	up to 1
Option 3				89.99	up to 5	up to 1
Option 4						
Option 5						

	Fixed Point-to-Multipoint Wireless								
	Arrow (unlicensed)			**CCL Networks**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Fort McMurray									
Residential							4G Satellite		
Option 1	65.00	up to 5	up to 1.5	49.95	up to 3.5	up to 1	69.99	up to 5	up to 1
Option 2				59.95	up to 6	up to 1.5	79.99	up to 5	up to 1
Option 3				79.95	up to 12	up to 2	89.99	up to 5	up to 1
Option 4				99.95	up to 18	up to 3			
Option 5				199.95	up to 18	up to 3			
Business							4G Satellite		
Option 1	250.00	up to 1.5	up to 1	189.00	up to 20	up to 4	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5				79.99	up to 5	up to 1
Option 3							89.99	up to 5	up to 1
Option 4									
Option 5									

	Fixed Point-to-Multipoint Wireless					
	Arrow (unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Mikisew Cree						
Residential				4G Satellite		
Option 1	65.00	up to 5	up to 1.5	69.99	up to 5	up to 1
Option 2				79.99	up to 5	up to 1
Option 3				89.99	up to 5	up to 1
Option 4						
Option 5						
Business				4G Satellite		
Option 1	250.00	up to 1.5	up to 1	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5	79.99	up to 5	up to 1
Option 3				89.99	up to 5	up to 1
Option 4						
Option 5						

	Fixed Point-to-Multipoint Wirele		
	XplorNet (licensed)		
	Cost	ndwidth - Mb/s	
	$/mo	Down	Up
Smith's Landing			
Residential	4G Satellite		
Option 1	69.99	up to 5	up to 1
Option 2	79.99	up to 5	up to 1
Option 3	89.99	up to 5	up to 1
Option 4			
Option 5			
Business	4G Satellite		
Option 1	69.99	up to 5	up to 1
Option 2	79.99	up to 5	up to 1
Option 3	89.99	up to 5	up to 1
Option 4			
Option 5			

16.3.3 Northeast Alberta Information HUB (Alberta HUB)

16.3.3.1 City of Cold Lake

	Wireline Providers						Fixed Point-to-Multipoint Wireless								
	TELUS (copper & fibre)			Eastlink (coaxial cable)			CCL Networks			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Cold Lake															
Residential													4G Satellite		
Option 1	63.00	up to 6	up to 1	55.95	up to 5	up to 1	49.95	up to 3.5	up to 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	78.95	up to 30	up to 3	59.95	up to 6	up to 1.5	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	73.00	up to 25	up to 5	88.95	up to 50	up to 5	79.95	up to 12	up to 2	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4	80.00	up to 50	up to 10	98.95	up to 100	up to 10	99.95	up to 18	up to 3	79.95	up to 12	up to 1			
Option 5	85.00	up to 150	up to 150	149.95	up to 150	up to 10	199.95	up to 18	up to 3	99.95	up to 20	up to 2			
Option 6				259.95	up to 940	up to 10				149.95	up to 20	up to 2			
Option 7										199.95	up to 20	up to 2			
Option 8										249.95	up to 20	up to 2			
Business													4G Satellite		
Option 1	60.00	up to 15	up to 1	na	up to 50	up to 5	189.00	up to 20	up to 4	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	85.00	up to 25	up to 5	na	up to 100	up to 10				49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	100.00	up to 50	up to 10	na	up to 200	up to 10				59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4	125.00	up to 100	up to 20							79.95	up to 12	up to 1			
Option 5	150.00	up to 150	up to 150							99.95	up to 20	up to 2			
Option 6										149.95	up to 20	up to 2			
Option 7										199.95	up to 20	up to 2			
Option 8										249.95	up to 20	up to 2			

16.3.3.2 Town of Bonnyville

	Wireline Providers						Fixed Point-to-Multipoint Wireless								
	TELUS (copper & fibre)			Eastlink (coaxial cable)			CCL Networks			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Bonnyville															
Residential													4G Satellite		
Option 1	63.00	up to 6	up to 1	55.95	up to 5	up to 1	49.95	up to 3.5	up to 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	78.95	up to 30	up to 3	59.95	up to 6	up to 1.5	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	73.00	up to 25	up to 5	88.95	up to 50	up to 5	79.95	up to 12	up to 2	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4	80.00	up to 50	up to 10	98.95	up to 100	up to 10	99.95	up to 18	up to 3	79.95	up to 12	up to 1			
Option 5	85.00	up to 150	up to 150	149.95	up to 150	up to 10	199.95	up to 18	up to 3	99.95	up to 20	up to 2			
Option 6				259.95	up to 940	up to 10				149.95	up to 20	up to 2			
Option 7										199.95	up to 20	up to 2			
Option 8										249.95	up to 20	up to 2			
Business													4G Satellite		
Option 1	60.00	up to 15	up to 1	na	up to 50	up to 5	189.00	up to 20	up to 4	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	85.00	up to 25	up to 5	na	up to 100	up to 10				49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	100.00	up to 50	up to 10	na	up to 200	up to 10				59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4	125.00	up to 100	up to 20							79.95	up to 12	up to 1			
Option 5	150.00	up to 150	up to 150							99.95	up to 20	up to 2			
Option 6										149.95	up to 20	up to 2			
Option 7										199.95	up to 20	up to 2			
Option 8										249.95	up to 20	up to 2			

16.3.3.3 Town of Bruderheim

	Wireline Provider			Fixed Point-to-Multipoint Wireless					
	Shaw (coaxial cable)			Alberta Com. (licensed)			CCI (unlicensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Bruderheim									
Residential									
Option 1	55.00	up to 5	up to 0.5	39.95	up to 1.5	up to 0.5	49.99	up to 2	up to 0.75
Option 2	66.00	up to 15	up to 0.5	49.95	up to 2	up to 0.8	74.99	up to 5	up to 1
Option 3	75.00	up to 30	up to 5	54.95	up to 3	up to 1	94.99	up to 10	up to 1
Option 4	95.00	up to 60	up to 6						
Option 5	135.00	up to 150	up to 15						
Option 6									
Business									
Option 1	na	na	na	59.95	up to 2	up to 0.8	200.00	up to 6	up to 2
Option 2				79.95	up to 3	up to 1	249.99	up to 7	up to 3
Option 3				89.95	up to 4	up to 1.2			
Option 4									
Option 5									

	Fixed Point-to-Multipoint Wireless								
	Clearwave			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Bruderheim									
Residential							4G LTE Fixed Wireless		
Option 1	69.95	up to 6	na	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	109.95	up to 6		49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	79.95	up to 12		59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4	119.95	up to 12		79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5	99.95	up to 25		99.95	up to 20	up to 2			
Option 6	139.95	up to 25		149.95	up to 20	up to 2			
Option 7	129.95	up to 50		199.95	up to 20	up to 2			
Option 8	139.95	up to 50		249.95	up to 20	up to 2			
Business							4G LTE Fixed Wireless		
Option 1	79.95	up to 12	na	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	159.95	up to 15		49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3	99.95	up to 25		59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4	229.95	up to 25		79.95	up to 12	up to 1			
Option 5	119.95	up to 50		99.95	up to 20	up to 2			
Option 6	329.95	up to 50		149.95	up to 20	up to 2			
Option 7	429.95	up to 75		199.95	up to 20	up to 2			
Option 8	529.95	up to 100		249.95	up to 20	up to 2			

16.3.3.4 Town of Elk Point

	Wireline Provider						Fixed Point-to-Multipoint Wireless					
	TELUS (copper)			Eastlink (coaxial cable)			MCSNet (licensed/unlicensed)			rNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	ndwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Elk Point												
Residential										4G LTE Fixed Wireless		
Option 1	63.00	up to 6	up to 1	77.00	up to 20	up to 2	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1				49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	73.00	up to 25	up to 5				59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4							79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5							99.95	up to 20	up to 2			
Option 6							149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			
Business										4G LTE Fixed Wireless		
Option 1							39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2							49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3							59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4							79.95	up to 12	up to 1			
Option 5							99.95	up to 20	up to 2			
Option 6							149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			

16.3.3.5 Town of Lamont

	Wireline Providers						Fixed Point-to-Multipoint Wireless								
	TELUS (copper)			Shaw (coaxial cable)			Alberta Com. (licensed)			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Lamont															
Residential													4G LTE Fixed Wireless		
Option 1	63.00	up to 6	up to 1	55.00	up to 5	up to 0.5	39.95	up to 1.5	up to 0.5	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	66.00	up to 15	up to 0.5	49.95	up to 2	up to 0.8	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	73.00	up to 25	up to 5	75.00	up to 30	up to 5	54.95	up to 3	up to 1	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4	80.00	up to 50	up to 10	95.00	up to 60	up to 6				79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5				135.00	up to 150	up to 15				99.95	up to 20	up to 2			
Option 6										149.95	up to 20	up to 2			
Option 7										199.95	up to 20	up to 2			
Option 8										249.95	up to 20	up to 2			
Business													4G LTE Fixed Wireless		
Option 1	60.00	up to 15	up to 1	51.95	up to 5	up to 0.5	59.95	up to 2	up to 0.8	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	85.00	up to 25	up to 5	60.95	up to 20	up to 1.5	79.95	up to 3	up to 1	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3				78.95	up to 30	up to 5	89.95	up to 4	up to 1.2	59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4				102.95	up to 60	up to 6				79.95	up to 12	up to 1			
Option 5										99.95	up to 20	up to 2			
Option 6										149.95	up to 20	up to 2			
Option 7										199.95	up to 20	up to 2			
Option 8										249.95	up to 20	up to 2			

16.3.3.6 Town of Mundare

	Wireline Provider			Fixed Point-to-Multipoint Wireless											
	TELUS (copper)			CCI (unlicensed)			DigitalWeb (lincensed)			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Mundare															
Residential													4G LTE Fixed Wireless		
Option 1	63.00	up to 6	up to 1	49.99	up to 2	up to 0.75	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	74.99	up to 5	up to 1	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3				94.99	up to 10	up to 1	55.00	up to 6	up to 1	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4							55.00	up to 10	up to 2	79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5							60.00	up to 15	up to 2	99.95	up to 20	up to 2			
Option 6							65.00	up to 25	up to 5	149.95	up to 20	up to 2			
Option 7							70.00	up to 50	up to 5	199.95	up to 20	up to 2			
Option 8										249.95	up to 20	up to 2			
Business													4G LTE Fixed Wireless		
Option 1				200.00	up to 6	up to 2	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2				249.99	up to 7	up to 3	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3							55.00	up to 6	up to 1	59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4							55.00	up to 10	up to 2	79.95	up to 12	up to 1			
Option 5							60.00	up to 15	up to 2	99.95	up to 20	up to 2			
Option 6							65.00	up to 25	up to 5	149.95	up to 20	up to 2			
Option 7							70.00	up to 50	up to 5	199.95	up to 20	up to 2			
Option 8										249.95	up to 20	up to 2			

16.3.3.7 Town of Smoky Lake

	Wireline Provider			Fixed Point-to-Multipoint Wireless								
	TELUS (copper)			CCI (unlicensed)			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Smoky Lake												
Residential										4G Satellite		
Option 1	63.00	up to 6	up to 1	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3				94.99	up to 10	up to 1	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4							79.95	up to 12	up to 1			
Option 5							99.95	up to 20	up to 2			
Option 6							149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			
Business										4G Satellite		
Option 1	60.00	up to 15	up to 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2				249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3							59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4							79.95	up to 12	up to 1			
Option 5							99.95	up to 20	up to 2			
Option 6							149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 7							249.95	up to 20	up to 2			

16.3.3.8 Town of St. Paul

	Wireline Providers						Fixed Point-to-Multipoint Wireless					
	TELUS (copper & fibre)			Eastlink (coaxial cable)			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
St. Paul												
Residential										4G Satellite		
Option 1	63.00	up to 6	up to 1	55.95	up to 5	up to 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	78.95	up to 30	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	73.00	up to 25	up to 5	88.95	up to 50	up to 5	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4	80.00	up to 50	up to 10	98.95	up to 100	up to 10	79.95	up to 12	up to 1			
Option 5	85.00	up to 150	up to 150	149.95	up to 150	up to 10	99.95	up to 20	up to 2			
Option 6				259.95	up to 940	up to 10	149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			
Business										4G Satellite		
Option 1	60.00	up to 15	up to 1	na	up to 50	up to 5	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	85.00	up to 25	up to 5	na	up to 100	up to 10	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	100.00	up to 50	up to 10	na	up to 200	up to 10	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4	125.00	up to 100	up to 20				79.95	up to 12	up to 1			
Option 5	150.00	up to 150	up to 150				99.95	up to 20	up to 2			
Option 6							149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			

16.3.3.9 Town of Two Hills

	Wireline Provider					
	TELUS (copper)			Eastlink (coaxial cable)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Two Hills						
Residential						
Option 1	63.00	up to 6	up to 1	77.00	up to 20	up to 2
Option 2						
Option 3						
Option 4						
Option 5						
Business						
Option 1	60.00	up to 6	up to 1			
Option 2						
Option 3						
Option 4						
Option 5						

	Fixed Point-to-Multipoint Wireless											
	CCI (unlicensed)			DigitalWeb (lincensed)			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Two Hills												
Residential										4G Satellite		
Option 1	49.99	up to 2	up to 0.75	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1	55.00	up to 6	up to 1	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				55.00	up to 10	up to 2	79.95	up to 12	up to 1			
Option 5				60.00	up to 15	up to 2	99.95	up to 20	up to 2			
Option 6				65.00	up to 25	up to 5	149.95	up to 20	up to 2			
Option 7				70.00	up to 50	up to 5	199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			
Business										4G Satellite		
Option 1	200.00	up to 6	up to 2	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	249.99	up to 7	up to 3	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3				55.00	up to 6	up to 1	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				55.00	up to 10	up to 2	79.95	up to 12	up to 1			
Option 5				60.00	up to 15	up to 2	99.95	up to 20	up to 2			
Option 6				65.00	up to 25	up to 5	149.95	up to 20	up to 2			
Option 7				70.00	up to 50	up to 5	199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			

16.3.3.10 Town of Vegreville

	Wireline Providers					
	TELUS (copper & fibre)			Shaw (coaxial cable)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Vegreville						
Residential						
Option 1	63.00	up to 6	up to 1	55.00	up to 5	up to 0.5
Option 2	68.00	up to 15	up to 1	66.00	up to 15	up to 0.5
Option 3	73.00	up to 25	up to 5	75.00	up to 30	up to 5
Option 4	80.00	up to 50	up to 10	95.00	up to 60	up to 6
Option 5	85.00	up to 150	up to 150	135.00	up to 150	up to 15
Business						
Option 1	60.00	up to 15	up to 1	55.00	up to 5	up to 0.5
Option 2	85.00	up to 25	up to 5	66.00	up to 15	up to 0.5
Option 3	100.00	up to 50	up to 10	75.00	up to 30	up to 5
Option 4	125.00	up to 100	up to 20	95.00	up to 60	up to 6
Option 5	150.00	up to 150	up to 150	135.00	up to 150	up to 15

	Fixed Point-to-Multipoint Wireless														
	CCI (unlicensed)			DigitalWeb (lincensed)			MCSNet (licensed/unlicensed)			Wild Rose (unlicensed)			XplorNet (licensed)		
	Cost	ndwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Vegreville															
Residential													4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	49.95	up to 1.5	up to 0.5	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	69.95	up to 1.5	up to 0.5	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	55.00	up to 6	up to 1	59.95	up to 6	up to 1				79.99	up to 25	up to 1
Option 4				55.00	up to 10	up to 2	79.95	up to 12	up to 1				109.99	up to 25	up to 1
Option 5				60.00	up to 15	up to 2	99.95	up to 20	up to 2						
Option 6				65.00	up to 25	up to 5	149.95	up to 20	up to 2						
Option 7				70.00	up to 50	up to 5	199.95	up to 20	up to 2						
Option 8							249.95	up to 20	up to 2						
Business													4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	49.95	up to 1.5	up to 0.5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	69.95	up to 1.5	up to 0.5	79.99	up to 25	up to 1
Option 3				55.00	up to 6	up to 1	59.95	up to 6	up to 1				109.99	up to 25	up to 1
Option 4				55.00	up to 10	up to 2	79.95	up to 12	up to 1						
Option 5				60.00	up to 15	up to 2	99.95	up to 20	up to 2						
Option 6				65.00	up to 25	up to 5	149.95	up to 20	up to 2						
Option 7				70.00	up to 50	up to 5	199.95	up to 20	up to 2						
Option 8							249.95	up to 20	up to 2						

16.3.3.11 Town of Vermilion

	Wireline Providers						Fixed Point-to-Multipoint Wireless					
	TELUS (copper)			Shaw (coaxial cable)			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Vermilion												
Residential										4G Satellite		
Option 1	63.00	up to 6	up to 1	55.00	up to 5	up to 0.5	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	66.00	up to 15	up to 0.5	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3				75.00	up to 30	up to 5	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				95.00	up to 60	up to 6	79.95	up to 12	up to 1			
Option 5				135.00	up to 150	up to 15	99.95	up to 20	up to 2			
Option 6							149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			
Business										4G Satellite		
Option 1	60.00	up to 15	up to 1	55.00	up to 5	up to 0.5	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2				66.00	up to 15	up to 0.5	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3				75.00	up to 30	up to 5	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				95.00	up to 60	up to 6	79.95	up to 12	up to 1			
Option 5				135.00	up to 150	up to 15	99.95	up to 20	up to 2			
Option 6							149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			

16.3.3.12 Village of Andrew

	Fixed Point-to-Multipoint Wireless											
	CCI (unlicensed)			**DigitalWeb (lincensed)**			**MCSNet (licensed/unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Andrew												
Residential										4G Wireless		
Option 1	49.99	up to 2	up to 0.75	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	55.00	up to 6	up to 1	59.95	up to 6	up to 1	79.99	up to 10	up to 1
Option 4				55.00	up to 10	up to 2	79.95	up to 12	up to 1	109.99	up to 10	up to 1
Option 5				60.00	up to 15	up to 2	99.95	up to 20	up to 2			
Option 6				65.00	up to 25	up to 5	149.95	up to 20	up to 2			
Option 7				70.00	up to 50	up to 5	199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			
Business										4G Wireless		
Option 1	200.00	up to 6	up to 2	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	79.99	up to 10	up to 1
Option 3				55.00	up to 6	up to 1	59.95	up to 6	up to 1	109.99	up to 10	up to 1
Option 4				55.00	up to 10	up to 2	79.95	up to 12	up to 1			
Option 5				60.00	up to 15	up to 2	99.95	up to 20	up to 2			
Option 6				65.00	up to 25	up to 5	149.95	up to 20	up to 2			
Option 7				70.00	up to 50	up to 5	199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			

16.3.3.13 Village of Chipman

	Fixed Point-to-Multipoint Wireless								
	MCSNet (licensed/unlicensed)			Alberta Com. (licensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Chipman									
Residential							4G LTE Fixed Wireless		
Option 1	39.95	up to 1.7	up to 0.5	39.95	up to 1.5	up to 0.5	59.99	up to 5	up to 1
Option 2	49.95	up to 3.2	up to 0.8	49.95	up to 2	up to 0.8	69.99	up to 10	up to 1
Option 3	59.95	up to 6	up to 1	54.95	up to 3	up to 1	79.99	up to 25	up to 1
Option 4	79.95	up to 12	up to 1				109.99	up to 25	up to 1
Option 5	99.95	up to 20	up to 2						
Option 6	149.95	up to 20	up to 2						
Option 7	199.95	up to 20	up to 2						
Option 8	249.95	up to 20	up to 2						
Business							4G LTE Fixed Wireless		
Option 1	39.95	up to 1.7	up to 0.5	59.95	up to 2	up to 0.8	69.99	up to 10	up to 1
Option 2	49.95	up to 3.2	up to 0.8	79.95	up to 3	up to 1	79.99	up to 25	up to 1
Option 3	59.95	up to 6	up to 1	89.95	up to 4	up to 1.2	109.99	up to 25	up to 1
Option 4	79.95	up to 12	up to 1						
Option 5	99.95	up to 20	up to 2						
Option 6	149.95	up to 20	up to 2						
Option 7	199.95	up to 20	up to 2						
Option 8	249.95	up to 20	up to 2						

16.3.3.14 Village of Dewberry

	Fixed Point-to-Multipoint Wireless					
	MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Dewberry						
Residential				4G LTE Fixed Wireless		
Option 1	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4	79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			
Business				4G LTE Fixed Wireless		
Option 1	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3	59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4	79.95	up to 12	up to 1			
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			

16.3.3.15 Village of Glendon

	Wireline Provider			Fixed Point-to-Multipoint Wireless					
	CCI Wired (copper)			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Glendon									
Residential							4G LTE Fixed Wireless		
Option 1	69.99	up to 10	up to 1	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	79.99	up to 15	up to 2	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	89.99	up to 25	up to 3	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4	109.99	up to 50	up to 5	79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G LTE Fixed Wireless		
Option 1	149.00	up to 25	up to 7	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	199.00	up to 50	up to 10	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3				59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

16.3.3.16 Village of Innisfree

	Fixed Point-to-Multipoint Wireless														
	CCI (unlicensed)			**DigitalWeb (lincensed)**			**MCSNet (licensed/unlicensed)**			**Wild Rose (unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Innisfree															
Residential													4G Satellite		
Option 1	49.99	up to 2	up to 0.75	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	49.95	up to 1.5	up to 0.5	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	69.95	up to 1.5	up to 0.5	79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1	55.00	up to 6	up to 1	59.95	up to 6	up to 1				89.99	up to 5	up to 1
Option 4				55.00	up to 10	up to 2	79.95	up to 12	up to 1						
Option 5				60.00	up to 15	up to 2	99.95	up to 20	up to 2						
Option 6				65.00	up to 25	up to 5	149.95	up to 20	up to 2						
Option 7				70.00	up to 50	up to 5	199.95	up to 20	up to 2						
Option 8							249.95	up to 20	up to 2						
Business													4G Satellite		
Option 1	200.00	up to 6	up to 2	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	49.95	up to 1.5	up to 0.5	69.99	up to 5	up to 1
Option 2	249.99	up to 7	up to 3	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	69.95	up to 1.5	up to 0.5	79.99	up to 5	up to 1
Option 3				55.00	up to 6	up to 1	59.95	up to 6	up to 1				89.99	up to 5	up to 1
Option 4				55.00	up to 10	up to 2	79.95	up to 12	up to 1						
Option 5				60.00	up to 15	up to 2	99.95	up to 20	up to 2						
Option 6				65.00	up to 25	up to 5	149.95	up to 20	up to 2						
Option 7				70.00	up to 50	up to 5	199.95	up to 20	up to 2						
Option 8							249.95	up to 20	up to 2						

16.3.3.17 Village of Kitscoty

	Fixed Point-to-Multipoint Wireless											
	CCI (unlicensed)			**Bellevista Broadband**			**MCSNet (licensed/unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Kitscoty												
Residential										4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	60.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	70.00	up to 10	up to 2	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1				59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4							79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5							99.95	up to 20	up to 2			
Option 6							149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			
Business										4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	60.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3				49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3							59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4							79.95	up to 12	up to 1			
Option 5							99.95	up to 20	up to 2			
Option 6							149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			

16.3.3.18 Village of Mannville

	Wireline Provider			Fixed Point-to-Multipoint Wireless											
	CCI Wired (copper)			DigitalWeb (lincensed)			MCSNet (licensed/unlicensed)			Wild Rose (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Mannville															
Residential													4G Satellite		
Option 1	69.99	up to 10	up to 1	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	49.95	up to 1.5	up to 0.5	69.99	up to 5	up to 1
Option 2	79.99	up to 15	up to 2	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	69.95	up to 1.5	up to 0.5	79.99	up to 5	up to 1
Option 3	89.99	up to 25	up to 3	55.00	up to 6	up to 1	59.95	up to 6	up to 1				89.99	up to 5	up to 1
Option 4	109.99	up to 50	up to 5	55.00	up to 10	up to 2	79.95	up to 12	up to 1						
Option 5				60.00	up to 15	up to 2	99.95	up to 20	up to 2						
Option 6				65.00	up to 25	up to 5	149.95	up to 20	up to 2						
Option 7				70.00	up to 50	up to 5	199.95	up to 20	up to 2						
Option 8							249.95	up to 20	up to 2						
Business													4G Satellite		
Option 1	149.00	up to 25	up to 7	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	49.95	up to 1.5	up to 0.5	69.99	up to 5	up to 1
Option 2	199.00	up to 50	up to 10	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	69.95	up to 1.5	up to 0.5	79.99	up to 5	up to 1
Option 3				55.00	up to 6	up to 1	59.95	up to 6	up to 1				89.99	up to 5	up to 1
Option 4				55.00	up to 10	up to 2	79.95	up to 12	up to 1						
Option 5				60.00	up to 15	up to 2	99.95	up to 20	up to 2						
Option 6				65.00	up to 25	up to 5	149.95	up to 20	up to 2						
Option 7				70.00	up to 50	up to 5	199.95	up to 20	up to 2						
Option 8							249.95	up to 20	up to 2						

16.3.3.19 Village of Marwayne

	Wireline Provider			Fixed Point-to-Multipoint Wireless											
	CCI Wired (copper)			Bellevista Broadband			CCI (unlicensed)			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Marwayne															
Residential													4G LTE Fixed Wireless		
Option 1	69.99	up to 10	up to 1	60.00	up to 6	up to 2	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	79.99	up to 15	up to 2	70.00	up to 10	up to 2	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	89.99	up to 25	up to 3				94.99	up to 10	up to 1	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4	109.99	up to 50	up to 5							79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5										99.95	up to 20	up to 2			
Option 6										149.95	up to 20	up to 2			
Option 7										199.95	up to 20	up to 2			
Option 8										249.95	up to 20	up to 2			
Business													4G LTE Fixed Wireless		
Option 1	149.00	up to 25	up to 7	60.00	up to 6	up to 2	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	199.00	up to 50	up to 10				249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3										59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4										79.95	up to 12	up to 1			
Option 5										99.95	up to 20	up to 2			
Option 6										149.95	up to 20	up to 2			
Option 7										199.95	up to 20	up to 2			
Option 8										249.95	up to 20	up to 2			

16.3.3.20 Village of Myrnam

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Myrnam									
Residential							4G Satellite		
Option 1	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G Satellite		
Option 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3				59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

16.3.3.21 Village of Paradise Valley

	Fixed Point-to-Multipoint Wireless											
	CCI (unlicensed)			Bellevista Broadband			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Paradise Valley												
Residential										4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	60.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	70.00	up to 10	up to 2	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1				59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4							79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5							99.95	up to 20	up to 2			
Option 6							149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			
Business										4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	60.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3				49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3							59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4							79.95	up to 12	up to 1			
Option 5							99.95	up to 20	up to 2			
Option 6							149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			

16.3.3.22 Village of Vilna

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Vilna									
Residential							4G Satellite		
Option 1	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G Satellite		
Option 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3				59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

16.3.3.23 Village of Waskatenau

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			**MCSNet** (licensed/unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Waskatenau									
Residential							4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3				59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

16.3.3.24 Village of Willingdon

	Fixed Point-to-Multipoint Wireless											
	CCI (unlicensed)			**DigitalWeb (lincensed)**			**MCSNet (licensed/unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Willingdon												
Residential										4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	55.00	up to 6	up to 1	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4				55.00	up to 10	up to 2	79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5				60.00	up to 15	up to 2	99.95	up to 20	up to 2			
Option 6				65.00	up to 25	up to 5	149.95	up to 20	up to 2			
Option 7				70.00	up to 50	up to 5	199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			
Business										4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3				55.00	up to 6	up to 1	59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4				55.00	up to 10	up to 2	79.95	up to 12	up to 1			
Option 5				60.00	up to 15	up to 2	99.95	up to 20	up to 2			
Option 6				65.00	up to 25	up to 5	149.95	up to 20	up to 2			
Option 7				70.00	up to 50	up to 5	199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			

16.3.3.25 Summer Villages of Bonnyville Beach & Pelican Narrows

	Fixed Point-to-Multipoint Wireless								
	CCL Networks			**MCSNet** (licensed/unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Summer Villages of Bonnyville Beach & Pelican Narrow									
Residential							4G Satellite		
Option 1	49.95	up to 3.5	up to 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	59.95	up to 6	up to 1.5	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	79.95	up to 12	up to 2	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4	99.95	up to 18	up to 3	79.95	up to 12	up to 1			
Option 5	199.95	up to 18	up to 3	99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G Satellite		
Option 1	189.00	up to 20	up to 4	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2				49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3				59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

16.3.3.26 Summer Villages of Horseshoe Bay

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Summer Village of Horseshoe Bay									
Residential							4G Satellite		
Option 1	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G Satellite		
Option 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3				59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

16.3.3.27 MD of Bonnyville

	Fixed Point-to-Multipoint Wireless								
	CCL Networks			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Ardmore, Beaver Crossing, Beaverdam, Cherry Grove, Fort Kent									
Residential							4G Satellite		
Option 1	49.95	up to 3.5	up to 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	59.95	up to 6	up to 1.5	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	79.95	up to 12	up to 2	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4	99.95	up to 18	up to 3	79.95	up to 12	up to 1			
Option 5	199.95	up to 18	up to 3	99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G Satellite		
Option 1	189.00	up to 20	up to 4	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2				49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3				59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
La Corey, Therien									
Residential							4G LTE Fixed Wireless		
Option 1	49.95	up to 3.5	up to 1	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	59.95	up to 6	up to 1.5	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	79.95	up to 12	up to 2	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4	99.95	up to 18	up to 3	79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5	199.95	up to 18	up to 3	99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G LTE Fixed Wireless		
Option 1	189.00	up to 20	up to 4	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2				49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3				59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

16.3.3.28 Lac La Biche County

	Fixed Point-to-Multipoint Wireless														
	Arrow (unlicensed)			**CCI (unlicensed)**			**CCL Networks**			**MCSNet** (licensed/unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Beaver Lake, Hylo, Venice															
Residential													Expedience		
Option 1	65.00	up to 5	up to 1.5	49.99	up to 2	up to 0.75	49.95	up to 3.5	up to 1	39.95	up to 1.7	up to 0.5	51.99	up to 1.5	up to 0.25
Option 2				74.99	up to 5	up to 1	59.95	up to 6	up to 1.5	49.95	up to 3.2	up to 0.8	71.99	up to 3	up to 0.5
Option 3				94.99	up to 10	up to 1	79.95	up to 12	up to 2	59.95	up to 6	up to 1	91.99	up to 5	up to 0.5
Option 4							99.95	up to 18	up to 3	79.95	up to 12	up to 1			
Option 5							199.95	up to 18	up to 3	99.95	up to 20	up to 2			
Option 6										149.95	up to 20	up to 2			
Option 7										199.95	up to 20	up to 2			
Option 8										249.95	up to 20	up to 2			
Business													Expedience		
Option 1	250.00	up to 1.5	up to 1	200.00	up to 6	up to 2	189.00	up to 20	up to 4	39.95	up to 1.7	up to 0.5	104.99	up to 3	up to 0.8
Option 2	500.00	up to 3	up to 1.5	249.99	up to 7	up to 3				49.95	up to 3.2	up to 0.8	149.99	up to 5	up to 1
Option 3										59.95	up to 6	up to 1			
Option 4										79.95	up to 12	up to 1			
Option 5										99.95	up to 20	up to 2			
Option 6										149.95	up to 20	up to 2			
Option 7										199.95	up to 20	up to 2			
Option 8										249.95	up to 20	up to 2			

	Wireline Provider		
	TELUS (copper)		
	Cost	Bandwidth - Mb/s	
	$/mo	Down	Up
Lac La Biche			
Residential			
Option 1	63.00	up to 6	up to 1
Option 2	68.00	up to 15	up to 1
Option 3	73.00	up to 25	up to 5
Option 4			
Option 5			
Business			
Option 1	60.00	up to 15	up to 1
Option 2	85.00	up to 25	up to 5
Option 3			
Option 4			
Option 5			

	Fixed Point-to-Multipoint Wireless														
	Arrow (unlicensed)			CCI (unlicensed)			CCL Networks			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Lac La Biche															
Residential													Expedience		
Option 1	65.00	up to 5	up to 1.5	49.99	up to 2	up to 0.75	49.95	up to 3.5	up to 1	39.95	up to 1.7	up to 0.5	51.99	up to 1.5	up to 0.25
Option 2				74.99	up to 5	up to 1	59.95	up to 6	up to 1.5	49.95	up to 3.2	up to 0.8	71.99	up to 3	up to 0.5
Option 3				94.99	up to 10	up to 1	79.95	up to 12	up to 2	59.95	up to 6	up to 1	91.99	up to 5	up to 0.5
Option 4							99.95	up to 18	up to 3	79.95	up to 12	up to 1			
Option 5							199.95	up to 18	up to 3	99.95	up to 20	up to 2			
Option 6										149.95	up to 20	up to 2			
Option 7										199.95	up to 20	up to 2			
Option 8										249.95	up to 20	up to 2			
Business													Expedience		
Option 1	250.00	up to 1.5	up to 1	200.00	up to 6	up to 2	189.00	up to 20	up to 4	39.95	up to 1.7	up to 0.5	104.99	up to 3	up to 0.8
Option 2	500.00	up to 3	up to 1.5	249.99	up to 7	up to 3				49.95	up to 3.2	up to 0.8	149.99	up to 5	up to 1
Option 3										59.95	up to 6	up to 1			
Option 4										79.95	up to 12	up to 1			
Option 5										99.95	up to 20	up to 2			
Option 6										149.95	up to 20	up to 2			
Option 7										199.95	up to 20	up to 2			
Option 8										249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless											
	CCI (unlicensed)			**CCL Networks**			**MCSNet (licensed/unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Plamondon												
Residential										4G Satellite		
Option 1	49.99	up to 2	up to 0.75	49.95	up to 3.5	up to 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	59.95	up to 6	up to 1.5	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1	79.95	up to 12	up to 2	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				99.95	up to 18	up to 3	79.95	up to 12	up to 1			
Option 5				199.95	up to 18	up to 3	99.95	up to 20	up to 2			
Option 6							149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			
Business										4G Satellite		
Option 1	200.00	up to 6	up to 2	189.00	up to 20	up to 4	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	249.99	up to 7	up to 3				49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3							59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4							79.95	up to 12	up to 1			
Option 5							99.95	up to 20	up to 2			
Option 6							149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			

16.3.3.29 Lamont County

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			**MCSNet** (licensed/unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Hilliard, Whitford, Wostok									
Residential							4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3				59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless											
	Alberta Com. (licensed)			**CCI (unlicensed)**			**MCSNet** (licensed/unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
St. Michael, Star												
Residential										4G LTE Fixed Wireless		
Option 1	39.95	up to 1.5	up to 0.5	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	49.95	up to 2	up to 0.8	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	54.95	up to 3	up to 1	94.99	up to 10	up to 1	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4							79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5							99.95	up to 20	up to 2			
Option 6							149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			
Business										4G LTE Fixed Wireless		
Option 1	59.95	up to 2	up to 0.8	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	79.95	up to 3	up to 1	249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3	89.95	up to 4	up to 1.2				59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4							79.95	up to 12	up to 1			
Option 5							99.95	up to 20	up to 2			
Option 6							149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			

16.3.3.30 County of Minburn

	Fixed Point-to-Multipoint Wireless														
	CCI (unlicensed)			**DigitalWeb (lincensed)**			**MCSNet (licensed/unlicensed)**			**Wild Rose (unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Lavoy															
Residential													4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	49.95	up to 1.5	up to 0.5	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	69.95	up to 1.5	up to 0.5	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	55.00	up to 6	up to 1	59.95	up to 6	up to 1				79.99	up to 25	up to 1
Option 4				55.00	up to 10	up to 2	79.95	up to 12	up to 1				109.99	up to 25	up to 1
Option 5				60.00	up to 15	up to 2	99.95	up to 20	up to 2						
Option 6				65.00	up to 25	up to 5	149.95	up to 20	up to 2						
Option 7				70.00	up to 50	up to 5	199.95	up to 20	up to 2						
Option 8							249.95	up to 20	up to 2						
Business													4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	49.95	up to 1.5	up to 0.5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	69.95	up to 1.5	up to 0.5	79.99	up to 25	up to 1
Option 3				55.00	up to 6	up to 1	59.95	up to 6	up to 1				109.99	up to 25	up to 1
Option 4				55.00	up to 10	up to 2	79.95	up to 12	up to 1						
Option 5				60.00	up to 15	up to 2	99.95	up to 20	up to 2						
Option 6				65.00	up to 25	up to 5	149.95	up to 20	up to 2						
Option 7				70.00	up to 50	up to 5	199.95	up to 20	up to 2						
Option 8							249.95	up to 20	up to 2						

	Fixed Point-to-Multipoint Wireless														
	CCI (unlicensed)			**DigitalWeb (lincensed)**			**MCSNet (licensed/unlicensed)**			**Wild Rose (unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Minburn, Ranfurly															
Residential													4G Satellite		
Option 1	49.99	up to 2	up to 0.75	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	49.95	up to 1.5	up to 0.5	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	69.95	up to 1.5	up to 0.5	79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1	55.00	up to 6	up to 1	59.95	up to 6	up to 1				89.99	up to 5	up to 1
Option 4				55.00	up to 10	up to 2	79.95	up to 12	up to 1						
Option 5				60.00	up to 15	up to 2	99.95	up to 20	up to 2						
Option 6				65.00	up to 25	up to 5	149.95	up to 20	up to 2						
Option 7				70.00	up to 50	up to 5	199.95	up to 20	up to 2						
Option 8							249.95	up to 20	up to 2						
Business													4G Satellite		
Option 1	200.00	up to 6	up to 2	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	49.95	up to 1.5	up to 0.5	69.99	up to 5	up to 1
Option 2	249.99	up to 7	up to 3	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	69.95	up to 1.5	up to 0.5	79.99	up to 5	up to 1
Option 3				55.00	up to 6	up to 1	59.95	up to 6	up to 1				89.99	up to 5	up to 1
Option 4				55.00	up to 10	up to 2	79.95	up to 12	up to 1						
Option 5				60.00	up to 15	up to 2	99.95	up to 20	up to 2						
Option 6				65.00	up to 25	up to 5	149.95	up to 20	up to 2						
Option 7				70.00	up to 50	up to 5	199.95	up to 20	up to 2						
Option 8							249.95	up to 20	up to 2						

16.3.3.31 Smoky Lake County

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			**MCSNet (licensed/unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Bellis, Edward, Spedden, Warspite									
Residential							4G Satellite		
Option 1	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G Satellite		
Option 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3				59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

16.3.3.32 County of St. Paul

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			**MCSNet** (licensed/unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Ashmont, Lottie Lake, Mallaig, St. Lina									
Residential							4G Satellite		
Option 1	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G Satellite		
Option 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3				59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless					
	MCSNet (licensed/unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Heinsburg, Lafond						
Residential				4G Satellite		
Option 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4	79.95	up to 12	up to 1			
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			
Business				4G Satellite		
Option 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4	79.95	up to 12	up to 1			
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless					
	MCSNet (licensed/unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Lindbergh, Riverview						
Residential				4G Wireless		
Option 1	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	59.95	up to 6	up to 1	79.99	up to 10	up to 1
Option 4	79.95	up to 12	up to 1	109.99	up to 10	up to 1
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			
Business				4G Wireless		
Option 1	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	49.95	up to 3.2	up to 0.8	79.99	up to 10	up to 1
Option 3	59.95	up to 6	up to 1	109.99	up to 10	up to 1
Option 4	79.95	up to 12	up to 1			
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless					
	MCSNet (licensed/unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
St. Edouard, St. Vincent						
Residential				4G LTE Fixed Wireless		
Option 1	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4	79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			
Business				4G LTE Fixed Wireless		
Option 1	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3	59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4	79.95	up to 12	up to 1			
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			

16.3.3.33 Thorhild County

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			**MCSNet** (licensed/unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Abee, Egremont, Opal, Radway, Thorhild									
Residential							4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3				59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			**MCSNet** (licensed/unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Newbrook									
Residential							Expedience		
Option 1	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	51.99	up to 1.5	up to 0.25
Option 2	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	71.99	up to 3	up to 0.5
Option 3	94.99	up to 10	up to 1	59.95	up to 6	up to 1	91.99	up to 5	up to 0.5
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							Expedience		
Option 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	104.99	up to 3	up to 0.8
Option 2	249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	149.99	up to 5	up to 1
Option 3				59.95	up to 6	up to 1			
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless					
	MCSNet (licensed/unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Long Lake						
Residential				4G Satellite		
Option 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4	79.95	up to 12	up to 1			
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			
Business				4G Satellite		
Option 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4	79.95	up to 12	up to 1			
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			

