# **City of Spruce Grove Fibre-Optic Broadband Strategy**





Submitted to The City of Spruce Grove by IBI Group July 2019

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## 1. Executive Summary

The City of Spruce Grove has identified the need to improve the high speed broadband Internet services that are currently available to businesses located within its' commercial areas and industrial parks. This report confirms the current state of business broadband services within the City, as well as explores alternatives available to the City to improve the current situation. The City has options, including direct investment and partnering with the private sector in order to achieve a state of improved services. Recommendations, a preliminary business case as well as a high level deployment plan are provided.

## Why is Broadband Important?

#### **Municipal Needs**

As a growing vibrant City, Spruce Grove relies on broadband internet services to deliver a variety of essential services to its citizens as well as efficiently operate on a day to day basis. Past reports and studies in this area leave no doubt as to the ever increasing importance of high speed broadband services to support municipal operations. The City has responded to this need by beginning to implement fibre optic based connectivity to key municipal locations, with an approved capital plan to continue to invest in fibre optic infrastructure in the coming years. In the future, the ability to adopt Smart City technologies such as sensor networks, intelligent transportation and traffic management systems as well as to support citizen increasing demands and expectations of on-line, real time and streamed services from their municipal government will depend on the City's investment in broadband infrastructure to its key facilities.

#### Industrial/Commercial Businesses

"We must be highly responsive to opportunities that will attract and retain commercial and industrial businesses and develop economic development strategies that focus on strengthening existing businesses and attracting new ones. If we do this well, we will make Spruce Grove the economic power center of the region."

- Spruce Grove Strategic Plan 2015-2025

Much like the City, industrial and commercial businesses have an ever increasing reliance on reliable, affordable high speed broadband services. Past business surveys have indicated a high reliance and importance on broadband by almost all business sectors, industrial and commercial. Speed tests performed in the fall of 2018 indicate that industrial and commercial areas are limited in terms of available broadband services from commercial providers such as Telus and Shaw due to the lack of broadband (fibre optic) infrastructure in some areas of the industrial and commercial business districts. Businesses that have requested that fibre optic infrastructure be installed to their properties have received installation price quotations sometimes in excess of \$100,000 and in addition, need to enter into long term contracts with a service provider. These costs and conditions make broadband unaffordable for medium and small businesses who may not be in a position to fund the capital nor make a long term commitment to their location. The net result of this current situation results in businesses moving away from Spruce Grove to nearby business parks where broadband internet is readily available, and also makes it very difficult to attract new businesses to the area.

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Speed tests performed from October – November, 2018 indicate that a large majority of businesses do not have internet speeds that meet the CRTCs basic service standard of 50Mbps download and 10Mbps upload.

#### **Industrial Areas:**

Average download speed: 20.6 Mbps with only 8% of businesses demonstrating speed test results greater than 50Mbps. The average upload speed in the industrial areas was measured at 8.9 Mbps.



#### **Commercial Areas:**

Average download speed: 16.6 Mbps with 0% of businesses demonstrating speed test results greater than 50Mbps. The average upload speed in the commercial areas was measured at 7.2 Mbps.



#### **Strategic Alternatives**

Strategic alternatives range from doing nothing (let the private sector solve the problem), to exploring partnerships with the private sector, all the way to making a direct investment in fibre optic infrastructure and contract with service providers to deliver retail broadband services as another City utility.

Based on an examination of capability and willingness of service providers, the path of partnership along with some direct City investment as an 'anchor tenant' has been identified the most viable path forward.

#### **Partnerships with Private Sector**

Several commercial carriers (Telus, Bell, Shaw) when contacted during the course of this engagement have expressed a general desire or interest to 'partner', i.e. to work with the City in a cooperative fashion to try and address the lack of adequate broadband services.

For each carrier, partnership will be defined uniquely and viable partnership options are available with one or more carriers as further discussed in this report and will need to be explored in a later stage, in some cases under the request of a non-disclosure agreement.

It should be noted that partnerships may carry the City forward in terms of addressing a shortcoming in existing broadband services, and the City must be careful to enter into partnerships that create a win-win, in terms of not only improved services, but also create a longer term competitive environment to ensure that price and service competition exists between service providers in order to allow market forces to determine pricing. Solesourced partnerships which create an advantage for only one service provider have the risk of effectivity creating a monopoly market within a particular area, without competitive pressures to regulate prices and ensure quality services are delivered.

#### **Municipal Investment**

The City has already starting down the path of investing in fibre optic infrastructure to meet its own long-term needs, and this report identifies alternatives to leverage that investment into additional capacity that could be used to deliver broadband services to the industrial and commercial areas. Using the City's planned fibre optic backbone as a basis, costs have been identified to extend broadband services to industrial and commercial parcels as shown in Table 1 below.

PHASE	DESCRIPTION	NUMBER OF PARCELS	CAPITAL BUDGET (\$M)	MAINTENANCE COSTS (3%, ANNUAL)
1	Industrial SE	99	\$1.06	\$31,808
2	Industrial SW	154	\$1.91	\$57,345
3	Commercial North	121	\$1.74	\$52,301
	Total	374	\$4.71	\$141,454
	Per Parcel:		\$12,607/ parcel	\$378/ parcel

#### **Costs to Extend Fibre from the Fibre Ring Network**

Table 1 – Costs to Extend Fibre from the Fibre Ring Network

Preliminary business case modelling suggests that the City would need to charge in the range of \$52 to \$193 per parcel, per month for fibre optic facilities to be installed to each land parcel within the business parks on a cost recover basis (assuming a 30 year cost recovery). A full business plan is recommended as a next step to fully identify market demand as well as additional administrative and marketing costs that would be applicable.

#### **Objectives for a Spruce Grove Broadband Strategy**

Taken directly from one of the City's economic development goals, namely to "Ensure that Spruce Grove businesses have access to state-of-the-art broadband services at competitive rates which are increasingly essential to attract and retain high quality businesses and jobs" (1), this proposed broadband strategy for Spruce Grove is intended to achieve the following strategic objectives:

1. Create partnerships with the private sector in securing improved and competitive broadband services to retain and attract investment in our commercial and industrial areas;

Economic Development Strategy & Action Plan Update 2017-2021, September 8, 2018

- 2. Leverage the City's investment in its own fibre optic infrastructure as a key component to a more comprehensive and integrated broadband network;
- 3. Establish the capacity over time to achieve an open access network that the City can utilize to promote competition and generate a financial return.

#### **High Level Strategic Recommendations**

The City's strategic long range plans for broadband improvement can be focused around 4 major areas of effort and investment:

S1. Reinforcing and accelerating existing City plans and capital budgets to build out the City's fibre ring to connect City facilities, improving broadband capacity and providing improved reliability of the City's broadband communications infrastructure.

S2. Working closely with commercial telecommunications carriers to facilitate their continued investment in commercial and industrial areas, as a priority. The City's role is not one of direct funding or subsidy of carriers, but to work collaboratively on aspects such as planning and coordination of City utility projects, coordinated planning/ engineering and construction approvals to reduce the time and cost of installation of carrier infrastructure, with a particular emphasis of coordinating and encouraging carrier investment at the time of City civil work occurring during roadway and underground utility projects.

S3. Seeking to drive synergies between planned (i) City civil construction projects and (ii) The City's planned fibre ring to install additional conduit to provide for future broadband capacity in the City's industrial and commercial areas.

S4. Investing in the creation of a Smart City strategy that will provide guidance on the adoption and use of Smart City technology and infrastructure throughout many aspects of municipal operations and inform the future needs of the City's fibre infrastructure.

#### **Specific Deployment Recommendations and Implementation Plan**

As part of this report a number of specific deployment recommendations and a sequenced implementation plan, along with a recommended capital budget, are provided. This will enable the City to create a long term competitive environment where advanced high speed broadband communication services are available to all commercial and industrial sector businesses. These recommendations are summarized as:

- 1. Advance negotiations with telecommunication carriers to confirm intentions for fibre optic investment and focus priorities on industrial and commercial areas that are underserved or where new lands are under development.
- 2. Update engineering standards to treat fibre-optic conduit systems as a municipal utility and include budgets in future roadway/utility construction projects to fund the deployment of these systems at the same time as other civil infrastructure work is undertaken.
- Reprioritize and advance the sequencing of the City's Municipal Fibre Ring Plan to construct the segments connecting the Public Works building to the Integrated RCMP facility and Campsite Transit Centre (using the Diamond Avenue alignment); begin preliminary engineering in 2019.
- Consider Westwind Centre as an opportunity to extend fibre to these planned commercial lands as well as provide municipal infrastructure for proposed Park & Ride and Arena/Event Centre.

- 5. Develop a full engineering and business plan for the build-out of a fibre optic infrastructure network that integrates and takes advantage of the synergies between both municipal and business needs. The business plan should consider opportunities for some level of cost recovery.
- 6. Utilize an implementation schedule to achieve the establishment of a fibre optic network within a 5-7 year timeframe including alternate connections into the Edmonton gateway.

## 2. Current State Analysis and the Case for Broadband

As part of this engagement, a review of past analysis and reports was performed to understand current information available to date. These findings are summarized in Appendix A of this report.