16.3.3.34 County of Two Hills

	Fixed Point-to-Multipoint Wireless											
	CCI (unlicensed)			DigitalWeb (lincensed)			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Beauvallon, Brosseau, Duvernay, Morecambe, Musidora												
Residential										4G Satellite		
Option 1	49.99	up to 2	up to 0.75	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1	55.00	up to 6	up to 1	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				55.00	up to 10	up to 2	79.95	up to 12	up to 1			
Option 5				60.00	up to 15	up to 2	99.95	up to 20	up to 2			
Option 6				65.00	up to 25	up to 5	149.95	up to 20	up to 2			
Option 7				70.00	up to 50	up to 5	199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			
Business										4G Satellite		
Option 1	200.00	up to 6	up to 2	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	249.99	up to 7	up to 3	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3				55.00	up to 6	up to 1	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				55.00	up to 10	up to 2	79.95	up to 12	up to 1			
Option 5				60.00	up to 15	up to 2	99.95	up to 20	up to 2			
Option 6				65.00	up to 25	up to 5	149.95	up to 20	up to 2			
Option 7				70.00	up to 50	up to 5	199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless					
	MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Derwent						
Residential				4G Satellite		
Option 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4	79.95	up to 12	up to 1			
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			
Business				4G Satellite		
Option 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4	79.95	up to 12	up to 1			
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless											
	CCI (unlicensed)			**DigitalWeb (lincensed)**			**MCSNet (licensed/unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Hairy Hill												
Residential										4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	55.00	up to 6	up to 1	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4				55.00	up to 10	up to 2	79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5				60.00	up to 15	up to 2	99.95	up to 20	up to 2			
Option 6				65.00	up to 25	up to 5	149.95	up to 20	up to 2			
Option 7				70.00	up to 50	up to 5	199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			
Business										4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	35.00	up tp 1.5	up to 1	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	45.00	up to 3	up to 1	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3				55.00	up to 6	up to 1	59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4				55.00	up to 10	up to 2	79.95	up to 12	up to 1			
Option 5				60.00	up to 15	up to 2	99.95	up to 20	up to 2			
Option 6				65.00	up to 25	up to 5	149.95	up to 20	up to 2			
Option 7				70.00	up to 50	up to 5	199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			

16.3.3.35 County of Vermilion River

	Fixed Point-to-Multipoint Wireless											
	CCI (unlicensed)			**Bellevista Broadband**			**MCSNet (licensed/unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Blackfoot, Islay, McLaughlin, Rivercourse, Streamstown												
Residential										4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	60.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	70.00	up to 10	up to 2	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1				59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4							79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5							99.95	up to 20	up to 2			
Option 6							149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			
Business										4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	60.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3				49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3							59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4							79.95	up to 12	up to 1			
Option 5							99.95	up to 20	up to 2			
Option 6							149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless					
	MCSNet (licensed/unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Clandonald						
Residential				4G LTE Fixed Wireless		
Option 1	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4	79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			
Business				4G LTE Fixed Wireless		
Option 1	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3	59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4	79.95	up to 12	up to 1			
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			**MCSNet** (licensed/unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Tulliby Lake									
Residential							4G Satellite		
Option 1	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G Satellite		
Option 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3				59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

16.3.3.36 First Nations (Alberta HUB)

	Fixed Point-to-Multipoint Wireless											
	Arrow (unlicensed)			**CCI (unlicensed)**			**MCSNet (licensed/unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Beaver Lake												
Residential										Expedience		
Option 1	65.00	up to 5	up to 1.5	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	51.99	up to 1.5	up to 0.25
Option 2				74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	71.99	up to 3	up to 0.5
Option 3				94.99	up to 10	up to 1	59.95	up to 6	up to 1	91.99	up to 5	up to 0.5
Option 4							79.95	up to 12	up to 1			
Option 5							99.95	up to 20	up to 2			
Option 6							149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			
Business										Expedience		
Option 1	250.00	up to 1.5	up to 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	104.99	up to 3	up to 0.8
Option 2	500.00	up to 3	up to 1.5	249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	149.99	up to 5	up to 1
Option 3							59.95	up to 6	up to 1			
Option 4							79.95	up to 12	up to 1			
Option 5							99.95	up to 20	up to 2			
Option 6							149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless								
	DeneTech			**MCSNet (licensed/unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Cold Lake									
Residential							4G Satellite		
Option 1	50.00	up to 10	to 20	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2				49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3				59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G Satellite		
Option 1	50.00	up to 10	to 20	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2				49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3				59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless								
	Arrow (unlicensed)			**MCSNet (licensed/unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Frog Lake									
Residential							4G Satellite		
Option 1	65.00	up to 5	up to 1.5	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2				49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3				59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G Satellite		
Option 1	250.00	up to 1.5	up to 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3				59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless								
	Arrow (unlicensed)			**MCSNet (licensed/unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Heart Lake									
Residential							4G Satellite		
Option 1	65.00	up to 5	up to 1.5	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2				49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3				59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G Satellite		
Option 1	250.00	up to 1.5	up to 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3				59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless								
	Arrow (unlicensed)			**MCSNet (licensed/unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Kehewin Cree									
Residential							4G LTE Fixed Wireless		
Option 1	65.00	up to 5	up to 1.5	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2				49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3				59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G LTE Fixed Wireless		
Option 1	250.00	up to 1.5	up to 1	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	500.00	up to 3	up to 1.5	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3				59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless					
	MCSNet (licensed/unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Saddle Lake						
Residential				4G Satellite		
Option 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4	79.95	up to 12	up to 1			
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			
Business				4G Satellite		
Option 1	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4	79.95	up to 12	up to 1			
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless					
	Arrow (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Whitefish Lake (Goodfish Lake)						
Residential				4G Satellite		
Option 1	65.00	up to 5	up to 1.5	69.99	up to 5	up to 1
Option 2				79.99	up to 5	up to 1
Option 3				89.99	up to 5	up to 1
Option 4						
Option 5						
Business				4G Satellite		
Option 1	250.00	up to 1.5	up to 1	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5	79.99	up to 5	up to 1
Option 3				89.99	up to 5	up to 1
Option 4						
Option 5						

16.3.3.37 Métis Settlements (Alberta HUB)

	Fixed Point-to-Multipoint Wireless								
	Infinity			**MCSNet** (licensed/unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Buffalo Lake									
Residential							4G LTE Fixed Wireless		
Option 1	69.00	up to 2	na	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	79.00	up to 4	na	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	99.00	up to 7	na	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5				99.95	up to 20	up to 2		Also Satellite	
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G LTE Fixed Wireless		
Option 1				39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2				49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3				59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1		Also Satellite	
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless					
	Infinity			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Elizabeth						
Residential						
Option 1	69.00	up to 2	na			
Option 2	79.00	up to 4	na			
Option 3	99.00	up to 7	na			
Option 4						
Option 5						
Business						
Option 1						
Option 2						
Option 3						
Option 4						
Option 5						

	Fixed Point-to-Multipoint Wireless					
	Arrow (unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Fishing Lake						
Residential				4G Satellite		
Option 1	65.00	up to 5	up to 1.5	69.99	up to 5	up to 1
Option 2				79.99	up to 5	up to 1
Option 3				89.99	up to 5	up to 1
Option 4						
Option 5						
Business				4G Satellite		
Option 1	250.00	up to 1.5	up to 1	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5	79.99	up to 5	up to 1
Option 3				89.99	up to 5	up to 1
Option 4						
Option 5						

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			**MCSNet (licensed/unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Kikino									
Residential							4G Satellite		
Option 1	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G Satellite		
Option 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3				59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

16.3.4 Grizzly Regional Economic Alliance Society (GROWTH Alberta)

12.2.1.1 Town of Barrhead

	Wireline Providers					
	TELUS (copper)			Shaw (coaxial cable)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Barrhead						
Residential						
Option 1	63.00	up to 6	up to 1	55.00	up to 5	up to 0.5
Option 2	68.00	up to 15	up to 1	66.00	up to 15	up to 0.5
Option 3	73.00	up to 25	up to 5	75.00	up to 30	up to 5
Option 4				95.00	up to 60	up to 6
Option 5						
Business						
Option 1	60.00	up to 6	up to 1	124.95	up to 60	up to 6
Option 2						
Option 3						
Option 4						
Option 5						

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Barrhead									
Residential							4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3				59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

12.2.1.2 Town of Mayerthorpe

	Wireline Providers						Fixed Point-to-Multipoint Wireless					
	TELUS (copper)			Eastlink (coaxial cable)			CCI (unlicensed)			First Broadband		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Mayerthorpe												
Residential												
Option 1	63.00	up to 6	up to 1	55.95	up to 5	up to 1	49.99	up to 2	up to 0.75	99.00	up to 1	up to 0.5
Option 2				78.95	up to 30	up to 3	74.99	up to 5	up to 1	129.00	up to 4	up to 1
Option 3				88.95	up to 50	up to 5	94.99	up to 10	up to 1	149.00	up to 7	up to 1
Option 4				98.95	up to 100	up to 10						
Option 5				149.95	up to 150	up to 10						
Option 6				259.95	up to 400	up to 10						
Business												
Option 1	60.00	up to 6	up to 1	na	up to 50	up to 5	200.00	up to 6	up to 2	199.00	up to 2.5	up to 1.5
Option 2				na	up to 100	up to 10	249.99	up to 7	up to 3	279.00	up to 5	up to 2.5
Option 3				na	up to 200	up to 10				329.00	up to 8	up to 4
Option 4										na	up to 10	up to 5
Option 5												
Option 6												

	Fixed Point-to-Multipoint Wireless											
	Slave Lake (licensed)			Tera-Byte (unlicensed)			Whitecourt (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Mayerthorpe												
Residential										4G LTE Fixed Wireless		
Option 1	46.55	up to 4	up to 2	$44.95	up to 6	up to 2	46.55	up to 4	up to 2	59.99	up to 5	up to 1
Option 2	84.55	up to 6	up to 2				84.55	up to 6	up to 2	69.99	up to 10	up to 1
Option 3	122.55	up to 10	up to 2				122.55	up to 10	up to 2	79.99	up to 25	up to 1
Option 4	151.05	up to 15	up to 2				151.05	up to 15	up to 2	109.99	up to 25	up to 1
Option 5												
Business										4G LTE Fixed Wireless		
Option 1	200.00	up to 7	up to 3	$44.95	up to 6	up to 2	200.00	up to 7	up to 3	69.99	up to 10	up to 1
Option 2	300.00	up to 10	up to 7				300.00	up to 10	up to 7	79.99	up to 25	up to 1
Option 3	500.00	up to 15	up to 10				500.00	up to 15	up to 10	109.99	up to 25	up to 1
Option 4	700.00	up to 20	up to 15				700.00	up to 20	up to 15			
Option 5												

12.2.1.3 Town of Onoway

	Wireline Provider			Fixed Point-to-Multipoint Wireless											
	TELUS (copper)			Broadband Surfer (unlicensed)			CCI (unlicensed)			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Onoway															
Residential													4G LTE Fixed Wireless		
Option 1	63.00	up to 6	up to 1	49.95	up to 3 to 4		49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1				74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3							94.99	up to 10	up to 1	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4										79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5										99.95	up to 20	up to 2			
Option 6										149.95	up to 20	up to 2			
Option 7										199.95	up to 20	up to 2			
Option 8										249.95	up to 20	up to 2			
Business													4G LTE Fixed Wireless		
Option 1	60.00	up to 15	up to 1	49.95	up to 3 to 4		200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2							249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3										59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4										79.95	up to 12	up to 1			
Option 5										99.95	up to 20	up to 2			
Option 6										149.95	up to 20	up to 2			
Option 7										199.95	up to 20	up to 2			
Option 8										249.95	up to 20	up to 2			

12.2.1.4 Town of Swan Hills

	Wireline Provider			Fixed Point-to-Multipoint Wireless								
	TELUS (copper)			Slave Lake (licensed)			Whitecourt (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Swan Hills												
Residential										4G Satellite		
Option 1	63.00	up to 6	up to 1	46.55	up to 4	up to 2	46.55	up to 4	up to 2	69.99	up to 5	up to 1
Option 2				84.55	up to 6	up to 2	84.55	up to 6	up to 2	79.99	up to 5	up to 1
Option 3				122.55	up to 10	up to 2	122.55	up to 10	up to 2	89.99	up to 5	up to 1
Option 4				151.05	up to 15	up to 2	151.05	up to 15	up to 2			
Option 5												
Business										4G Satellite		
Option 1	60.00	up to 15	up to 1	200.00	up to 7	up to 3	200.00	up to 7	up to 3	69.99	up to 5	up to 1
Option 2				300.00	up to 10	up to 7	300.00	up to 10	up to 7	79.99	up to 5	up to 1
Option 3				500.00	up to 15	up to 10	500.00	up to 15	up to 10	89.99	up to 5	up to 1
Option 4				700.00	up to 20	up to 15	700.00	up to 20	up to 15			
Option 5												

12.2.1.5 Town of Westlock

	Wireline Providers						Fixed Point-to-Multipoint Wireless								
	TELUS (copper & fibre)			Shaw (coaxial cable)			CCI (unlicensed)			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Westlock															
Residential													4G LTE Fixed Wireless		
Option 1	63.00	up to 6	up to 1	55.00	up to 5	up to 0.5	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	66.00	up to 15	up to 0.5	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	73.00	up to 25	up to 5	75.00	up to 30	up to 5	94.99	up to 10	up to 1	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4	80.00	up to 50	up to 10							79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5	85.00	up to 150	up to 150							99.95	up to 20	up to 2			
Option 6										149.95	up to 20	up to 2			
Option 7										199.95	up to 20	up to 2			
Option 8										249.95	up to 20	up to 2			
Business													4G LTE Fixed Wireless		
Option 1	60.00	up to 15	up to 1	na	na	na	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	85.00	up to 25	up to 5				249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3	100.00	up to 50	up to 10							59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4	125.00	up to 100	up to 20							79.95	up to 12	up to 1	79.99	up to 25	up to 1
Option 5	150.00	up to 150	up to 150							99.95	up to 20	up to 2	109.99	up to 25	up to 1
Option 6										149.95	up to 20	up to 2			
Option 7										199.95	up to 20	up to 2			
Option 8										249.95	up to 20	up to 2			

12.2.1.6 Town of Whitecourt

	Wireline Providers						Fixed Point-to-Multipoint Wireless					
	TELUS (copper)			Eastlink (coaxial cable)			CCI (unlicensed)			First Broadband		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Whitecourt												
Residential												
Option 1	63.00	up to 6	up to 1	55.95	up to 5	up to 1	49.99	up to 2	up to 0.75	99.00	up to 1	up to 0.5
Option 2	68.00	up to 15	up to 1	78.95	up to 30	up to 3	74.99	up to 5	up to 1	129.00	up to 4	up to 1
Option 3	73.00	up to 25	up to 5	88.95	up to 50	up to 5	94.99	up to 10	up to 1	149.00	up to 7	up to 1
Option 4	80.00	up to 50	up to 10	98.95	up to 100	up to 10						
Option 5				149.95	up to 150	up to 10						
Option 6				259.95	up to 400	up to 10						
Business												
Option 1	60.00	up to 15	up to 1	na	up to 50	up to 5	200.00	up to 6	up to 2	199.00	up to 2.5	up to 1.5
Option 2	85.00	up to 25	up to 5	na	up to 100	up to 10	249.99	up to 7	up to 3	279.00	up to 5	up to 2.5
Option 3				na	up to 200	up to 10				329.00	up to 8	up to 4
Option 4										na	up to 10	up to 5
Option 5												

	Fixed Point-to-Multipoint Wireless								
	Slave Lake (licensed)			Whitecourt (licensed/unlicensed)			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Whitecourt									
Residential							4G LTE Fixed Wireless		
Option 1	46.55	up to 4	up to 2	46.55	up to 4	up to 2	59.99	up to 5	up to 1
Option 2	84.55	up to 6	up to 2	84.55	up to 6	up to 2	69.99	up to 10	up to 1
Option 3	122.55	up to 10	up to 2	122.55	up to 10	up to 2	79.99	up to 25	up to 1
Option 4	151.05	up to 15	up to 2	151.05	up to 15	up to 2	109.99	up to 25	up to 1
Option 5									
Business							4G LTE Fixed Wireless		
Option 1	200.00	up to 7	up to 3	200.00	up to 7	up to 3	69.99	up to 10	up to 1
Option 2	300.00	up to 10	up to 7	300.00	up to 10	up to 7	79.99	up to 25	up to 1
Option 3	500.00	up to 15	up to 10	500.00	up to 15	up to 10	109.99	up to 25	up to 1
Option 4	700.00	up to 20	up to 15	700.00	up to 20	up to 15			
Option 5									

12.2.1.7 Village of Alberta Beach

	Wireline Provider			Fixed Point-to-Multipoint Wireless											
	TELUS (copper)			Arrow (unlicensed)			Broadband Surfer (unlicensed)			CCI (unlicensed)			First Broadband		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Alberta Beach															
Residential															
Option 1	63.00	up to 6	up to 1	65.00	up to 5	up to 1.5	49.95	up to 3 to 4		49.99	up to 2	up to 0.75	99.00	up to 1	up to 0.5
Option 2	68.00	up to 15	up to 1							74.99	up to 5	up to 1	129.00	up to 4	up to 1
Option 3	73.00	up to 25	up to 5							94.99	up to 10	up to 1	149.00	up to 7	up to 1
Option 4	80.00	up to 50	up to 10												
Option 5															
Business															
Option 1	60.00	up to 15	up to 1	250.00	up to 1.5	up to 1	49.95	up to 3 to 4		200.00	up to 6	up to 2	199.00	up to 2.5	up to 1.5
Option 2	85.00	up to 25	up to 5	500.00	up to 3	up to 1.5				249.99	up to 7	up to 3	279.00	up to 5	up to 2.5
Option 3													329.00	up to 8	up to 4
Option 4													na	up to 10	up to 5
Option 5															

12.2.1.8 Village of Clyde

	Wireline Provider			Fixed Point-to-Multipoint Wireless											
	TELUS (copper)			CCI (unlicensed)			Clearwave			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Clyde															
Residential													4G LTE Fixed Wireless		
Option 1	63.00	up to 6	up to 1	49.99	up to 2	up to 0.75	69.95	up to 6		39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2				74.99	up to 5	up to 1	109.95	up to 6		49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3				94.99	up to 10	up to 1	79.95	up to 12		59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4							119.95	up to 12		79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5							99.95	up to 25		99.95	up to 20	up to 2			
Option 6							139.95	up to 25		149.95	up to 20	up to 2			
Option 7							129.95	up to 50		199.95	up to 20	up to 2			
Option 8							139.95	up to 50		249.95	up to 20	up to 2			
Business													4G LTE Fixed Wireless		
Option 1	60.00	up to 15	up to 1	200.00	up to 6	up to 2	79.95	up to 12	up to 3	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	85.00	up to 25	up to 5	249.99	up to 7	up to 3	159.95	up to 15	up to 4	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3							99.95	up to 25	up to 12	59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4							229.95	up to 25	up to 18	79.95	up to 12	up to 1			
Option 5							119.95	up to 50		99.95	up to 20	up to 2			
Option 6							329.95	up to 50		149.95	up to 20	up to 2			
Option 7							429.95	up to 75		199.95	up to 20	up to 2			
Option 8							529.95	up to 100		249.95	up to 20	up to 2			

12.2.1.9 Village of Wabamun

	Wireline Provider			Fixed Point-to-Multipoint Wireless											
	TELUS (copper)			Arrow (unlicensed)			Broadband Surfer (unlicensed)			CCI (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Wabamun															
Residential													4G LTE Fixed Wireless		
Option 1	63.00	up to 6	up to 1	65.00	up to 5	up to 1.5	49.95	up to 3 to 4		49.99	up to 2	up to 0.75	59.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1							74.99	up to 5	up to 1	69.99	up to 10	up to 1
Option 3										94.99	up to 10	up to 1	79.99	up to 25	up to 1
Option 4													109.99	up to 25	up to 1
Option 5															
Business													4G LTE Fixed Wireless		
Option 1	na			250.00	up to 1.5	up to 1	49.95	up to 3 to 4		200.00	up to 6	up to 2	69.99	up to 10	up to 1
Option 2				500.00	up to 3	up to 1.5				249.99	up to 7	up to 3	79.99	up to 25	up to 1
Option 3													109.99	up to 25	up to 1
Option 4															
Option 5															

12.2.1.10 Summer Villages

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			**MCSNet (licensed/unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Summer Village - Birch Cove									
Residential							4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3				59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless								
	Arrow (unlicensed)			**Broadband Surfer (unlicensed)**			**CCI (unlicensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Summer Villages - Castle Island, Sunset Point, Val Quentin									
Residential									
Option 1	65.00	up to 5	up to 1.5	49.95	up to 3 to 4		49.99	up to 2	up to 0.75
Option 2							74.99	up to 5	up to 1
Option 3							94.99	up to 10	up to 1
Option 4									
Option 5									
Business									
Option 1	250.00	up to 1.5	up to 1	49.95	up to 3 to 4		200.00	up to 6	up to 2
Option 2	500.00	up to 3	up to 1.5				249.99	up to 7	up to 3
Option 3									
Option 4									
Option 5									

	Fixed Point-to-Multipoint Wireless								
	First Broadband			Tera-Byte (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Summer Villages - Castle Island, Sunset Point, Val Quentin									
Residential							4G LTE Fixed Wireless		
Option 1	99.00	up to 1	up to 0.5	$44.95	up to 6	up to 2	59.99	up to 5	up to 1
Option 2	129.00	up to 4	up to 1				69.99	up to 10	up to 1
Option 3	149.00	up to 7	up to 1				79.99	up to 25	up to 1
Option 4							109.99	up to 25	up to 1
Option 5									
Business							4G LTE Fixed Wireless		
Option 1	199.00	up to 2.5	up to 1.5	$44.95	up to 6	up to 2	69.99	up to 10	up to 1
Option 2	279.00	up to 5	up to 2.5				79.99	up to 25	up to 1
Option 3	329.00	up to 8	up to 4				109.99	up to 25	up to 1
Option 4	na	up to 10	up to 5						
Option 5									

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Summer Village - Larkspur									
Residential							4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3				59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless											
	CCI (unlicensed)			**MCSNet (licensed/unlicensed)**			**Tera-Byte (unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Summer Villages - Nakamun Park												
Residential										4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	$44.95	up to 6	up to 2	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8				69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	59.95	up to 6	up to 1				79.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1				109.99	up to 25	up to 1
Option 5				99.95	up to 20	up to 2						
Option 6				149.95	up to 20	up to 2						
Option 7				199.95	up to 20	up to 2						
Option 8				249.95	up to 20	up to 2						
Business										4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	$44.95	up to 6	up to 2	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8				79.99	up to 25	up to 1
Option 3				59.95	up to 6	up to 1				109.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1						
Option 5				99.95	up to 20	up to 2						
Option 6				149.95	up to 20	up to 2						
Option 7				199.95	up to 20	up to 2						
Option 8				249.95	up to 20	up to 2						

	Fixed Point-to-Multipoint Wireless								
	Arrow (unlicensed)			**CCI (unlicensed)**			**First Broadband**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Summer Villages - Ross Haven, Yellowstone									
Residential									
Option 1	65.00	up to 5	up to 1.5	49.99	up to 2	up to 0.75	99.00	up to 1	up to 0.5
Option 2				74.99	up to 5	up to 1	129.00	up to 4	up to 1
Option 3				94.99	up to 10	up to 1	149.00	up to 7	up to 1
Option 4									
Option 5									
Business									
Option 1	250.00	up to 1.5	up to 1	200.00	up to 6	up to 2	199.00	up to 2.5	up to 1.5
Option 2	500.00	up to 3	up to 1.5	249.99	up to 7	up to 3	279.00	up to 5	up to 2.5
Option 3							329.00	up to 8	up to 4
Option 4							na	up to 10	up to 5
Option 5									

	Fixed Point-to-Multipoint Wireless								
	MCSNet (licensed/unlicensed)			**Tera-Byte (unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Summer Villages - Ross Haven, Yellowstone									
Residential							4G LTE Fixed Wireless		
Option 1	39.95	up to 1.7	up to 0.5	$44.95	up to 6	up to 2	59.99	up to 5	up to 1
Option 2	49.95	up to 3.2	up to 0.8				69.99	up to 10	up to 1
Option 3	59.95	up to 6	up to 1				79.99	up to 25	up to 1
Option 4	79.95	up to 12	up to 1				109.99	up to 25	up to 1
Option 5	99.95	up to 20	up to 2						
Option 6	149.95	up to 20	up to 2						
Option 7	199.95	up to 20	up to 2						
Option 8	249.95	up to 20	up to 2						
Business							4G LTE Fixed Wireless		
Option 1	39.95	up to 1.7	up to 0.5	$44.95	up to 6	up to 2	69.99	up to 10	up to 1
Option 2	49.95	up to 3.2	up to 0.8				79.99	up to 25	up to 1
Option 3	59.95	up to 6	up to 1				109.99	up to 25	up to 1
Option 4	79.95	up to 12	up to 1						
Option 5	99.95	up to 20	up to 2						
Option 6	149.95	up to 20	up to 2						
Option 7	199.95	up to 20	up to 2						
Option 8	249.95	up to 20	up to 2						

	Fixed Point-to-Multipoint Wireless					
	CCI (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	ndwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Summer Villages - Sandy Beach, Sunrise Beach						
Residential				4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	79.99	up to 25	up to 1
Option 4				109.99	up to 25	up to 1
Option 5						
Business				4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	79.99	up to 25	up to 1
Option 3				109.99	up to 25	up to 1
Option 4						
Option 5						

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			Tera-Byte (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Summer Villages - Silver Sands, South View									
Residential							4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	$44.95	up to 6	up to 2	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1				69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1				79.99	up to 25	up to 1
Option 4							109.99	up to 25	up to 1
Option 5									
Business							4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	$44.95	up to 6	up to 2	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3				79.99	up to 25	up to 1
Option 3							109.99	up to 25	up to 1
Option 4									
Option 5									

	Fixed Point-to-Multipoint Wireless											
	Arrow (unlicensed)			**CCI (unlicensed)**			**Tera-Byte (unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Summer Village - West Cove												
Residential										4G LTE Fixed Wireless		
Option 1	65.00	up to 5	up to 1.5	49.99	up to 2	up to 0.75	$44.95	up to 6	up to 2	59.99	up to 5	up to 1
Option 2				74.99	up to 5	up to 1				69.99	up to 10	up to 1
Option 3				94.99	up to 10	up to 1				79.99	up to 25	up to 1
Option 4										109.99	up to 25	up to 1
Option 5												
Business										4G LTE Fixed Wireless		
Option 1	250.00	up to 1.5	up to 1	200.00	up to 6	up to 2	$44.95	up to 6	up to 2	69.99	up to 10	up to 1
Option 2	500.00	up to 3	up to 1.5	249.99	up to 7	up to 3				79.99	up to 25	up to 1
Option 3										109.99	up to 25	up to 1
Option 4												
Option 5												

12.2.1.11 Barrhead County

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Campsie, Manola, Neerlandia, Thunder Lake									
Residential							4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3				59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

12.2.1.12 Lac Ste. Anne County

	Fixed Point-to-Multipoint Wireless											
	CCI (unlicensed)			**MCSNet (licensed/unlicensed)**			**Tera-Byte (unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Cherhill, Rich Valley												
Residential										4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	$44.95	up to 6	up to 2	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8				69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	59.95	up to 6	up to 1				79.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1				109.99	up to 25	up to 1
Option 5				99.95	up to 20	up to 2						
Option 6				149.95	up to 20	up to 2						
Option 7				199.95	up to 20	up to 2						
Option 8				249.95	up to 20	up to 2						
Business										4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	$44.95	up to 6	up to 2	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8				79.99	up to 25	up to 1
Option 3				59.95	up to 6	up to 1				109.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1						
Option 5				99.95	up to 20	up to 2						
Option 6				149.95	up to 20	up to 2						
Option 7				199.95	up to 20	up to 2						
Option 8				249.95	up to 20	up to 2						

	Fixed Point-to-Multipoint Wireless								
	Arrow (unlicensed)			**CCI (unlicensed)**			**First Broadband**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Glenevis, Gunn									
Residential									
Option 1	65.00	up to 5	up to 1.5	49.99	up to 2	up to 0.75	99.00	up to 1	up to 0.5
Option 2				74.99	up to 5	up to 1	129.00	up to 4	up to 1
Option 3				94.99	up to 10	up to 1	149.00	up to 7	up to 1
Option 4									
Option 5									
Business									
Option 1	250.00	up to 1.5	up to 1	200.00	up to 6	up to 2	199.00	up to 2.5	up to 1.5
Option 2	500.00	up to 3	up to 1.5	249.99	up to 7	up to 3	279.00	up to 5	up to 2.5
Option 3							329.00	up to 8	up to 4
Option 4							na	up to 10	up to 5
Option 5									

	Fixed Point-to-Multipoint Wireless								
	MCSNet (licensed/unlicensed)			**Tera-Byte (unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Glenevis, Gunn									
Residential							4G LTE Fixed Wireless		
Option 1	39.95	up to 1.7	up to 0.5	$44.95	up to 6	up to 2	59.99	up to 5	up to 1
Option 2	49.95	up to 3.2	up to 0.8				69.99	up to 10	up to 1
Option 3	59.95	up to 6	up to 1				79.99	up to 25	up to 1
Option 4	79.95	up to 12	up to 1				109.99	up to 25	up to 1
Option 5	99.95	up to 20	up to 2						
Option 6	149.95	up to 20	up to 2						
Option 7	199.95	up to 20	up to 2						
Option 8	249.95	up to 20	up to 2						
Business							4G LTE Fixed Wireless		
Option 1	39.95	up to 1.7	up to 0.5	$44.95	up to 6	up to 2	69.99	up to 10	up to 1
Option 2	49.95	up to 3.2	up to 0.8				79.99	up to 25	up to 1
Option 3	59.95	up to 6	up to 1				109.99	up to 25	up to 1
Option 4	79.95	up to 12	up to 1						
Option 5	99.95	up to 20	up to 2						
Option 6	149.95	up to 20	up to 2						
Option 7	199.95	up to 20	up to 2						
Option 8	249.95	up to 20	up to 2						

	Fixed Point-to-Multipoint Wireless											
	CCI (unlicensed)			First Broadband			Tera-Byte (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Green Court, Rochfort Bridge												
Residential										4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	99.00	up to 1	up to 0.5	$44.95	up to 6	up to 2	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	129.00	up to 4	up to 1				69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	149.00	up to 7	up to 1				79.99	up to 25	up to 1
Option 4										109.99	up to 25	up to 1
Option 5												
Business										4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	199.00	up to 2.5	up to 1.5	$44.95	up to 6	up to 2	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	279.00	up to 5	up to 2.5				79.99	up to 25	up to 1
Option 3				329.00	up to 8	up to 4				109.99	up to 25	up to 1
Option 4				na	up to 10	up to 5						
Option 5												

	Wireline Provider			Fixed Point-to-Multipoint Wireless											
	TELUS (copper)			CCI (unlicensed)			MCSNet (licensed/unlicensed)			Tera-Byte (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Sangudo															
Residential													4G LTE Fixed Wireless		
Option 1	63.00	up to 6	up to 1	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	$44.95	up to 6	up to 2	59.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8				69.99	up to 10	up to 1
Option 3				94.99	up to 10	up to 1	59.95	up to 6	up to 1				79.99	up to 25	up to 1
Option 4							79.95	up to 12	up to 1				109.99	up to 25	up to 1
Option 5							99.95	up to 20	up to 2						
Option 6							149.95	up to 20	up to 2						
Option 7							199.95	up to 20	up to 2						
Option 8							249.95	up to 20	up to 2						
Business													4G LTE Fixed Wireless		
Option 1	60.00	up to 15	up to 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	$44.95	up to 6	up to 2	69.99	up to 10	up to 1
Option 2				249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8				79.99	up to 25	up to 1
Option 3							59.95	up to 6	up to 1				109.99	up to 25	up to 1
Option 4							79.95	up to 12	up to 1						
Option 5							99.95	up to 20	up to 2						
Option 6							149.95	up to 20	up to 2						
Option 7							199.95	up to 20	up to 2						
Option 8							249.95	up to 20	up to 2						

12.2.1.13 Westlock County

	Fixed Point-to-Multipoint Wireless					
	MCSNet (licensed/unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Busby, Pickardville						
Residential				4G LTE Fixed Wireless		
Option 1	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4	79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			
Business				4G LTE Fixed Wireless		
Option 1	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3	59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4	79.95	up to 12	up to 1			
Option 5	99.95	up to 20	up to 2			
Option 6	149.95	up to 20	up to 2			
Option 7	199.95	up to 20	up to 2			
Option 8	249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless											
	Clearwave			**CCI (unlicensed)**			**MCSNet** (licensed/unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Dapp, Vimy												
Residential										4G LTE Fixed Wireless		
Option 1	69.95	up to 6		49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	109.95	up to 6		74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	79.95	up to 12		94.99	up to 10	up to 1	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4	119.95	up to 12					79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5	99.95	up to 25					99.95	up to 20	up to 2			
Option 6	139.95	up to 25					149.95	up to 20	up to 2			
Option 7	129.95	up to 50					199.95	up to 20	up to 2			
Option 8	139.95	up to 50					249.95	up to 20	up to 2			
Business										4G LTE Fixed Wireless		
Option 1	79.95	up to 12		200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	159.95	up to 15		249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3	99.95	up to 25					59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4	229.95	up to 25					79.95	up to 12	up to 1			
Option 5	119.95	up to 50					99.95	up to 20	up to 2			
Option 6	329.95	up to 50					149.95	up to 20	up to 2			
Option 7	429.95	up to 75					199.95	up to 20	up to 2			
Option 8	529.95	up to 100					249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			**MCSNet (licensed/unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Fawcett, Jarvie, Nestow, Pibroch, Tawatinaw									
Residential							4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3				59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

12.2.1.14 Woodlands County

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			First Broadband			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Blue Ridge									
Residential							4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	99.00	up to 1	up to 0.5	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	129.00	up to 4	up to 1	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	149.00	up to 7	up to 1	79.99	up to 25	up to 1
Option 4							109.99	up to 25	up to 1
Option 5									
Business							4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	199.00	up to 2.5	up to 1.5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	279.00	up to 5	up to 2.5	79.99	up to 25	up to 1
Option 3				329.00	up to 8	up to 4	109.99	up to 25	up to 1
Option 4				na	up to 10	up to 5			
Option 5									

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			MCSNet (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Fort Assiniboine									
Residential							4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	39.95	up to 1.7	up to 0.5	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	49.95	up to 3.2	up to 0.8	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	59.95	up to 6	up to 1	79.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1	109.99	up to 25	up to 1
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			
Business							4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	39.95	up to 1.7	up to 0.5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	49.95	up to 3.2	up to 0.8	79.99	up to 25	up to 1
Option 3				59.95	up to 6	up to 1	109.99	up to 25	up to 1
Option 4				79.95	up to 12	up to 1			
Option 5				99.95	up to 20	up to 2			
Option 6				149.95	up to 20	up to 2			
Option 7				199.95	up to 20	up to 2			
Option 8				249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wireless											
	CCI (unlicensed)			**First Broadband**			**MCSNet (licensed/unlicensed)**			**XplorNet (licensed)**		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Goose Lake												
Residential										4G Satellite		
Option 1	49.99	up to 2	up to 0.75	99.00	up to 1	up to 0.5	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	129.00	up to 4	up to 1	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1	149.00	up to 7	up to 1	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4							79.95	up to 12	up to 1			
Option 5							99.95	up to 20	up to 2			
Option 6							149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			
Business										4G Satellite		
Option 1	200.00	up to 6	up to 2	199.00	up to 2.5	up to 1.5	39.95	up to 1.7	up to 0.5	69.99	up to 5	up to 1
Option 2	249.99	up to 7	up to 3	279.00	up to 5	up to 2.5	49.95	up to 3.2	up to 0.8	79.99	up to 5	up to 1
Option 3				329.00	up to 8	up to 4	59.95	up to 6	up to 1	89.99	up to 5	up to 1
Option 4				na	up to 10	up to 5	79.95	up to 12	up to 1			
Option 5							99.95	up to 20	up to 2			
Option 6							149.95	up to 20	up to 2			
Option 7							199.95	up to 20	up to 2			
Option 8							249.95	up to 20	up to 2			

	Fixed Point-to-Multipoint Wirele		
	Whitecourt (licensed/unlicensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up
Rural			
Residential			
Option 1	46.55	up to 4	up to 2
Option 2	84.55	up to 6	up to 2
Option 3	122.55	up to 10	up to 2
Option 4	151.05	up to 15	up to 2
Option 5			
Business			
Option 1	200.00	up to 7	up to 3
Option 2	300.00	up to 10	up to 7
Option 3	500.00	up to 15	up to 10
Option 4	700.00	up to 20	up to 15
Option 5			

12.2.1.15 First Nation (GROWTH Alberta)

	Fixed Point-to-Multipoint Wireless					
	Arrow (unlicensed)			CCI (unlicensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Alexis Nakota						
Residential						
Option 1	65.00	up to 5	up to 1.5	49.99	up to 2	up to 0.75
Option 2				74.99	up to 5	up to 1
Option 3				94.99	up to 10	up to 1
Option 4						
Option 5						
Business						
Option 1	250.00	up to 1.5	up to 1	200.00	up to 6	up to 2
Option 2	500.00	up to 3	up to 1.5	249.99	up to 7	up to 3
Option 3						
Option 4						
Option 5						

16.3.5 Lesser Slave Lake Economic Alliance (LSLEA)

12.2.1.16 Town of High Prairie

	Wireline Providers					
	TELUS (copper)			KBS-TV (coaxial cable)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
High Prairie						
Residential						
Option 1	63.00	up to 6	up to 1	55.00	up to 6	na
Option 2	68.00	up to 15	up to 1			
Option 3						
Option 4						
Option 5						
Business						
Option 1	60.00	up to 15	up to 1	55.00	up to 6	na
Option 2						
Option 3						
Option 4						
Option 5						

	Fixed Point-to-Muiltipoint Wireless														
	CCI (unlicensed)			Infinity AB (licensed)			I Want			Slave Lake (licensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
High Prairie															
Residential													4G Satellite		
Option 1	49.99	up to 2	up to 0.75	60.00	up to 5	up to 1	49.95	up to 5	up to 1	46.55	up to 4	up to 2	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	99.00	up to 10	up to 1	59.95	up to 5	up to 1	84.55	up to 6	up to 2	79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1				89.95	up to 10	up to 2	122.55	up to 10	up to 2	89.99	up to 5	up to 1
Option 4							129.95	up to 15	up to 3	151.05	up to 15	up to 2			
Option 5							159.95	up to 15	up to 3						
Business													4G Satellite		
Option 1	200.00	up to 6	up to 2	109.00	up to 10	up to 2	99.95	up to 10	up to 2	200.00	up to 7	up to 3	69.99	up to 5	up to 1
Option 2	249.99	up to 7	up to 3				149.95	up to 15	up to 3	300.00	up to 10	up to 7	79.99	up to 5	up to 1
Option 3							249.95	up to 20	up to 4	500.00	up to 15	up to 10	89.99	up to 5	up to 1
Option 4							800.00	up to 50	up to 10	700.00	up to 20	up to 15			
Option 5															

12.2.1.17 Town of Slave Lake

	Wireline Providers					
	TELUS (copper & fibre)			Eastlink (coaxial cable)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Slave Lake						
Residential						
Option 1	63.00	up to 6	up to 1	55.95	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	78.95	up to 30	up to 3
Option 3	73.00	up to 25	up to 5	88.95	up to 50	up to 5
Option 4	80.00	up to 50	up to 10	98.95	up to 100	up to 10
Option 5	85.00	up to 150	up to 150	149.95	up to 150	up to 10
Option 6				259.95	up to 400	up to 10
Option 7						
Business						
Option 1	60.00	up to 15	up to 1	na	up to 50	up to 5
Option 2	85.00	up to 25	up to 5	na	up to 100	up to 10
Option 3	100.00	up to 50	up to 10	na	up to 200	up to 10
Option 4	125.00	up to 100	up to 20			
Option 5	150.00	up to 150	up to 150			

	Fixed Point-to-Multipoint Wireless														
	CCI (unlicensed)			Bell			Slave Lake (licensed)			Sniper			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Slave Lake															
Residential													4G Wireless		
Option 1	49.99	up to 2	up to 0.75	65.00	up to 5	up to 1	46.55	up to 4	up to 2	50.00	up to 1.5	na	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1				84.55	up to 6	up to 2	80.00	up to 2	na	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1				122.55	up to 10	up to 2	120.00	up to 3	na	79.99	up to 10	up to 1
Option 4							151.05	up to 15	up to 2				109.99	up to 10	up to 1
Business													4G Wireless		
Option 1	200.00	up to 6	up to 2				200.00	up to 7	up to 3	80.00	up to 2	na	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3				300.00	up to 10	up to 7	120.00	up to 3	na	79.99	up to 10	up to 1
Option 3							500.00	up to 15	up to 10				109.99	up to 10	up to 1
Option 4							700.00	up to 20	up to 15						

12.2.1.18 Big Lakes County

	Fixed Point-to-Multipoint Wireless											
	CCI (unlicensed)			Infinity AB (licensed)			Slave Lake (licensed)			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Enilda, Joussard												
Residential										4G Satellite		
Option 1	49.99	up to 2	up to 0.75	60.00	up to 5	up to 1	46.55	up to 4	up to 2	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	99.00	up to 10	up to 1	84.55	up to 6	up to 2	79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1				122.55	up to 10	up to 2	89.99	up to 5	up to 1
Option 4							151.05	up to 15	up to 2			
Business										4G Satellite		
Option 1	200.00	up to 6	up to 2	109.00	up to 10	up to 2	200.00	up to 7	up to 3	69.99	up to 5	up to 1
Option 2	249.99	up to 7	up to 3				300.00	up to 10	up to 7	79.99	up to 5	up to 1
Option 3							500.00	up to 15	up to 10	89.99	up to 5	up to 1
Option 4							700.00	up to 20	up to 15			
Option 5												

	Fixed Point-to-Multipoint Wireless											
	CCI (unlicensed)			Lakeshore (unlicensed)			Slave Lake (licensed)			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Faust												
Residential										4G Wireless		
Option 1	49.99	up to 2	up to 0.75	55.00	up to 2.5	up to 0.77	46.55	up to 4	up to 2	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	75.00	up to 5	up to 1	84.55	up to 6	up to 2	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1				122.55	up to 10	up to 2	79.99	up to 10	up to 1
Option 4							151.05	up to 15	up to 2	109.99	up to 10	up to 1
Business										4G Wireless		
Option 1	200.00	up to 6	up to 2	115.00	up to 10	up to 1.5	200.00	up to 7	up to 3	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3				300.00	up to 10	up to 7	79.99	up to 10	up to 1
Option 3							500.00	up to 15	up to 10	109.99	up to 10	up to 1
Option 4							700.00	up to 20	up to 15			
Option 5												

	Fixed Point-to-Multipoint Wireless											
	Boreal Wireless (unlicensed)			**CCI (unlicensed)**			**Lakeshore (unlicensed)**			**Slave Lake (licensed)**			**XplorNet (licensed)**		
	Cost	ndwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Kinuso															
Residential													4G Wireless		
Option 1	46.75	up to 1	up to 1	49.99	up to 2	up to 0.75	55.00	up to 2.5	up to 0.77	46.55	up to 4	up to 2	59.99	up to 5	up to 1
Option 2				74.99	up to 5	up to 1	75.00	up to 5	up to 1	84.55	up to 6	up to 2	69.99	up to 10	up to 1
Option 3				94.99	up to 10	up to 1				122.55	up to 10	up to 2	79.99	up to 10	up to 1
Option 4										151.05	up to 15	up to 2	109.99	up to 10	up to 1
Business													4G Wireless		
Option 1	116.75	up to 1	up to 1	200.00	up to 6	up to 2	115.00	up to 10	up to 1.5	200.00	up to 7	up to 3	69.99	up to 10	up to 1
Option 2				249.99	up to 7	up to 3				300.00	up to 10	up to 7	79.99	up to 10	up to 1
Option 3										500.00	up to 15	up to 10	109.99	up to 10	up to 1
Option 4										700.00	up to 20	up to 15			
Option 5															

	Fixed Point-to-Multipoint Wireless											
	Arrow (unlicensed)			**CCI (unlicensed)**			**Infinity AB (licensed)**			**Lakeshore (unlicensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Grouard				**CCI**								
Residential												
Option 1	65.00	up to 5	up to 1.5	49.99	up to 2	up to 0.75	55.00	up to 2.5	up to 0.77	55.00	up to 2.5	up to 0.77
Option 2				74.99	up to 5	up to 1	75.00	up to 5	up to 1	75.00	up to 5	up to 1
Option 3				94.99	up to 10	up to 1						
Option 4												
Business												
Option 1	250.00	up to 1.5	up to 1	200.00	up to 6	up to 2	115.00	up to 10	up to 1.5	115.00	up to 10	up to 1.5
Option 2	500.00	up to 3	up to 1.5	249.99	up to 7	up to 3						
Option 3												
Option 4												
Option 5												

	Fixed Point-to-Multipoint Wireless					
	Slave Lake (licensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Grouard						
Residential				4G Satellite		
Option 1	46.55	up to 4	up to 2	69.99	up to 5	up to 1
Option 2	84.55	up to 6	up to 2	79.99	up to 5	up to 1
Option 3	122.55	up to 10	up to 2	89.99	up to 5	up to 1
Option 4	151.05	up to 15	up to 2			
Business				4G Satellite		
Option 1	200.00	up to 7	up to 3	69.99	up to 5	up to 1
Option 2	300.00	up to 10	up to 7	79.99	up to 5	up to 1
Option 3	500.00	up to 15	up to 10	89.99	up to 5	up to 1
Option 4	700.00	up to 20	up to 15			
Option 5						

16.3.5.1 MD of Lesser Slave River

	Fixed Point-to-Multipoint Wireless											
	CCI (unlicensed)			Lakeshore (unlicensed)			Slave Lake (licensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Canyon Creek												
Residential										4G Satellite		
Option 1	49.99	up to 2	up to 0.75	55.00	up to 2.5	up to 0.77	46.55	up to 4	up to 2	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	75.00	up to 5	up to 1	84.55	up to 6	up to 2	79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1				122.55	up to 10	up to 2	89.99	up to 5	up to 1
Option 4							151.05	up to 15	up to 2			
Business										4G Satellite		
Option 1	200.00	up to 6	up to 2	115.00	up to 10	up to 1.5	200.00	up to 7	up to 3	69.99	up to 5	up to 1
Option 2	249.99	up to 7	up to 3				300.00	up to 10	up to 7	79.99	up to 5	up to 1
Option 3							500.00	up to 15	up to 10	89.99	up to 5	up to 1
Option 4							700.00	up to 20	up to 15			
Option 5												

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			Slave Lake (licensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Chisholm, Marten Beach, Smith									
Residential							4G Satellite		
Option 1	49.99	up to 2	up to 0.75	46.55	up to 4	up to 2	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	84.55	up to 6	up to 2	79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1	122.55	up to 10	up to 2	89.99	up to 5	up to 1
Option 4				151.05	up to 15	up to 2			
Business							4G Satellite		
Option 1	200.00	up to 6	up to 2	200.00	up to 7	up to 3	69.99	up to 5	up to 1
Option 2	249.99	up to 7	up to 3	300.00	up to 10	up to 7	79.99	up to 5	up to 1
Option 3				500.00	up to 15	up to 10	89.99	up to 5	up to 1
Option 4				700.00	up to 20	up to 15			
Option 5									
Flatbush									
Residential							4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	46.55	up to 4	up to 2	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	84.55	up to 6	up to 2	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	122.55	up to 10	up to 2	79.99	up to 25	up to 1
Option 4				151.05	up to 15	up to 2	109.99	up to 25	up to 1
Business							4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	200.00	up to 7	up to 3	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	300.00	up to 10	up to 7	79.99	up to 25	up to 1
Option 3				500.00	up to 15	up to 10	109.99	up to 25	up to 1
Option 4				700.00	up to 20	up to 15			
Option 5									
Wagner, Widewater									
Residential							4G Wireless		
Option 1	49.99	up to 2	up to 0.75	46.55	up to 4	up to 2	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	84.55	up to 6	up to 2	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	122.55	up to 10	up to 2	79.99	up to 10	up to 1
Option 4				151.05	up to 15	up to 2	109.99	up to 10	up to 1
Business							4G Wireless		
Option 1	200.00	up to 6	up to 2	200.00	up to 7	up to 3	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	300.00	up to 10	up to 7	79.99	up to 10	up to 1
Option 3				500.00	up to 15	up to 10	109.99	up to 10	up to 1
Option 4				700.00	up to 20	up to 15			
Option 5									

12.2.1.19 MD of Opportunity

	Fixed Point-to-Multipoint Wireless											
	Arrow (unlicensed)			CCI (unlicensed)			Slave Lake (licensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Calling Lake												
Residential										4G Satellite		
Option 1	65.00	up to 5	up to 1.5	49.99	up to 2	up to 0.75	46.55	up to 4	up to 2	69.99	up to 5	up to 1
Option 2				74.99	up to 5	up to 1	84.55	up to 6	up to 2	79.99	up to 5	up to 1
Option 3				94.99	up to 10	up to 1	122.55	up to 10	up to 2	89.99	up to 5	up to 1
Option 4							151.05	up to 15	up to 2			
Business										4G Satellite		
Option 1	250.00	up to 1.5	up to 1	200.00	up to 6	up to 2	200.00	up to 7	up to 3	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5	249.99	up to 7	up to 3	300.00	up to 10	up to 7	79.99	up to 5	up to 1
Option 3							500.00	up to 15	up to 10	89.99	up to 5	up to 1
Option 4							700.00	up to 20	up to 15			
Option 5												
Red Earth Creek												
Residential										4G Satellite		
Option 1							46.55	up to 4	up to 2	69.99	up to 5	up to 1
Option 2							84.55	up to 6	up to 2	79.99	up to 5	up to 1
Option 3							122.55	up to 10	up to 2			
Option 4							151.05	up to 15	up to 2			
Business										4G Satellite		
Option 1							200.00	up to 7	up to 3	69.99	up to 5	up to 1
Option 2							300.00	up to 10	up to 7	79.99	up to 5	up to 1
Option 3							500.00	up to 15	up to 10			
Option 4							700.00	up to 20	up to 15			
Option 5												

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			Slave Lake (licensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Sandy Lake									
Residential				46.55	up to 4	up to 2	4G Satellite		
Option 1	46.55	up to 4	up to 2	84.55	up to 6	up to 2	69.99	up to 5	up to 1
Option 2	84.55	up to 6	up to 2	122.55	up to 10	up to 2	79.99	up to 5	up to 1
Option 3	122.55	up to 10	up to 2	151.05	up to 15	up to 2	89.99	up to 5	up to 1
Option 4	151.05	up to 15	up to 2						
Business							4G Satellite		
Option 1	200.00	up to 7	up to 3	200.00	up to 7	up to 3	69.99	up to 5	up to 1
Option 2	300.00	up to 10	up to 7	300.00	up to 10	up to 7	79.99	up to 5	up to 1
Option 3	500.00	up to 15	up to 10	500.00	up to 15	up to 10	89.99	up to 5	up to 1
Option 4	700.00	up to 20	up to 15	700.00	up to 20	up to 15			

CCL Networks offers Commercial services in the MD of Opportunity

	Wireline Providers			Fixed Point-to-Multipoint Wireless											
	TELUS (copper)			Arrow (unlicensed)			CCI (unlicensed)			Slave Lake (licensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Wabasca															
Residential													Expedience		
Option 1	63.00	up to 6	up to 1	65.00	up to 5	up to 1.5	49.99	up to 2	up to 0.75	46.55	up to 4	up to 2	51.99	up to 1.5	up to 0.25
Option 2	68.00	up to 15	up to 1				74.99	up to 5	up to 1	84.55	up to 6	up to 2	71.99	up to 3	up to 0.5
Option 3	73.00	up to 25	up to 5				94.99	up to 10	up to 1	122.55	up to 10	up to 2	91.99	up to 5	up to 0.5
Option 4	80.00	up to 50	up to 10							151.05	up to 15	up to 2			
Option 5															
Business													Expedience		
Option 1	60.00	up to 15	up to 1	250.00	up to 1.5	up to 1	200.00	up to 6	up to 2	200.00	up to 7	up to 3	104.99	up to 3	up to 0.8
Option 2				500.00	up to 3	up to 1.5	249.99	up to 7	up to 3	300.00	up to 10	up to 7	149.99	up to 5	up to 1
Option 3										500.00	up to 15	up to 10			
Option 4										700.00	up to 20	up to 15			

12.2.1.20 First Nations (LSLEA)

	Fixed Point-to-Multipoint Wireless														
	Arrow (unlicensed)			CCI (unlicensed)			Slave Lake (licensed)			Sniper			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Bigstone Cree															
Residential													Expedience		
Option 1	65.00	up to 5	up to 1.5	49.99	up to 2	up to 0.75	46.55	up to 4	up to 2	50.00	up to 1.5	na	51.99	up to 1.5	up to 0.25
Option 2				74.99	up to 5	up to 1	84.55	up to 6	up to 2	80.00	up to 2	na	71.99	up to 3	up to 0.5
Option 3				94.99	up to 10	up to 1	122.55	up to 10	up to 2	120.00	up to 3	na	91.99	up to 5	up to 0.5
Option 4							151.05	up to 15	up to 2						
Option 5															
Business															
Option 1	250.00	up to 1.5	up to 1	200.00	up to 6	up to 2				80.00	up to 2	na	Expedience		
Option 2	500.00	up to 3	up to 1.5	249.99	up to 7	up to 3				120.00	up to 3	na	104.99	up to 3	up to 0.8
Option 3													149.99	up to 5	up to 1
Option 4															
Option 5															

	Fixed Point-to-Multipoint Wireless														
	CCI (unlicensed)			Lakeshore (unlicensed)			Slave Lake (licensed)			Sniper			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Driftpile Cree															
Residential													4G Satellite		
Option 1	49.99	up to 2	up to 0.75	55.00	up to 2.5	up to 0.77	46.55	up to 4	up to 2	50.00	up to 1.5	na	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	75.00	up to 5	up to 1	84.55	up to 6	up to 2	80.00	up to 2	na	79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1				122.55	up to 10	up to 2	120.00	up to 3	na	89.99	up to 5	up to 1
Option 4							151.05	up to 15	up to 2						
Option 5															
Business															
Option 1	200.00	up to 6	up to 2	115.00	up to 10	up to 1.5				80.00	up to 2	na	4G Satellite		
Option 2	249.99	up to 7	up to 3							120.00	up to 3	na	69.99	up to 5	up to 1
Option 3													79.99	up to 5	up to 1
Option 4													89.99	up to 5	up to 1
Option 5															

	Fixed Point-to-Multipoint Wireless														
	Arrow (unlicensed)			**CCI (unlicensed)**			**Infinity AB (licensed)**			**Lakeshore (unlicensed)**			**Slave Lake (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Kapawe'no															
Residential															
Option 1	65.00	up to 5	up to 1.5	49.99	up to 2	up to 0.75	60.00	up to 5	up to 1	55.00	up to 2.5	up to 0.77	46.55	up to 4	up to 2
Option 2				74.99	up to 5	up to 1	99.00	up to 10	up to 1	75.00	up to 5	up to 1	84.55	up to 6	up to 2
Option 3				94.99	up to 10	up to 1							122.55	up to 10	up to 2
Option 4													151.05	up to 15	up to 2
Option 5															
Business															
Option 1	250.00	up to 1.5	up to 1	200.00	up to 6	up to 2	109.00	up to 10	up to 2	115.00	up to 10	up to 1.5			
Option 2	500.00	up to 3	up to 1.5	249.99	up to 7	up to 3									
Option 3															
Option 4															
Option 5															

	Fixed Point-to-Multipoint Wireless					
	Sniper			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Kapawe'no (cont'd)						
Residential				4G Satellite		
Option 1	50.00	up to 1.5	na	69.99	up to 5	up to 1
Option 2	80.00	up to 2	na	79.99	up to 5	up to 1
Option 3	120.00	up to 3	na	89.99	up to 5	up to 1
Option 4						
Option 5						
Business				4G Satellite		
Option 1	80.00	up to 2	na	69.99	up to 5	up to 1
Option 2	120.00	up to 3	na	79.99	up to 5	up to 1
Option 3				89.99	up to 5	up to 1
Option 4						
Option 5						

	Fixed Point-to-Multipoint Wireless											
	Arrow (unlicensed)			Slave Lake (licensed)			Sniper			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Loon River												
Residential										4G Satellite		
Option 1	65.00	up to 5	up to 1.5	46.55	up to 4	up to 2	50.00	up to 1.5	na	69.99	up to 5	up to 1
Option 2				84.55	up to 6	up to 2	80.00	up to 2	na	79.99	up to 5	up to 1
Option 3				122.55	up to 10	up to 2	120.00	up to 3	na			
Option 4				151.05	up to 15	up to 2						
Option 5												
Business										4G Satellite		
Option 1	250.00	up to 1.5	up to 1				80.00	up to 2	na	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5				120.00	up to 3	na	79.99	up to 5	up to 1
Option 3												
Option 4												
Option 5												

	Fixed Point-to-Multipoint Wireless											
	Arrow (unlicensed)			Slave Lake (licensed)			Sniper			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Peerless Trout												
Residential										4G Satellite		
Option 1	65.00	up to 5	up to 1.5	46.55	up to 4	up to 2	50.00	up to 1.5	na	69.99	up to 5	up to 1
Option 2				84.55	up to 6	up to 2	80.00	up to 2	na	79.99	up to 5	up to 1
Option 3				122.55	up to 10	up to 2	120.00	up to 3	na	89.99	up to 5	up to 1
Option 4				151.05	up to 15	up to 2						
Option 5												
Business										4G Satellite		
Option 1	250.00	up to 1.5	up to 1				80.00	up to 2	na	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5				120.00	up to 3	na	79.99	up to 5	up to 1
Option 3										89.99	up to 5	up to 1
Option 4												
Option 5												

	Fixed Point-to-Multipoint Wireless											
	CCI (unlicensed)			Slave Lake (licensed)			Sniper			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Sawridge												
Residential										4G Wireless		
Option 1	49.99	up to 2	up to 0.75	46.55	up to 4	up to 2	50.00	up to 1.5	na	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	84.55	up to 6	up to 2	80.00	up to 2	na	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	122.55	up to 10	up to 2	120.00	up to 3	na	79.99	up to 10	up to 1
Option 4				151.05	up to 15	up to 2				109.99	up to 10	up to 1
Option 5												
Business										4G Wireless		
Option 1	200.00	up to 6	up to 2				80.00	up to 2	na	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3				120.00	up to 3	na	79.99	up to 10	up to 1
Option 3										109.99	up to 10	up to 1
Option 4												
Option 5												

	Fixed Point-to-Multipoint Wireless											
	CCI (unlicensed)			**Infinity AB (licensed)**			**Lakeshore (unlicensed)**			**Slave Lake (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	ndwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Sucker Creek												
Residential												
Option 1	49.99	up to 2	up to 0.75	60.00	up to 5	up to 1	55.00	up to 2.5	up to 0.77	46.55	up to 4	up to 2
Option 2	74.99	up to 5	up to 1	99.00	up to 10	up to 1	75.00	up to 5	up to 1	84.55	up to 6	up to 2
Option 3	94.99	up to 10	up to 1							122.55	up to 10	up to 2
Option 4										151.05	up to 15	up to 2
Option 5												
Business												
Option 1	200.00	up to 6	up to 2	109.00	up to 10	up to 2	115.00	up to 10	up to 1.5			
Option 2	249.99	up to 7	up to 3									
Option 3												
Option 4												
Option 5												

	Fixed Point-to-Multipoint Wireless					
	Sniper			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Sucker Creek						
Residential				4G Satellite		
Option 1	50.00	up to 1.5	na	69.99	up to 5	up to 1
Option 2	80.00	up to 2	na	79.99	up to 5	up to 1
Option 3	120.00	up to 3	na	89.99	up to 5	up to 1
Option 4						
Option 5						
Business				4G Satellite		
Option 1	80.00	up to 2	na	69.99	up to 5	up to 1
Option 2	120.00	up to 3	na	79.99	up to 5	up to 1
Option 3				89.99	up to 5	up to 1
Option 4						
Option 5						

	Fixed Point-to-Multipoint Wireless														
	CCI (unlicensed)			Lakeshore (unlicensed)			Slave Lake (licensed)			Sniper (unlicensed)			XplorNet		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Swan River															
Residential													4G Wireless		
Option 1	49.99	up to 2	up to 0.75	55.00	up to 2.5	up to 0.77	46.55	up to 4	up to 2	50.00	up to 1.5	na	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	75.00	up to 5	up to 1	84.55	up to 6	up to 2	80.00	up to 2	na	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1				122.55	up to 10	up to 2	120.00	up to 3	na	79.99	up to 10	up to 1
Option 4							151.05	up to 15	up to 2				109.99	up to 10	up to 1
Option 5															
Business													4G Wireless		
Option 1	200.00	up to 6	up to 2	115.00	up to 10	up to 1.5				80.00	up to 2	na	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3							120.00	up to 3	na	79.99	up to 10	up to 1
Option 3													109.99	up to 10	up to 1
Option 4															
Option 5															

	Fixed Point-to-Multipoint Wireless								
	Arrow (unlicensed)			Slave Lake (licensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Whitefish Lake									
Residential							4G Satellite		
Option 1	65.00	up to 5	up to 1.5	46.55	up to 4	up to 2	69.99	up to 5	up to 1
Option 2				84.55	up to 6	up to 2	79.99	up to 5	up to 1
Option 3				122.55	up to 10	up to 2	89.99	up to 5	up to 1
Option 4				151.05	up to 15	up to 2			
Option 5									
Business							4G Satellite		
Option 1	250.00	up to 1.5	up to 1				69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5				79.99	up to 5	up to 1
Option 3							89.99	up to 5	up to 1
Option 4									
Option 5									

	Fixed Point-to-Multipoint Wireless								
	Arrow (unlicensed)			Slave Lake (licensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Woodland Cree									
Residential							4G Satellite		
Option 1	65.00	up to 5	up to 1.5	46.55	up to 4	up to 2	69.99	up to 5	up to 1
Option 2				84.55	up to 6	up to 2	79.99	up to 5	up to 1
Option 3				122.55	up to 10	up to 2			
Option 4				151.05	up to 15	up to 2			
Option 5									
Business							4G Satellite		
Option 1	250.00	up to 1.5	up to 1				69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5				79.99	up to 5	up to 1
Option 3									
Option 4									
Option 5									

12.2.1.21 Métis Settlements (LSLEA)

	Fixed Point-to-Multipoint Wireless											
	Arrow (unlicensed)			CCI (unlicensed)			Sniper			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	ndwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
East Prairie												
Residential										4G Satellite		
Option 1	65.00	up to 5	up to 1.5	49.99	up to 2	up to 0.75	50.00	up to 1.5	na	69.99	up to 5	up to 1
Option 2				74.99	up to 5	up to 1	80.00	up to 2	na	79.99	up to 5	up to 1
Option 3				94.99	up to 10	up to 1	120.00	up to 3	na	89.99	up to 5	up to 1
Option 4												
Business										4G Satellite		
Option 1	250.00	up to 1.5	up to 1	200.00	up to 6	up to 2	80.00	up to 2	na	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5	249.99	up to 7	up to 3	120.00	up to 3	na	79.99	up to 5	up to 1
Option 3										89.99	up to 5	up to 1
Option 4												
Option 5												

	Fixed Point-to-Multipoint Wireless								
	Arrow (unlicensed)			CCI (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	ndwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Gift Lake									
Residential							4G Satellite		
Option 1	65.00	up to 5	up to 1.5	49.99	up to 2	up to 0.75	69.99	up to 5	up to 1
Option 2				74.99	up to 5	up to 1	79.99	up to 5	up to 1
Option 3				94.99	up to 10	up to 1	89.99	up to 5	up to 1
Option 4									
Option 5							Have stopped selling		
Business							4G Satellite		
Option 1	250.00	up to 1.5	up to 1	200.00	up to 6	up to 2	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5	249.99	up to 7	up to 3	79.99	up to 5	up to 1
Option 3							89.99	up to 5	up to 1
Option 4									
Option 5							Have stopped selling		

	Fixed Point-to-Multipoint Wireless					
	Arrow (unlicensed)			CCI (unlicensed)		
	Cost	Bandwidth - Mb/s		Cost	ndwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Peavine						
Residential						
Option 1	65.00	up to 5	up to 1.5	49.99	up to 2	up to 0.75
Option 2				74.99	up to 5	up to 1
Option 3				94.99	up to 10	up to 1
Option 4						
Business						
Option 1	250.00	up to 1.5	up to 1	200.00	up to 6	up to 2
Option 2	500.00	up to 3	up to 1.5	249.99	up to 7	up to 3
Option 3						
Option 4						
Option 5						

16.3.6 Peace Region Economic Development Alliance (PREDA)

12.2.1.22 City of Grande Prairie

	Wireline Providers								
	TELUS (copper & fibre)			Eastlink (coaxial cable)			GPOptiX (Fibre)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Grande Prairie									
Residential							Partial		
Option 1	63.00	up to 6	up to 1	55.95	up to 5	up to 1	69.95	up to 10	up to 2.5
Option 2	68.00	up to 15	up to 1	78.95	up to 30	up to 3	85.95	up to 30	up to 3
Option 3	73.00	up to 25	up to 5	88.95	up to 50	up to 5	115.95	up to 25	up to 5
Option 4	80.00	up to 50	up to 10	98.95	up to 100	up to 10	145.95	up to 50	up to 5
Option 5	85.00	up to 150	up to 150	149.95	up to 150	up to 10			
Option 6				259.95	up to 940	up to 10			
Business									
Option 1	60.00	up to 15	up to 1	na	up to 50	up to 5	79.95	up to 10	up to 5
Option 2	85.00	up to 25	up to 5	na	up to 100	up to 10	139.95	up to 20	up to 7.5
Option 3	100.00	up to 50	up to 10	na	up to 200	up to 10	219.95	up to 30	up to 10
Option 4	125.00	up to 100	up to 20						
Option 5	150.00	up to 150	up to 150						

	Fixed Point-to-Multipoint Wireless																	
	CCI (unlicensed)			Crossover			First Broadband			GPNetworks			NEXXCom (licensed)			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Grande Prairie																		
Residential										Partial						4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	na	na	na	99.00	up to 1	up to 0.5	49.95	up to 3	up to 1.5	69.95	up to 3	up to 1	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1				129.00	up to 4	up to 1	79.95	up to 5	up to 1.5	89.95	up to 6	up to 2	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1				149.00	up to 7	up to 1	99.95	up to 7	up to 1.5				79.99	up to 25	up to 1
Option 4										189.95	up to 10	up to 2				109.99	up to 25	up to 1
Business																4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	na	na	na	199.00	up to 2.5	up to 1.5	59.95	up to 3	up to 2	149.95	up to 5	up to 5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3				279.00	up to 5	up to 2.5	129.95	up to 5	up to 2	224.95	up to 7.5	up to 7.5	79.99	up to 25	up to 1
Option 3							329.00	up to 8	up to 4	219.95	up to 7	up to 3	299.95	up to 10	up to 10	109.99	up to 25	up to 1
Option 4							na	up to 10	up to 5									
Option 5																		

12.2.1.23 Town of Beaverlodge

	Wireline Providers					
	TELUS (copper)			Eastlink (coaxial cable)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Beaverlodge						
Residential						
Option 1	63.00	up to 6	up to 1	55.95	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	78.95	up to 30	up to 3
Option 3				88.95	up to 50	up to 5
Option 4				98.95	up to 100	up to 10
Option 5				149.95	up to 150	up to 10
Option 6				259.95	up to 940	up to 10
Business						
Option 1	60.00	up to 15	up to 1	na	up to 50	up to 5
Option 2	85.00	Up to 25	up to 5	na	up to 100	up to 10
Option 3				na	up to 200	up to 10
Option 4						
Option 5						

	Fixed Point-to-Multipoint Wireless																	
	CCI (unlicensed)			Crossover			First Broadband			GPNetworks			NEXXCom (licensed)			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Beaverlodge																		
Residential																4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	na	na	na	99.00	up to 1	up to 0.5	49.95	up to 3	up to 1.5	69.95	up to 3	up to 1	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1				129.00	up to 4	up to 1	79.95	up to 5	up to 1.5	89.95	up to 6	up to 2	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1				149.00	up to 7	up to 1	99.95	up to 7	up to 1.5				79.99	up to 25	up to 1
Option 4										189.95	up to 10	up to 2				109.99	up to 25	up to 1
Option 5																		
Business																4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	na	na	na	199.00	up to 2.5	up to 1.5	59.95	up to 3	up to 2	149.95	up to 5	up to 5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3				279.00	up to 5	up to 2.5	129.95	up to 5	up to 2	224.95	up to 7.5	up to 7.5	79.99	up to 25	up to 1
Option 3							329.00	up to 8	up to 4	219.95	up to 7	up to 3	299.95	up to 10	up to 10	109.99	up to 25	up to 1
Option 4							na	up to 10	up to 5									
Option 5																		

12.2.1.24 Town of Fairview

	Wireline Providers						Fixed Point-to-Multipoint Wireless											
	TELUS (copper)			Eastlink (coaxial cable)			AB North			Mighty Peace (licensed/unlicensed)			Wispernet			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Fairview																		
Residential																Fixed Wireless Expedience		
Option 1	63.00	up to 6	up to 1	77.00	up to 20	up to 2	53.00	up to 1.5	up to 0.5	49.95	up to 2	up to 1	$39.95	up to 1.5	up to 1.5	51.99	up to 1.5	up to 0.3
Option 2	68.00	up to 15	up to 1				83.00	up to 5	up to 1	74.95	up to 5	up to 1.25				71.99	up to 3	up to 0.5
Option 3	73.00	up to 25	up to 5							94.95	up to 7	up to 1.5				91.99	up to 5	up to 0.5
Option 4																		
Option 5																		
Business																Fixed Wireless Expedience		
Option 1	60.00	up to 15	up to 1				200.00	up to 10	up to 2	49.95	up to 2	up to 1	$49.95	up to 1.5	up to 1.5	104.99	up to 3	up to 0.8
Option 2	85.00	up to 25	up to 5							100.00	up to 8	up to 2				149.99	up to 5	up to 1
Option 3																		
Option 4																		
Option 5																		

12.2.1.25 Town of Falher

	Wireline Provider			Fixed Point-to-Multipoint Wireless														
	TELUS (copper)			AB North			CCI (unlicensed)			I Want			Wispernet			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Falher																		
Residential																KA2 Satellite		
Option 1	63.00	up to 6	up to 1	53.00	up to 1.5	up to 0.5	49.99	up to 2	up to 0.75	49.95	up to 5	up to 1	$39.95	up to 1.5	up to 1.5	69.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	83.00	up to 5	up to 1	74.99	up to 5	up to 1	59.95	up to 5	up to 1				79.99	up to 5	up to 1
Option 3							94.99	up to 10	up to 1	89.95	up to 10	up to 2						
Option 4										129.95	up to 15	up to 3						
Option 5										159.95	up to 15	up to 3						
Business																KA2 Satellite		
Option 1	60.00	up to 15	up to 1	200.00	up to 10	up to 2	200.00	up to 6	up to 2	99.95	up to 10	up to 2	$49.95	up to 1.5	up to 1.5	69.99	up to 5	up to 1
Option 2							249.99	up to 7	up to 3	149.95	up to 15	up to 3				79.99	up to 5	up to 1
Option 3										249.95	up to 20	up to 4						
Option 4										800.00	up to 50	up to 10						
Option 5																		

12.2.1.26 Town of Fox Creek

	Wireline Providers						Fixed Point-to-Multipoint Wireless								
	TELUS (copper)			Eastlink (coaxial cable)			Slave Lake (licensed)			Whitecourt (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Fox Creek															
Residential													KA2 Satellite		
Option 1	63.00	up to 6	up to 1	55.95	up to 5	up to 1	46.55	up to 4	up to 2	46.55	up to 4	up to 2	69.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	78.95	up to 30	up to 3	84.55	up to 6	up to 2	84.55	up to 6	up to 2	79.99	up to 5	up to 1
Option 3				88.95	up to 50	up to 5	122.55	up to 10	up to 2	122.55	up to 10	up to 2	89.99	up to 5	up to 1
Option 4				98.95	up to 100	up to 10	151.05	up to 15	up to 2	151.05	up to 15	up to 2			
Option 5				149.95	up to 150	up to 10									
Option 6				259.95	up to 400	up to 10									
Business													KA2 Satellite		
Option 1	60.00	up to 15	up to 1	na	up to 50	up to 5	200.00	up to 7	up to 3	200.00	up to 7	up to 3	69.99	up to 5	up to 1
Option 2				na	up to 100	up to 10	300.00	up to 10	up to 7	300.00	up to 10	up to 7	79.99	up to 5	up to 1
Option 3				na	up to 200	up to 10	500.00	up to 15	up to 10	500.00	up to 15	up to 10	89.99	up to 5	up to 1
Option 4							700.00	up to 20	up to 15	700.00	up to 20	up to 15			
Option 5															

12.2.1.27 Town of Grande Cache

	Wireline Provider			Fixed Wireless		
	TELUS (copper)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Grande Cache						
Residential				Fixed Wireless Expedience		
Option 1	63.00	up to 6	up to 1	51.99	up to 1.5	up to 0.25
Option 2				71.99	up to 3	up to 0.5
Option 3				91.99	up to 5	up to 0.5
Option 4						
Option 5						
Business				Fixed Wireless Expedience		
Option 1				104.99	up to 3	up to 0.8
Option 2				149.99	up to 5	up to 1
Option 3						
Option 4						
Option 5						

12.2.1.28 Town of Grimshaw

	Wireline Providers						Fixed Point-to-Multipoint Wireless											
	TELUS (copper)			Eastlink (coaxial cable)			AB North			Bell			Wispernet			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Grimshaw																		
Residential																Fixed Wireless Expedience		
Option 1	63.00	up to 6	up to 1		up to 20	up to 2	53.00	up to 1.5	up to 0.5	65.00	up to 5	up to 1	$39.95	up to 1.5	up to 1.5	51.99	up to 1.5	up to 0.25
Option 2	68.00	up to 15	up to 1				83.00	up to 5	up to 1							71.99	up to 3	up to 0.5
Option 3	73.00	up to 25	up to 5													91.99	up to 5	up to 0.5
Option 4	80.00	up to 50	up to 10															
Option 5																		
Business																Fixed Wireless Expedience		
Option 1							200.00	up to 10	up to 2				$49.95	up to 1.5	up to 1.5	104.99	up to 3	up to 0.8
Option 2																149.99	up to 5	up to 1
Option 3																		
Option 4																		
Option 5																		

12.2.1.29 Town of Manning

	Wireline Provider			Fixed Point-to-Multipoint Wireless					
	TELUS (copper)			AB North			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Manning									
Residential							KA2 Satellite		
Option 1	63.00	up to 6	up to 1	53.00	up to 1.5	up to 0.5	69.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	83.00	up to 5	up to 1	79.99	up to 5	up to 1
Option 3	73.00	up to 25	up to 5						
Option 4	80.00	up to 50	up to 10						
Option 5									
Business							KA2 Satellite		
Option 1	60.00	up to 15	up to 1	200.00	up to 10	up to 2	69.99	up to 5	up to 1
Option 2							79.99	up to 5	up to 1
Option 3									
Option 4									
Option 5									

12.2.1.30 Town of McLennan

	Wireline Provider			Fixed Point-to-Multipoint Wireless								
	TELUS (copper)			CCI (unlicensed)			I Want			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
McLennan												
Residential										KA2 Satellite		
Option 1	63.00	up to 6	up to 1	49.99	up to 2	up to 0.75	49.95	up to 5	up to 1	69.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	74.99	up to 5	up to 1	59.95	up to 5	up to 1	79.99	up to 5	up to 1
Option 3	73.00	up to 25	up to 5	94.99	up to 10	up to 1	89.95	up to 10	up to 2			
Option 4	80.00	up to 50	up to 10				129.95	up to 15	up to 3			
Option 5							159.95	up to 15	up to 3			
Business										KA2 Satellite		
Option 1	60.00	up to 15	up to 1	200.00	up to 6	up to 2	99.95	up to 10	up to 2	69.99	up to 5	up to 1
Option 2	85.00	up to 25	up to 5	249.99	up to 7	up to 3	149.95	up to 15	up to 3	79.99	up to 5	up to 1
Option 3							249.95	up to 20	up to 4			
Option 4							800.00	up to 50	up to 10			
Option 5												

12.2.1.31 Town of Peace River

	Wireline Providers						Fixed Point-to-Multipoint Wireless											
	TELUS (copper & fibre)			Eastlink (coaxial cable)			AB North			I Want			Wispernet			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Peace River																		
Residential																Fixed Wireless Expedience		
Option 1	63.00	up to 6	up to 1	77.00	up to 20	up to 2	53.00	up to 1.5	up to 0.5	49.95	up to 5	up to 1	$39.95	up to 1.5	up to 1.5	51.99	up to 1.5	up to 0.25
Option 2	68.00	up to 15	up to 1				83.00	up to 5	up to 1	59.95	up to 5	up to 1				71.99	up to 3	up to 0.5
Option 3	73.00	up to 25	up to 5							89.95	up to 10	up to 2				91.99	up to 5	up to 0.5
Option 4	80.00	up to 50	up to 10							129.95	up to 15	up to 3						
Option 5	85.00	up to 150	up to 150							159.95	up to 15	up to 3						
Business																Fixed Wireless Expedience		
Option 1	60.00	up to 15	up to 1				200.00	up to 10	up to 2	99.95	up to 10	up to 2	$49.95	up to 1.5	up to 1.5	104.99	up to 3	up to 0.8
Option 2	85.00	up to 25	up to 5							149.95	up to 15	up to 3				149.99	up to 5	up to 1
Option 3	100.00	up to 50	up to 10							249.95	up to 20	up to 4						
Option 4	125.00	up to 100	up to 20							800.00	up to 50	up to 10						
Option 5	150.00	up to 150	up to 150															

12.2.1.32 Town of Sexsmith

	Wireline Providers						Fixed Point-to-Multipoint Wireless								
	TELUS (copper)			Eastlink (coaxial cable)			CCI (unlicensed)			Crossover			First Broadband		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Sexsmith															
Residential															
Option 1	63.00	up to 6	up to 1	55.95	up to 5	up to 1	49.99	up to 2	up to 0.75	na	na	na	99.00	up to 1	up to 0.5
Option 2	68.00	up to 15	up to 1	78.95	up to 30	up to 3	74.99	up to 5	up to 1				129.00	up to 4	up to 1
Option 3				88.95	up to 50	up to 5	94.99	up to 10	up to 1				149.00	up to 7	up to 1
Option 4				98.95	up to 100	up to 10									
Option 5				149.95	up to 150	up to 10									
Option 6				259.95	up to 940	up to 10									
Business															
Option 1	60.00	up to 15	up to 1	na	up to 50	up to 5	200.00	up to 6	up to 2	na	na	na	199.00	up to 2.5	up to 1.5
Option 2	85.00	up to 25	up to 5	na	up to 100	up to 10	249.99	up to 7	up to 3				279.00	up to 5	up to 2.5
Option 3				na	up to 200	up to 10							329.00	up to 8	up to 4
Option 4													na	up to 10	up to 5
Option 5															