In addition, stakeholder engagement consultations were performed with City departments, as well as NAIT, public and separate school boards, as well as the Chamber of Commerce. A summary of the findings from these engagement sessions are presented in Appendix B.

## **CIRA SpeedTest**

On October 1st, 2018 the City of Spruce Grove opted to employ a network measurement tool, developed by the Canadian Internet Registration Authority, in order to accurately develop an understanding of internet speeds within the Spruce Grove region. A customized web page was developed to manage the testing process and results, with a snapshot shown here:



During the running of the test a central focus was made upon the commercial and industrial business areas. Many bandwidth tests, including some speed tests done by internet providers, measure only the local connection between the residence or business and the nearest server hosted by such internet provider. This is a measurement of the maximum speed that can be expected over the local connection, however it is not an accurate measurement of the actual performance of the connection when accessing typical files on the internet and content that is not stored locally. Unlike such common speed tests, The CIRA test measures internet speeds by

calculating the maximum capacity of an individual TCP connection to a random instance within the greater internet. Through using random points within the greater internet, users of the test are provided with a more accurate and realistic understanding of their connection. In addition, not only does the test measure the speed of the connection, it also measures the quality of the connection while taking the latency (time/distance between source and destination) into consideration. Furthermore, all data points were geo-located through the utilization of IP addresses in order to exploit specific underserved areas within the municipality, specifically the northern commercial and southern industrial regions.

### **Bandwidth Test Results**

Results were collected with the purpose of developing an understanding of the current internet quality within the region, with specific focus upon average download speeds within the segregated business regions of the City. Once results were compiled and analyzed, the following insights regarding average regional download speeds were derived for both the Commercial Region (Figure 1) and the Industrial Region (Figure 2).

#### Average Download/Upload Speeds:

Municipality Overall (outside of Commercial and Industrial Regions): 22.36 Mbps download, 11.2 Mbps upload

Commercial Region: 16.6 Mbps download, 7.2 Mbps upload Industrial Region: 20.6 Mbps download, 8.9 Mbps upload



Figure 1 – Commercial Region



Figure 2 – Industrial Region

Based on the results, one can clearly identify that relative to the overall municipality, both the commercial and industrial regions are lacking.

The following graphs summarize the individual speed test results and context in terms of the CRTC Basic Service level and provincial average. Each graph is segregated to represent a different key business area within the Spruce Grove region.





Figure 3 - Commercial Speed Test Results

Spruce Grove Industrial Download Speed



Figure 4 – Industrial Speed Test Results

Figure 5 provides a map that identifies individual speed test results in the Industrial and Commercial areas.

From both graphs, we can observe that the majority of results fell below both the Alberta average download speed of 21.7 Mbps as measured by CIRA, and the CRTC Basic Service level of 50 Mbps. With Spruce Grove businesses increasingly needing higher quality internet connections with the minimum being the CRTC basic service level, a large area of concern is identified.

A comparison of upload results identifies similar disparity, with commercial and industrial download speeds being measured at 7.2 Mbps and 8.9Mbps respectively. Both results fall below the CRTC upload minimum service standards.

The industrial and commercial business regions rank below neighbouring municipalities of Edmonton, Leduc, Wetaskwin and Camrose. Operating within a highly competitive market, falling below nearby competitors can consequently correlate to a large weakness in Spruce Grove's ability to attract and retain businesses.







Figure 7 - Commercial Region - Alberta Provincial Download Speed Ranking

## Summary of Key Findings

In analyzing the information from the current state analysis, and CIRA test results, the following key findings were derived:

- With the exception of larger companies on corporate networks, the test results reveal that businesses located within the industrial and commercial regions are operating on connections that are far below both the CIRA provincial average and CRTC basic service standard.
- Spruce Grove is currently ranked below its nearby competitors on both a national and provincial scale, and as a result, consequently faces a significant risk of losing businesses to more competitive municipalities with greater offerings.
- Currently, internal city departments have a desire for advanced cloud-based applications and data collection methods, but do not have adequate network connections to support such technology.
- 4. Current service providers (Bell, Telus, etc.) have little to no existing infrastructure in the industrial region, as well as no planned future broadband investments for the municipality.
- 5. Although the service providers offer the option of fibre based broadband connectivity, the upfront cost associated with installation makes this option unaffordable to the majority of businesses.

## **Broadband Standards**

### Introduction

Responding to a global transition to knowledge based economies, governments at all levels have identified access to information communication technologies (ICT) as a cornerstone to support future sustainable economic development, enable wealth creation and serve as a cornerstone to maintain a high standard of living and quality of life.

The very definition of broadband has evolved rapidly over the past 5 years as governments and regulatory bodies have closely examined the service characteristics of internet services that allow consumers and businesses to take advantage of the benefits these services.

## **Canadian Regulatory Context**

In 2011, the Canadian Radio Telecommunications Commission (CRTC) established universal target speeds of 5 Mbps download and 1 Mbps upload, stating that these speeds should be available to all Canadians by the year 2015.

In revisiting the 2011 universal target speeds, in 2016 the CRTC issued Telecom Regulatory Policy CRTC 2016-496 - Modern Telecommunications Services. This provided the path forward for Canada's digital economy with the following statements to provide additional context for the policy:

This decision sets out the actions the Commission is taking to help meet the needs of Canadians so that they can participate in the digital economy and society.

Modern telecommunications services are fundamental to Canada's future economic prosperity, global competitiveness, social development, and democratic discourse. In particular, fixed and mobile wireless broadband Internet access services are catalysts for innovation and underpin a vibrant, creative, interactive world that connects Canadians across vast distances and with the rest of the world.

Canadians are using these services to find jobs, manage their investments, conduct business, further their education, keep informed on matters of public concern, consult with health care professionals, and interact with all levels of government. In general, fixed and mobile wireless broadband Internet access services improve the quality of life for Canadians and empower them as citizens, creators, and consumers.

A country the size of Canada, with its varying geography and climate, faces unique challenges in providing similar broadband Internet access services for all Canadians. Private sector investments, as well as funding programs from various levels of government, support the expansion of these services outside densely populated urban centres. Despite these efforts, many Canadians, particularly in rural and remote areas, do not have access to broadband Internet access services that are comparable to those offered to the vast majority of Canadians in terms of speed, capacity, quality, and price.

As part of this policy, the CRTC established that broadband internet was a basic service with target service objectives of 50 Mbps download and 10 Mbps upload, with unlimited usage capacity to be available in 90% of Canadian premises by the end of 2021 and in the remaining 10% of Canadian premises within 10 to 15 years.

Communities and regions within Canada have adopted strategies and targets for high speed broadband within their community that go well beyond the CRTC's recently announced basic service objectives.

For example, in York Region (Ontario), the following vision statement has been adopted by the Region: "To establish York Region as a Gigabit Region, recognized for its leadership in fostering an ecosystem of collaboration and business innovation within a connected lifestyle community." Supporting that vision, the Region established the following 5 and 10 year broadband targets in 2014, shown in Table 2 below.

	5 YEAR TARGET		10 YEAR TARGET	
LAND USE ITPE	UPLOAD	DOWNLOAD	UPLOAD	DOWNLOAD
Regional Centres and Corridors	10 Gbps	10 Gbps	1 Tbps	1 Tbps
Employment and Institutional Lands	10 Gbps	10 Gbps	1 Tbps	1 Tbps
Urban Residential	500 Mbps	500 Mbps	1 Gbps	1 Gbps
Urban Commercial	1 Gbps	1 Gbps	10 Gbps	10 Gbps
Towns and Villages	50 Mbps	250 Mbps	100 Mbps	500 Mbps
Rural Areas	50 Mbps	100 Mbps	50 Mbps	250 Mbps

#### York Region – Broadband Targets

Table 2 - York Region - Broadband Targets; Source: York Region Broadband Strategy 2014

## **Applications Drive Bandwidth**

Historically, bandwidth consumption patterns have been driven by a download consumption model. Consumers and business users would download content (e.g. email, video, music) from major content creators on the internet and thus the disparity between download and upload speeds available did not significantly impact the users experience as long as download speeds could be maintained.

### Video

Emerging applications that support real time video communication (e.g. FaceTime, Skype, etc.) and the penetration of mobile devices has allowed a far greater number of consumers and businesses to upload video content created on their smart phones. Many online businesses rely on creating and publishing bandwidth intensive content to the internet or to corporate servers (e.g. graphic designers and videographers, professional photographers, engineers, etc.), creating pressure on limited upload speeds that currently exist. Overall the penetration and use of real time video in HD, 4K and emerging 8K formats continues to drive the need for high speed symmetrical bandwidth. The use of video and imaging applications within the healthcare and educational sectors continues to increase, driving the need for increasing bandwidth that is reliable and supports real time video applications.

### Cloud

Over the past 5 years, most applications have moved to cloud based hosting and service models. Software as a Service (SaaS) has become the predominant business model for major application and software providers such as Microsoft, Google and many other firms. In order for clients to take advantage of the benefits of the cloud based services, they must have access to the internet in order for these applications to perform efficiently. While a single instance of a cloud application does not need a large volume of bandwidth, the widespread adoption of these applications mean that every device (computer, tablet, and smart phone) connected to the cloud is constantly consuming bandwidth, creating higher levels of bandwidth demand in the aggregate.