	Fixed Point-to-Multipoint Wireless											
	GPNetworks			I Want			NEXXCom (licensed)			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Sexsmith												
Residential										4G LTE Fixed Wireless		
Option 1	49.95	up to 3	up to 1.5	49.95	up to 5	up to 1	69.95	up to 3	up to 1	59.99	up to 5	up to 1
Option 2	79.95	up to 5	up to 1.5	59.95	up to 5	up to 1	89.95	up to 6	up to 2	69.99	up to 10	up to 1
Option 3	99.95	up to 7	up to 1.5	89.95	up to 10	up to 2				79.99	up to 25	up to 1
Option 4	189.95	up to 10	up to 2	129.95	up to 15	up to 3				109.99	up to 25	up to 1
Option 5				159.95	up to 15	up to 3						
Business										4G LTE Fixed Wireless		
Option 1	59.95	up to 3	up to 2	99.95	up to 10	up to 2	149.95	up to 5	up to 5	69.99	up to 10	up to 1
Option 2	129.95	up to 5	up to 2	149.95	up to 15	up to 3	224.95	up to 7.5	up to 7.5	79.99	up to 25	up to 1
Option 3	219.95	up to 7	up to 3	249.95	up to 20	up to 4	299.95	up to 10	up to 10	109.99	up to 25	up to 1
Option 4				800.00	up to 50	up to 10						
Option 5												

12.2.1.33 Town of Spirit River

	Wireline Provider			Fixed Point-to-Multipoint Wireless								
	TELUS (copper)			AB North			CCI (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Spirit River												
Residential										4G LTE Fixed Wireless		
Option 1	63.00	up to 6	up to 1	53.00	up to 1.5	up to 0.5	49.99	up to 2	up to 0.75	59.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	83.00	up to 5	up to 1	74.99	up to 5	up to 1	69.99	up to 10	up to 1
Option 3							94.99	up to 10	up to 1	79.99	up to 25	up to 1
Option 4										109.99	up to 25	up to 1
Option 5												
Business										4G LTE Fixed Wireless		
Option 1	60.00	up to 15	up to 1	200.00	up to 10	up to 2	200.00	up to 6	up to 2	69.99	up to 10	up to 1
Option 2							249.99	up to 7	up to 3	79.99	up to 25	up to 1
Option 3										109.99	up to 25	up to 1
Option 4												
Option 5												

12.2.1.34 Town of Valleyview

	Wireline Provider			Fixed Point-to-Multipoint Wireless					
	TELUS (copper)			I Want			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Valleyview									
Residential							Fixed Wireless Expedience		
Option 1	63.00	up to 6	up to 1	49.95	up to 5	up to 1	51.99	up to 1.5	up to 0.25
Option 2	68.00	up to 15	up to 1	59.95	up to 5	up to 1	71.99	up to 3	up to 0.5
Option 3				89.95	up to 10	up to 2	91.99	up to 5	up to 0.5
Option 4				129.95	up to 15	up to 3			
Option 5				159.95	up to 15	up to 3			
Business							Fixed Wireless Expedience		
Option 1	60.00	up to 15	up to 1	99.95	up to 10	up to 2	104.99	up to 3	up to 0.8
Option 2				149.95	up to 15	up to 3	149.99	up to 5	up to 1
Option 3				249.95	up to 20	up to 4			
Option 4				800.00	up to 50	up to 10			
Option 5									

12.2.1.35 Town of Wembley

	Wireline Provider					
	TELUS (copper)			Eastlink (coaxial cable)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Wembley						
Residential						
Option 1	63.00	up to 6	up to 1	55.95	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	78.95	up to 30	up to 3
Option 3	73.00	up to 25	up to 5	88.95	up to 50	up to 5
Option 4	80.00	up to 50	up to 10	98.95	up to 100	up to 10
Option 5				149.95	up to 150	up to 10
Option 6				259.95	up to 940	up to 10
Business						
Option 1	60.00	up to 15	up to 1	na	up to 50	up to 5
Option 2				na	up to 100	up to 10
Option 3				na	up to 200	up to 10
Option 4						
Option 5						

	Fixed Point-to-Multipoint Wireless																	
	CCI (unlicensed)			Crossover			First Broadband			GPNetworks			NEXXCom (licensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Wembley (cont'd)																		
Residential																4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	na	na	na	99.00	up to 1	up to 0.5	49.95	up to 3	up to 1.5	69.95	up to 3	up to 1	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1				129.00	up to 4	up to 1	79.95	up to 5	up to 1.5	89.95	up to 6	up to 2	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1				149.00	up to 7	up to 1	99.95	up to 7	up to 1.5				79.99	up to 25	up to 1
Option 5										189.95	up to 10	up to 2				109.99	up to 25	up to 1
Option 4																		
Business																4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	na	na	na	199.00	up to 2.5	up to 1.5	59.95	up to 3	up to 2	149.95	up to 5	up to 5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3				279.00	up to 5	up to 2.5	129.95	up to 5	up to 2	224.95	up to 7.5	up to 7.5	79.99	up to 25	up to 1
Option 3							329.00	up to 8	up to 4	219.95	up to 7	up to 3	299.95	up to 10	up to 10	109.99	up to 25	up to 1
Option 4							na	up to 10	up to 5									
Option 5																		

12.2.1.36 Village of Berwyn

	Wireline Provider			Fixed Point-to-Multipoint Wireless								
	TELUS (copper)			Bell			AB North			Wispernet			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Berwyn															
Residential													Fixed Wireless Expedience		
Option 1	63.00	up to 6	up to 1	65.00	up to 5	up to 1	53.00	up to 1.5	up to 0.5	$39.95	up to 1.5	up to 1.5	51.99	up to 1.5	up to 0.25
Option 2	68.00	up to 15	up to 1				83.00	up to 5	up to 1				71.99	up to 3	up to 0.5
Option 3	73.00	up to 25	up to 5										91.99	up to 5	up to 0.5
Option 4															
Option 5															
Business													Fixed Wireless Expedience		
Option 1	60.00	up to 15	up to 1				200.00	up to 10	up to 2	$49.95	up to 1.5	up to 1.5	104.99	up to 3	up to 0.8
Option 2	85.00	up to 25	up to 5										149.99	up to 5	up to 1
Option 3															
Option 4															
Option 5															

12.2.1.37 Village of Donnelly

	Wireline Provider			Fixed Point-to-Multipoint Wireless								
	TELUS (copper)			I Want			Wispernet			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Donnelly												
Residential										KA2 Satellite		
Option 1	63.00	up to 6	up to 1	49.95	up to 5	up to 1	$39.95	up to 1.5	up to 1.5	69.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	59.95	up to 5	up to 1				79.99	up to 5	up to 1
Option 3				89.95	up to 10	up to 2						
Option 4				129.95	up to 15	up to 3						
Option 5				159.95	up to 15	up to 3						
Business										KA2 Satellite		
Option 1	60.00	up to 15	up to 1	99.95	up to 10	up to 2	$49.95	up to 1.5	up to 1.5	69.99	up to 5	up to 1
Option 2				149.95	up to 15	up to 3				79.99	up to 5	up to 1
Option 3				249.95	up to 20	up to 4						
Option 4				800.00	up to 50	up to 10						
Option 5												

12.2.1.38 Village of Girouxville

	Wireline Provider			Fixed Point-to-Multipoint Wireless												
	TELUS (copper)			AB North			CCI (unlicensed)			I Want			Wispernet			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Girouxville																		
Residential																KA2 Satellite		
Option 1	63.00	up to 6	up to 1	53.00	up to 1.5	up to 0.5	49.99	up to 2	up to 0.75	49.95	up to 5	up to 1	$39.95	up to 1.5	up to 1.5	69.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	83.00	up to 5	up to 1	74.99	up to 5	up to 1	59.95	up to 5	up to 1				79.99	up to 5	up to 1
Option 3	73.00	up to 25	up to 5				94.99	up to 10	up to 1	89.95	up to 10	up to 2						
Option 4	80.00	up to 50	up to 10							129.95	up to 15	up to 3						
Option 5										159.95	up to 15	up to 3						
Business																KA2 Satellite		
Option 1	60.00	up to 15	up to 1	200.00	up to 10	up to 2	200.00	up to 6	up to 2	99.95	up to 10	up to 2	$49.95	up to 1.5	up to 1.5	69.99	up to 5	up to 1
Option 2							249.99	up to 7	up to 3	149.95	up to 15	up to 3				79.99	up to 5	up to 1
Option 3										249.95	up to 20	up to 4						
Option 4										800.00	up to 50	up to 10						
Option 5																		

12.2.1.39 Village of Hines Creek

	Fixed Point-to-Multipoint Wireless								
	AB North			Mighty Peace (licensed/unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Hines Creek									
Residential							Fixed Wireless Expedience		
Option 1	53.00	up to 1.5	up to 0.5	49.95	up to 2	up to 1	51.99	up to 1.5	up to 0.25
Option 2	83.00	up to 5	up to 1	74.95	up to 5	up to 1.25	71.99	up to 3	up to 0.5
Option 3				94.95	up to 7	up to 1.5	91.99	up to 5	up to 0.5
Option 4									
Option 5									
Business							Fixed Wireless Expedience		
Option 1	200.00	up to 10	up to 2	49.95	up to 2	up to 1	104.99	up to 3	up to 0.8
Option 2				100.00	up to 8	up to 2	149.99	up to 5	up to 1
Option 3									
Option 4									
Option 5									

12.2.1.40 Village of Hythe

	Wireline Provider		
	TELUS (copper)		
	Cost	Bandwidth - Mb/s	
	$/mo	Down	Up
Hythe			
Residential			
Option 1	63.00	up to 6	up to 1
Option 2			
Option 3			
Option 4			
Option 5			
Business			
Option 1			
Option 2			
Option 3			
Option 4			
Option 5			

	Fixed Point-to-Multipoint Wireless																	
	CCI (unlicensed)			Crossover			First Broadband			GPNetworks			NEXXCom (licensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Hythe																		
Residential																4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	na	na	na	99.00	up to 1	up to 0.5	49.95	up to 3	up to 1.5	69.95	up to 3	up to 1	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1				129.00	up to 4	up to 1	79.95	up to 5	up to 1.5	89.95	up to 6	up to 2	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1				149.00	up to 7	up to 1	99.95	up to 7	up to 1.5				79.99	up to 25	up to 1
Option 4										189.95	up to 10	up to 2				109.99	up to 25	up to 1
Option 5																		
Business																4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	na	na	na	199.00	up to 2.5	up to 1.5	59.95	up to 3	up to 2	149.95	up to 5	up to 5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3				279.00	up to 5	up to 2.5	129.95	up to 5	up to 2	224.95	up to 7.5	up to 7.5	79.99	up to 25	up to 1
Option 3							329.00	up to 8	up to 4	219.95	up to 7	up to 3	299.95	up to 10	up to 10	109.99	up to 25	up to 1
Option 4							na	up to 10	up to 5									
Option 5																		

12.2.1.41 Village of Nampa

	Wireline Provider			Fixed Point-to-Multipoint Wireless											
	CCI Wired (copper)			AB North			I Want			Wispernet			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Nampa															
Residential													KA2 Satellite		
Option 1	69.99	up to 10	up to 1	53.00	up to 1.5	up to 0.5	49.95	up to 5	up to 1	$39.95	up to 1.5	up to 1.5	69.99	up to 5	up to 1
Option 2	79.99	up to 15	up to 2	83.00	up to 5	up to 1	59.95	up to 5	up to 1				79.99	up to 5	up to 1
Option 3	89.99	up to 25	up to 3				89.95	up to 10	up to 2						
Option 4	109.99	up to 50	up to 5				129.95	up to 15	up to 3						
Option 5							159.95	up to 15	up to 3						
Business													KA2 Satellite		
Option 1	149.00	up to 25	up to 7	200.00	up to 10	up to 2	99.95	up to 10	up to 2	$49.95	up to 1.5	up to 1.5	69.99	up to 5	up to 1
Option 2	199.00	up to 50	up to 10				149.95	up to 15	up to 3				79.99	up to 5	up to 1
Option 3							249.95	up to 20	up to 4						
Option 4							800.00	up to 50	up to 10						
Option 5															

12.2.1.42 Village of Rycroft

	Wireline Provider			Fixed Point-to-Multipoint Wireless													
	TELUS (copper)			AB North			CCI (unlicensed)			I Want			Wispernet			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Rycroft																		
Residential																4G LTE Fixed Wireless		
Option 1	63.00	up to 6	up to 1	53.00	up to 1.5	up to 0.5	49.99	up to 2	up to 0.75	49.95	up to 5	up to 1	$39.95	up to 1.5	up to 1.5	59.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	83.00	up to 5	up to 1	74.99	up to 5	up to 1	59.95	up to 5	up to 1				69.99	up to 10	up to 1
Option 3	73.00	up to 25	up to 5				94.99	up to 10	up to 1	89.95	up to 10	up to 2				79.99	up to 25	up to 1
Option 4										129.95	up to 15	up to 3				109.99	up to 25	up to 1
Option 5										159.95	up to 15	up to 3						
Business																4G LTE Fixed Wireless		
Option 1	60.00	up to 15	up to 1	200.00	up to 10	up to 2	200.00	up to 6	up to 2	99.95	up to 10	up to 2	$49.95	up to 1.5	up to 1.5	69.99	up to 10	up to 1
Option 2	85.00	up to 25	up to 5				249.99	up to 7	up to 3	149.95	up to 15	up to 3				79.99	up to 25	up to 1
Option 3										249.95	up to 20	up to 4				109.99	up to 25	up to 1
Option 4										800.00	up to 50	up to 10						
Option 5																		

12.2.1.43 Birch Hills County

	Fixed Point-to-Multipoint Wireless											
	AB North			CCI (unlicensed)			Wispernet			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Eaglesham												
Residential										KA2 Satellite		
Option 1	53.00	up to 1.5	up to 0.5	49.99	up to 2	up to 0.75	$39.95	up to 1.5	up to 1.5	69.99	up to 5	up to 1
Option 2	83.00	up to 5	up to 1	74.99	up to 5	up to 1				79.99	up to 5	up to 1
Option 3				94.99	up to 10	up to 1						
Option 4												
Option 5												
Business										KA2 Satellite		
Option 1	200.00	up to 10	up to 2	200.00	up to 6	up to 2	$49.95	up to 1.5	up to 1.5	69.99	up to 5	up to 1
Option 2				249.99	up to 7	up to 3				79.99	up to 5	up to 1
Option 3												
Option 4												
Option 5												

	Fixed Point-to-Multipoint Wireless											
	AB North			CCI (unlicensed)			Wispernet			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Wanham												
Residential										4G LTE Fixed Wireless		
Option 1	53.00	up to 1.5	up to 0.5	49.99	up to 2	up to 0.75	50.00	up to 2	up to 1	59.99	up to 5	up to 1
Option 2	83.00	up to 5	up to 1	74.99	up to 5	up to 1	100.00	up to 8	up to 2	69.99	up to 10	up to 1
Option 3				94.99	up to 10	up to 1				79.99	up to 25	up to 1
Option 4										109.99	up to 25	up to 1
Option 5												
Business										4G LTE Fixed Wireless		
Option 1	200.00	up to 10	up to 2	200.00	up to 6	up to 2	50.00	up to 2	up to 1	69.99	up to 10	up to 1
Option 2				249.99	up to 7	up to 3	100.00	up to 8	up to 2	79.99	up to 25	up to 1
Option 3										109.99	up to 25	up to 1
Option 4												
Option 5												

	Fixed Point-to-Multipoint Wireless								
	AB North			**CCI (unlicensed)**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Peoria, Watino									
Residential							KA2 Satellite		
Option 1	53.00	up to 1.5	up to 0.5	49.99	up to 2	up to 0.75	69.99	up to 5	up to 1
Option 2	83.00	up to 5	up to 1	74.99	up to 5	up to 1	79.99	up to 5	up to 1
Option 3				94.99	up to 10	up to 1			
Option 4									
Option 5									
Business							KA2 Satellite		
Option 1	200.00	up to 10	up to 2	200.00	up to 6	up to 2	69.99	up to 5	up to 1
Option 2				249.99	up to 7	up to 3	79.99	up to 5	up to 1
Option 3									
Option 4									
Option 5									

	Fixed Point-to-Multipoint Wireless											
	AB North			**CCI (unlicensed)**			**Wispernet**			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Tangent												
Residential										KA2 Satellite		
Option 1	53.00	up to 1.5	up to 0.5	49.99	up to 2	up to 0.75	$39.95	up to 1.5	up to 1.5	69.99	up to 5	up to 1
Option 2	83.00	up to 5	up to 1	74.99	up to 5	up to 1				79.99	up to 5	up to 1
Option 3				94.99	up to 10	up to 1						
Option 4												
Option 5												
Business										KA2 Satellite		
Option 1	200.00	up to 10	up to 2	200.00	up to 6	up to 2	$49.95	up to 1.5	up to 1.5	69.99	up to 5	up to 1
Option 2				249.99	up to 7	up to 3				79.99	up to 5	up to 1
Option 3												
Option 4												
Option 5												

12.2.1.44 Clear Hills County

	Fixed Point-to-Multipoint Wireless					
	CCI (unlicensed)			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Cleardale						
Residential				KA2 Satellite		
Option 1	49.99	up to 2	up to 0.75	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1			
Option 4						
Option 5						
Business				KA2 Satellite		
Option 1	200.00	up to 6	up to 2	69.99	up to 5	up to 1
Option 2	249.99	up to 7	up to 3	79.99	up to 5	up to 1
Option 3						
Option 4						
Option 5						

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			Mighty Peace (licensed/unlicensed)			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Worsley									
Residential							KA2 Satellite		
Option 1	49.99	up to 2	up to 0.75	49.95	up to 2	up to 1	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	74.95	up to 5	up to 1.25	79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1	94.95	up to 7	up to 1.5			
Option 4									
Option 5									
Business							KA2 Satellite		
Option 1	200.00	up to 6	up to 2	49.95	up to 2	up to 1	69.99	up to 5	up to 1
Option 2	249.99	up to 7	up to 3	100.00	up to 8	up to 2	79.99	up to 5	up to 1
Option 3									
Option 4									
Option 5									

12.2.1.45 MD of Fairview

	Fixed Point-to-Multipoint Wireless											
	AB North			Mighty Peace (licensed/unlicens			Wispernet			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Bluesky, Whitelaw												
Residential										Expedience		
Option 1	53.00	up to 1.5	up to 0.5	49.95	up to 2	up to 1	$39.95	up to 1.5	up to 1.5	51.99	up to 1.5	up to 0.25
Option 2	83.00	up to 5	up to 1	74.95	up to 5	up to 1.25				71.99	up to 3	up to 0.5
Option 3				94.95	up to 7	up to 1.5				91.99	up to 5	up to 0.5
Option 4												
Option 5												
Business										Expedience		
Option 1	200.00	up to 10	up to 2	49.95	up to 2	up to 1	$49.95	up to 1.5	up to 1.5	104.99	up to 3	up to 0.8
Option 2				100.00	up to 8	up to 2				149.99	up to 5	up to 1
Option 3												
Option 4												
Option 5												

12.2.1.46 County of Grande Prairie

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			GPNetworks			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	ndwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Bezanson									
Residential							4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	49.95	up to 3	up to 1.5	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	79.95	up to 5	up to 1.5	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	99.95	up to 7	up to 1.5	79.99	up to 25	up to 1
Option 4				189.95	up to 10	up to 2	109.99	up to 25	up to 1
Option 5									
Business							4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	59.95	up to 3	up to 2	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	129.95	up to 5	up to 2	79.99	up to 25	up to 1
Option 3				219.95	up to 7	up to 3	109.99	up to 25	up to 1
Option 4									
Option 5									

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			GPNetworks			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	ndwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Demmitt									
Residential							4G Satellite		
Option 1	49.99	up to 2	up to 0.75	49.95	up to 3	up to 1.5	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	79.95	up to 5	up to 1.5	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	99.95	up to 7	up to 1.5	79.99	up to 10	up to 1
Option 4				189.95	up to 10	up to 2	109.99	up to 10	up to 1
Option 5									
Business							4G Satellite		
Option 1	200.00	up to 6	up to 2	59.95	up to 3	up to 2	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	129.95	up to 5	up to 2	79.99	up to 10	up to 1
Option 3				219.95	up to 7	up to 3	109.99	up to 10	up to 1
Option 4									
Option 5									

	Wireline Providers						Fixed Point-to-Multipoint Wireless								
	TELUS (copper)			Eastlink (coaxial cable)			CCI (unlicensed)			Crossover			First Broadband		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Clairmont															
Residential															
Option 1	63.00	up to 6	up to 1	55.95	up to 5	up to 1	49.99	up to 2	up to 0.75	na	na	na	99.00	up to 1	up to 0.5
Option 2	68.00	up to 15	up to 1	78.95	up to 30	up to 3	74.99	up to 5	up to 1				129.00	up to 4	up to 1
Option 3				88.95	up to 50	up to 5	94.99	up to 10	up to 1				149.00	up to 7	up to 1
Option 4				98.95	up to 100	up to 10									
Option 5				149.95	up to 150	up to 10									
Option 6				259.95	up to 940	up to 10									
Business															
Option 1	60.00	up to 15	up to 1	na	up to 50	up to 5	200.00	up to 6	up to 2	na	na	na	199.00	up to 2.5	up to 1.5
Option 2				na	up to 100	up to 10	249.99	up to 7	up to 3				279.00	up to 5	up to 2.5
Option 3				na	up to 200	up to 10							329.00	up to 8	up to 4
Option 4													na	up to 10	up to 5
Option 5															

	Fixed Point-to-Multipoint Wireless											
	GPNetworks			I Want			NEXXCom (licensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Clairmont												
Residential										4G LTE Fixed Wireless		
Option 1	49.95	up to 3	up to 1.5	49.95	up to 5	up to 1	69.95	up to 3	up to 1	59.99	up to 5	up to 1
Option 2	79.95	up to 5	up to 1.5	59.95	up to 5	up to 1	89.95	up to 6	up to 2	69.99	up to 10	up to 1
Option 3	99.95	up to 7	up to 1.5	89.95	up to 10	up to 2				79.99	up to 25	up to 1
Option 4	189.95	up to 10	up to 2	129.95	up to 15	up to 3				109.99	up to 25	up to 1
Option 5				159.95	up to 15	up to 3						
Business										4G LTE Fixed Wireless		
Option 1	59.95	up to 3	up to 2	99.95	up to 10	up to 2	149.95	up to 5	up to 5	69.99	up to 10	up to 1
Option 2	129.95	up to 5	up to 2	149.95	up to 15	up to 3	224.95	up to 7.5	up to 7.5	79.99	up to 25	up to 1
Option 3	219.95	up to 7	up to 3	249.95	up to 20	up to 4	299.95	up to 10	up to 10	109.99	up to 25	up to 1
Option 4				800.00	up to 50	up to 10						
Option 5												

	Fixed Point-to-Multipoint Wireless											
	CCI (unlicensed)			GPNetworks			NEXXCom (licensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	ndwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Dimsdale, Elmworth, Goodfare, Teepee Creek												
Residential										4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	49.95	up to 3	up to 1.5	69.95	up to 3	up to 1	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	79.95	up to 5	up to 1.5	89.95	up to 6	up to 2	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1	99.95	up to 7	up to 1.5				79.99	up to 25	up to 1
Option 4				189.95	up to 10	up to 2				109.99	up to 25	up to 1
Option 5												
Business										4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	59.95	up to 3	up to 2	149.95	up to 5	up to 5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3	129.95	up to 5	up to 2	224.95	up to 7.5	up to 7.5	79.99	up to 25	up to 1
Option 3				219.95	up to 7	up to 3	299.95	up to 10	up to 10	109.99	up to 25	up to 1
Option 4												
Option 5												

	Fixed Point-to-Multipoint Wireless											
	CCI (unlicensed)			Crossover			First Broadband			GPNetworks		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Huallen, La Glace												
Residential												
Option 1	49.99	up to 2	up to 0.75	na	na	na	99.00	up to 1	up to 0.5	49.95	up to 3	up to 1.5
Option 2	74.99	up to 5	up to 1				129.00	up to 4	up to 1	79.95	up to 5	up to 1.5
Option 3	94.99	up to 10	up to 1				149.00	up to 7	up to 1	99.95	up to 7	up to 1.5
Option 4										189.95	up to 10	up to 2
Option 5												
Business												
Option 1	200.00	up to 6	up to 2	na	na	na	199.00	up to 2.5	up to 1.5	59.95	up to 3	up to 2
Option 2	249.99	up to 7	up to 3				279.00	up to 5	up to 2.5	129.95	up to 5	up to 2
Option 3							329.00	up to 8	up to 4	219.95	up to 7	up to 3
Option 4							na	up to 10	up to 5			
Option 5												

	Fixed Point-to-Multipoint Wireless								
	I Want			NEXXCom (licensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Huallen, La Glace (cont'd)									
Residential							4G LTE Fixed Wireless		
Option 1	49.95	up to 5	up to 1	69.95	up to 3	up to 1	59.99	up to 5	up to 1
Option 2	59.95	up to 5	up to 1	89.95	up to 6	up to 2	69.99	up to 10	up to 1
Option 3	89.95	up to 10	up to 2				79.99	up to 25	up to 1
Option 4	129.95	up to 15	up to 3				109.99	up to 25	up to 1
Option 5	159.95	up to 15	up to 3						
Business							4G LTE Fixed Wireless		
Option 1	99.95	up to 10	up to 2	149.95	up to 5	up to 5	69.99	up to 10	up to 1
Option 2	149.95	up to 15	up to 3	224.95	up to 7.5	up to 7.5	79.99	up to 25	up to 1
Option 3	249.95	up to 20	up to 4	299.95	up to 10	up to 10	109.99	up to 25	up to 1
Option 4	800.00	up to 50	up to 10						
Option 5									

	Fixed Point-to-Multipoint Wireless																	
	CCI (unlicensed)			Crossover			First Broadband			GPNetworks			NEXXCom (licensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Valhalla Centre																		
Residential																4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	na	na	na	99.00	up to 1	up to 0.5	49.95	up to 3	up to 1.5	69.95	up to 3	up to 1	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1				129.00	up to 4	up to 1	79.95	up to 5	up to 1.5	89.95	up to 6	up to 2	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1				149.00	up to 7	up to 1	99.95	up to 7	up to 1.5				79.99	up to 25	up to 1
Option 4										189.95	up to 10	up to 2				109.99	up to 25	up to 1
Option 5																		
Business																4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	na	na	na	199.00	up to 2.5	up to 1.5	59.95	up to 3	up to 2	149.95	up to 5	up to 5	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3				279.00	up to 5	up to 2.5	129.95	up to 5	up to 2	224.95	up to 7.5	up to 7.5	79.99	up to 25	up to 1
Option 3							329.00	up to 8	up to 4	219.95	up to 7	up to 3	299.95	up to 10	up to 10	109.99	up to 25	up to 1
Option 4							na	up to 10	up to 5									
Option 5																		

	Fixed Point-to-Multipoint Wireless																	
	CCI (unlicensed)			Crossover			First Broadband			GPNetworks			NEXXCom (licensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Wedgewood																		
Residential																4G LTE Fixed Wireless		
Option 1	49.99	up to 2	up to 0.75	na	na	na	99.00	up to 1	up to 0.5	49.95	up to 3	up to 1.5	69.95	up to 3	up to 1	59.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1				129.00	up to 4	up to 1	79.95	up to 5	up to 1.5	89.95	up to 6	up to 2	69.99	up to 10	up to 1
Option 3	94.99	up to 10	up to 1				149.00	up to 7	up to 1	99.95	up to 7	up to 1.5				79.99	up to 25	up to 1
Option 4										189.95	up to 10	up to 2				109.99	up to 25	up to 1
Option 5																		
Business																		
Option 1	200.00	up to 6	up to 2	na	na	na	199.00	up to 2.5	up to 1.5	59.95	up to 3	up to 2	149.95	up to 5	up to 5	4G LTE Fixed Wireless		
Option 2	249.99	up to 7	up to 3				279.00	up to 5	up to 2.5	129.95	up to 5	up to 2	224.95	up to 7.5	up to 7.5	69.99	up to 10	up to 1
Option 3							329.00	up to 8	up to 4	219.95	up to 7	up to 3	299.95	up to 10	up to 10	79.99	up to 25	up to 1
Option 4							na	up to 10	up to 5							109.99	up to 25	up to 1
Option 5																		

12.2.1.47 MD of Greenview

	Fixed Point-to-Multipoint Wireless					
	I Want			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
DeBolt						
Residential				4G LTE Fixed Wireless		
Option 1	49.95	up to 5	up to 1	59.99	up to 5	up to 1
Option 2	59.95	up to 5	up to 1	69.99	up to 10	up to 1
Option 3	89.95	up to 10	up to 2	79.99	up to 25	up to 1
Option 4	129.95	up to 15	up to 3	109.99	up to 25	up to 1
Option 5	159.95	up to 15	up to 3			
Business				4G LTE Fixed Wireless		
Option 1	99.95	up to 10	up to 2	69.99	up to 10	up to 1
Option 2	149.95	up to 15	up to 3	79.99	up to 25	up to 1
Option 3	249.95	up to 20	up to 4	109.99	up to 25	up to 1
Option 4	800.00	up to 50	up to 10			
Option 5						

	Fixed Point-to-Multipoint Wireless														
	CCI (unlicensed)			Crossover			NEXXCom (licensed)			GPNetworks			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Grovedale, Landry Heights													4G LTE Fixed Wireless		
Residential													59.99	up to 5	up to 1
Option 1	49.99	up to 2	up to 0.75	na	na	na	69.95	up to 3	up to 1	49.95	up to 3	up to 1.5	69.99	up to 10	up to 1
Option 2	74.99	up to 5	up to 1				89.95	up to 6	up to 2	79.95	up to 5	up to 1.5	79.99	up to 25	up to 1
Option 3	94.99	up to 10	up to 1							99.95	up to 7	up to 1.5	109.99	up to 25	up to 1
Option 4										189.95	up to 10	up to 2			
Option 5															
Business													4G LTE Fixed Wireless		
Option 1	200.00	up to 6	up to 2	na	na	na	149.95	up to 5	up to 5	59.95	up to 3	up to 2	69.99	up to 10	up to 1
Option 2	249.99	up to 7	up to 3				224.95	up to 7.5	up to 7.5	129.95	up to 5	up to 2	79.99	up to 25	up to 1
Option 3							299.95	up to 10	up to 10	219.95	up to 7	up to 3	109.99	up to 25	up to 1
Option 4															
Option 5															

	Fixed Point-to-Multipoint Wirele		
	XplorNet (licensed)		
	Cost	Bandwidth - Mb/s	
	$/mo	Down	Up
Little Smoky			
Residential	4G Satellite		
Option 1	69.99	up to 5	up to 1
Option 2	79.99	up to 5	up to 1
Option 3	89.99	up to 5	up to 1
Option 4			
Option 5			
Business	4G Satellite		
Option 1	69.99	up to 5	up to 1
Option 2	79.99	up to 5	up to 1
Option 3	89.99	up to 5	up to 1
Option 4			
Option 5			

	Fixed Point-to-Multipoint Wirele		
	XplorNet (licensed)		
	Cost	Bandwidth - Mb/s	
	$/mo	Down	Up
Ridgevalley			
Residential	4G LTE Fixed Wireless		
Option 1	59.99	up to 5	up to 1
Option 2	69.99	up to 10	up to 1
Option 3	79.99	up to 25	up to 1
Option 4	109.99	up to 25	up to 1
Option 5			
Business	4G LTE Fixed Wireless		
Option 1	69.99	up to 10	up to 1
Option 2	79.99	up to 25	up to 1
Option 3	109.99	up to 25	up to 1
Option 4			
Option 5			

	Fixed Point-to-Multipoint Wirele		
	Whitecourt (licensed/unlicensed)		
	Cost	Bandwidth - Mb/s	
	$/mo	Down	Up
Rural			
Residential			
Option 1	46.55	up to 4	up to 2
Option 2	84.55	up to 6	up to 2
Option 3	122.55	up to 10	up to 2
Option 4	151.05	up to 15	up to 2
Option 5			
Business			
Option 1	200.00	up to 7	up to 3
Option 2	300.00	up to 10	up to 7
Option 3	500.00	up to 15	up to 10
Option 4	700.00	up to 20	up to 15
Option 5			

12.2.1.48 County of Northern Lights

	Fixed Point-to-Multipoint Wireless					
	AB North			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Deadwood, Dixonville, North Star, Notikewin						
Residential				KA2 Satellite		
Option 1	53.00	up to 1.5	up to 0.5	69.99	up to 5	up to 1
Option 2	83.00	up to 5	up to 1	79.99	up to 5	up to 1
Option 3						
Option 4						
Option 5						
Business				KA2 Satellite		
Option 1	200.00	up to 10	up to 2	69.99	up to 5	up to 1
Option 2				79.99	up to 5	up to 1
Option 3						
Option 4						
Option 5						

12.2.1.49 Northern Sunrise County

	Fixed Point-to-Multipoint Wirele		
	XplorNet (licensed)		
	Cost	Bandwidth - Mb/s	
	$/mo	Down	Up
Cadotte Lake, Little Buffalo			
Residential	KA2 Satellite		
Option 1	69.99	up to 5	up to 1
Option 2	79.99	up to 5	up to 1
Option 3			
Option 4			
Option 5			
Business			
Option 1	KA2 Satellite		
Option 2	69.99	up to 5	up to 1
Option 3	79.99	up to 5	up to 1
Option 4			
Option 5			

	Fixed Point-to-Multipoint Wireless											
	AB North			Bell			Wispernet			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Marie-Reine												
Residential										KA2 Satellite		
Option 1	53.00	up to 1.5	up to 0.5	65.00	up to 5	up to 1	$39.95	up to 1.5	up to 1.5	69.99	up to 5	up to 1
Option 2	83.00	up to 5	up to 1							79.99	up to 5	up to 1
Option 3												
Option 4												
Option 5												
Business										KA2 Satellite		
Option 1	200.00	up to 10	up to 2				$49.95	up to 1.5	up to 1.5	69.99	up to 5	up to 1
Option 2										79.99	up to 5	up to 1
Option 3												
Option 4												
Option 5												

	Fixed Point-to-Multipoint Wireless					
	AB North			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Reno						
Residential				KA2 Satellite		
Option 1	53.00	up to 1.5	up to 0.5	69.99	up to 5	up to 1
Option 2	83.00	up to 5	up to 1	79.99	up to 5	up to 1
Option 3						
Option 4						
Option 5						
Business				KA2 Satellite		
Option 1	200.00	up to 10	up to 2	69.99	up to 5	up to 1
Option 2				79.99	up to 5	up to 1
Option 3						
Option 4						
Option 5						

	Fixed Point-to-Multipoint Wireless											
	AB North			I Want			Wispernet			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
St. Isidore												
Residential										KA2 Satellite		
Option 1	53.00	up to 1.5	up to 0.5	49.95	up to 5	up to 1	$39.95	up to 1.5	up to 1.5	69.99	up to 5	up to 1
Option 2	83.00	up to 5	up to 1	59.95	up to 5	up to 1				79.99	up to 5	up to 1
Option 3				89.95	up to 10	up to 2						
Option 4				129.95	up to 15	up to 3						
Option 5				159.95	up to 15	up to 3						
Business										KA2 Satellite		
Option 1	200.00	up to 10	up to 2	99.95	up to 10	up to 2	$49.95	up to 1.5	up to 1.5	69.99	up to 5	up to 1
Option 2				149.95	up to 15	up to 3				79.99	up to 5	up to 1
Option 3				249.95	up to 20	up to 4						
Option 4				800.00	up to 50	up to 10						
Option 5												

12.2.1.50 MD of Peace 135

	Fixed Point-to-Multipoint Wireless								
	AB North			Wispernet			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Brownvale									
Residential							Expedience		
Option 1	53.00	up to 1.5	up to 0.5	$39.95	up to 1.5	up to 1.5	51.99	up to 1.5	up to 0.25
Option 2	83.00	up to 5	up to 1				71.99	up to 3	up to 0.5
Option 3							91.99	up to 5	up to 0.5
Option 4									
Option 5									
Business							Expedience		
Option 1	200.00	up to 10	up to 2	$49.95	up to 1.5	up to 1.5	104.99	up to 3	up to 0.8
Option 2							149.99	up to 5	up to 1
Option 3									
Option 4									
Option 5									

12.2.1.51 Saddle Hills County

	Fixed Point-to-Multipoint Wireless											
	AB North			CCI (unlicensed)			PRiS			XplorNet (licensed)		
	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up	Cost $/mo	Bandwidth - Mb/s Down	Up
Woking, Blueberry Mountain												
Residential										4G LTE Fixed Wireless		
Option 1	53.00	up to 1.5	up to 0.5	49.99	up to 2	up to 0.75	40.00	up to 1.5	up to 1.5	59.99	up to 5	up to 1
Option 2	83.00	up to 5	up to 1	74.99	up to 5	up to 1	55.00	up to 3	up to 3	69.99	up to 10	up to 1
Option 3				94.99	up to 10	up to 1	80.00	up to 5	up to 5	79.99	up to 25	up to 1
Option 4							115.00	up to 5	up to 5	109.99	up to 25	up to 1
Option 5												
Business										4G LTE Fixed Wireless		
Option 1	200.00	up to 10	up to 2	200.00	up to 6	up to 2	40.00	up to 1.5	up to 1.5	69.99	up to 10	up to 1
Option 2				249.99	up to 7	up to 3	55.00	up to 3	up to 3	79.99	up to 25	up to 1
Option 3							80.00	up to 5	up to 5	109.99	up to 25	up to 1
Option 4							115.00	up to 5	up to 5			
Option 5												

	Fixed Point-to-Multipoint Wireless					
	PRiS			XplorNet (licensed)		
	Cost $/mo	ndwidth - Mb/s Down	Up	Cost $/mo	ndwidth - Mb/s Down	Up
Localities Bay Tree, Gordondale						
Residential				4G LTE Fixed Wireless		
Option 1	40.00	up to 1.5	up to 1.5	59.99	up to 5	up to 1
Option 2	55.00	up to 3	up to 3	69.99	up to 10	up to 1
Option 3	80.00	up to 5	up to 5	79.99	up to 25	up to 1
Option 4	115.00	up to 5	up to 5	109.99	up to 25	up to 1
Option 5						
Business				4G LTE Fixed Wireless		
Option 1	40.00	up to 1.5	up to 1.5	69.99	up to 10	up to 1
Option 2	55.00	up to 3	up to 3	79.99	up to 25	up to 1
Option 3	80.00	up to 5	up to 5	109.99	up to 25	up to 1
Option 4	115.00	up to 5	up to 5			
Option 5						

	Fixed Point-to-Multipoint Wireless								
	PRiS			XplorNet (licensed)			Xtremewave		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Localities Bonanza, Silver Valley									
Residential				4G LTE Fixed Wireless					
Option 1	40.00	up to 1.5	up to 1.5	59.99	up to 5	up to 1	78.00	up to 5	up to 5
Option 2	55.00	up to 3	up to 3	69.99	up to 10	up to 1			
Option 3	80.00	up to 5	up to 5	79.99	up to 25	up to 1			
Option 4	115.00	up to 5	up to 5	109.99	up to 25	up to 1			
Option 5									
Business				4G LTE Fixed Wireless					
Option 1	40.00	up to 1.5	up to 1.5	69.99	up to 10	up to 1	78.00	up to 5	up to 5
Option 2	55.00	up to 3	up to 3	79.99	up to 25	up to 1			
Option 3	80.00	up to 5	up to 5	109.99	up to 25	up to 1			
Option 4	115.00	up to 5	up to 5						
Option 5									

12.2.1.52 MD of Smoky River

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			I Want			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Guy									
Residential							4G Satellite		
Option 1	49.99	up to 2	up to 0.75	49.95	up to 5	up to 1	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1	59.95	up to 5	up to 1	79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1	89.95	up to 10	up to 2	89.99	up to 5	up to 1
Option 4				129.95	up to 15	up to 3			
Option 5				159.95	up to 15	up to 3			
Business							4G Satellite		
Option 1	200.00	up to 6	up to 2	99.95	up to 10	up to 2	69.99	up to 5	up to 1
Option 2	249.99	up to 7	up to 3	149.95	up to 15	up to 3	79.99	up to 5	up to 1
Option 3				249.95	up to 20	up to 4	89.99	up to 5	up to 1
Option 4				800.00	up to 50	up to 10			
Option 5									