### Broadband Standards – City of Spruce Grove

Standards for the City need to be set within the context of the vision of the City for its future development, the type of businesses and residents and future developments it wants to attract and its overall strategy to support growth and development.

Focusing on the average download and upload speeds is an important standard however careful attention must be paid to not only the average metric, but as well the distribution of the results (median) values. It is important to note that while the CRTC has established a basic service standard of 50 / 10 Mbps, this standard reflects the current state of the incumbents' technology and will promote continued investment in legacy technology. Establishing standards beyond the minimum will allow the City to take a leadership position with respect to superior broadband services that will allow the City to attract businesses and residents that will take full advantage of broadband services and provide knowledge economy based growth and investment in the City.

Should the City proceed with investments in broadband technology, either as a wholesale or retail provider, or as a partner/ enabler of private sector investment, it is recommended that a minimum broadband standard be maintained in order to ensure that strategic objectives for the City are met.

Looking forward 5 years and 10 years, it will be important that broadband investments be able to support anticipated future growth and therefore aspirational targets for 5 years and 10 years ahead are also recommended. These recommendations are presented in Table 3 as follows.

METRIC	CURRENT STATE	5 YEAR TARGET	10 YEAR TARGET
Average Download/Upload	16.6/7.2 Mbps Industrial	1 /1 Gbps	10 /10
Speeds	20.6/8.9 Mbps Commercial		Gbps
% Above 15 Mbps Download	32%	40%	80%
Latency (North America destinations)		Less than 150ms	
Reliability		99.99% service uptime with a mean time to repair (MTTR) objective of 4 hours	
Open Access to Carriers		Yes	
% of Properties Connected		90%	100%

#### **City of Spruce Grove Recommended Broadband Standards**

Table 3 – Recommended Broadband Standards

#### **Other Recommended Broadband Standards and Policies:**

## Affordability and Usage Limits:

Flat rate pricing without incremental charges for usage

### Access to 3rd parties:

The broadband network shall be managed as an open network, allowing connections to other carriers on reasonable terms and prices and on a non-discriminatory basis.

## **New Development Connections**

The City should work closely with developers to negotiate the installation of dedicated telecommunications conduit systems for the City's use and operational control, providing a connection to the fibre optic backbone system at the closest practical connection point (planned or existing) and as well as a dedicated conduit connection from the backbone to the main telecom room or distribution facility located within the new development, or provide a connection directly to the dwelling unit.

## **Dig Once Standard**

All new construction or rehabilitation of roadways, bridges or other transportation infrastructure under the control and direction of the City should install new underground telecommunications conduit and associated hand wells/ pull boxes as part of the project scope.

All new construction of potable water or sanitary sewer trunk lines should be reviewed for the feasibility to install new underground telecommunications conduit and associated handwells/pull boxes as part of the project scope.

IBI Group recommends that following guidelines with respect to Fibre Optic Duct Engineering. These guidelines are subject to review and approval by the City of Spruce Grove's Engineering Department.

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## Fibre Optic Duct Engineering Guidelines:

- 1. Throughout the route, there shall be a minimum of 2 x 50 mm HDPE conduits deployed for backbone network. The exact quantity will be determined during detailed design phase.
- 2. There shall be cable vaults located at approximately every 2 km along the route. Size and type to be specified during detailed design phase.
- 3. There shall be hand wells located at approximately every 500 m along the route. Additional hand wells may be required due to on-site conditions or wherever the cumulative bends of conduits exceeds 180 degrees. Hand wells are also to be located near each traffic controller and also placed in order to aggregate drop conduit for individual building connections. Size and type to be specified during detailed design phase.
- 4. Additional 1 x 50 mm HDPE conduit, with sub-duct shall be installed for drop connections to provide connectivity to commercial buildings or residences. The installation of this conduit will be coordinated with specific construction details of the individual property, to be determined during the detailed design phase.

## 3. Business Model Options and Analysis

There are many factors to evaluate when considering the appropriate business model for Spruce Grove to consider for the development of broadband infrastructure. These include both strategic objectives and decisions on tactics.

## **Strategic Decisions and Considerations**

#### **Strategic Objectives**

- 1. Business attraction and retention by making high speed broadband available and affordable
- 2. Leverage City investment to reduce investment hurdles and enable competition
- 3. Open network access to public infrastructure
- 4. Use existing models/ best practices

#### **Decisions on Tactics**

- 1. Technology (Fibre or radio)
- 2. Wholesale vs. Retail
- 3. Build or Partner

## **Governance Business/Structure and Alternatives**

There are many options for the City to consider in terms of varying municipal involvement in the ownership and operations of a municipal fibre optic network. The diagram below identifies the spectrum of ownership and involvement, which we will discuss further.



#### **Do Nothing**

Under this scenario, the City would continue to purchase the services it requires from commercial telecommunications providers at the broadband speeds and prices available in the current marketplace.

#### **Benefits and Risks**

This option has the benefit of requiring no investment; however, there is a risk that places the City at a comparative disadvantage in the long term if commercial telecommunications providers do not make investments in fibre optic infrastructure to support the needs of the City, local businesses, and residents. Recent discussions with representatives of TELUS and Shaw indicate the incumbents do not intend to change their current investment strategies in the City, so status quo must be assumed.

#### **Existing Examples**

There are numerous examples of municipalities in Canada who have taken a 'Do Nothing" approach to date.

## Private Sector Partner (Private - Public Partnership)

Under this scenario, the City would engage potential partners in the investment and operations of the network by publishing long range plans and soliciting partner interest through a Request for Proposal (RFP) process. Potential partners could participate in the form of providing financing, construction, and/or operational expertise to build and operate the network. Depending on the nature of the partnership, the City may contribute to the partnership in the form of capital contribution, long term commitments to purchase telecommunications services or a combination of both. This model is more expensive than direct ownership of assets since private sector partners will want to receive a return (profit) from their investments. A summary of partnership approaches, structures and issues is provided in Table 4 below.

APPROACH	BUSINESS STRUCTURE	ISSUES TO CONSIDER
City Owned	<ul><li>Utility Corporation (e.g. EPCOR)</li><li>City Owned</li></ul>	<ul> <li>Focused on sustainable operations</li> <li>City control of assets/ strategy</li> </ul>
Partnership	<ul> <li>Outsourced Operations</li> <li>Equity Partner/Investor</li> <li>Design/Build/Finance/Maintain (PPP)</li> </ul>	<ul> <li>Less capital and operational risks</li> <li>Less control of assets and direction</li> </ul>
Carrier Commitment	• Exclusive agreement / NDA	<ul> <li>No control of outcomes</li> <li>Provides advantage to single service provider</li> <li>No cost</li> </ul>

#### **Partnership Approaches & Consideration**

Table 4 – Partnership Approaches & Consideration

#### **Benefits and Risks**

This option has the benefit of leaving options open for the City if it is unwilling to commit to a build program, or lacks the available capital to invest in broadband infrastructure. Partners may bring needed construction and/ or operational expertise that the City requires for such a network. This model creates a shared risk reward scenario for the City and the partner. Risks involved with this approach include the ability to attract a suitable partner for various reasons (size of the investment, market conditions, etc.), as well as the risk of losing some local control over the implementation of the network, uneven network coverage, etc. Since these arrangements are normally over a period of 10 to 30 years in order to allow for investment recovery and profit, it is important to ensure that long term vision of the partner is aligned with the City to prevent partnership conflicts. Exit strategies for both the City and the Partner must be carefully thought through as part of forming the partnership.

There is an additional form of partnership, that is currently being presented by Telus to many municipalities. This partnership, named 'Carrier Commitment' in the above table,

has the service provider (Telus) making a commitment to the municipality to undertake a construction program to deploy fibre optic infrastructure in the municipality and deliver fibre optic based services over this infrastructure. In exchange for this commitment, Telus does not request financial compensation, but rather that the municipality work closely with Telus on the logistics of such construction, including permitting coordination, necessary traffic accommodation. In addition, there is a request to conduct detailed negotiations on the terms of this commitment under non-disclosure terms, such that the marketplace (and competitors) are not privy to the terms of such arrangements.

While the offer is attractive to many municipalities, it should be noted that the commitment from both parties in this arrangement is quite minimal, in that the municipality has an obligation to coordinate on permitting and traffic accommodation regardless of such agreement, and Telus, beyond the commitment to install fibre optic infrastructure, does not have an obligation to commit to future service terms (speeds) and pricing in the community. The infrastructure installed by Telus remains for their exclusive use, and is not available to be used/licensed by 3rd parties, creating a 'closed network,' vs. an open network model presented in other alternatives following.

Not withstanding the above considerations, there is very little risk to the municipality to enter into such agreements. The municipality benefits from private infrastructure, with no direct financial investments and is not obligated to any future operations and maintenance costs of the asset. The only risk for the municipality is to rely solely on a single service provider in this approach. The goal of the municipality, long term, should be to have a competitive environment where cost effective broadband services are provided utilizing an open network model.

#### **Existing Examples**

Examples of the search and implementation of partnership models include the RMWB (AB), the Alberta SuperNet, the SWIFT Network and the Google Fibre Network implementation in Kansas City, MO.

## **Build and Lease Dark Fibre/Ducts**

This scenario sees the City making an investment in building fibre optic networks to support municipal connectivity, as well as making build investments to commercial buildings. This is typically driven by commercial demand or private sector interest in purchasing duct or dark fibre capacity to connect to the building. By using municipal connectivity requirements as a network anchor/backbone, and installing additional duct and fibre capacity at the time of construction, incremental extensions to the municipal network can be made, driven by private sector commercial demand. The City would effectively enter the wholesale telecommunications business, by selling capacity to retail telecommunications providers.

#### **Benefits and Risks**

This option provides the benefit of stimulating and increasing competition for broadband services as it would allow telecommunications resellers to develop and offer services based on a fibre optic network. Incumbents are likely to respond in the form of additional network investments and capacity to maintain their existing market share. The City retains local control over its assets, and this scenario leaves options open for the City to both expand the network as needed, or enter the retail telecommunications market in the future. Since

ducts and dark fibre have low operational requirements, the City does not require a large investment in operational staff to pursue this option. Risks with this model are primarily financial. The cost of construction presents a risk that can be managed through diligent procurement and construction management, however there is a longer term risk of demand for wholesale services not meeting initial forecasts, or competitive forces creating price pressure on wholesale services. This may result in underutilized or stranded network investment in the longer term.

#### **Existing Examples**

Reference case studies for this model include QNet in Coquitlam, BC, EPCOR dark fibre services in Edmonton, AB, Rhyzome Networks in Stratford, ON, and municipal network services in Mesa, AZ. The Public Sector Network (PSN) in Peel Region (Ontario) and WREPNet in Waterloo (Ontario) are examples of this approach, however these networks only offer services to other public sector institutions within their municipalities.

## **Build and Offer Limited Retail Services**

This scenario sees the City making an investment in building fibre optic networks to support municipal connectivity as well as making build investments to commercial buildings, typically driven by commercial demand. Using municipal connectivity requirements as a network anchor/backbone, and installing additional duct and fibre capacity at the time of construction, incremental extensions to the municipal network can be made, driven by private sector commercial demand. The City would effectively enter the retail telecommunications business, by selling capacity to retail businesses. At its discretion, the City could choose to offer services to other public sector partners, innovation districts (as a form of tax incentive) or support other community/social initiatives with broadband connectivity.

#### **Benefits and Risks**

This option provides the benefit of stimulating and increasing competition for broadband services at a retail level. Incumbents are likely to respond in the form of additional network investments and capacity to maintain their existing market share. The City retains local control over its assets and this scenario leaves options open for the City to expanded the network if need be. This model may not stimulate the wholesale/reseller telecommunications market (even if wholesale services are offered at reasonable discounted rates) as some resellers may be wary of trying to compete with the City for commercial clients. Risks with this model are both financial and operational. The cost of construction presents a risk that can be managed through diligent procurement and construction management, however, there is a longer term risk of demand for retail services not meeting initial forecasts or competitive forces creating price pressure on retail services. This may result in underutilized or stranded network investment in the longer term. The City may not have the expertise to operate retail telecommunications services, so there is some risk in terms of creating operational expertise, attracting and retaining qualified staff and overall operational sustainability. Finally this model will likely result in a direct response from incumbent telecommunications providers in the forms of:

- (i) Politically lobbying against the initiative;
- (ii) Predatory pricing to retain existing clients; and
- (iii) Focused win back programs to incent City customers to switch back to the incumbent, with one time incentives that the City may be unwilling to match.

#### **Existing Examples**

Reference examples for this model include York Telecom Network (Ontario), RedNet (Red Deer, AB), networks constructed in Arlington, VA and Washington, DC. Rhyzome Networks in Stratford, ON offers services on a wholesale basis only (to other broadband service providers).

### **Build and Offer Full Business and Residential Services**

This scenario sees the City making an investment in building fibre optic networks to support municipal connectivity as well as making build investments to provide universal connectivity to all business and residential customers. Using municipal connectivity requirements as a network anchor/backbone, and installing additional duct and fibre capacity at the time of construction, incremental extensions to the municipal network can be made. The City would enter the retail telecommunications business by selling capacity to retail businesses and residents.

#### **Benefits and Risks**

This option provides the benefit of stimulating and increasing competition for broadband services at a retail level. Incumbents are likely to respond in the form of additional network investments and capacity to maintain their existing market share. The City retains local control over its assets. This model may not stimulate the wholesale/reseller telecommunications market (even if wholesale services are offered at reasonable discounted rates) as some resellers may be wary of trying to compete with the City for commercial and residential clients. Risks with this model are both financial and operational. The cost of construction presents a risk that can be managed through diligent procurement and construction management, however there is a longer term risk of demand for retail services. This may result in underutilized or stranded network investment in the longer term. The City may not have the expertise to operate retail telecommunications services, so there is some risk in terms of creating operational expertise, attracting and retaining qualified staff and overall operational sustainability. Finally, this model will likely result in a direct response from incumbent telecommunications providers in the forms of:

- Politically lobbying against the initiative;
- (ii) Predatory pricing to retain existing clients; and
- (iii) Focused win back programs to incent City customers to switch back to the incumbent, with one time incentives that the City may be unwilling to match.

#### **Existing Examples**

Reference examples for this mode include O-Net (Olds, AB), Bruce Telecom (Kincardine, ON), Electric Power Board (EPB) in Chattanooga, TN and Lafayette, LA.

### **Business Model Recommendations**

There are several factors that lead to the recommendation that the City take positive action to improve the state of broadband services. Survey results and bandwidth testing reveal both below average broadband speeds for residents and businesses as well as a strong bias for the City to take an active role in improving services.

#### **Do Nothing**

A complete hands off approach will likely result very limited improvement of broadband services in the City, and as other municipalities begin to take an active role, notably in neighboring Parkland County, there is ongoing investment in rural broadband to improve the current state of services in that region. The City risks falling further behind national averages for broadband services. **Not Recommended.** 

#### **Private Sector Partner**

The market size of the City of Spruce Grove makes it difficult to attract investment partners as most private equity in the municipal broadband space are currently focused on investment opportunities in the \$100M range or greater. The size of the US municipal market dominates the attention of most equity investment in the municipal fibre optic domain. **Not Recommended.** 

#### **Public Private Partnership (PPP)**

Again the market size of the City makes it difficult to attract the attention of partners in the traditional PPP domain. As an alternative to building infrastructure, the municipality could directly subsidize a chosen service provider to reduce the construction costs to business locations. This should be considered as partnership model alternatives although federal/ provincial grants would not be eligible for direct subsidization of a service provider. In addition, the carrier commitment model does present a viable alternative/incentive to stimulate private sector investment with little risk or commitment from the City. This is also a viable option for the City to consider. **Recommended.** 



#### **Build and Lease Dark Fibre**

This option is available to the City and is a relatively low cost/ low risk option as an entry point into offering municipal broadband services. Larger municipalities (e.g. Calgary, Edmonton, York Region) have successfully used this strategy to leverage existing fibre optic network builds for municipal operational needs. Most customers of dark fibre are typically (i)

Wholesale purchasers – carriers looking to connect to radio tower sites or large enterprise customers; (ii) Public Institutions (e.g. schools, hospitals and RCMP) looking for long term, high bandwidth connections between locations and (iii) larger 'enterprise' business customers (e.g. industrial refineries, airports, etc.) who have the sophistication to implement networking equipment and backhaul strategies to make use of dark fibre connections. It is recommend the City offer these services, as many wireless providers, industrial clients and institutional clients will have an interest. **Recommended.** 

## Build and Operate a Public Network to Businesses, Innovation Districts and Community Anchors

This option builds on the Dark Fibre option described above and can be undertaken simultaneously with the Dark Fibre approach. This option allows the City to strategically prioritize areas of focus and align the offering of broadband services with its economic development strategies and priorities. In addition, the City can partner with other public institutions (e.g. schools, hospitals, etc.) to share costs and enhance community value with their participation. Due to the smaller size of municipality, it is suggested that the City pursue outsource operational agreements with experienced network operators in order to minimize operational costs and the risk of finding qualified staff to support operations. **Recommended with outsourced operations.** 

#### **Build and Operate a Public Network to all Businesses and Residents**

This model is simply an expansion of the preceding model "Build and Operate a Public Network to Businesses, Innovation Districts and Community Anchors" and would be implemented using the same parameters as previously described. A ubiquitous network that serves all businesses and residents is an ambitious goal, and should likely be considered in the long range as part of the overall strategy. This approach could be staged in terms of approaching new community developments with this in mind and, over time, implementing the required fibre optic infrastructure in existing developments on a longer term neighborhood improvement/ upgrading program that could be aligned with other road or utility construction programs. **Recommended with outsourced operations.** 

## **Ownership Structures**

In this section, various ownership structures have been reviewed to determine the best approach for the City's consideration, ranging from the establishment of an arm's length telecommunications utility that offers services to residents and businesses, to a wholesale provider of fibre optic cable/duct and radio tower capacity. Benefits and risks of each model have been discussed. Ownership options are divided into three (3) options:

#### **Option 1: Arm's Length Utility**

Under this option, the City would act as a utility provider with mandate for operations and financial sustainability. Investment will be made by the City for building the network and the investments will be recouped from the operations. Target set of customers will need to be established (initially municipal partners and businesses). Asset ownership will split from operational entity. The arm's length utility option will allow selling dark fibre and bandwidth to other service providers and small businesses. It will bring focus and remove perception that City is subsidizing private business.