	Fixed Point-to-Multipoint Wireless											
	AB North			CCI (unlicensed)			I Want			Wispernet			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Jean Côté															
Residential													KA2 Satellite		
Option 1	53.00	up to 1.5	up to 0.5	49.99	up to 2	up to 0.75	49.95	up to 5	up to 1	$39.95	up to 1.5	up to 1.5	69.99	up to 5	up to 1
Option 2	83.00	up to 5	up to 1	74.99	up to 5	up to 1	59.95	up to 5	up to 1				79.99	up to 5	up to 1
Option 3				94.99	up to 10	up to 1	89.95	up to 10	up to 2						
Option 4							129.95	up to 15	up to 3						
Option 5							159.95	up to 15	up to 3						
Business													KA2 Satellite		
Option 1	200.00	up to 10	up to 2	200.00	up to 6	up to 2	99.95	up to 10	up to 2	$49.95	up to 1.5	up to 1.5	69.99	up to 5	up to 1
Option 2				249.99	up to 7	up to 3	149.95	up to 15	up to 3				79.99	up to 5	up to 1
Option 3							249.95	up to 20	up to 4						
Option 4							800.00	up to 50	up to 10						
Option 5															

12.2.1.53 MD of Spirit River

	Fixed Point-to-Multipoint Wireless														
	AB North			CCI (unlicensed)			I Want			Wispernet			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Rural - no hamlets (Town of Spirit River and Village of Rycroft are within in its borders)															
Residential													4G LTE Fixed Wireless		
Option 1	53.00	up to 1.5	up to 0.5	49.99	up to 2	up to 0.75	49.95	up to 5	up to 1	$39.95	up to 1.5	up to 1.5	59.99	up to 5	up to 1
Option 2	83.00	up to 5	up to 1	74.99	up to 5	up to 1	59.95	up to 5	up to 1				69.99	up to 10	up to 1
Option 3				94.99	up to 10	up to 1	89.95	up to 10	up to 2				79.99	up to 25	up to 1
Option 4							129.95	up to 10	up to 2				109.99	up to 25	up to 1
Option 5							159.95	up to 15	up to 3						
Business													4G LTE Fixed Wireless		
Option 1	200.00	up to 10	up to 2	200.00	up to 6	up to 2	99.95	1.5 - 5		$49.95	up to 1.5	up to 1.5	69.99	up to 10	up to 1
Option 2				249.99	up to 7	up to 3	149.95	3 - 12					79.99	up to 25	up to 1
Option 3							249.95	3 - 20					109.99	up to 25	up to 1
Option 4							800.00	15 - 40							
Option 5															

12.2.1.54 First Nations (PREDA)

	Fixed Point-to-Multipoint Wireless								
	AB North			Arrow (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Duncan's									
Residential							Expedience		
Option 1	53.00	up to 1.5	up to 0.5	65.00	up to 5	up to 1.5	51.99	up to 1.5	up to 0.25
Option 2	83.00	up to 5	up to 1				71.99	up to 3	up to 0.5
Option 3							91.99	up to 5	up to 0.5
Option 4									
Option 5									
Business							Expedience		
Option 1	200.00	up to 10	up to 2	250.00	up to 1.5	up to 1	104.99	up to 3	up to 0.8
Option 2				500.00	up to 3	up to 1.5	149.99	up to 5	up to 1
Option 3									
Option 4									
Option 5									

	Fixed Point-to-Multipoint Wirele		
	XplorNet (licensed)		
	Cost	ndwidth - Mb/s	
	$/mo	Down	Up
Horse Lake			
Residential	4G Satellite		
Option 1	59.99	up to 5	up to 1
Option 2	69.99	up to 10	up to 1
Option 3	79.99	up to 10	up to 1
Option 4	109.99	up to 10	up to 1
Option 5			
Business	4G Satellite		
Option 1	69.99	up to 10	up to 1
Option 2	79.99	up to 10	up to 1
Option 3	109.99	up to 10	up to 1
Option 4			
Option 5			

	Fixed Point-to-Multipoint Wireless					
	Arrow (unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Lubicon Lake						
Residential				KA2 Satellite		
Option 1	65.00	up to 5	up to 1.5	69.99	up to 5	up to 1
Option 2				79.99	up to 5	up to 1
Option 3						
Option 4						
Option 5						
Business				KA2 Satellite		
Option 1	250.00	up to 1.5	up to 1	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5	79.99	up to 5	up to 1
Option 3						
Option 4						
Option 5						

	Fixed Point-to-Multipoint Wireless					
	Arrow (unlicensed)			**XplorNet (licensed)**		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Sturgeon Lake						
Residential				Fixed Wireless Expedience		
Option 1	65.00	up to 5	up to 1.5	51.99	up to 1.5	up to 0.25
Option 2				71.99	up to 3	up to 0.5
Option 3				91.99	up to 5	up to 0.5
Option 4						
Option 5						
Business				Fixed Wireless Expedience		
Option 1	250.00	up to 1.5	up to 1	104.99	up to 3	up to 0.8
Option 2	500.00	up to 3	up to 1.5	149.99	up to 5	up to 1
Option 3						
Option 4						
Option 5						

16.3.7 Regional Economic Development for Northwest Alberta (REDI)

12.2.1.55 Town of High Level

	Wireline Providers								
	TELUS (copper)			Northwestel (coaxial cable)			TekSavvy (copper)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
High Level									
Residential									
Option 1	63.00	up to 6	up to 1	39.95	up to 1	up to 0.25	29.99	up to 6	up to 1
Option 2	68.00	up to 15	up to 1	59.95	up to 8	up to 0.5	39.99	up to 15	up to 1
Option 3	73.00	up to 25	up to 5	79.95	up to 16	up to 0.77	44.99	up to 25	up to 5
Option 4				110.95	up to 50	up to 2			
Option 5									
Business									
Option 1	60.00	up to 15	up to 1	79.95	up to 5	up to 0.5	44.95	up to 6	up to 0.8
Option 2	85.00	up to 25	up to 5	109.95	up to 10	up to 0.77			
Option 3				129.95	up to 16	up to 1			
Option 4				149.95	up to 50	up to 2			
Option 5									

	Fixed Point-to-Multipoint Wireless								
	CCI (unlicensed)			Bell			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Residential							KA2 Satellite		
Option 1	49.99	up to 2	up to 0.75	65.00	up to 5	up to 1	69.99	up to 5	up to 1
Option 2	74.99	up to 5	up to 1				79.99	up to 5	up to 1
Option 3	94.99	up to 10	up to 1						
Option 4									
Business							KA2 Satellite		
Option 1	200.00	up to 6	up to 2				69.99	up to 5	up to 1
Option 2	249.99	up to 7	up to 3				79.99	up to 5	up to 1
Option 3									
Option 4									

12.2.1.56 Town of Rainbow Lake

	Wireline Provider						Fixed Point-to-Multipoint Wirele		
	TELUS (copper)			Town - Rainbow Lake (coaxial)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Rainbow Lake									
Residential							KA2 Satellite		
Option 1	63.00	up to 6	up to 1	49.07	0.5	0.05	69.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1				79.99	up to 5	up to 1
Option 3							Have stopped selling		
Business							KA2 Satellite		
Option 1	60.00	up to 15	up to 1	49.07	0.5	0.05	69.99	up to 5	up to 1
Option 2	85.00	up to 25	up to 5				79.99	up to 5	up to 1
Option 3							Have stopped selling		

12.2.1.57 Mackenzie County

	Wireline Provider			Fixed Point-to-Multipoint Wireless								
	TELUS (copper)			CCI (unlicensed)			Arrow (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Fort Vermilion												
Residential										KA2 Satellite		
Option 1	63.00	up to 6	up to 1	49.99	up to 2	up to 0.75	65.00	up to 5	up to 1.5	69.99	up to 5	up to 1
Option 2	68.00	up to 15	up to 1	74.99	up to 5	up to 1				79.99	up to 5	up to 1
Option 3	73.00	up to 25	up to 5	94.99	up to 10	up to 1						
Option 4												
Business										KA2 Satellite		
Option 1	60.00	up to 9	up to 1	200.00	up to 6	up to 2	250.00	up to 1.5	up to 1	69.99	up to 5	up to 1
Option 2	85.00	up to 25	up to 5	249.99	up to 7	up to 3	500.00	up to 3	up to 1.5	79.99	up to 5	up to 1
Option 3												
Option 4												
Option 5												
La Crete												
Residential										KA2 Satellite		
Option 1	63.00	up to 6	up to 1	49.99	up to 2	up to 0.75	65.00	up to 5	up to 1.5	69.99	up to 5	up to 1
Option 2				74.99	up to 5	up to 1				79.99	up to 5	up to 1
Option 3				94.99	up to 10	up to 1						
Option 4												
Business										KA2 Satellite		
Option 1	60.00	up to 9	up to 1	200.00	up to 6	up to 2	250.00	up to 1.5	up to 1	69.99	up to 5	up to 1
Option 2				249.99	up to 7	up to 3	500.00	up to 3	up to 1.5	79.99	up to 5	up to 1
Option 3												
Option 4												
Option 5												

	Fixed Point-to-Multipoint Wireles		
	Arrow (unlicensed)		
	Cost	Bandwidth - Mb/s	
	$/mo	Down	Up
Zama City			
Residential			
Option 1	100.00	up to 5	up to 1.5
Option 2			
Option 3			
Business			
Option 1	250.00	up to 1.5	up to 1
Option 2	500.00	up to 3	up to 1.5
Option 3			

16.3.7.1 First Nations (REDI)

	Fixed Point-to-Multipoint Wireless								
	Arrow (unlicensed)			CCI (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Beaver First - Boyer & Child Lake									
Residential							KA2 Satellite		
Option 1	65.00	up to 5	up to 1.5	49.99	up to 2	up to 0.75	69.99	up to 5	up to 1
Option 2				74.99	up to 5	up to 1	79.99	up to 5	up to 1
Option 3				94.99	up to 10	up to 1			
Option 4									
Business							KA2 Satellite		
Option 1	250.00	up to 1.5	up to 1	200.00	up to 6	up to 2	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5	249.99	up to 7	up to 3	79.99	up to 5	up to 1
Option 3									

	Fixed Point-to-Multipoint Wireless								
	Arrow (unlicensed)			CCI (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Dene Tha' - Bushe River									
Residential							KA2 Satellite		
Option 1	65.00	up to 5	up to 1.5	49.99	up to 2	up to 0.75	69.99	up to 5	up to 1
Option 2				74.99	up to 5	up to 1	79.99	up to 5	up to 1
Option 3				94.99	up to 10	up to 1			
Option 4									
Business							KA2 Satellite		
Option 1	250.00	up to 1.5	up to 1	200.00	up to 6	up to 2	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5	249.99	up to 7	up to 3	79.99	up to 5	up to 1
Option 3									

	Fixed Point-to-Multipoint Wireless					
	Arrow (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Dene Tha' - Hay Lake & Zama Lake (Amber River - recreation area only)						
Residential				KA2 Satellite		
Option 1	65.00	up to 5	up to 1.5	69.99	up to 5	up to 1
Option 2				79.99	up to 5	up to 1
Option 3						
Business				KA2 Satellite		
Option 1	250.00	up to 1.5	up to 1	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5	79.99	up to 5	up to 1
Option 3						

	Fixed Point-to-Multipoint Wireless					
	Arrow (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Dene Tha' - Upper Hay River						
Residential				KA2 Satellite		
Option 1	65.00	up to 5	up to 1.5	69.99	up to 5	up to 1
Option 2				79.99	up to 5	up to 1
Option 3						
Business				KA2 Satellite		
Option 1	250.00	up to 1.5	up to 1	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5	79.99	up to 5	up to 1
Option 3						

	Fixed Point-to-Multipoint Wireless								
	Arrow (unlicensed)			Little Red River First Nation			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Little Red River Cree - Fox Lake									
Residential							TeleSat KA2 Satellite		
Option 1	65.00	up to 5	up to 1.5	0.00	up to 2	na	69.99	up to 5	up to 1
Option 2							79.99	up to 5	up to 1
Option 3							89.99	up to 6	up to 1
Option 4									
Business							TeleSat KA2 Satellite		
Option 1	250.00	up to 1.5	up to 1				69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5				79.99	up to 5	up to 1
Option 3							89.99	up to 6	up to 1
Option 4									

	Fixed Point-to-Multipoint Wireless								
	Arrow (unlicensed)			Little Red River First Nation			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up	$/mo	Down	Up
Little Red River Cree - Garden River & John D'or Prairie									
Residential							KA2 Satellite		
Option 1	65.00	up to 5	up to 1.5	0.00	up to 2	na	69.99	up to 5	up to 1
Option 2							79.99	up to 5	up to 1
Option 3									
Business							KA2 Satellite		
Option 1	250.00	up to 1.5	up to 1				69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5				79.99	up to 5	up to 1
Option 3									

	Fixed Point-to-Multipoint Wireless					
	Arrow (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Tallcree - North & South						
Residential				KA2 Satellite		
Option 1	65.00	up to 5	up to 1.5	69.99	up to 5	up to 1
Option 2				79.99	up to 5	up to 1
Option 3						
Business				KA2 Satellite		
Option 1	250.00	up to 1.5	up to 1	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5	79.99	up to 5	up to 1
Option 3						

16.3.7.2 Métis Settlement (PREDA)

	Fixed Point-to-Multipoint Wireless					
	Arrow (unlicensed)			XplorNet (licensed)		
	Cost	Bandwidth - Mb/s		Cost	Bandwidth - Mb/s	
	$/mo	Down	Up	$/mo	Down	Up
Paddle Prairie Métis Settlement						
Residential				KA2 Satellite		
Option 1	65.00	up to 5	up to 1.5	69.99	up to 5	up to 1
Option 2				79.99	up to 5	up to 1
Option 3						
Business				KA2 Satellite		
Option 1	250.00	up to 1.5	up to 1	69.99	up to 5	up to 1
Option 2	500.00	up to 3	up to 1.5	79.99	up to 5	up to 1
Option 3						

16.4 Coverage Maps

16.4.1 Fixed Wireless Providers

To minimize provider costs, wireless services in rural areas are typically provided using point-to-multipoint (PMP) equipment. In this configuration, a '*host*' tower transmits and receives signals to a specified geographic area. Each client has dedicated reception equipment that homes on the host tower. All users in the area share the host signal.

Higher-end business services may use dedicated point-to-point (PTP) systems that are typically engineered to deliver higher quality, higher bandwidth services. Pricing is installation specific and depends on the service parameters and equipment selected.



Figure 183 – Alberta Communication cable services.

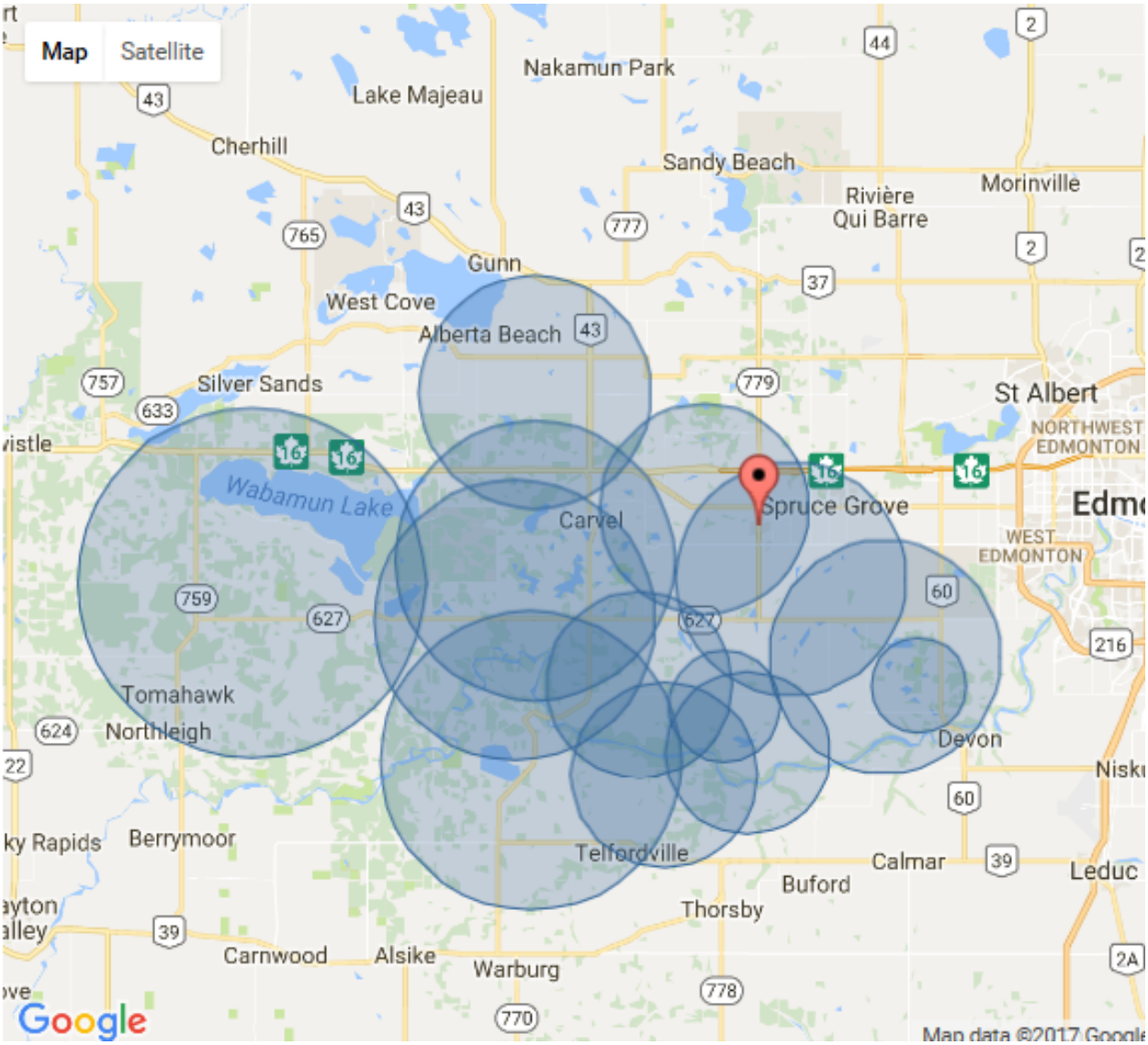


Figure 184 – Broadband Surfer coverage.

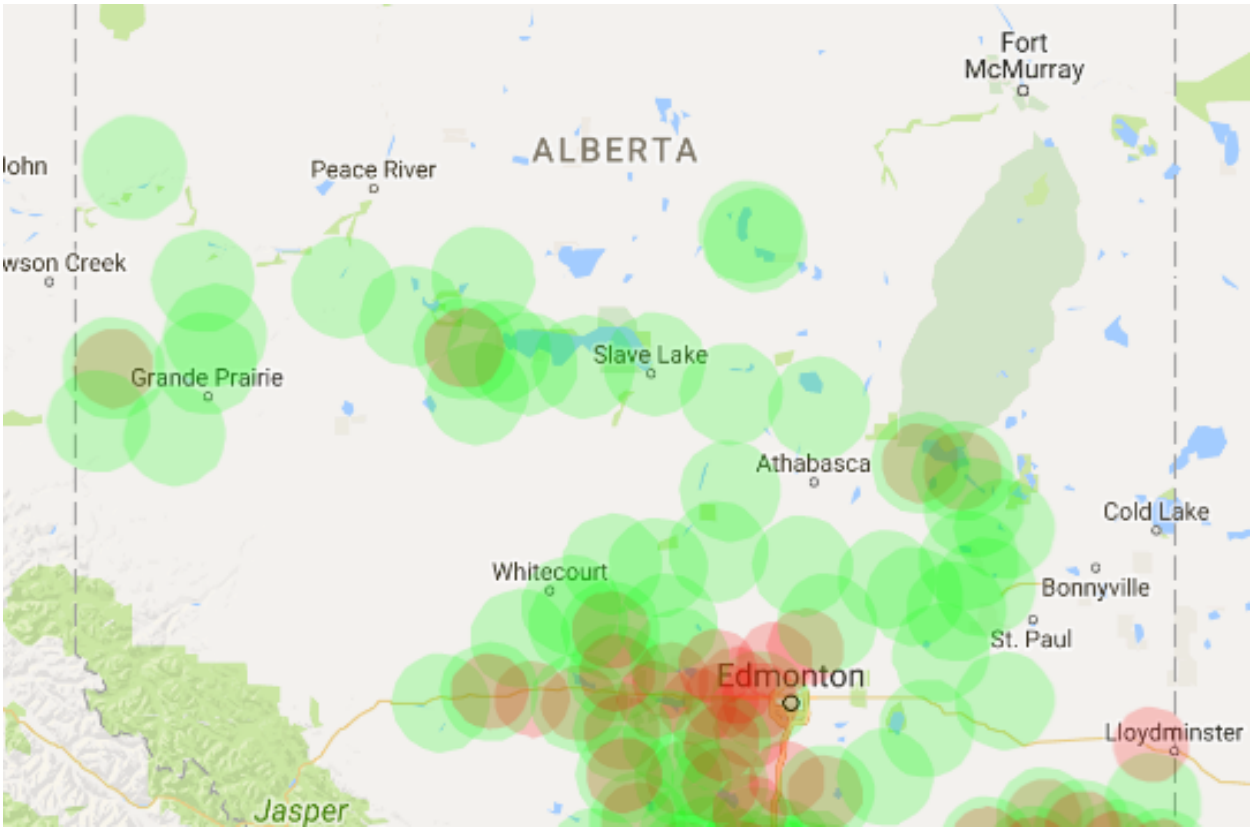


Figure 185 – Corridor Communications Inc. (CCI) coverage in northern Alberta.

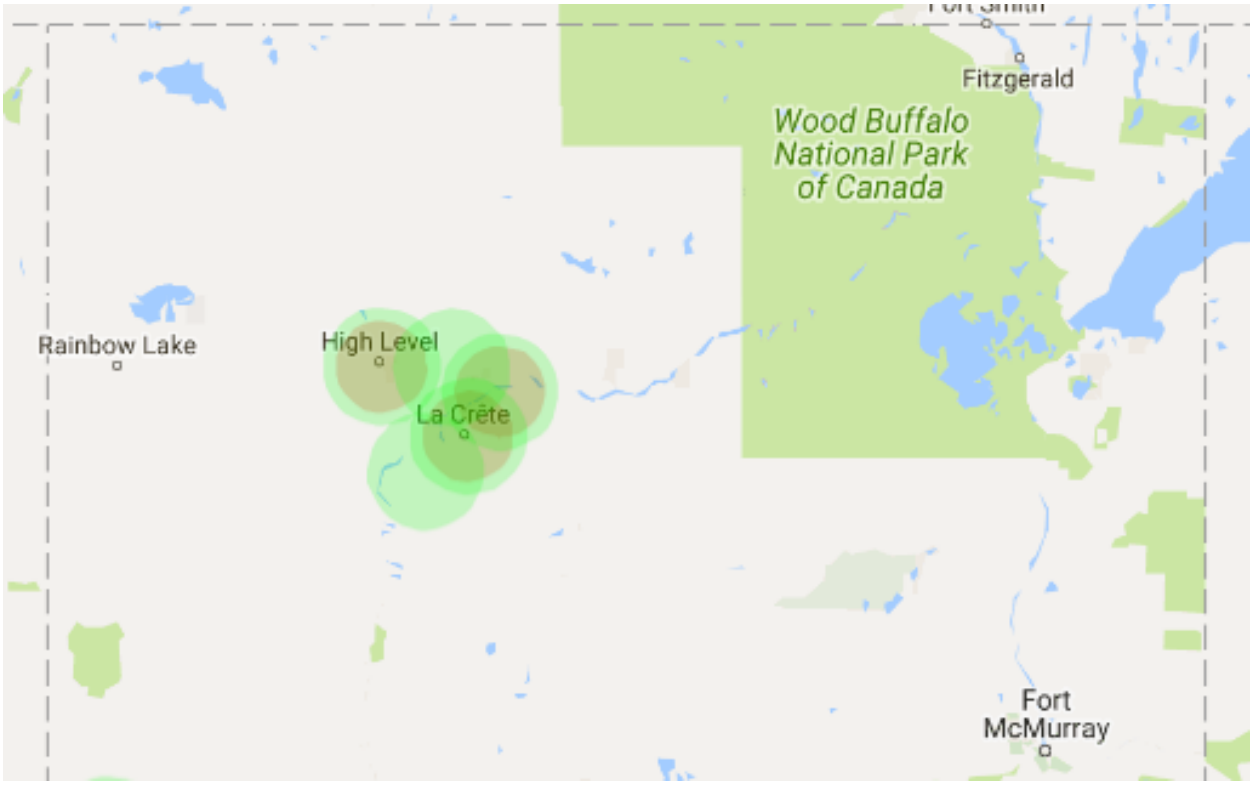


Figure 186 – CCI coverage in the High Level area.

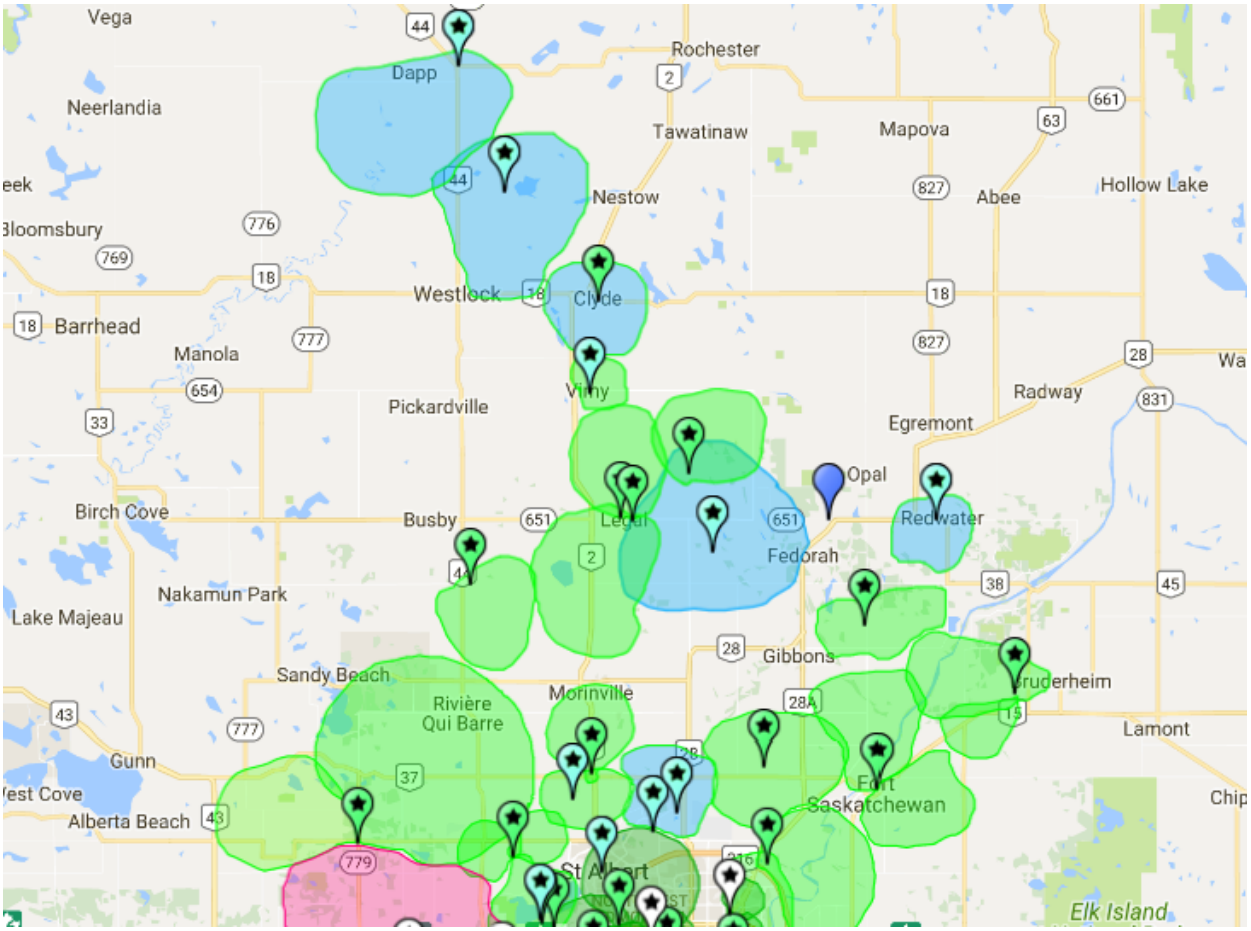


Figure 187 – Clearwave Broadband Networks coverage.

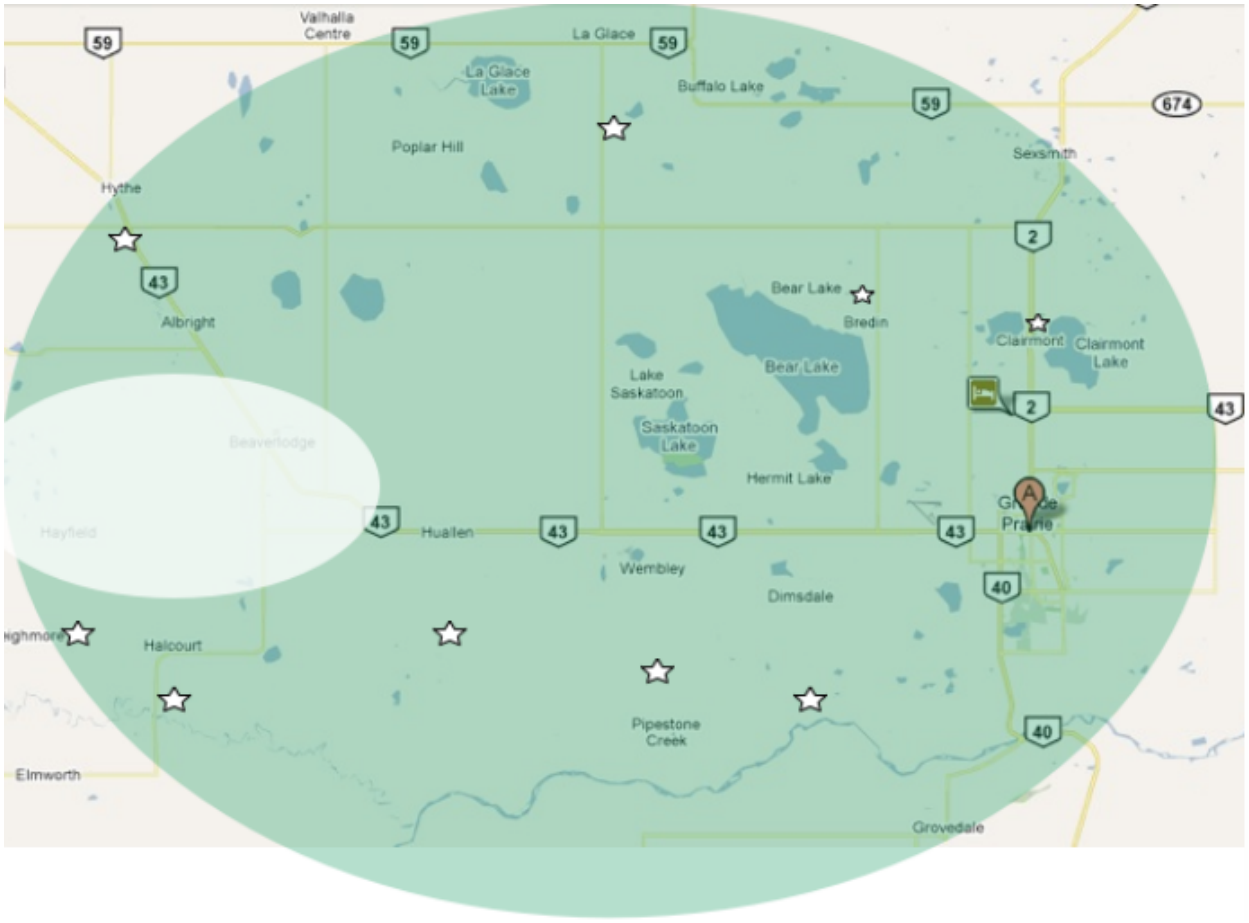


Figure 188 – First Broadband coverage in the Grande Prairie area.

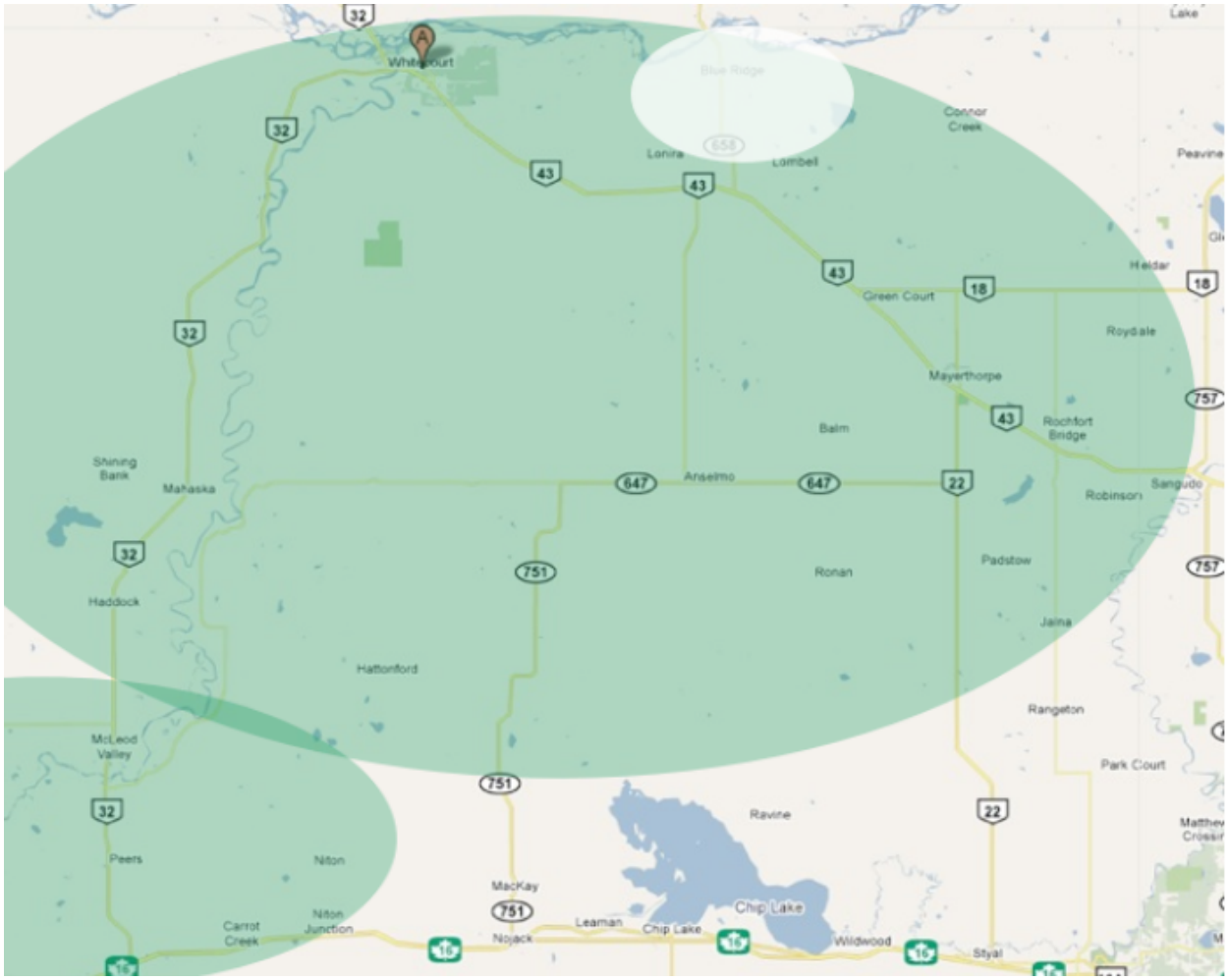


Figure 189 – First Broadband coverage in the Whitecourt area.

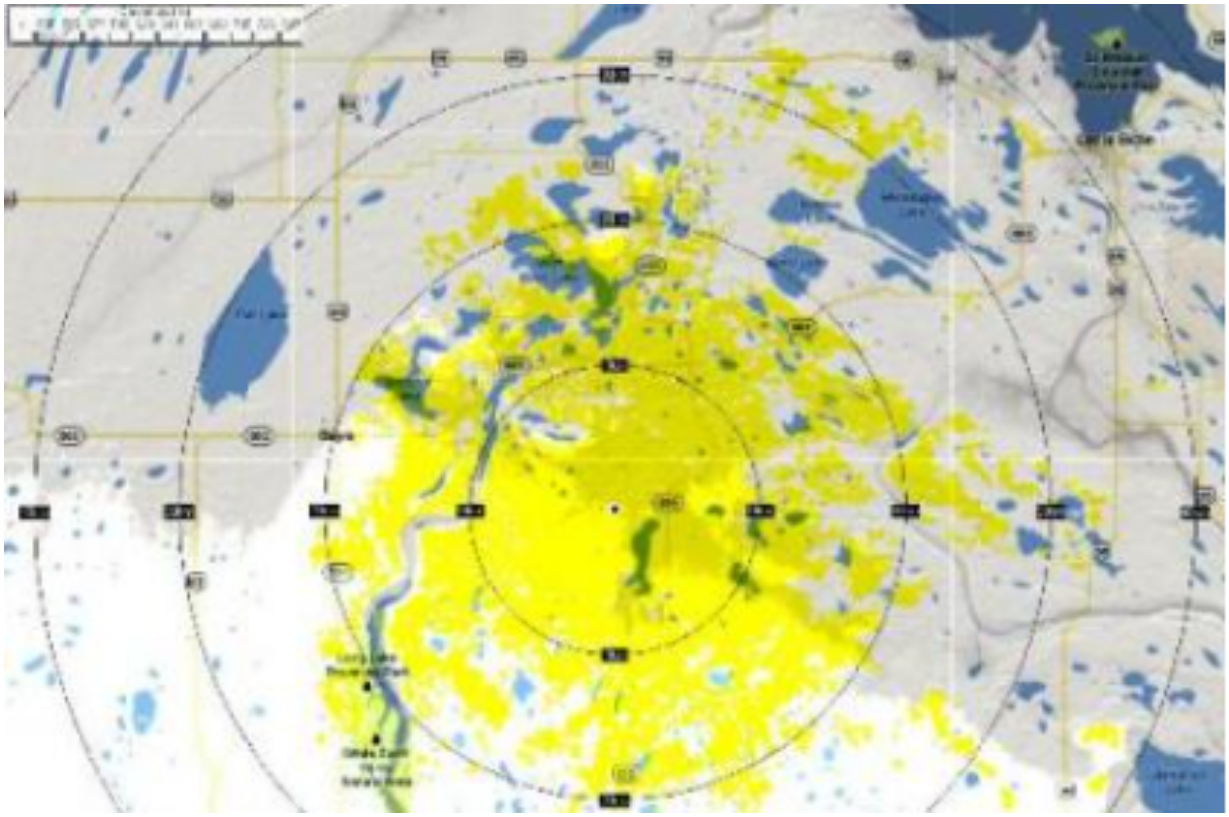


Figure 190 – Infinity Internet Solutions coverage in the Buffalo Lake Métis Settlement.