Benefits of this approach are listed below in Table 5.

#### **Utility Model Benefits and Risks**

BENEFITS	RISKS
Targets the immediate needs of the municipal partners by building a purposeful dedicated dark fibre network and selling of bandwidth to TSPs; faster decision making and governance processes.	Overhead costs to establish legal entity, legal agreements, etc.
Lease out dark fibre to municipal partners and let them define the required capacity/ bandwidth.	Need to setup a City organization for profit with a mandate for financial and operational sustainability.
Consolidate other infrastructure development programs to enable efficient builds – e.g. road redevelopment.	Relatively high dependency on financial budgets and other programs.

Table 5 – Utility Model Benefits and Risks

#### **Option 2: City Owned**

Under this option, the City will invest in building the network and appoint an Operations and Maintenance (O and M) agency for providing services. The City would potentially compete with the other service providers in the vicinity. In this option, the City can target all customers including municipal partners, businesses and residential. This option is comparably slower than arm's length utility option. Benefits and risks are summarized in Table 6 below.

#### **City Owned Benefits and Risks**

BENEFITS	RISKS
Simplified Ownership Structure.	Capital intensive program requiring strong financial support.
Low overhead costs.	Speed of decision making and governance may not be suitable for the commercially competitive marketplace.

Table 6 – City Owned Benefits and Risks

#### **Option 3: Public-Private Partnership (PPP)**

Under this option, the City owns the network after PPP tenure completion. The City appoints a third party for O and M of the network effectively becoming a bandwidth reseller and can target all customers including municipal partners, businesses and residential. Benefits of PPP option are listed in Table 7.

#### **Public-Private Partnership Benefits and Risks**

BENEFITS	RISKS
Target all potential users and act as an owner.	Limited investment still can be large as currently no incentive for service providers to build their fibre network.
Invest in only limited part of the community to cultivate equitable access to broadband network.	Market acceptance of such a model in Spruce Grove may require further analysis and buy-in.

Table 7 – PPP Benefits and Risks

### **Ownership Structure Recommendations**

In our experience with municipal ownership structures for broadband assets and infrastructure, many municipalities begin with a City Owned (Option 2) approach in order to minimize start-up costs and complexity and allow a focus on internal connectivity requirements. As these Cities evolve to service providers (e.g. leasing of Dark Fibre and delivering broadband services) we feel it is strategic to transition to an Arm's Length Utility structure (Option 1) as quickly as possible in order to achieve the following benefits:

- Creates financial transparency in that the broadband utility must set rates for services that recover all costs.
- Allows for flexibility in managing the operations of the utility in terms of adjusting rates to reflect market pricing, entering into revenue and supply contracts on procurement terms that are competitive with the telecommunications industry.
- Provides council oversight into operations and financial matters without the need to involve council to create additional bylaws to establish rates for new service offerings or unique revenue contracts that may be negotiated.
- Creates a corporate entity to hold the assets and operations of the network such that, if desired, an exit strategy from the broadband services business could be executed involving the sale of the assets, customers and operational contracts to a private sector entity.

## 4. Preliminary Business Case

This preliminary business case identifies high level capital and operating costs estimates associated with the construction and development of a municipal broadband fibre optic network.

#### **Capital and Maintenance Costs**

Construction of a fibre optic backbone network (for additional details see Section 8 High Level Deployment Plan) is required as a necessary initial investment. This backbone may be constructed over several years in order to minimize large capital expenditures in any single year. In addition to the capital and operational costs related to fibre optic backbone infrastructure, there are capital costs and operating associated with connecting each property parcel to the fibre optic backbone, commonly known as "drop" costs.

Table 8 below identifies costs (backbone and drop) and recommended phases of fibre optic backbone construction as well as anticipated annual maintenance costs to perform such functions as cable location to facilitate nearby civil construction, and any repairs necessary due to shifting of ground due to water erosion, frost heaves, vehicle traffic, etc.)

PHASE	DESCRIPTION	NUMBER OF PARCELS	CAPITAL BUDGET (\$M)	MAINTENANCE COSTS (3%, ANNUAL)
1	Industrial SE	99	\$1.06	\$31,808
2	Industrial SW	154	\$1.91	\$57,345
3	Commercial North	121	\$1.74	\$52,301
	Total	374	\$4.71	\$141,454

#### **Costs to Extend Fibre from the Fibre Ring Network**

Table 8 – Costs to Extend Fibre from the Fibre Ring Network

#### **Cost Recovery**

In order to provide an estimate of the annual costs, on a per parcel basis, we must include all of the backbone costs in each phase, plus an estimate of the expected 'take rate', (the % of parcel owners that subscribe to the service) to capture the expected drop costs. To understand the sensitivity of take rate, calculations have been performed at 20%, 50% and 80% take rate for illustrative purposes. Additional detailed market analysis would need to be undertaken to further refine and quantify the estimates.

It is assumed, for the purposes of analysis, that operating costs should be recovered on an annual basis, while capital costs recovery will be on the basis of the life of the fibre optic asset, namely 25 years.

Costs of borrowing and inflation are not included at this level of preliminary analysis. Table 9 following identifies the monthly cost recovery charges that would need to be implemented in order to achieve cost recovery at 20%, 50% and 80% take rates.

#### **Analysis of Monthly Cost Recovery**

PHASE	DESCRIPTION	NUMBER OF PARCELS	MONTHLY COST RECOVERY (20% TAKE RATE)	MONTHLY COST RECOVERY (50% TAKE RATE)	MONTHLY COST RECOVERY (80% TAKE RATE)
1	Industrial SE	99	\$167.66	\$70.56	\$46.29
2	Industrial SW	154	\$196.04	\$81.92	\$53.38
3	Commercial North	121	\$229.30	\$95.22	\$61.70
	Total	374	\$193.00	\$80.70	\$52.62

Table 9 – Analysis of Monthly Cost Recovery

From the above analysis, we can conclude on a preliminary basis that the City would need to charge in the range of \$52 to \$193, per month, per parcel in order to achieve cost recovery. General industry metrics suggest that wholesale dark fibre pricing in the range of \$50 - \$80 per month per parcel is viable for wholesale providers. In less dense, less urban environments such as the Industrial areas of Spruce Grove, it should be expected that overall costs should be higher than the more developed Commercial areas.

#### **Additional Costs**

It should be noted that the preliminary analysis above does not factor in costs that are not directly related to the fibre optic infrastructure. Costs such as marketing/advertising, communications, legal and other overhead costs need to be added.



#### Wholesale Model

A viable wholesale model involves the licensing of fibre connections, also known as dark fibre, to carriers and wholesale Internet Service Providers to allow for the provision of value added services (lit services) over the dark fibre. Such services would include high speed internet services, as well as television and telephone services as requested by business subscribers. A summary of roles and responsibilities under this model is provided in Table 10 below.

#### **Wholesale Model Roles and Responsibilities**

CITY OF SPRUCE GROVE	SERVICE PROVIDER
Own and Maintain Local Fibre	Direct and manage local technician installations and repairs
Local Marketing and Sales Support	Network Operations and Provisioning
	Customer Service & Technical Support
	Billing
	Internet Service
	Television Services
	Telephone Services

Table 10 - Wholesale Model Roles and Responsibilities



#### Figure 8 - Wholesale Model

In order to facilitate a wholesale model, it is recommended that the City budget for a fulltime "Broadband Program Manager" position that would oversee annual construction and maintenance programs, as well as coordinate requests from wholesale clients for the connection of dark fibre services.

#### **Retail Model**

Going beyond the wholesale model, if a retail model is desired, it is recommended that the City explore outsource operational models with "white label" community network operators. These operators allow for the ability for the City to specify the types and prices of retail services to be delivered to business subscribers and have the necessary operational support systems (e.g. customer care, network monitoring, billing, payment processing) in order to service retail business customers. Without an outsource model, the City can expect to incur staffing costs for approximately 5-8 staff to support outsource operational functions in a retail model.

#### **Retail Model Roles and Responsibilities**

CITY OF SPRUCE GROVE	OUTSOURCED OPERATIONS PROVIDER
Own and Maintain Local Fibre	Direct and manage local technician installations and repairs
Own and Maintain Local Electronics	Network Operations and Provisioning
Leased Backhaul Connection to Calgary	Customer Service & Technical Support
Local Marketing and Sales Support	Billing (on behalf of City)
	Internet Service (on behalf of City)
	Television Services (on behalf of City)
	Telephone Services (on behalf of City)

Table 11 – Retail Model Roles and Responsibilities



Figure 9 - Retail Model

## 5. Strategic Decisions and Considerations

In order to provide context for a discussion of broadband strategic considerations and decisions that must be made, we look to the City's overall vision and mission statements, referenced in the City's publication "Strategic Plan 2015-2015" (1)

Drawing on the vision statement of "Spruce Grove is the best place to live, to raise an active, health family and to grow a strong, successful business."

As well as statements such as "We must be highly responsive to opportunities that will attract and retain commercial and industrial businesses and develop economic development strategies that focus on strengthening existing businesses and attracting new ones...If we do this well, we will make Spruce Grove the economic power center of the region" we find context for a broadband strategic considerations.

The City's mission "...to build an exceptional city through innovation, leadership and committed public service." also provides additional context

#### **City Fibre Ring**

The City has prioritized the construction of a fibre optic network to provide reliable high speed broadband connections to key City facilities and has identified \$1.78M in funding to support this initiative, planned for phased construction through the years 2021 through 2026. This investment will provide a key foundation upon which other strategic investments can be made, and can be directly linked to the City's mission statement in terms of an infrastructure where broadband technologies can be deployed to support innovative approaches to the delivery of City services to its' citizens.

The City fibre ring also provides a basis on which to plan further investments in broadband infrastructure (fibre optics) to support strengthening businesses and attracting new ones.

#### **Smart Cities and infrastructure investment**

Over the last 3-5 years, the emergence of connected technologies that are applicable to municipal applications, also known as 'Smart City' technologies have become widely adopted and used by cities worldwide to allow for innovate approaches for the delivery of municipal services and operations as well as provide for better engagement with residents.

The use of intelligent transportation systems, including the adoption of roadway sensor networks, connected and centrally managed traffic signals, video surveillance systems and speed monitoring/ variable speed limit systems have become widely adopted and required broadband networks to support their operations.

With the advancement of lower costs high volume devices that measure, control and report everything from environmental conditions to vehicle and pedestrian counters to noise measurements, all known as Internet of Things (IoT) devices there is an opportunity to collect more data and manage city operations with a high degree of granularity and precision. These systems, if deployed all require telecommunications support services that typically come in the form of hybrid fibre optic and wireless networks. Municipal water, waste water and storm water systems have evolved to include the use of remote sensors, automatic meter reading technologies as well as the use of video surveillance systems to augment traditional SCADA networks that support system operations and monitoring.

Waste collection is evolving from traditional fixed routes and schedules to on-demand models, where intelligent garbage bins, connected to sensor networks, can signal the need for pickup, optimizing the costs of vehicles, labour and wear and tear on City streets.

Parks, recreation and culture services provided by a city are moving to on-line connected models to support on-line, real time communication of the availability of recreation facilities, as well as the live streaming of municipal cultural events for increased participation and engagement. Access to high speed broadband connections in public places is a key amenity that citizens have come to expect as part of their recreation and cultural experience.

All of the above mentioned trends all point toward the need for high speed broadband services to be made available at City facilities and in public spaces managed by the City. While in some cases the sensor networks or citizen connections may be made wirelessly using WiFi or private LTE technologies, the underlying infrastructure to support City wireless networks will be a fibre optic network.

While the City has not yet developed a Smart City strategy it must plan its fibre optic investment with these applications and needs in mind, including planning for municipal fibre optic connections at key locations such as at traffic signals and alongside major roadways.

As the City progresses in detailed planning for its fibre optic infrastructure, the above considerations must be taken in order to plan for all connections that may be required by future applications.

In summary, telecommunications networks that include a hybrid of fibre optic and wireless systems will have an increasing need to be available to support future Smart City applications.

#### **Supporting 5G**

Wireless data telecommunication services delivered for residents and business operations allow for the transfer of larger quantities of data to remote single use sites and for connection to mobile assets. the technology to deliver this service has evolved from 3G to 4G (LTE) which is the service that is available to us today. As our expectation for capacity and speed increase so to the complexity and need for speed and capacity increase for the technology of end devices such as mobile video-based monitoring systems. This demand is pushing the existing technology to capacity.

The next generation of wireless technology is called 5G which promises to have over 1,000 times the capacity and 10 times the speed of 4G allowing for the support of mobile virtual reality and other video based applications, high volumes of sensors and autonomous/ connected vehicles. 5G will take advantage of a combination of new technologies to accomplish the increased performance.

Two of the new technologies that will be leveraged are higher frequency waves and small cell networks. The small cell networks will include a larger number of small tower "cells" that will transmit shorter distances and help penetrate facilities and provide better coverage for the lower range signals.

It is expected that in a 3 to 5 year time frame 5G networks will begin to built out by the major mobile telecommunication carriers that will have purchased from Industry Canada the wireless spectrum required. What will be required of the network operators is a larger scale footprint of fibre optic telecommunications networks to support these 5G networks.

While the expectations of 5G technology will bring additional speed and capability to mobile data networks, it is not expected, due to spectrum licensing costs, that the average cost per connection, nor the current mobile data usage caps and overage charges will substantially decline. Thus, businesses will require a fibre optic based connection for internet services to run their business, and the need for municipalities to facilitate such investments remains strong. In fact, mobile carrier needs for access to additional fibre optic infrastructure to support their own roll out of 5G cell sites may present an additional wholesale opportunity for the City to license some of their future fibre optic infrastructure to mobile carriers wishing to locate new cell sites in industrial or commercial areas.

#### **Broadband Infrastructure to Attract and Retain Business**

Businesses now view access to a high speed, affordable broadband connection as an essential utility, similar to electricity, natural gas or water services to their business location. Basic broadband services have moved from a differentiator category to an essential category in terms of decision criteria for site selection. Table 12 below, identifies connectivity and broadband as a high ranking item in terms of site selection, prioritized higher than transportation and logistics, amongst other factors.

DECISION-MAKING FACTOR	RANKING	PERCENTAGE
Security and Safety	1	61%
Connectivity and Broadband	2	51%
Supportive Business Environment	3	49%
Transportation and Logistics	4	43%
Income and Prosperity	5	40%
Strong Community Leadership	6	39%
Return on Investment	7	39%
Affordability and Accessibility	8	38%
Access to Markets	9	33%
Access to Capital Financing	10	32%

#### **Global Trends ~ Local Opportunities in Economic Development**

Table 12 – Global Trends ~ Local Opportunities in Economic Development Lee Malleau, April 2018

#### **Connectivity to Internet Exchanges**

There are several alternatives to consider in terms of connections to internet exchanges. Historically the City has procured through normal retail channels, a commercial internet access service through Shaw or Telus. Historically this service architecture has Telus and/ or Shaw provide the facilities (fibre optic connection) to the City's desired location (City Hall), and the City takes the responsibility to distribute this connection (via City owned fibre or leased WAN services) to various municipal locations where Internet access is required. Going forward, as the City continues its planned build of a municipal fibre optic backbone, it can explore different alternatives to access the Internet:

- Access via leased fibre: Rohl has quoted the City an alternative to access the Edmonton Internet exchange via fibre optic facilities that Rohl has access to adjacent to Highway 16. This approach would require the City to construct a fibre optic connection to the Rohl fibre.
- 2. Wholesale access via carriers: Bell, Shaw and Telus all have fibre optic facilities within the City that are capable of providing very high capacity (10Gb/s and beyond) wavelength based connections to the Edmonton Internet Exchange. Once this connection to the Edmonton Internet Exchange is established via a wavelength service, the City has options to purchase Internet access from many other wholesale providers, at reduced prices.

There are benefits to the City from a reliability and redundancy perspective to pursue alternative Internet connections that provide some route diversity in the event of an unplanned cable cut or damage. There are also competitive price advantages in having access to multiple wholesale Internet providers at the Edmonton Internet Exchange. Should the City pursue the development of a municipal fibre optic network to support business connections, the above alternatives require additional exploration to understand cost/ benefits of each approach.

#### **Municipal Engineering Guidelines**

As noted in previous sections of this report, it is recommended that the City consider the adoption of additional engineering guidelines to support the cost effective development of a municipal broadband network.

#### **New Development Connections**

The City should work closely with developers to negotiate the installation of dedicated telecommunications conduit systems for the City's use and operational control, providing a connection to the fibre optic backbone system at the closest practical connection point (planned or existing) and as well as a dedicated conduit connection from the backbone to the main telecom room or distribution facility located within the new development, or provide a connection directly to the dwelling unit.

#### **Dig Once Standard**

All new construction or rehabilitation of roadways, bridges or other transportation infrastructure under the control and direction of the City should install new underground telecommunications conduit and associated hand wells/ pull boxes as part of the project scope.

All new construction of potable water or sanitary sewer trunk lines should be reviewed for the feasibility to install new underground telecommunications conduit and associated handwells/pull boxes as part of the project scope.

IBI Group recommends that following guidelines with respect to Fibre Optic Duct Engineering. These guidelines are subject to review and approval by the City of Spruce Grove's Engineering Department.