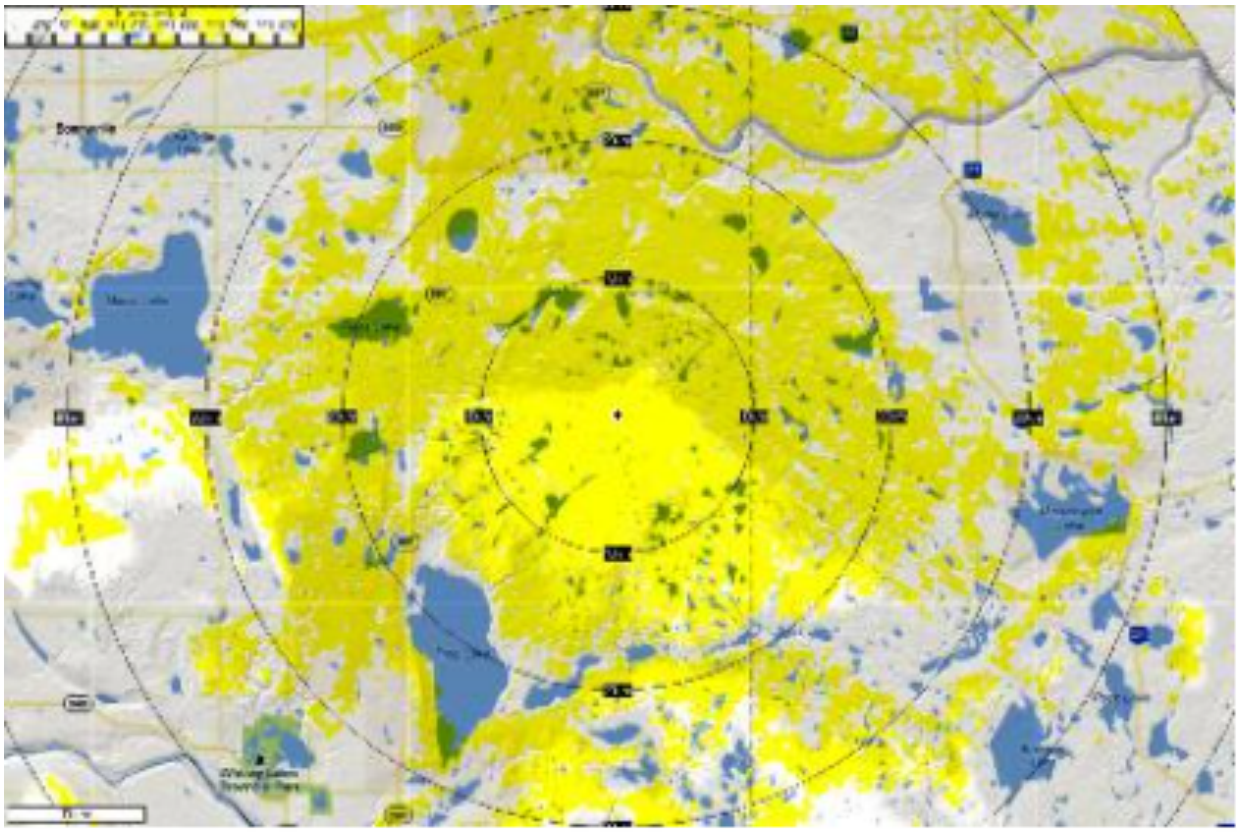


Figure 191 – Infinity Internet Solutions coverage in the Elizabeth Métis Settlement.

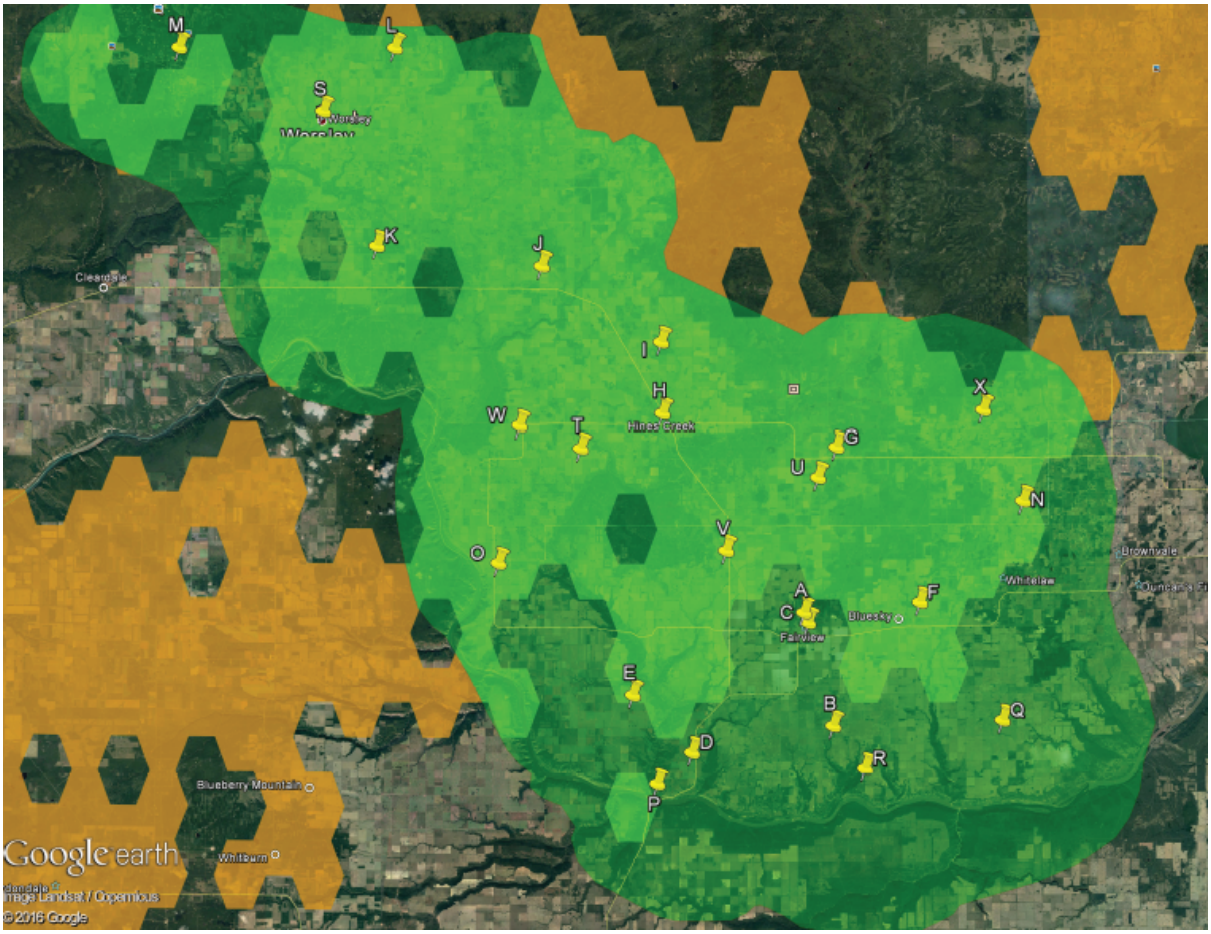


Figure 192 – Mighty Peace Wireless coverage.

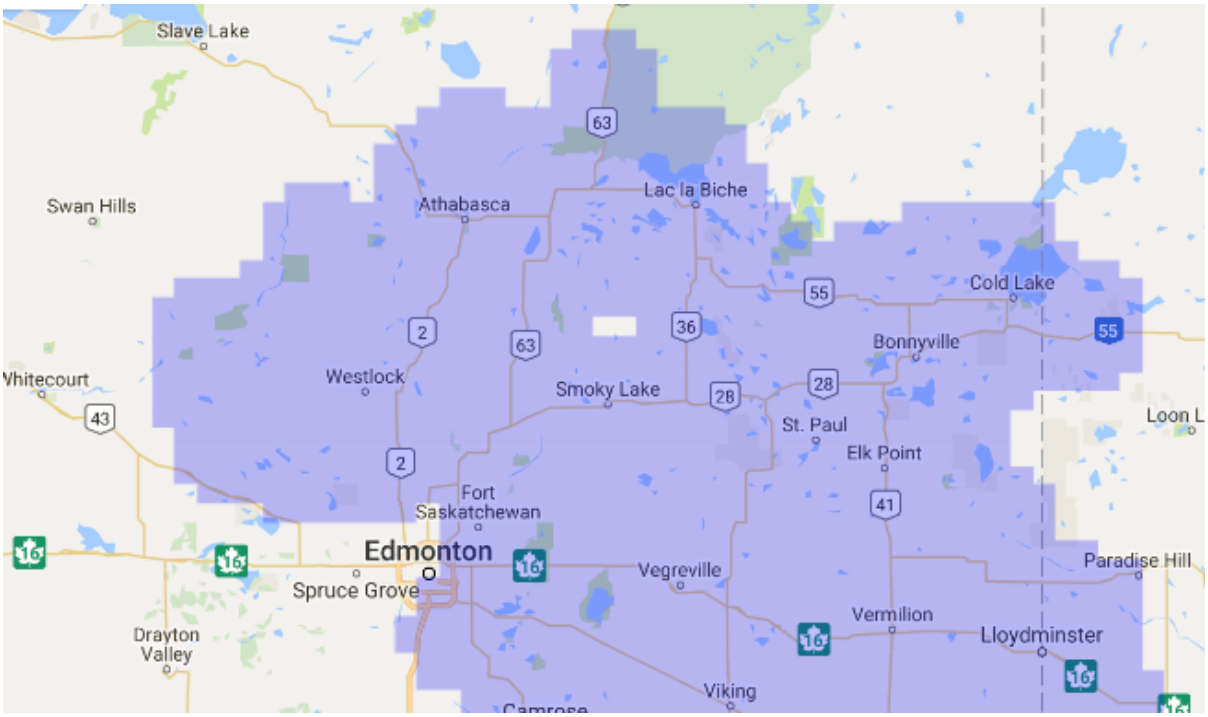


Figure 193 – MCSNet Coverage.

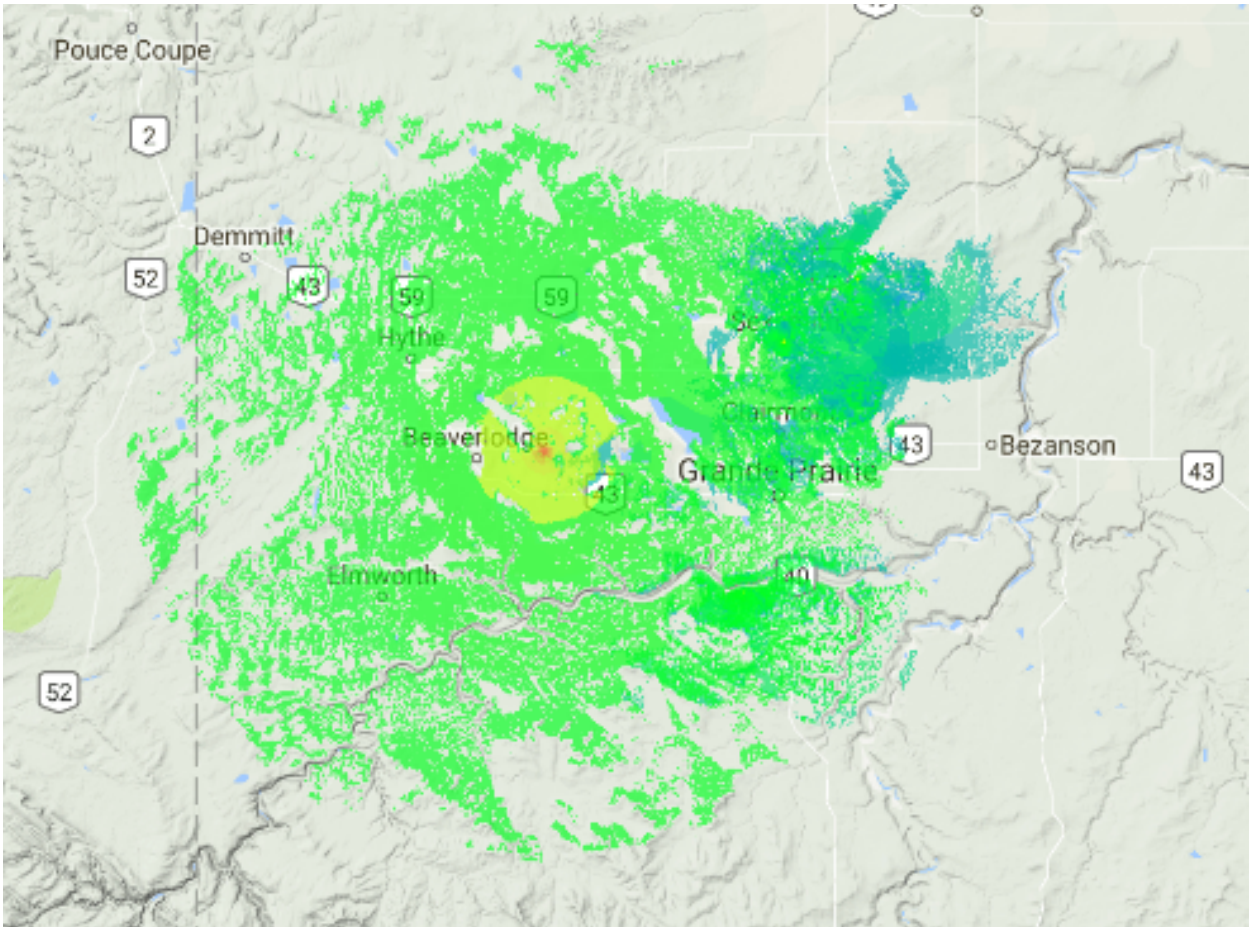


Figure 194 – NexxCom Technologies coverage.

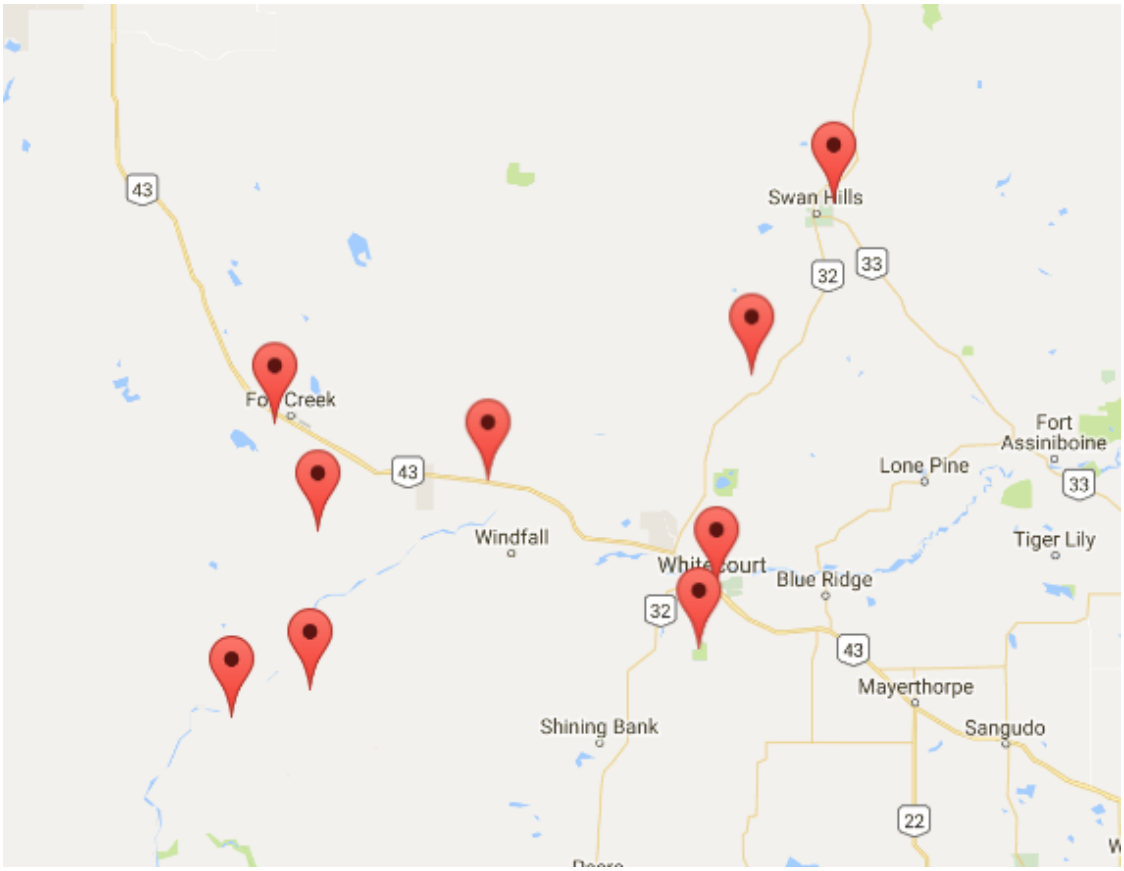


Figure 195 – Whitecourt Communications towers



Figure 196 – Tera-Byte Wireless coverage.

16.4.2 Mobility Providers

Athabasca and Wood Buffalo Regions (Fort Chipewyan)

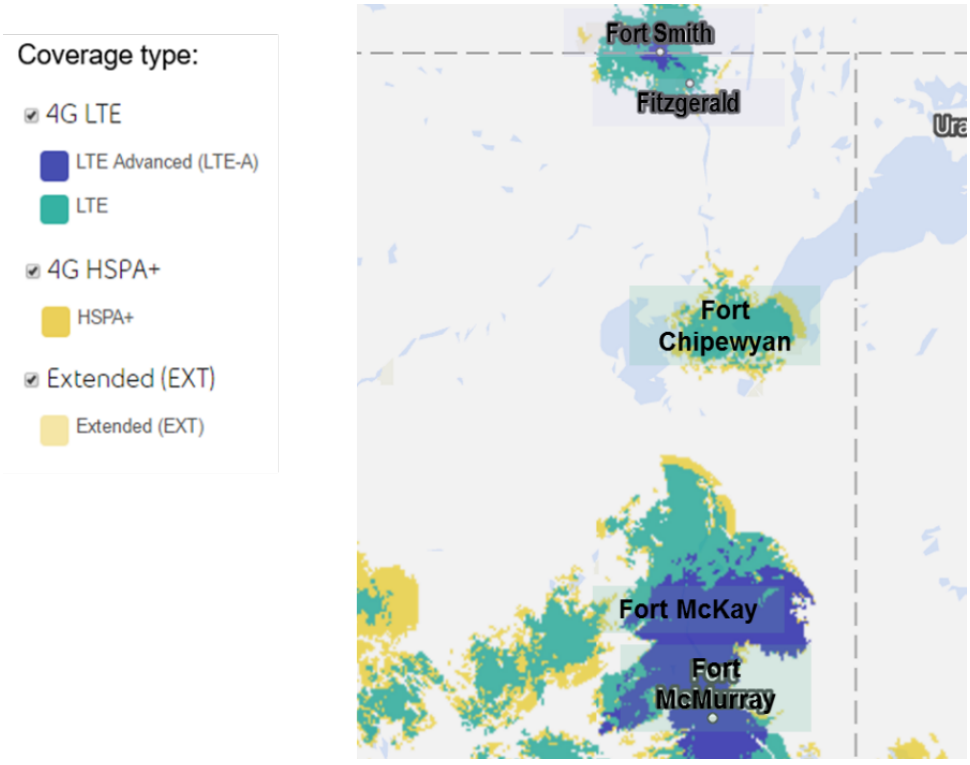


Figure 197 – Fort Chipewyan mobility coverage – TELUS/Bell.

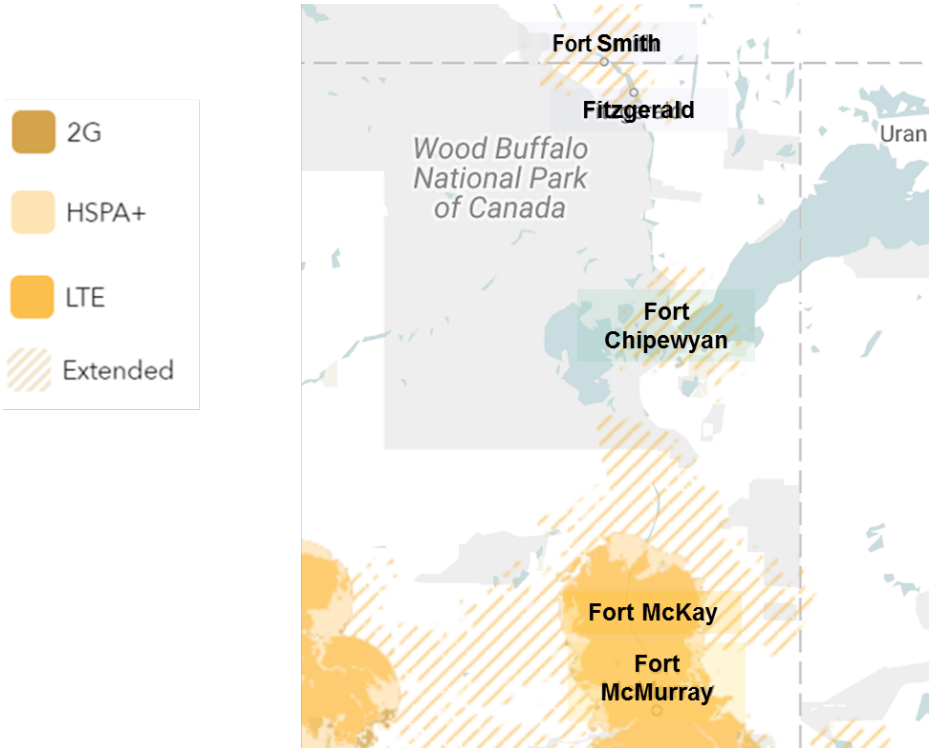


Figure 198 – Fort Chipewyan Mobility Coverage – Rogers

Athabasca and Wood Buffalo Urban Service Area

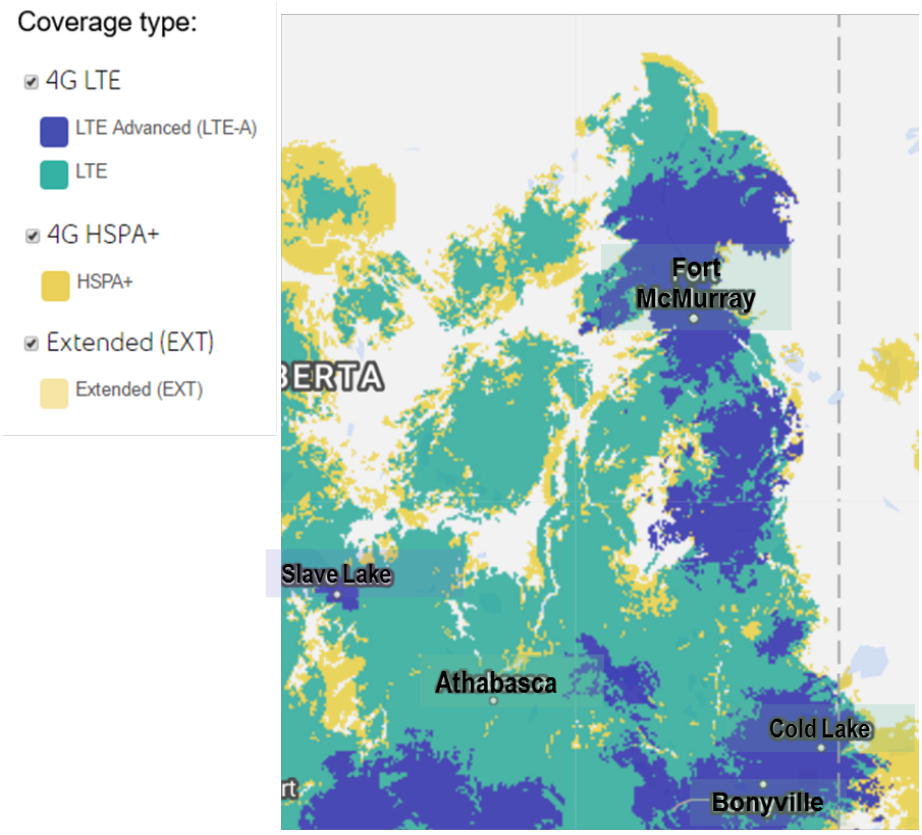


Figure 199 – Wood Buffalo urban service area mobility coverage – TELUS/Bell.

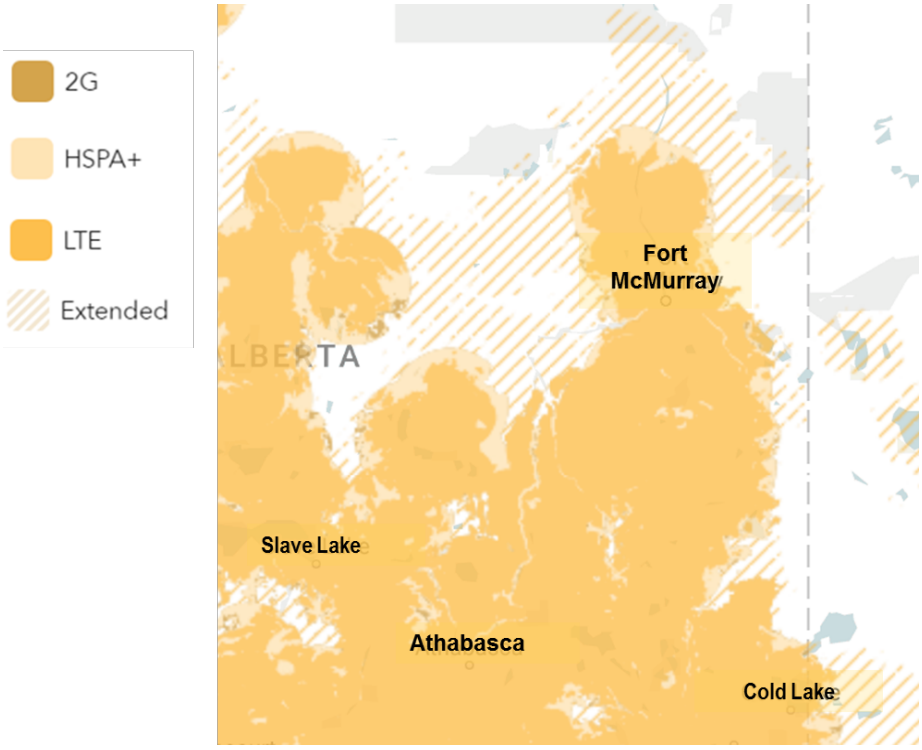


Figure 200 – Wood Buffalo urban service area mobility coverage – Rogers Communications.

Alberta HUB

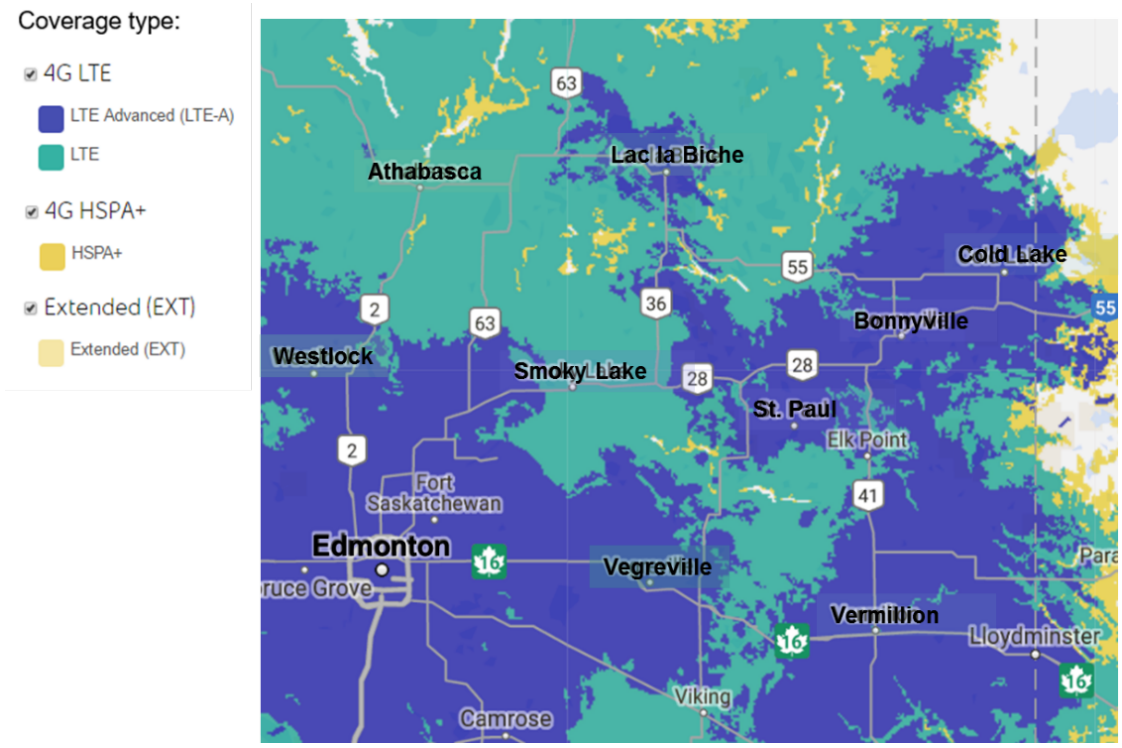


Figure 201 – Alberta HUB mobility coverage – TELUS/Bell.



Figure 202 – Alberta HUB mobility coverage – Rogers Communications.

GROWTH Alberta & Athabasca

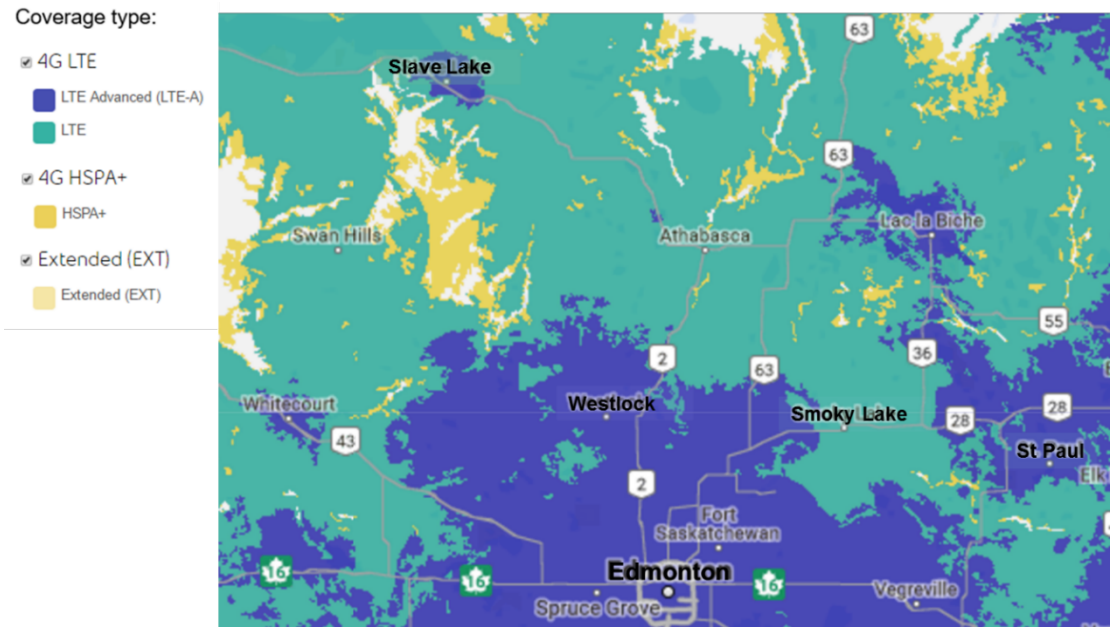


Figure 203 – GROWTH Alberta & Athabasca mobility coverage – TELUS/Bell.



Figure 204 – GROWTH Alberta & Athabasca mobility coverage – Rogers Communications.

GROWTH Alberta (Barrhead & Whitecourt)

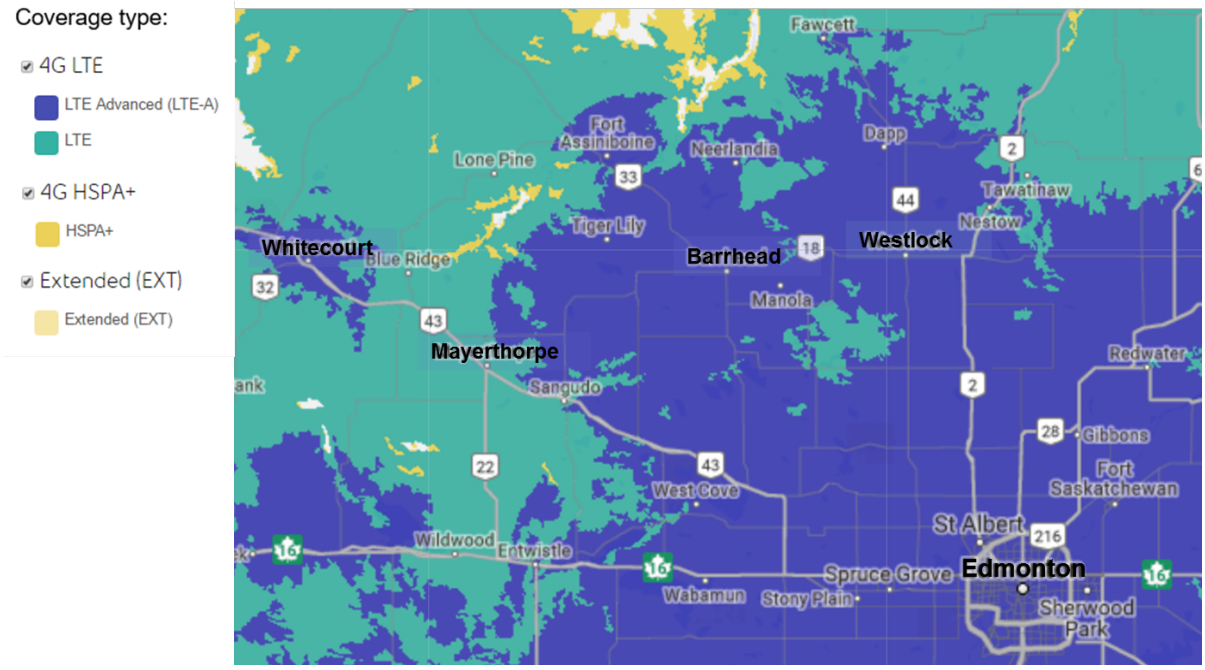


Figure 205 – GROWTH Alberta mobility coverage – TELUS/Bell.

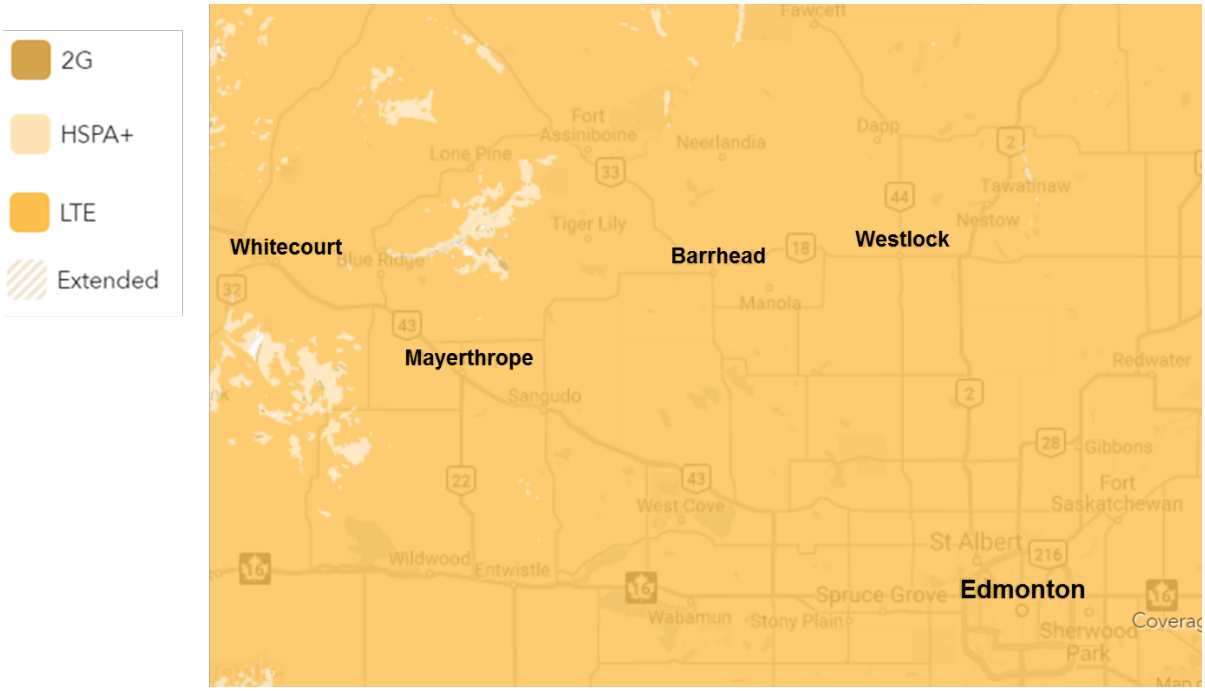


Figure 206 – GROWTH Alberta mobility coverage – Rogers Communications.

LSLEA & PREDA (County of Grande Prairie)

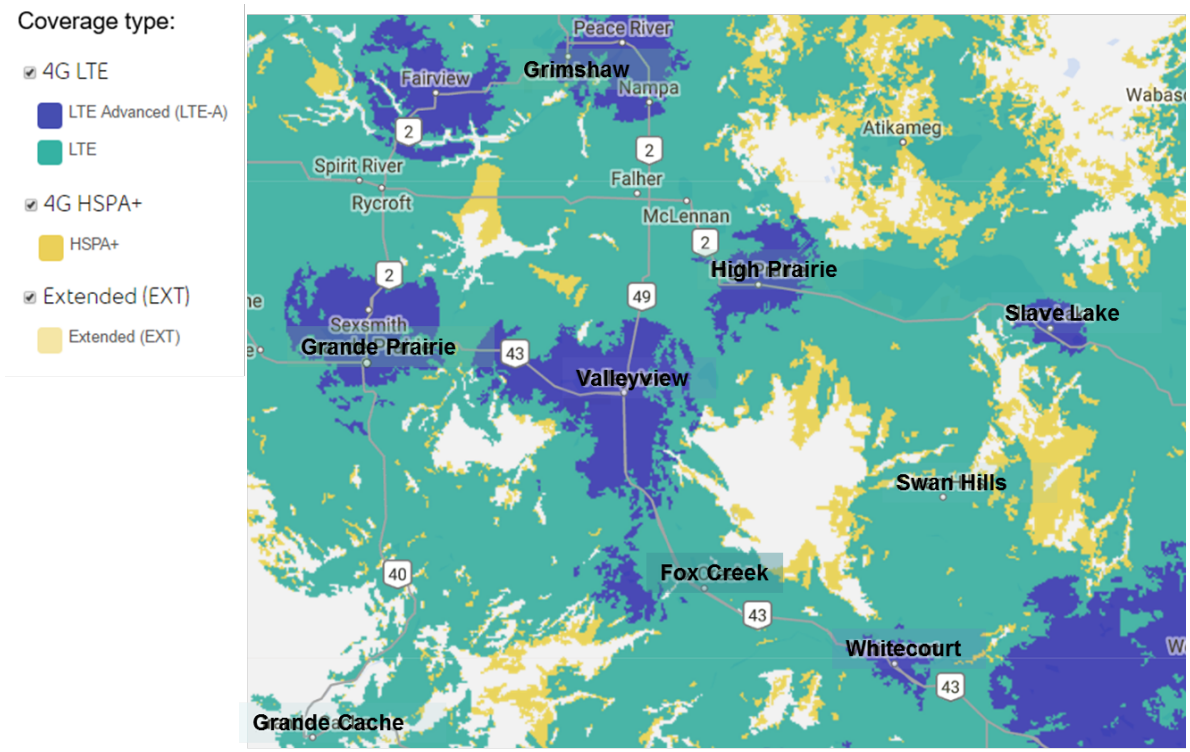


Figure 207 – Mobility coverage in the County of Grande Prairie – TELUS/Bell.