#### Fibre Optic Duct Engineering Guidelines:

- 1. Throughout the route, there shall be at a minimum of 2 x 50 mm HDPE conduits deployed for backbone network. The exact quantity will be determined during detailed design phase.
- 2. There shall be cable vaults located at approximately every 2 km along the route. Size and type to be specified during detailed design phase.
- 3. There shall be hand wells located at approximately every 500 m along the route. Additional hand wells may be required due to on-site conditions or wherever the cumulative bends of conduits exceeds 180 degrees. Hand wells are also to be located near each traffic controller and also placed in order to aggregate drop conduit for individual building connections. Size and type to be specified during detailed design phase.
- 4. Additional 1 x 50 mm HDPE conduit, with sub-duct shall be installed for drop connections to provide connectivity to commercial buildings or residences. The installation of this conduit will be coordinated with specific construction details of the individual property, to be determined during the detailed design phase.

## 6. High Level Deployment Plan

## **Broadband Strategic Plan Recommendations**

In reviewing the options to improve broadband services for industrial and commercial businesses, the following plan summarized below in Table 13 provides a roadmap for planning, budgeting and negotiations to pursue a multi-faceted approach to broadband improvement, and to take advantage of telecommunications carriers' offer to coordinate with planned deep utility construction in the commercial area.

#### **Broadband Strategic Plan Recommendations**

NUMBER	ACTION	EXPECTED OUTCOME	TIMING	RECOMMENDED BUDGET	LEAD DEPARTMENT
1	Advance negotiations with telecommunications carriers to confirm intentions for fibre optic investment and focus priorities Commercial areas due to planned deep utility work	Agreement with telecommunications carriers to facilitate construction planning and coordination with the City's planned deep utility construction plans	2019	N/A	Economic Development/IT
2a	Perform engineering route design for item #3 below in advance and solicit businesses near the planned route for interest in a municipal fibre optic connection	Finalize the route to allow for: i) Application of grant funding for construction from other levels of government ii) Market demand assessment of business interest iii) Further cost certainty of construction	2019	\$68,000	IT/ Economic Development
2b	Review of municipal engineering standards and inclusion of conduits in future roadway/ utility construction projects	Review and coordination of planned deep utility construction projects to allow for the inclusion of conduit to support future broadband connections.	2019 in advance of finalizing construction scope and project tendering	\$15,000 (engineering consulting)	Engineering
3	Reprioritize and advance the sequencing of the City's Municipal Fibre Ring Plan (2021 – 2026, Cl417.5) to construct the segments connecting the Public Works Building to the Integrated RCMP Building and the Campsite Transit Centre (utilizing the Diamond Avenue alignment)	Advance the timing of the Municipal Fibre Ring to create an anchor investment as a platform to allow for future connections to businesses in close proximity to the backbone	2020	\$502,463 Existing budget, advance from 2022	Information Technology
4	Add the Arena Project in the City's Municipal Fibre Ring plan	Include new facility requirements	TBD (align to develop timelines)	\$150,000	Information Technology

Table 13 - Broadband Plan Strategic Recommendations

NUMBER	ACTION	EXPECTED OUTCOME	TIMING	RECOMMENDED BUDGET	LEAD DEPARTMENT
5	Develop a full engineering and business plan for the build out of a fibre optic infrastructure, identifying municipal and business needs and considering opportunities for cost recovery	Using the results of the market survey/ solicitation identified in item #2; develop a full business and engineering plan for council approval.	2020	\$130,000	Economic Development
6	Upon successful deployment of a pilot project, budget for full deployment based on market demand for services	Allocate capital for broadband investment to support economic development	2021-2024	2021: \$1,060,000 (Industrial SE) 2022: \$1,910,000 (Industrial SW) 2023: \$1,740,000 (Commercial North)	Economic Development
7	Invest in the development of a Smart City Strategy	Create a strategic road map for the adoption of Smart City connected technologies and the need for future City fibre optic facility investment to support this road map	2020-2022	\$275,000	Information Technology

Table 13 - Broadband Plan Strategic Recommendations

It should be noted that the sequencing proposed provides for deployment of infrastructure to the most critically impacted areas as a priority. Some cost reductions from the proposed budgets above may be achieved by coordinating construction timing with other roadway or utility projects.

## **Recommended Broadband Standards**

1. It is recommended that the City adopt broadband standards identified in this report to move it from its current state of average 16.6 Mbps (Industrial) and 20.6 Mbps Commercial (download/upload) towards increased speeds of 100/20 Mbps and future symmetrical speeds of 1000/1000 Mbps. These standards would apply to existing City facilities and provide guidance on any future investment or partnership with other providers that are focused on delivering services in the City. These new standards would be phased in over several years, as the City will required a fibre optic backbone network to support these speeds. These standards are summarized in Table 14 on the following page.

METRIC	CURRENT STATE	5 YEAR TARGET	10 YEAR TARGET	
Average Download/Upload	16.6/7.2 Mbps Industrial	1 /1 Gbps	10 /10	
Speeds	20.6/8.9 Mbps Commercial		Gbps	
% Above 15 Mbps Download	32%	40%	80%	
Latency (North America destinations)		Less than 150ms		
Reliability		99.99% service uptime with a mean time to repair (MTTR) objective of 4 hours		
Open Access to Carriers		Yes		
% of Properties Connected		90%	100%	

#### **City of Spruce Grove Recommended Broadband Standards**

Table 14 – Recommended Broadband Standards

## **Construction of a Fibre Optic Backbone**

2. It is recommended that the City continue with its plans for the budgeting and construction of a fibre optic backbone to connect City facilities. This will also provide an anchor investment enabling the extension of a future fibre optic distribution network to businesses and residents, either by direct City investment or by 3rd parties, who could license dark fibre capacity on the City's backbone and construct network extensions from the backbone. Please see Figure 10 on the page following that provides an overview of these plans.

## Improved Broadband Services to Businesses and Residents

- 3. It is recommended that the City pursue a further evaluation of a pilot project to provide broadband services to businesses and residents within close proximity to the fibre optic backbone identified in recommendation #2. Additional efforts would need to be undertaken to fully develop the business case, based on expected take rates and business/ resident adoption, as well as the additional costs of service electronics and operational costs for fibre optic network maintenance (locates and repairs), operational costs to operate the network and provide broadband services. Due to the relatively small size of the market within the City, it is recommended that the City pursue an outsource arrangement with a broadband operator to minimize the fixed operational costs of supporting such a network. In Alberta, O-Net (Town of Olds) does provide these services on an outsource basis. The development of the business case would further define outsource options (vendors) as well as outsource costs based on the scope of the trial and the number of customers that are forecasted. The creation of a detailed business plan to support this pilot is recommended.
- 4. Pending the success of the pilot identified in recommendation #3 above, should the City wish to pursue a City wide broadband program for businesses, high level capital investment program costs have been identified in Table 15 below as:

PHASE	DESCRIPTION	NUMBER OF PARCELS	CAPITAL BUDGET (\$M)	MAINTENANCE COSTS (3%, ANNUAL)
1	Industrial SE	99	\$1.06	\$31,808
2	Industrial SW	154	\$1.91	\$57,345
3	Commercial North	121	\$1.74	\$52,301
	Total	374	\$4.71	\$141,454

#### Fibre Optic Backbone Capital and Operating Costs (Estimated)

Table 15 – Fibre Optic Backbone Capital and Operating Costs (Estimated)

Please refer to Figure 11 on the following pages which provides a proposed map that corresponds to the above cost table. Appendix C provides an overview of various public and private sector funding mechanisms to support investment in broadband infrastructure.

5. It is recommended the City adopt the following business approaches to achieve improved services, including the sale of dark fibre services as well as the offering of broadband services to businesses and residents on selective basis with a view to providing services of a ubiquitous nature in the long term. This business approach would be best executed using an Arm's Length Utility structure.



Figure 10 – Spruce Grove Municipal Fibre Optic Backbone - Existing and Planned



Figure 11 – Proposed Municipal Broadband Network

## Appendix A

## **Review of Past Work**

In order to provide context of the current state of planning efforts and approach, IBI Group performed a review of past activities related to Broadband Planning, including reports provided by past consultants and potential vendors of broadband infrastructure. A brief summary of past work is provided here and provides context for the material to follow in this report.

## Fibre Optic Broadband Provisioning Discussion Paper (Taylor Warwick, May 2016)

This paper focuses on the need for and the potential of fibre optic broadband network and services provisioning within the City of Spruce Grove and explores options and tradeoffs associated with enabling enhanced broadband services within the City. The paper identifies that while broadband services appear to be somewhat adequate in the City overall, there are certain areas of the City where services for businesses are not competitive with surrounding areas such as Edmonton and therefore a limitation on economic development. The current state of broadband services is discussed along with the needs of businesses that were currently not met by current service providers. A proposed fibre optic backbone route is proposed that would enable the connection of City facilities as well as alternatives ranging from partnering with the private sector to community owned fibre optic network infrastructure are identified.

#### Fibre Optic Network Ring Proposal (ROHL Geomatics, May 2016)

In this document ROHL, a potential vendor of construction services, provides a proposal for the construction of a fibre optic backbone ring.