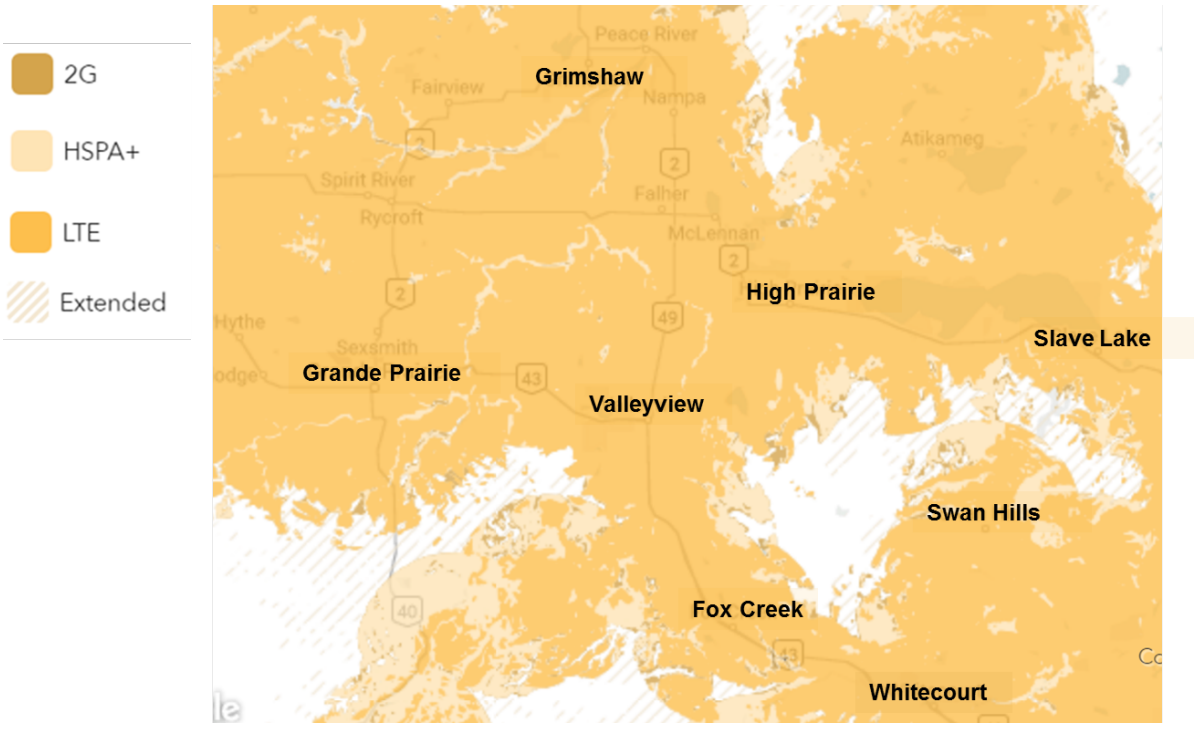


Figure 208 – Mobility coverage in the County of Grande Prairie – Rogers Communications.

PREDA (Grande Cache)

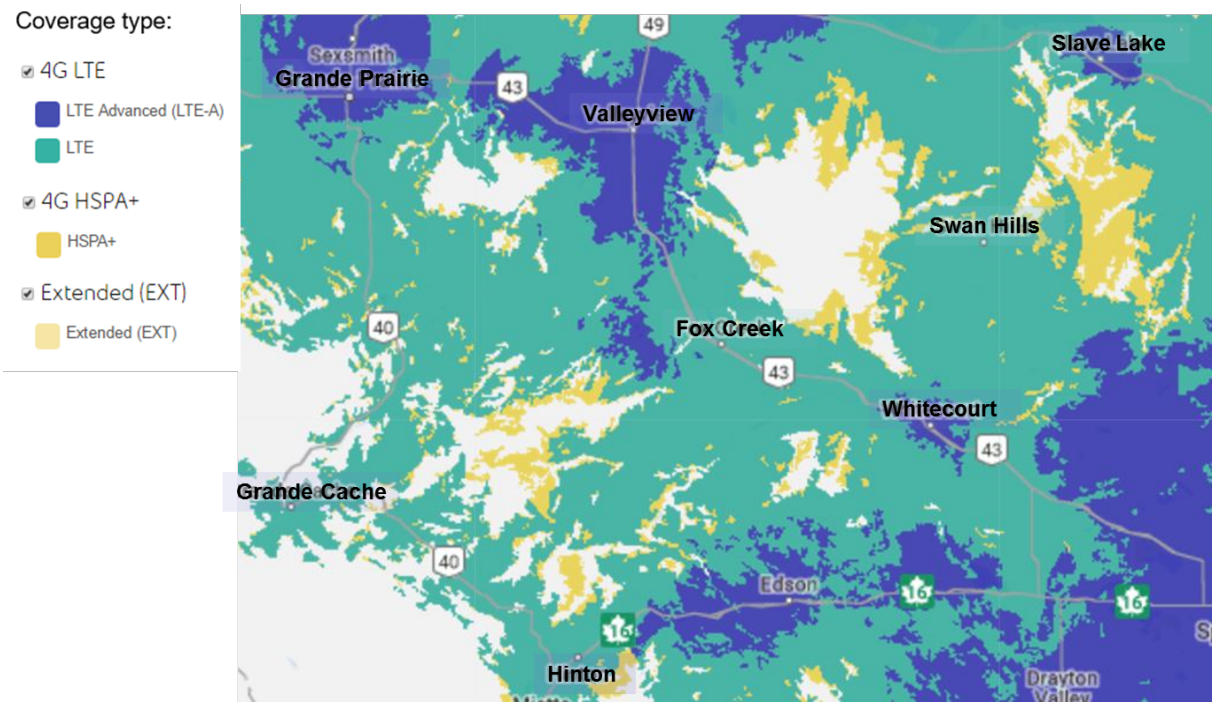


Figure 209 – Mobility coverage near Grande Cache – TELUS/Bell.

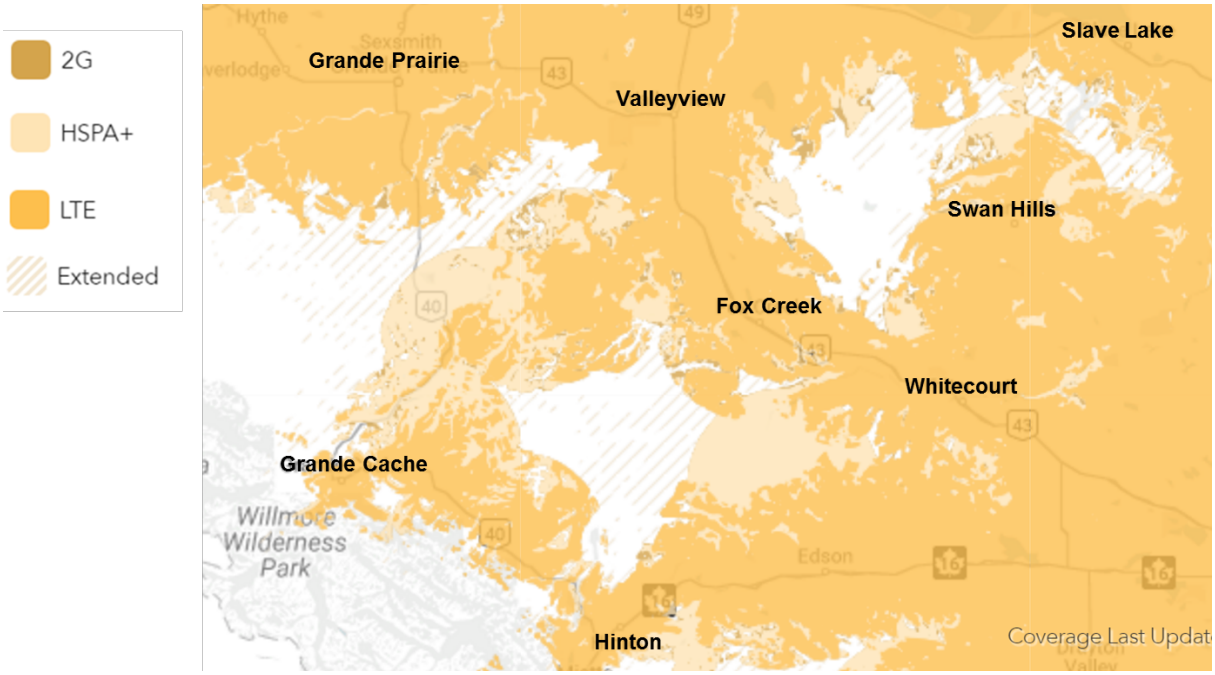


Figure 210 – Mobility coverage near Grande Cache – Rogers Communications.

PREDA (Grimshaw)

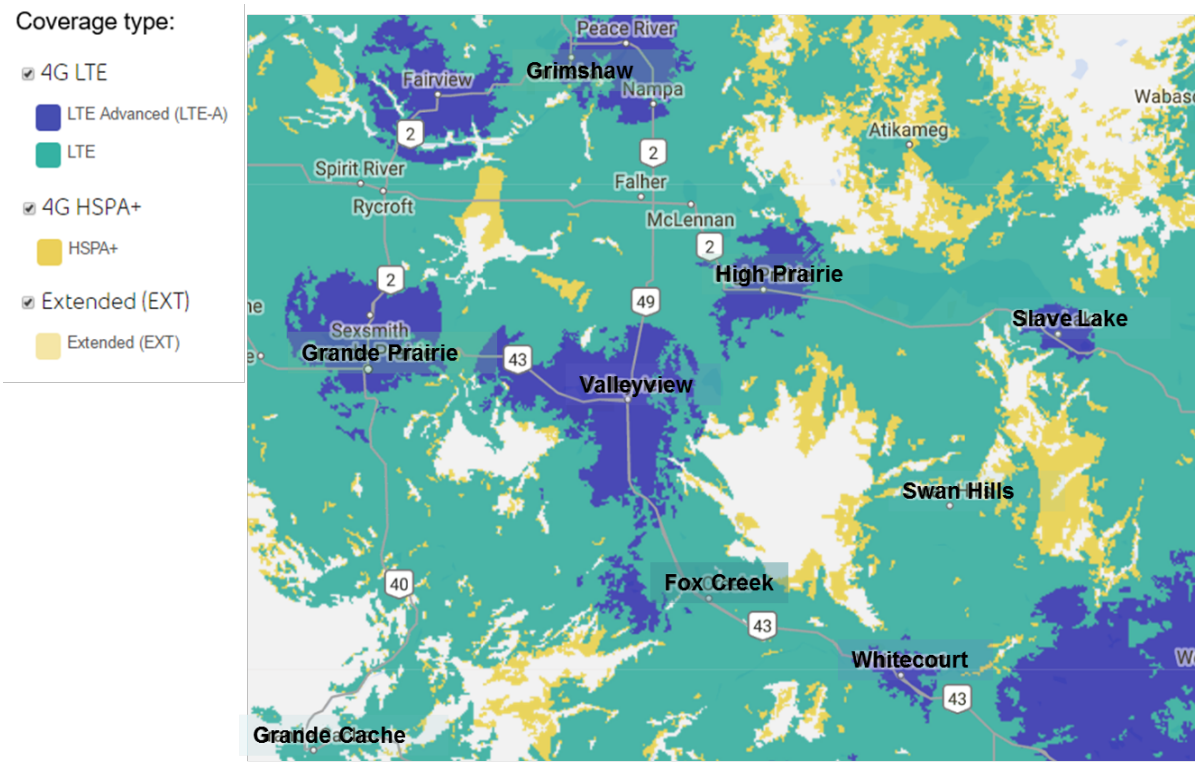


Figure 211 – Mobility coverage near Grimshaw – TELUS/Bell.



Figure 212 – Mobility coverage near Grimshaw – Rogers Communications.

REDI

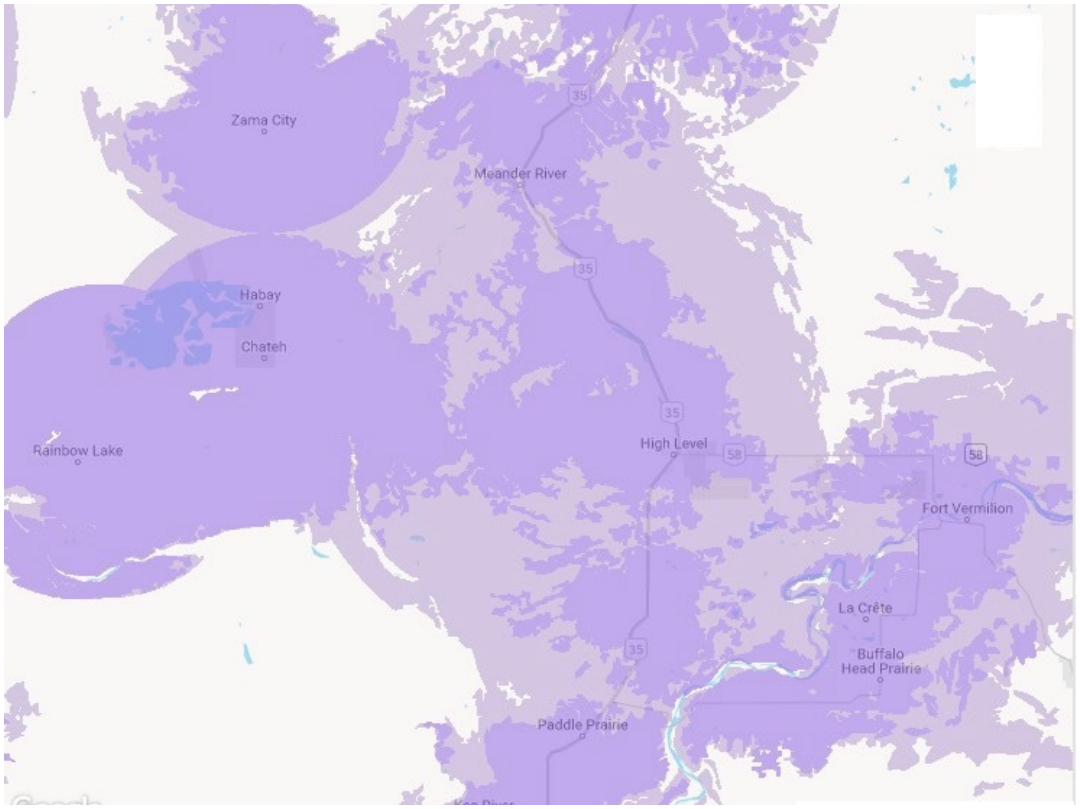


Figure 213 – REDI mobility coverage – TELUS/Bell.

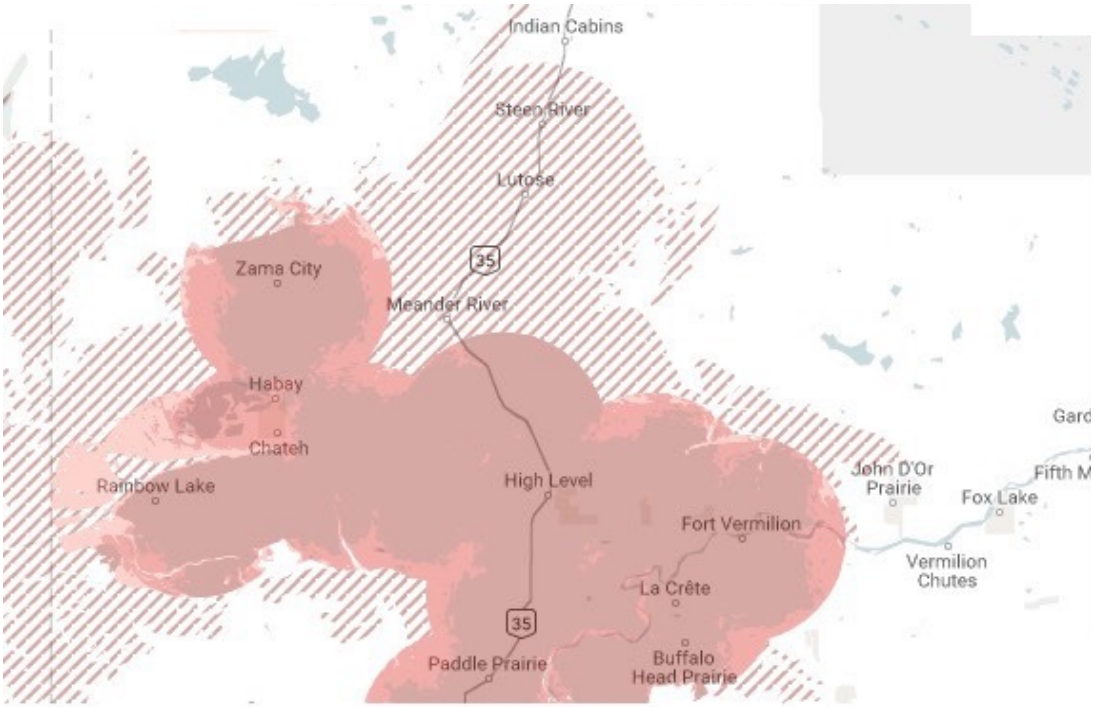


Figure 214 – REDI mobility coverage – Rogers Communications.

16.5 Alberta SuperNet

The Alberta *SuperNet* is a broadband superhighway, conceived by the Government of Alberta (GoA) in the early 2000's to connect public institutions, collectively termed the GLHLM (GoA, Learning, Health, Library, and Municipality) clients, to a broadband network for high-speed Internet access, video conferencing, and other services. The GLHLM component of the *SuperNet* links 4,200 GLHLM facilities in 429 communities. A second, wholesale backbone services, component enables rural Internet Service Providers (ISPs) to connect their access networks back to a peering point in Calgary and Edmonton. It is on this component that the discussion below is focused.

The Alberta *SuperNet* consists of the Bell-operated BAN serving 27 of the larger urban centres in the province and the Axia-operated EAN, covering the rest of the province. BAN communities in northern Alberta include Bonnyville, Cold Lake, Fort McMurray, Grande Prairie, Vegreville, Vermilion, and Whitecourt. While the *SuperNet* mostly consists of fibre-optic backbone facilities, wireless links are used to complete the network in the most rural areas.

As the *SuperNet* is operated on an *'open-access'* basis (its services are available to all service providers on a comparable basis), to preclude any conflicts of interest, neither Bell nor Axia can offer retail services such as Internet with in their *SuperNet* footprint. To date, Bell does not offer retail services within the province, but Axia NetMedia does provide retail services to corporate clients and, through AxiaConnect, provides retail Internet services in smaller communities (e.g., Town of Fairview).

Deploying fibre to smaller towns, villages, hamlets, small subdivisions, and other remote groups of premises need not be more expensive than deploying to neighbourhoods in urban areas, except for the following:

- A backhaul connection is needed to connect the community to the global network, and
- Operational costs could increase if the community is not near maintenance personnel.

The availability and monthly costs of the backhaul connections are therefore fundamental to enabling fibre deployment and sustainable operations in all of these communities. To enable triple play services in communities, a 1 Gb/s backhaul connection is the absolute minimum. The *SuperNet* operating requirement is to enable minimum 1 Gb/s (and preferably 5 or 10 Gb/s) connections between communities and a peering point in for example Edmonton at a low enough rate that these community operations are sustainable. Obviously, there are expenses other than debt service and backhaul, but those can be reduced by scale - either by outsourcing operations to a larger player or by partnering with other local communities to realize scale themselves.

Since its construction, there have been issues for users, ISPs, and municipalities with the SuperNet. Service Alberta summarized the current issues as follows:[205]

- Quality and cost of services.
- Uneven playing field between ISPs and the SuperNet operator;
- Poor contracts, which are difficult to manage; and
- From Service Alberta's perspective, escalating costs to the Government of Alberta.

The SuperNet operating contact will expire on June 18, 2018.

[205] Bull, Stephen, Assistant Deputy Minister, Service Alberta, SuperNet Secretariat; *Alberta SuperNet 2.0*; Message to Doris Regula; 24 January 2017. E-mail.

16.6 ATCO's and Fortis Alberta's Service Areas

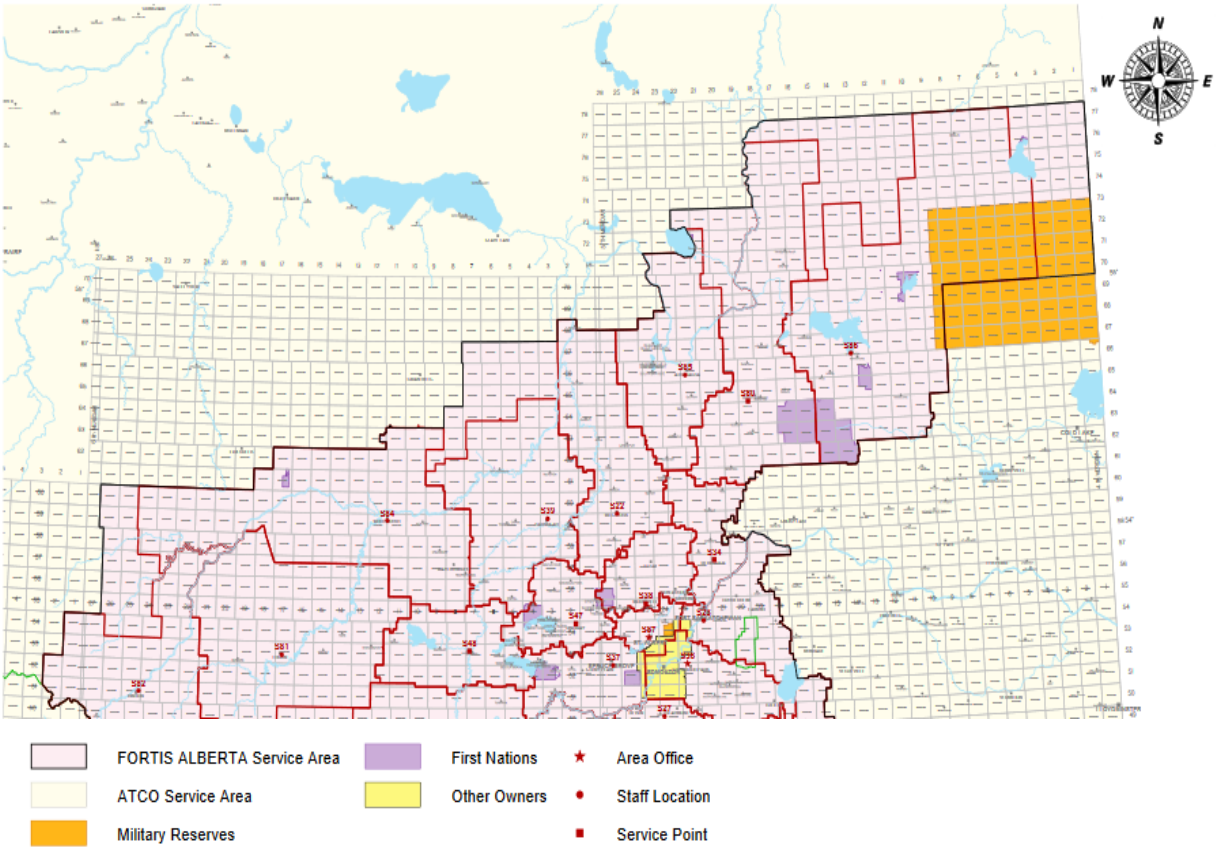
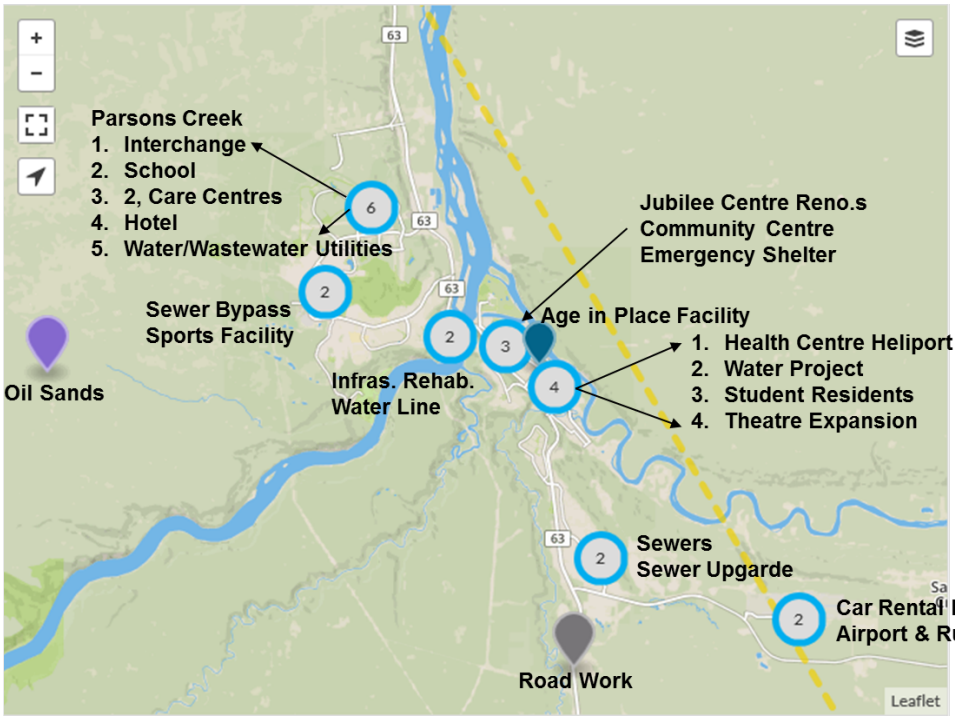


Figure 215 – ATCO Electric & Fortis Alberta service areas in northern Alberta.

16.7 Major Projects

Athabasca and Regional Municipality of Wood Buffalo



Regional Infrastructure Projects over $5 M.

Figure 216 – Major projects – Regional Municipality of Wood Buffalo, urban service area.

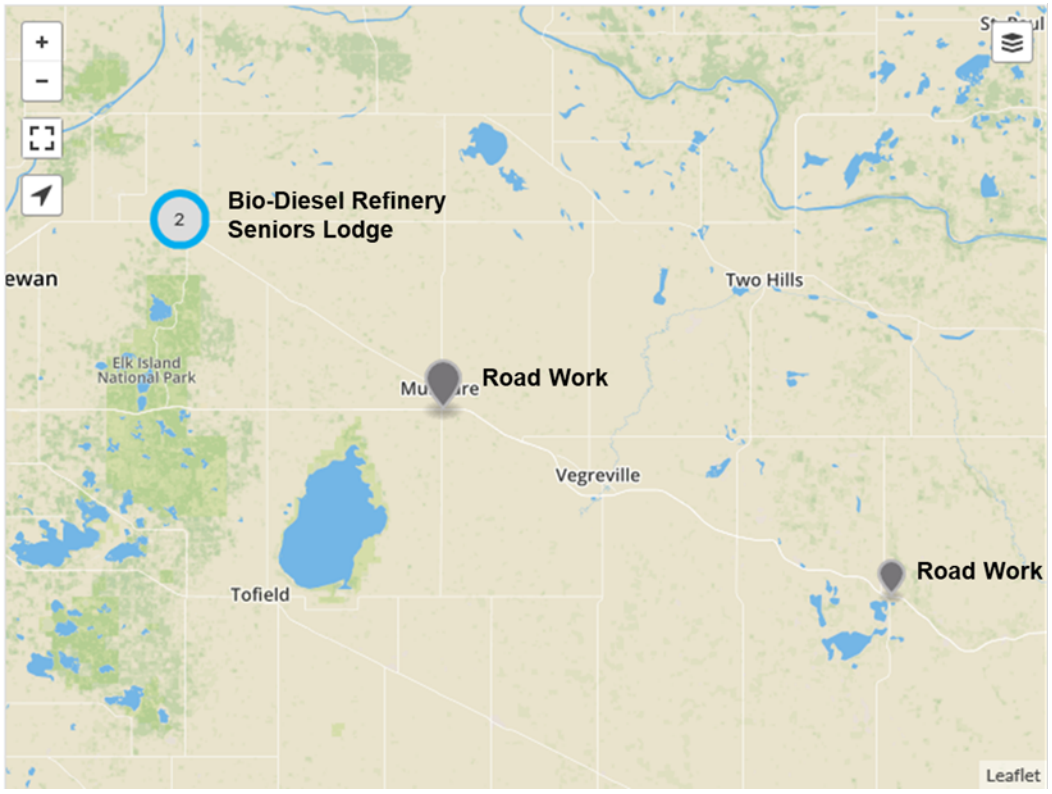
Alberta HUB



Figure 217 – Major projects – Smoky Lake area.

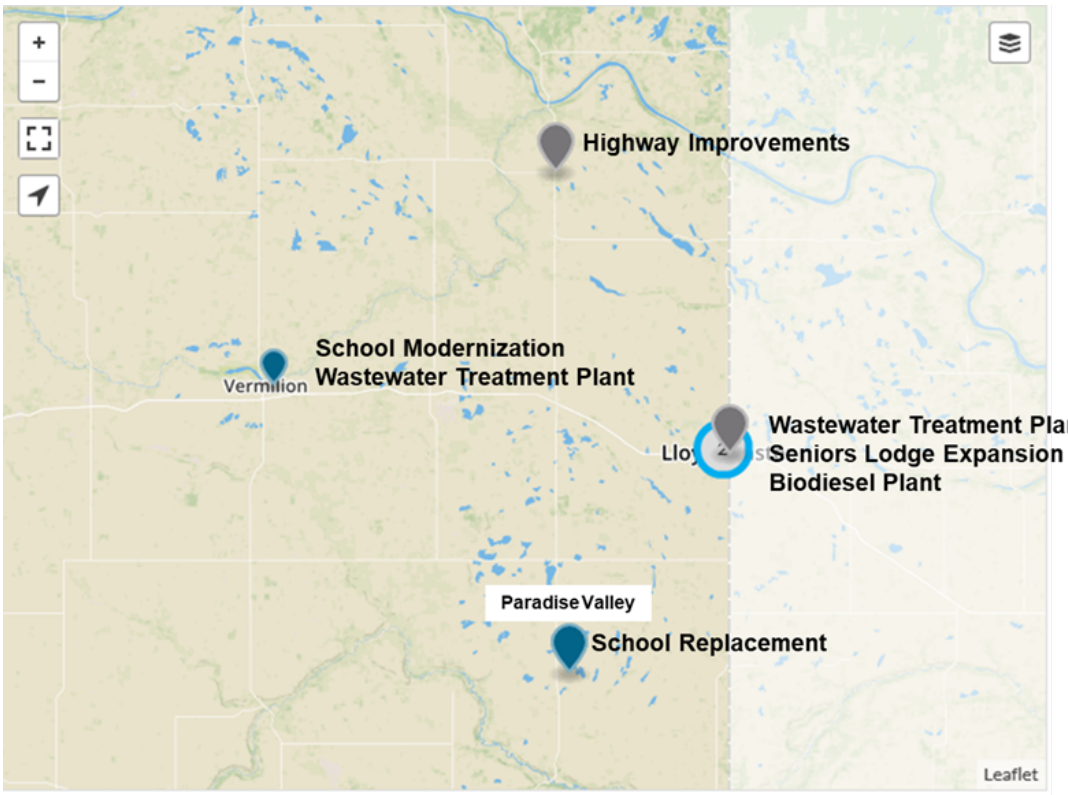


Figure 218 – Major projects – St. Paul area.



Regional Infrastructure Projects over $5 M.

Figure 219 – Major projects – Vegreville area.



Regional Infrastructure Projects over $5 M.

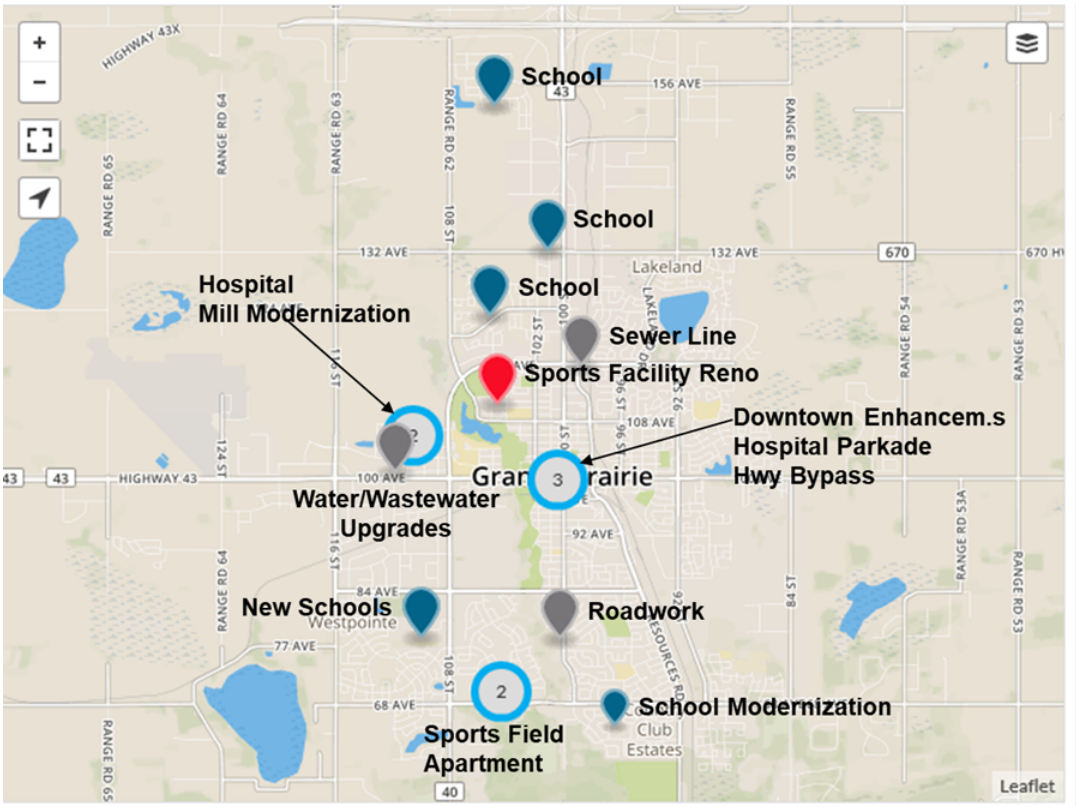
Figure 220 – Major projects – Vermilion area.

PREDA



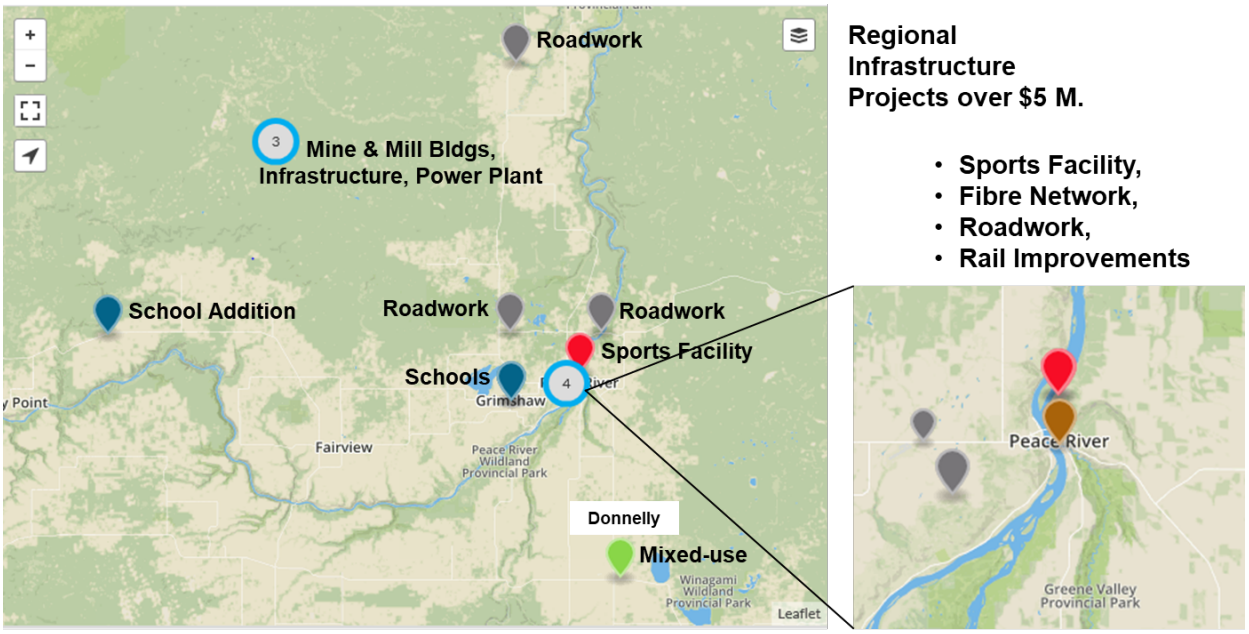
Regional Infrastructure Projects over $5 M.

Figure 221 – Major projects – Grande Cache area.



Regional Infrastructure Projects over $5 M.

Figure 222 – Major projects – City of Grande Prairie area.



The '*fibre network*' reference is to TELUS's fibre optic installation.

Figure 223 – Major projects – Grimshaw/Peace River area.

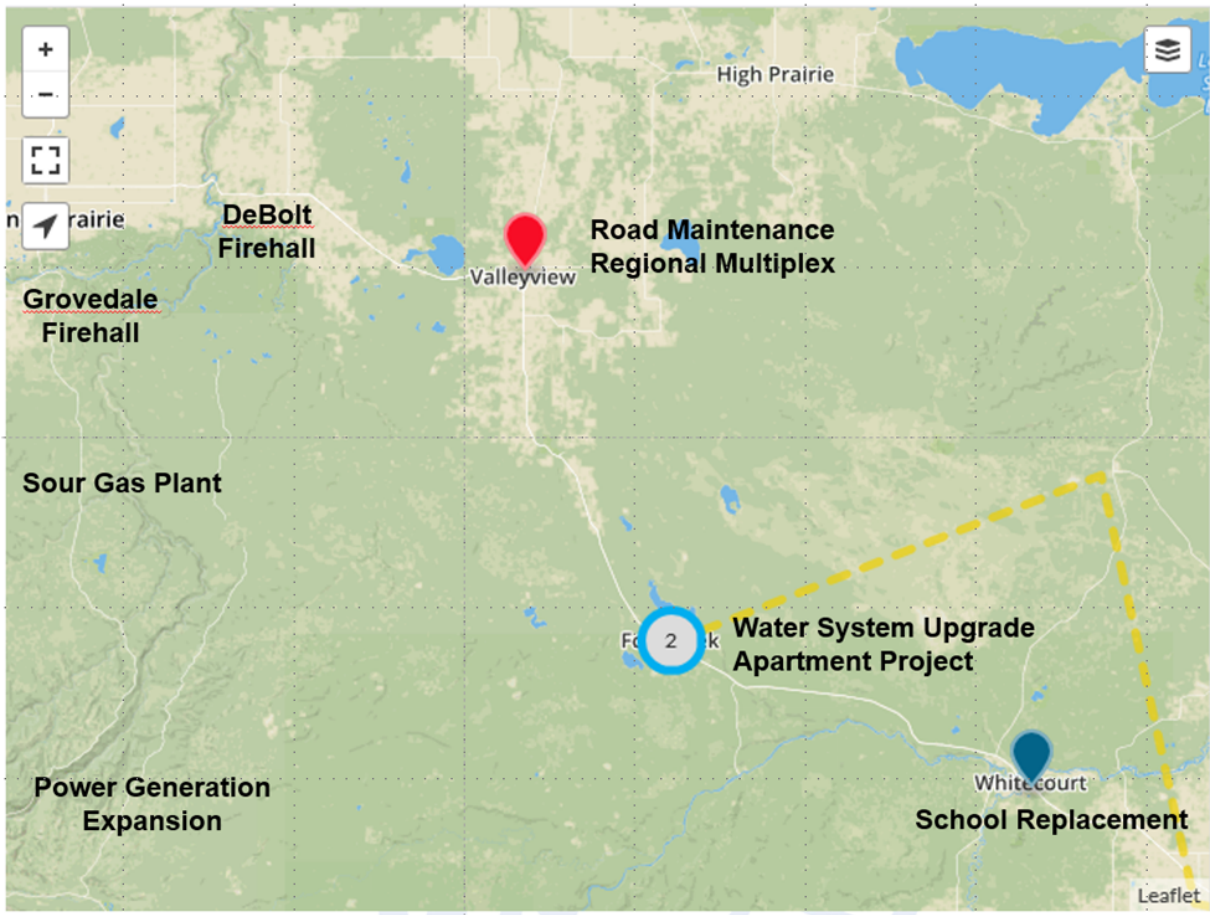


Figure 224 – Major projects – Valleyview/Fox Creek area.

16.8 Alberta Central East (ACE) Regional Water System

Member municipalities:

- County of Minburn
- County of Two Hills
- County of Vermilion River
- Town of Two Hills
- Town of Vermilion River
- Village of Dewberry
- Village of Innisfree
- Village of Kitscoty
- Village of Mannville
- Village of Marwayne
- Village of Myrnam
- Village of Paradise Valley
- Village of Willingdon

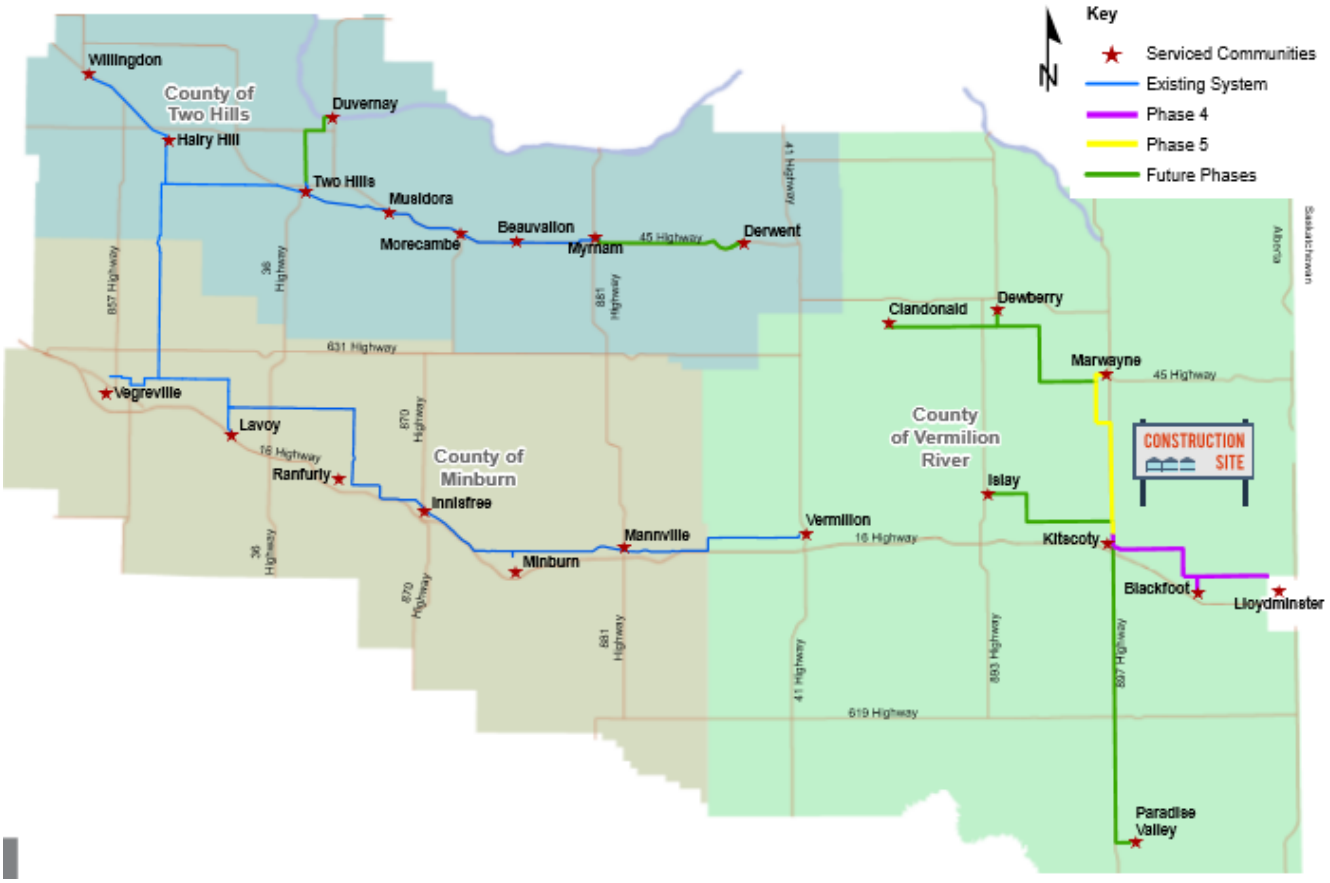


Figure 225 – Alberta Central East (ACE) regional water system.

16.9 Fort McMurray West 500 kV Transmission Line

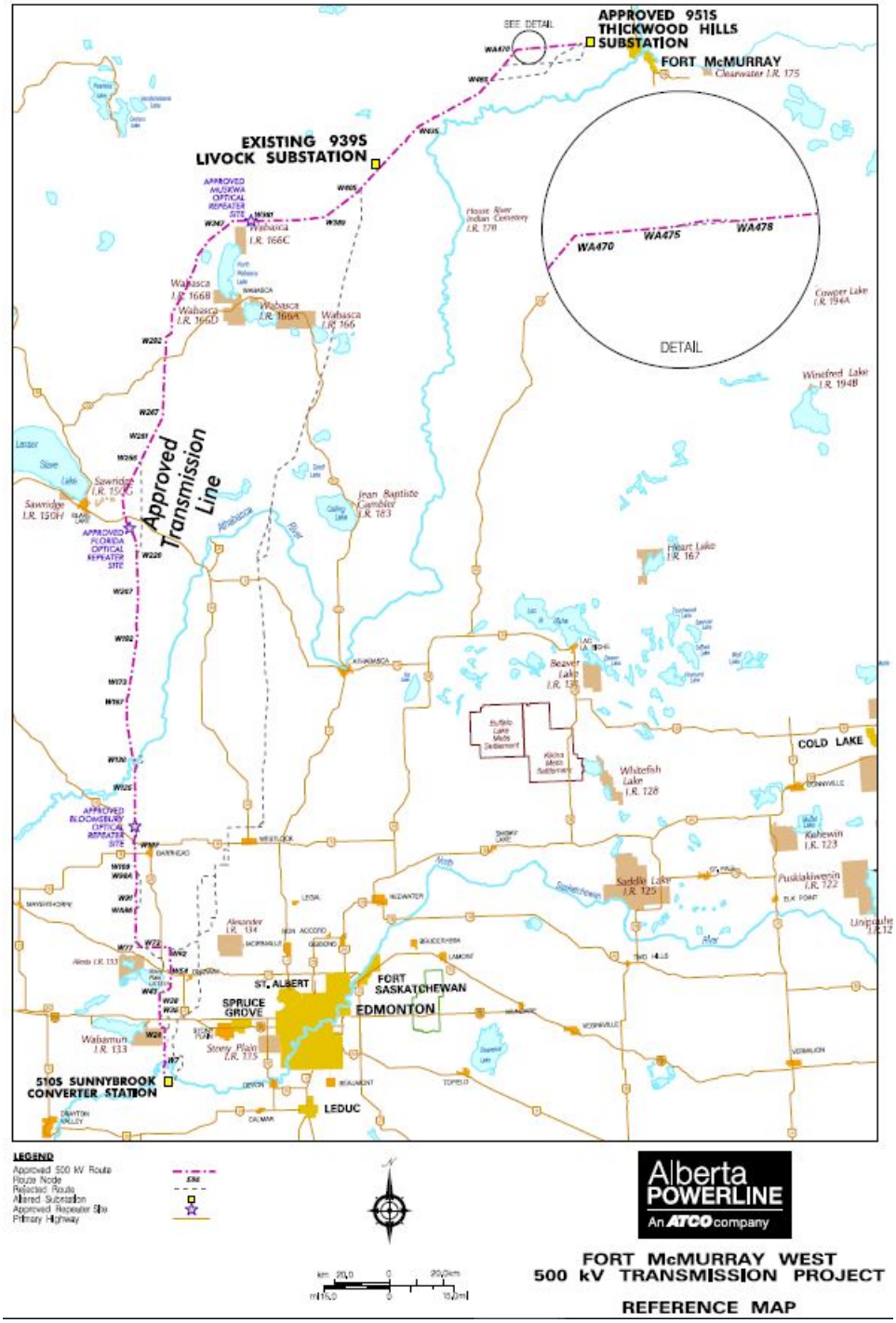
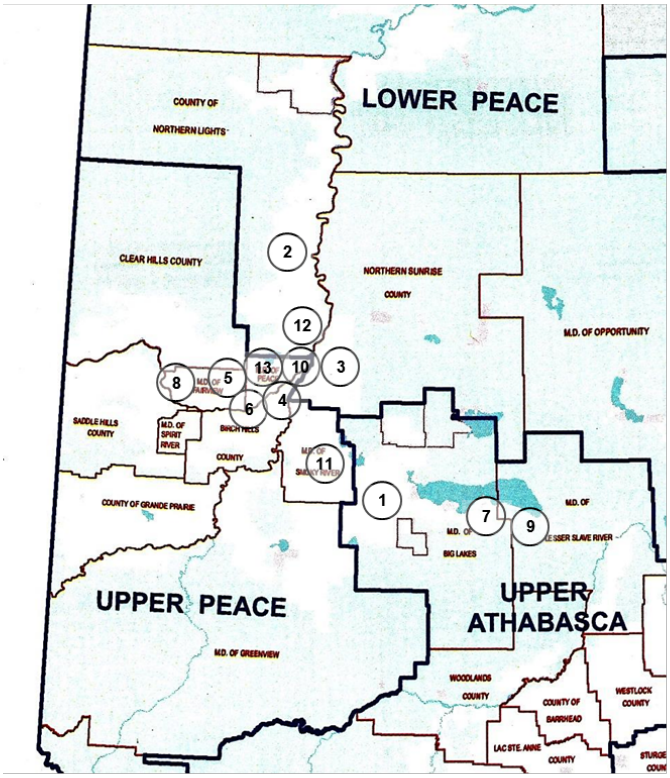


Figure 226 – Fort McMurray west 500 kV transmission line.

16.10 Rural Water Co-operatives' Service Areas



1. Big Meadow, Heart River, High Prairie East, North End, Northwest, Riverbend, Southside, West End
2. Northern Lights
3. East Peace
4. East Grimshaw
5. Fairview Rural Water Project Ltd.
6. Griffin Creek
7. Kinuso
8. Little Burnt River
9. Poplar Lane
10. Shaftesbury
11. Smoky River
12. Weberville
13. West Grimshaw

Figure 227 – Northwestern Alberta rural water co-operatives.[206]

[206] Regula, Doris; *Market Opportunity Analysis;* Regula & Associates Consulting Ltd; 15 May 2015. 121.

16.11 Desired State by Community

16.11.1 Athabasca and Wood Buffalo Regions

Table 71 – Athabasca and Wood Buffalo Regions Community Broadband Plans and Visions

	Issues/Challenges Facing Community in Next 5 Years	Fibre /broadband on Agenda?	Factors impacting capability to pursue fibre/broadband	Broadband Next 3, 5, 10 Years
Towns				
Athabasca	• Keeping up essential services infrastructure • Poor Internet services, including coverage and capacity (residents are demanding action to improve Internet services – bit rates and service coverage)	Yes	Cost Topology and density challenges (i.e., valleys, which slope towards the Athabasca River create dead zones)	Fibre-based high-speed Internet for all (potentially provisioned by Axia)
Boyle	Information was not available at the time this report was finalized			
Counties/RMs				
Athabasca	• Oil industry shocks to the local economy such as spending in that sector, the closing of field offices and businesses that support the industry, and loss of employment. As well the trickle-down effect to other sectors such as the pipeline industry (e.g., projects put on hold) • Internet service levels (need to improve and expand)	Cellular service has been a topic of discussion	Cost	10 yrs. – much expanded Internet service (at this point, unsure what role the county would play in that). They want to promote economic development and the county knows that broadband plays a role
Wood Buffalo – Rural Communities[207]	• Foresee the lack of reliable high-speed Internet in some of the rural communities, which could restrict business opportunities and negatively impact the overall quality of life within these communities	No, not at this time; it has been on the Rural Committee's agenda various times in the past	Cost	3 yrs. – reliable high-speed Internet for all rural residents 5 yrs. – rural residents and businesses have choice (i.e., multiple ISPs service offerings available) 10 yrs. – continued improvements of all

[207] In the Urban Service Area, the RMWB's preference is to have the local incumbents manage the evolution of enhanced broadband service. Hintz, AnnMarie, Information and Advisory Services, RMWB; 'Telephone Conversation'; 10 November 2016.

	Issues/Challenges Facing Community in Next 5 Years	Fibre /broadband on Agenda?	Factors impacting capability to pursue fibre/broadband	Broadband Next 3, 5, 10 Years
				telecommunications services
First Nations				
Athabasca Chipewyan	Information was not available at the time this report was finalized			
Chipewyan Prairie	Information was not available at the time this report was finalized			
Fort McKay	Information was not available at the time this report was finalized			
Fort McMurray	Information was not available at the time this report was finalized			
Mikisew Cree	None provided	No	Remote, isolated	None provided
Smith's Landing	Information was not available at the time this report was finalized			

16.11.2 Alberta HUB

Table 72 – Alberta HUB Community Broadband Plans and Visions

	Issues/Challenges Facing Community in Next 5 Years	Fibre /broadband on Agenda?	Factors impacting capability to pursue fibre/broadband	Broadband Next 3, 5, 10 Years
City				
Cold Lake	TELUS FTTP in progress Cost of infrastructure	No	Cost	3 yrs. – fibre-based broadband service available to all 5 yrs. – all municipal buildings connected via fibre
Towns				
Bonnyville	TELUS fibre community			
Bruderheim	• Internet bandwidth and speed • Attracting and retaining businesses • Other critical infrastructure in need of repair • Connectivity to high-speed infrastructure (fibre) • Limited availability and interest of suppliers in a small community	Yes, definitely	1. Funding is a big issue with regard to the infrastructure costs associated with utility upgrades 2. Getting enough people to subscribe to high-speed Internet to attract a company to provide the service may also be an issue, particularly if cost is a substantial issue for them	3 yrs. – new construction and downtown with access to fibre 5 yrs. – entire community with access to fibre 10 yrs. - integration with surrounding municipalities for high-speed internet
Elk Point	• Securing improved Internet bandwidth and speed when the community's size is too small to attract an investment by a larger ISP	Yes	Cost	Interested in Axia solution due to the cost of a community fibre build
Lamont	None	Not available (have sufficient Internet)	Demand will drive deployment of fibre	None
Mundare	• Maintaining current level of taxation • Business attraction difficult due to lack of industrial area, which they are looking for a solution •	Like to see it on Council's agenda, but infrastructure projects (roads, sewer) are of higher priority	• Cost/funding • Uncertainty regarding the SuperNet contract	10 yrs. – probably earliest they would potentially deploy fibre

	Issues/Challenges Facing Community in Next 5 Years	Fibre /broadband on Agenda?	Factors impacting capability to pursue fibre/broadband	Broadband Next 3, 5, 10 Years
Smoky Lake	Losing youth	Yes, looking for options (solution has to be inexpensive enough but have the performance needed)	None	Currently considering wireless (Town of Smoky Lake provided) and fibre options (through TELUS, Axia) 3 yrs. – desires to connect all residents and businesses, however, if the wireless option is selected the rollout would be slower than a fibre deployment and could take up to 5 years to complete
St. Paul	TELUS fibre community			
Two Hills	• Learning and affordability • Critical infrastructure (e.g., water and sewer capital replacement)	No	• Lack of knowledge • Affordability	Engaging in discussions, learning, possibly working on a regional plan
Vegreville	TELUS fibre community			
Vermilion	• Financial commitment to broadband • Attracting and retaining business	Yes	Cost	A Vermilion River Regional Alliance community (3 to 5 years broadband network in place)
Villages				
Andrew	Information was not available at the time this report was finalized			
Chipman	Information was not available at the time this report was finalized			
Dewberry	Vermilion River Regional Alliance community			
Glendon	• Other critical infrastructure in need of repair, upgrading, or replacement • Attracting and retaining businesses • Youth leaving	Yes, very interested	Cost and where would it fit into their budget?	3 yrs. – affordable, reliable broadband to municipal office, schools, firehall (other municipal buildings) 5 yrs. – affordable, reliable to all businesses and industry, leading up to having broadband available to all of residents
Innisfree	Information was not available at the time this report was finalized			
Kitscoty	• Maintaining or rehabilitating aging infrastructure • Providing effective services to citizens with limited tax dollars • Diversifying assessment base by attracting non-	Yes	Financial	A Vermilion River Regional Alliance community 3 yrs. – fibre network design in place citizens, businesses, and institutions of the municipality

	Issues/Challenges Facing Community in Next 5 Years	Fibre /broadband on Agenda?	Factors impacting capability to pursue fibre/broadband	Broadband Next 3, 5, 10 Years
	residential development • Providing a community with the lifestyle components that will attract new residents • Internet bandwidth and speeds • Financial			5 yrs. – Kitscoty able to market municipality as a connected community, with reliable, affordable, fibre-based broadband Internet services available to all 10 yrs. – Kitscoty realizes optimal benefits from non-residential development growth (accomplishing goal of assessment diversity) and enhanced community growth and sustainability
Mannville	Vermilion River Regional Alliance community			
Marwayne	• Increase industrial assessment base • Attracting and retaining business • Infrastructure old and in bad condition	Yes	Money	A Vermilion River Regional Alliance community (work with regional collaboration to attain broadband for everyone)
Myrnam	Information was not available at the time this report was finalized			
Paradise Valley	Vermilion River Regional Alliance community			
Vilna	Information was not available at the time this report was finalized			
Waskatenau	• Internet bandwidth and speeds • Attracting and retaining business	No	Cost to community and residents/businesses	3 yrs. – access to high-speed broadband
Willingdon	Transitioning to hamlet status within Two Hills County			
Counties/MDs				
Bonnyville	• Loss of industry (oil and gas) • Loss of tax revenue, which impacts maintenance and the upgrading of critical infrastructure • Loss of jobs, leading to residents leaving and lack of growth for the MD • Growth is also affected by the lack of access to the Internet	No	• Cost • Grant funding	3 yrs. – all residents have access to high-speed Internet 5 yrs. – building fibre broadband capability 10 yrs. – residents and businesses have affordable high-speed broadband services
Lac La Biche	• Rural Internet access services (and a willing ISP), which impacts and	Discussed, but no strategy	• Cost • Access to right of way land	3 yrs. – develop a strategy

	Issues/Challenges Facing Community in Next 5 Years	Fibre /broadband on Agenda?	Factors impacting capability to pursue fibre/broadband	Broadband Next 3, 5, 10 Years
	limits opportunities for rural and economic development			5 yrs. – implement plan to include subdivisions in proximity of hamlets of Lac La Biche and Plamondon 10 yrs. – access to major subdivisions in remaining part of County
Lamont	• From an economic development perspective – attract appropriate industry to create jobs and tax base, including encouragement of value-added agriculture product development • Putting appropriate infrastructure in place that industry will require (e.g., roads, water)	No	Not a high enough priority (have not heard from constituents that broadband is an issue) Density (widely dispersed residences – 2,000 plus kilometre of roads) does not warrant the cost Demographic not engaged or reliant on the technology	Within 5 yrs. – no change 10 yrs. – if the provincial or federal governments will put in policy or procedure that all municipalities need to adhere to some regulation and with some subsidies to assist with that
Minburn	• Access to high-speed Internet for all residents (via wireless towers or direct line to home)	Yes	Ability for private ISPs to access fibre optic lines to tie into their wireless towers	3 yrs. – Installation of more towers by private ISPs to provide broadband access to all rate payers in the county 5 yrs. – ISPs starts tying existing towers to fibre 10 yrs. – 100% of towers with fibre
Smoky Lake	• Internet bandwidth and speeds (necessary for home-based businesses and these types of businesses are needed for economic diversification) • Attracting and retaining businesses • Other critical infrastructure in need of repair, upgrading, replacement • Social (e.g., high unemployment rate, youth leaving, addiction)	Yes (helped create and invested in CCI)	Lack of federal grant money	3 yrs. – county/CCI towers can increase backhaul with fibre to the tower 5 yrs. – micro-tower sites established to provide service to remaining 2% of county residents 10 yrs. – new technology and gigabit speed
St. Paul	• Internet bandwidth and speeds	Yes, support increased fibre	Lack of knowledge	3 yrs. – most residents, businesses, institutions have

	Issues/Challenges Facing Community in Next 5 Years	Fibre /broadband on Agenda?	Factors impacting capability to pursue fibre/broadband	Broadband Next 3, 5, 10 Years
	• Loss of industry • Other critical infrastructure in need of repair, upgrading, and replacement • Financial challenges (uncertainty facing rural municipalities regarding changes in assessment and collaboration costs)	installation of a local ISP; Wi-Fi planned for County-owned parks; applied for CARES grant to develop an economic development strategy	Lack of funding available for broadband and/or the willingness to move this to a priority expense due to lack of knowledge	high quality, affordable high-speed broadband service and coverage 5 yrs. – <u>all</u> residents, businesses, institutions have high quality, affordable high-speed broadband service and coverage 10 yrs. – all residents have ready access to broadband technologies and the skills to use them regardless of socio-economic status
Thorhild	Internet capacity	No	None provided	'Screaming' for capacity
Two Hills	Information was not available at the time this report was finalized			
Vermilion River	Vermilion River Regional Alliance community			
First Nations				
Beaver Lake	Information was not available at the time this report was finalized			
Cold Lake	Information was not available at the time this report was finalized			
Frog Lake	Information was not available at the time this report was finalized			
Heart Lake	Information was not available at the time this report was finalized			
Kehewin Cree	• Water quality (11 yrs. under boiled water advisory) • Housing • Employment	Not sure		Fibre-based Internet services for community
Saddle Lake	• Hazardous road conditions during wet weather (shortage of water lines means much of the community depends on truck haul) • Dump grounds are filling up rapidly and not a lot of room for more cells	Yes	Funding	3 yrs. – widespread availability of better quality broadband services to residents and businesses potentially through band- or community-owned business or partnerships
Whitefish Lake (Goodfish Lake)				Envision being a leader in broadband

Métis Settlements				
Buffalo Lake	Information was not available			
Elizabeth	• Speed (very slow) and reliability of Internet service • Population growth and the need for housing (currently there can be 3 or 4 families per unit)	Yes	Funding	
Fishing Lake	Information was not available at the time this report was finalized			
Kikino	Information was not available at the time this report was finalized			

16.11.3 GROWTH Alberta

Table 73 – GROWTH Alberta Community Broadband Plans and Visions

	Issues/Challenges Facing Community in Next 5 Years	Fibre /broadband on Agenda?	Factors impacting capability to pursue fibre/broadband	Broadband Next 3, 5, 10 Years
Towns				
Barrhead	• Land for development, town surrounded by privately owned farmland that has stayed undeveloped for many years and will probably remain that way for many years in the future	No	Funding	None provided
Mayerthorpe	• Cost of installing fibre to service areas that do not have existing fibre • Axia (SuperNet) and Eastlink have the necessary broadband speeds; however, there is restricted access (Axia) and limited access due to infrastructure location (Eastlink). These issues place the community at an economic disadvantage for attracting business and industry	Yes	Cost of installation of infrastructure	3 yrs. – Council's goal is to install free public access to Wi-Fi in public buildings (Town Office, curling rink, swimming pool, Exhibition Centre, and Diamond Centre)
Onoway	None provided	No	Cost	Good, high-speed access for all
Swan Hills	• Attracting and retaining businesses • Residents leaving (declining population) • Loss of industry • Declining infrastructure (is aging and in of repair)	Yes	• Financial commitments (cost and source of funds?) • Lack of expertise (what's needed?) • Who would be the service provider – private or town?	3 yrs. – planning complete and infrastructure deployment started 5 yrs. – infrastructure build complete and broadband services available to all homes and businesses 10 yrs. – broadband is '*standard*' and affordable service
Westlock	TELUS fibre community			
Whitecourt	Information was not available at the time this report was finalized			

	Issues/Challenges Facing Community in Next 5 Years	Fibre /broadband on Agenda?	Factors impacting capability to pursue fibre/broadband	Broadband Next 3, 5, 10 Years
Villages				
Alberta Beach	Information was not available at the time this report was finalized			
Clyde	Information was not available at the time this report was finalized			
Wabamun	• Loss of mining and power plant jobs • Lack of industrial land available for development • Sustainable financial base • High-speed Internet access	Yes, considering options, including becoming own Internet service provider	• Adequate infrastructure, project sponsor or backer	3 yrs. - explore all options for expanding high-speed Internet access in the village including fibre optic connections, ensure fibre optic capability included in all new developments 5 yrs. - have full plan and details in place for expanding high-speed Internet access 10 yrs. - full high-speed Internet connectivity to all residents and business via fibre optics
Counties				
Barrhead	• Internet bandwidth and speeds across the municipality for rural residents, farming, and business operations at consistent price • Attracting and retaining businesses • Other critical infrastructure in need of repair, upgrading, or replacement	Yes	• Cost • Timelines	3 yrs. – gain understanding of current state, needs, and caps in order to devise a plan/strategy to achieve access to Internet for all residences and businesses. Due to potential for financial constraints this may involve prioritization and alignment with other infrastructure projects. 5 yrs. – majority of residents and businesses have access to affordable high-speed broadband services. 10 yrs. – ALL residents and businesses have access to affordable high-speed broadband services.
Lac Ste. Anne	• Expectations of urban services in a rural lifestyle • Aging bridges and the costs to repair • Locating dependable, affordable gravel stockpiles	Yes, Council adopted a utility model in 2010	Fibre deployment would be to be facilitated via grant funding (as was fixed wireless tower construction)	3 yrs. – broadband service to the majority of unserved areas 5 yrs. – broadband service to all unserved areas
Westlock	Information was not available at the time this report was finalized			

	Issues/Challenges Facing Community in Next 5 Years	Fibre /broadband on Agenda?	Factors impacting capability to pursue fibre/broadband	Broadband Next 3, 5, 10 Years
Woodlands	• Population density • Terrain (trees)	Yes	• Cost • Topology	Fibre throughout County through an initiative such as the 1964 AGT rural buried cable program
First Nations				
Alexis Nakota	Information was not available at the time this report was finalized			

16.11.4 LSLEA

Table 74 – LSLEA Community Broadband Plans and Visions

	Issues/Challenges Facing Community in Next 5 Years	Fibre /broadband on Agenda?	Factors impacting capability to pursue fibre/broadband	Broadband Next 3, 5, 10 Years
Towns				
High Prairie	Business attraction	Yes	None	Within 3 yrs. – FTTP to all residents and businesses
Slave Lake	TELUS fibre community (predominately residential)			
Counties/MDs				
Big Lakes	• Diversification of local economy • Remaining a '*have*' municipality • Attracting new residents • Providing a better quality of life	Yes	Money	3 yrs. – develop Strategic Plan, incorporating a broadband plan 5 yrs. – deliver broadband to more populated areas 10 yrs. – deliver full broadband coverage to all
Opportunity	Information was not available at the time this report was finalized			
Lesser Slave River	Information was not available at the time this report was finalized			
First Nations				
Bigstone Cree	Information was not available at the time this report was finalized			
Driftpile	Information was not available at the time this report was finalized			
Kapawe'no	Information was not available at the time this report was finalized			
Loon River	Information was not available at the time this report was finalized			
Peerless Trout	Information was not available at the time this report was finalized			
Sawridge Band	Information was not available at the time this report was finalized			
Sucker Creek	Information was not available at the time this report was finalized			
Swan River	Information was not available at the time this report was finalized			
Whitefish Lake	Information was not available at the time this report was finalized			
Woodland Cree	Satisfied with current Internet services			
Métis Settlements				
East Prairie	Information was not available at the time this report was finalized			
Gift Lake	• Employment for youth • More accessibility to the Internet (some households do not have Internet service), even work stations at Settlement's administration office	Yes	Money Community's isolation Lack of broadband '*know how*'	3 yrs. – hard to know where technology is going but envisions comparable broadband service levels to those available in urban centres

	Issues/Challenges Facing Community in Next 5 Years	Fibre /broadband on Agenda?	Factors impacting capability to pursue fibre/broadband	Broadband Next 3, 5, 10 Years
Peavine	• Suitable housing for youth (less than 30 years of age) • Job outlook bleak, especially for youth	No, but do support (did write letter of support for local ISP re: ISED Connect to Innovate program)	Funding Other priorities	3 yrs. – goal is to attain comparable broadband service levels to those available in urban centres (as a service, broadband and Internet is on the same level as a utility now)

16.11.5 PREDA

Table 75 – PREDA Community Broadband Plans and Visions

	Issues/Challenges Facing Community in Next 5 Years	Fibre /broadband on Agenda?	Factors impacting capability to pursue fibre/broadband	Broadband Next 3, 5, 10 Years
City				
Grande Prairie	TELUS fibre community			
Towns				
Beaverlodge	Information was not available at the time this report was finalized			
Fairview	Axia fibre community			
Falher	• Internet bandwidth and speeds • Attracting and retaining businesses • Loss of industry • Financial	Discussed at Council	Cost	3 yrs. – residents and businesses have access to high quality, affordable high-speed broadband services and coverage 5 yrs. – widespread affordable, reliable, scalable high-speed broadband access 7 yrs. – fibre broadband infrastructure deployment is accelerated, so that over 90% of homes and businesses have access to gigabit-capable Internet
Fox Creek	Information was not available at the time this report was finalized			
Grande Cache	• Internet speed • Population decreasing • Loss of industry • Critical infrastructure in need of repair, upgrading, replacement • Financial • Social – all aspects	No	Cost	No vision
Grimshaw	• Economic development (loss of businesses, attracting businesses back, idle industrial businesses) • Maintaining infrastructure such as roads and securing funding for such work • Future competitiveness with neighbouring towns of Peace River and Fairview, which have	Yes	Cost Provincial direction regarding a provincial broadband strategy and uncertainty of SuperNet/Axia contract	3 yrs. – comparable quality bandwidth to other municipalities of similar size An equal level of service to downtown Calgary (why not?)

	Issues/Challenges Facing Community in Next 5 Years	Fibre /broadband on Agenda?	Factors impacting capability to pursue fibre/broadband	Broadband Next 3, 5, 10 Years
	fibre-based broadband services			
Manning	Information was not available at the time this report was finalized			
McLennan	Information was not available at the time this report was finalized			
Peace River	TELUS fibre community. An issue is encouraging property developers to develop (town has high offsite levies).			
Sexsmith	Information was not available; however, local businesses are very concerned about the lack of bandwidth			
Spirit River	Population density	Yes	Cost	None provided
Valleyview	• Growing local business • Retaining investment dollars in the community	Yes	Cost Scale of operations	3 yrs. – broadband network deployed and fully operational
Wembley	Critical infrastructure in need of repair	No	Unknown	3 yrs. – reliable high-speed Internet 5 yrs. – affordable Internet services 10 yrs. – optical fibre services
Villages				
Berwyn	Information was not available at the time this report was finalized			
Donnelly	• Attracting new residents (fibre would be an incentive) • Industry closures	Yes, one of their priorities	Finances Feasibility	3 yrs. – initiating community-based broadband 5 yrs. – infrastructure completed and beginning to market broadband services
Girouxville	Information was not available at the time this report was finalized			
Hines Creek	Information was not available at the time this report was finalized			
Hythe	• Attracting and retaining businesses • Other critical infrastructure in need of repair or replacement	Yes, looking at a pilot project with a smaller firm	Time Level of expertise	3 yrs. – competitive with other communities, using current technology 5 yrs. – making good use of the SuperNet in servicing the community 7 yrs. – making good use of the newest and best technology
Nampa	Information was not available at the time this report was finalized			
Rycroft	• Attracting new residents and businesses • Remaining viable • Economic development	Yes	Small scale	Fibre conduit deployment in downtown in July 2017, as part of local street

	Issues/Challenges Facing Community in Next 5 Years	Fibre /broadband on Agenda?	Factors impacting capability to pursue fibre/broadband	Broadband Next 3, 5, 10 Years
				improvement project. Followed by FTTP
Counties/MDs				
Birch Hills	Information was not available at the time this report was finalized			
Clear Hills	None provided	No	Population density	High-speed Internet to all
Fairview	• Poor Internet service • Youth leaving • Road and bridge infrastructure in need of very costly repairs and upgrades • Low oil and gas activity (compared to other areas in the region) limits tax revenue	Yes	Cost - limited financial resources and capacity Topography Density	3 yrs. – residents, businesses, institutions have high quality, affordable high-speed broadband service and coverage
Grande Prairie	• Managing their growth • Current network of fixed-wireless towers is no longer meeting the county's bandwidth/capacity needs (both for residential and business user – limiting businesses) • Demand pressure on for new housing	Yes	Cost Lack of service provider cooperation to explore options with them	3 yrs. – to achieve fibre-based broadband speeds to 90% of the county (up to 1 Gb/s) 5 yrs. – redundancy or expandability of the network reflected in the number of service providers (do not want to see a monopoly situation)
Greenview	Information was not available at the time this report was finalized			
Northern Lights	• Keeping up with province's requirements under MGA changes • Loss of Industry such as oil and gas (old oilfield – end of life for many) • Need for potable water in large part of County • Increasing taxes to pay for services • Regional collaboration (have three urban communities and decreasing budgets)	No	Cost Capacity	3 yrs. – residents, businesses, institutions have high quality, affordable high-speed broadband service and coverage 5 yrs. – all residents have ready access to broadband technologies
Northern Sunrise	• Loss of industry (population very dependent on how busy the oil field is)	Yes	Cost Geography and population (i.e., low density)	3 yrs. – broadband connectivity for as many people as possible

	Issues/Challenges Facing Community in Next 5 Years	Fibre /broadband on Agenda?	Factors impacting capability to pursue fibre/broadband	Broadband Next 3, 5, 10 Years
			Cost/benefit issue (i.e., how much needs to be invested to get the greatest benefit?)	5 yrs. – broadband connectivity for all
Peace 135	• Reduction in economic activity • Loss of industry • Attracting and retaining businesses	Yes	Cost Topography	5 yrs. – 50% of municipality to have reliable, high-speed Internet 7 yrs. – 75% of municipality to have as stated above 10 yrs. – 100% of municipality to have as stated above
Saddle Hills	• Looking for growth (increase population and businesses required to support that) • Improving quality of life (Internet, provision of water) – Council is exploring idea of providing water to people's homes (no water co-ops in the County)	Yes	• Ability to secure grant funding • Uncertainty of assessment revenue from oil and gas industry • Implications of changes to MGA (regional collaboration and funding agreements that will need to come out of those)	Vision is that the county be fully served (would like to be there already) Fibre to towers (currently have wireless backhaul); Continue to position so that today's investments will still be beneficial in 10 to 20 years time
Smoky River	Issues • Attracting and retaining businesses • Loss of industry Challenges • Internet bandwidth and speeds, • Social (youth leaving the region) • Financial	Yes, discussed and Council has been in discussions with local MLA and provincial ministers	Cost	3 yrs. – access to high quality, affordable high-speed and broadband service and coverage for residents and businesses
Spirit River	Information was not available at the time this report was finalized			
First Nations				
Duncan's	Information was not available at the time this report was finalized			
Horse Lake	Information was not available at the time this report was finalized			
Lubicon Lake	Information was not available at the time this report was finalized			
Sturgeon Lake	Information was not available at the time this report was finalized			

16.11.6 REDI

Table 76 – REDI Community Broadband Plans and Visions

	Issues/Challenges Facing Community in Next 5 Years	Fibre /broadband on Agenda?	Factors impacting capability to pursue fibre/broadband	Broadband Next 3, 5, 10 Years
Towns				
High Level	• Ensuring residential and businesses are getting the advertised level of service and what they are paying for • Loss of industry – oil and gas, residents leaving • Attracting new businesses given remote location (need to be able to do business online)	On Council's radar	Cost and location	At the very least, citizens to receive the Internet service levels they pay for
Rainbow Lake	Remoteness	No	None provided	None provided
Counties				
Mackenzie	• Building the infrastructure needed for roads, water, and sewer • Improved cellular and Internet services coverage, reliability, and bandwidth • Remoteness	Has been a topic of discussion	Do not wish to compete with local communications companies and ISPs	Improved and enhanced broadband services (coverage, reliability and speed) offered by the existing ISPs and encouraged and supported by Mackenzie County Residents and businesses have access to the most current telecommunications technologies to permit them to participate in global opportunities[208]
First Nations				
Beaver First	Information was not available at the time this report was finalized			
Dene Tha'	• Housing shortage • Lack of employment (oil and gas decline) • Unstable and inconsistent Internet access	With the Chief	• Cost • Low density, particularly at Hay Lakes (also know as Chateh)	

[208] Mackenzie County; Mackenzie County, Sustainability Plan 2015 – January 2016, Approved January 12, 2017. 33.

	Issues/Challenges Facing Community in Next 5 Years	Fibre /broadband on Agenda?	Factors impacting capability to pursue fibre/broadband	Broadband Next 3, 5, 10 Years
Little Red River	• Fibre-based high-speed Internet services are a priority need • Remoteness and semi-remoteness affect the costs of goods and services because travel distances are significant on gravel roads (Fox Lake 162 access is ice bridge in winter and barge services in summer) • Cellular service is needed for the three First Nations communities, tourists, workers accessing the Wood Buffalo National Park, and goods and services providers • Reserve roads require designed/engineered modernization • Major housing shortage and overcrowding (i.e., need to address population growth and the addition of new families) • High unemployment • Economic opportunities and growth (Highway 58 connector to Fort Smith would improve opportunities) as well as regional work opportunities • Limited access to postsecondary educational opportunities	Yes, high on Council's agenda[209]	Cost – would like to move away from fixed wireless to fibre-based Internet	Within 3 yrs. – envision community health centres, schools, college campuses, the First Nation's offices, and residents will have higher quality and affordable access to high-speed internet services (on par with other communities in the region that are served by the SuperNet). 5 yrs. – through the cooperative lobby efforts of the northern communities and the premises of the Broadband project, greatly improved access to educational and training opportunities for youth and others in developing skills, attaining a post secondary education, and improving the general capacity of the residents of the three Little Red River communities will become a reality. 10 yrs. – increased capacity of the communities drives economic growth and greater opportunities for the populace including having their own ISP or a continued partnership with Arrow.

[209] The Little Red River First Nation sees a role for broadband to play in addressing the issues and challenges facing their communities. Broadband would increase access to more online post secondary education for youth and its people as well as telehealth and other social services. Assistance with local improvements and the needs of the communities would benefit if communications and the sharing of information with the federal authorities were broader and more timely. As well the availability of broadband could encourage the creation of online business ventures.

	Issues/Challenges Facing Community in Next 5 Years	Fibre /broadband on Agenda?	Factors impacting capability to pursue fibre/broadband	Broadband Next 3, 5, 10 Years
Tallcree	• Housing (new, sustainable, maintenance, low income) • Employment • Infrastructure • Operational funding • Broadband bandwidth • Lack of cell phone coverage • Education	Yes	• Capacity • Lack of knowledge	3 yrs. – on par, in terms of bandwidth, with the Fort Vermilion School Division (50/50 Mb/s), reliable Internet 10 yrs. – being in a position to provide educational opportunities (access to training) and programming that would give their community a competitive edge in the job market

16.12 Business Model Options

Dark Fibre	Conduit	***E.g.,:*** Montreal ***Open access*** can be provided via conduit sharing or subducting, but is limited by the size of the existing conduit.
		Pro's: Simple operationally, can be handled by traditional utility departments. Takes 50-60% of the deployment expense off the table for service providers if well designed. 5. ***Con's:*** Typically only includes feeder and some distribution routes; Limited breakout points; May restrict fibre architecture.
	Fibre	***E.g.,:*** Stokab in Stockholm, Qnet in Coquitlam, OICRD in Olds, Calgary ***Open access*** is typically provided via home-run architecture and by provisioning multiple fibres per premise. If fibre counts are limited, a community may opt for first-come, first-served arrangements.
		Pro's: Simple operationally, but considerably more helpful than a conduit-only play. Takes 50-75% of the deployment expense off the table for service providers. Reduces disruption due to civic construction. Enables efficient conduit/fibre design and can be optimized for connectivity. Over-provisioning is required to ensure sufficient fibre and space for multiple sets of network equipment. ***Con's:*** Potential service providers must also deploy network equipment to light the fibres they wish to lease prior to providing services. In large metropolitan areas, this works, but in smaller communities, it will limit the number of service providers available to you. O-Net, for instance, is not likely to play, and if one does come in, it's likely that no-one else will, due to the limited market – giving them a defacto monopoly.

Lit Fibre		***E.g.,:*** *SuperNet* in Alberta (backbone only). Common in Europe and would work well here. ***Open access*** can be provided via an independent network operator and a well-managed routing centre.
		Pro's: Facilitates unencumbered services-based competition amongst pure-play service providers and thus opens up services innovation to all players. ***Con's:*** Goes against long standing (if not antiquated) federal policy of facilities-based competition. A services-based eco-system has not yet developed in Canada and current incumbents will boycott your network.
Integrated		***E.g.,:*** Bell, Rogers, Shaw, TELUS; Traditional business model. All incumbents.
		Pro's: Good for single-purpose networks and universal service. ***Con's:*** Inhibits competition and innovation is only with permission from the network operators. Results in defacto monopoly control of critical civic infrastructure. Interests of the incumbent shareholders do not align with the needs of the communities they serve.