## Next Generation Strategic Broadband Strategic Plan Proposal (ROHL Geomatics, 2017)

This document refreshes ROHL's construction services proposal from their May 2016 document and adds an option to interconnect and contract with ROHL for high speed internet access utilizing existing fibre optic infrstructure that ROHL operates along Highway 16.

## Spruce Grove Next Generation Broadband Strategy (Lightcore, April 2018)

This strategy document, along with the accompanying market survey, provides the context of the current market forces that are driving the demand for business and residential services along with rationale for service provider decisions regarding further investment of broadband infrastructure. The report warns of the risks of inaction, and provides guidance towards municipal investment in broadband infrastructure (fibre optics) as an economic development approach to retain and attract businesses.

#### Spruce Grove Market Survey (Lightcore, April 2018)

Highlights from the market survey include a "key finding is that while 95% of businesses in Spruce Grove consider broadband as essential as water and electricity, and 100% of businesses with over 20 employees believe it is critical, in all sizes of businesses surveyed between 64% and 88% felt that upload and download speeds were serious Internet connectivity situations."

While residential broadband customers appear to have adequate services and a choice of competitive providers, there is clearly a lack of adequate, affordable services in the industrial areas, as well as in some commercial areas. Survey respondents indicated that they were faced with extremely high up front charges for installation of broadband infrastructure (over \$100,000) and forced to agree to long term 'deals' (contracts) in order to have broadband services constructed to their property that would meet their needs.

## Spruce Grove Financial Models of Municipal Communications Infrastructure Utility (Lightcore, 2018)

This document contains various financial models, all based on a City wide deployment to 15,000 premises. With take rate variable of 35% to 55%, most scenarios turn cash flow positive in their 5th year, with full capital payback in their 20th to 30th year or beyond.

#### Spruce Grove Fibre Availability Analysis (Lightcore, April 2018)

A high level inventory of service provider (Telus, Shaw, Bell) existing fibre is reviewed in this document. Of note, Telus, Bell and Shaw all have made selective investments in fibre infrastructure in the industrial areas, however no single service provider has ubiquitous industrial coverage.

## Appendix B

## Stakeholder Consultation and Needs Analysis

### **Business Interviews**

## **B.1 Internal Stakeholder Workshops**

As a part of the stakeholder consultation phase, IBI Group conducted 3 workshops involving internal city employees on September 26th and September 27th at Spruce Grove City Hall. Workshops were segmented by department to ensure broadband concerns were heard and noted. Workshops were structured to first inform departments about Smart City initiatives, stimulating thoughts around broadband capabilities, followed by a consultation phase in which departments focused upon current state and future requirements. Consultation phases were structured in a round-table discussion format and included specific questions pertaining to departments' current and future operations. Questions referencing departments' current systems were also addressed to introduce how broadband may benefit existing applications. Such questions were intended to probe stakeholder's thoughts on broadband as an enabler for their operations. Following the consultation phase each department was encouraged to take time to reflect upon the questions asked during the session, and return their responses to IBI Group the following week. Please refer to Workshop Details and Interview Questions at the end of this appendix section for the addressed questions and workshop contact list.

#### **Geographic Areas of Concerns**

Following workshops, Spruce Grove's internal departments were asked to reflect upon their key facilities, major facilities, and planned future facilities. The facilities identified ranged from outdoor recreational areas to important infrastructure locations as shown in Figure 12 on the following page.



Figure 12 – Map of Spruce Grove Municipal Facilities

#### **Current System/Applications**

Broadband is viewed by all departments as essential for improving and modernizing organizational operations. In regards to system and application usage, Spruce Grove currently utilizes an extensive plethora of technological tools which aid in all areas of all departments' operations. As Spruce Grove has explored the system capabilities which broadband connectivity enables, they have narrowed their focus upon on the ability to integrate mobile solutions and enhance data collection abilities. Currently one of Spruce Grove's largest attractions is the Horizon Theatre, which offers a variety of events and entertainment. The theatre is one area, which through the utilization of broadband services, will be able to be integrated with mobile solutions. The integration of mobile solutions will ultimately allow for modern point of sale systems to be utilized during concession and box office sales within the theatre. In regards to the future usage of systems such as Office 365, adequate broadband upload and download speeds enables users to take advantage of the software's "cloud" functions, which ultimately acts as a secure external storage site for files. Additionally, permitting users to take advantage of the cloud prompts increased internal data transfer which promotes interconnectivity and improved information sharing from an organizational standpoint.

#### **Future Departmental Broadband Needs**

In addition to the need for broadband access for existing systems, Spruce Grove also realizes further future advantages from broadband. One of the largest motivations for broadband connectivity being the ability to employ multiple communication methods including, but not limited to video conferencing, Audio Visual (AV) internet streaming, and dispatching. In regards to the Protective Services department, a realization has already been identified that the need for system understanding and utilization will continue to follow current trends. Furthermore, as dependency upon current systems increases, broadband needs will naturally parallel the same trend. Furthermore, another major application of broadband realized within the community of Spruce Grove is the enhancement of data collection methods. Interest has been identified in the ability, through broadband, to use vehicle monitoring and environmental sensors within major road ways. Such sensors allow roadway operations to collect and interpret data regarding road conditions and in real-time adjust operations to accommodate drivers. Through responding to real-time data, departments are able to utilize valuable resources where and when they are most needed, effectively saving on costs and operational time. Additionally, enhanced data collection also enables Spruce Grove's ability to increase community engagement with their residents. Such engagement is mutually beneficial from both an organizational and resident perspective.

One form of community engagement utilized through enhanced data collection is the ability for users to collect and report facts on speeds pertaining to high-complaint residential areas. Through compiling such data in an easily comprehensible dashboard, residents can individually view information about their neighbourhood speeds. In employing such, residents are able to confirm the severity and impact of speeding within individual neighborhoods.

Moreover, Spruce Grove Economic Development has also identified the critical need for broadband for the City to remain a competitive market place for retaining and acquiring businesses. Surrounded by quick acting municipalities, Spruce Grove's Economic Development department has identified that broadband connectivity has become a

standard expectation for prospective business to locate within the City. Furthermore, the City acknowledges that without such, they stand significant risk of losing crucial business to larger competitive municipalities such as Edmonton, Calgary, and Stony Plain. The City also realizes that current departmental dependence upon broadband will exponentially increase in the future as technology continues to follow the current trend.

## **B.2 External Stakeholder Interviews**

External Interviews were conducted throughout the week of September 24th, 2018 to September 28th, 2018 and were held with both public and catholic school boards as well as Bell Canada, NAIT, TELUS, Shaw, and the Government of Alberta. External interviews with school boards were conducted in-person at the school boards' administration offices, while all other stakeholders were interviewed via conference call. Consultations were structured similarly to workshops with the exclusion of the introduction period. During such interviews, Interviewees were prompted to respond to a set of questions regarding their network satisfaction, role within the Spruce Grove municipality, and current/future business plans pertaining to broadband. Throughout all interviews 3 IBI Group representatives and 1 Spruce Grove municipality representative were present. Please refer to Appendix A - Workshop Details and Interview Questions for a detailed outline of questions addressed.

#### **Bell Canada**

A conference call took place on September 25th, 2018 with Bell representatives Curtis Coon, Client Executive, and Jim Merryfield, Solutions Architect, regarding Bell's future network plans within the Spruce Grove municipality. During the discussion, Bell representatives communicated their current lack of broadband initiatives within the Spruce Grove area as a result of their "contract-first" policy. Such policy stipulates that a customer contract must be present prior to Bell considering the integration of new infrastructure within an area. Although Bell is limited with the availability of existing broadband infrastructure in the Spruce Grove community, it was communicated that they have the ability to construct a point-of-presence (POP) south of highway 16A, near the NAIT heavy equipment campus. Such point of presence may enable the City of Spruce Grove to build-out fibre from the location, ultimately connecting the surrounding industrial area. However it was noted that Bell would not take responsibility for the cost of last-mile connectivity to the NAIT campus and that this cost would require external funding Furthermore, Bell notified Spruce Grove that they also currently have broadband services at all of the following locations within the industrial park areas:

- 205 Diamond Road
- 250 Diamond Road
- Range Road 272

In addition, Bell also provided a recommendation towards the consideration of the Public Works building as another POP. As the Public Works building, already possessing Supernet infrastructure, could easily be formed into a Bell POP. In conclusion, Bell agreed to outline current available Bell services in the industrial region to assist in future build plans, moreover they also agreed to mock-up high levels costs reflecting the expenditure required for last mile connectivity to the NAIT campus.

#### NAIT

During communications with Northern Alberta Institute of Technology, a conference call took place with Daryl Allenby, Director of Infrastructure and Operations. Throughout the course of the call Darrell communicated that currently NAIT's Spruce Grove campus is connected with SuperNet, however this is not their preferred method of connectivity. NAIT frequently opts to have ownership of their own fibre, but following an analysis of the area it was concluded that the option was not viable due to the extensive distance from NAIT's main campus to Spruce Grove. As a result NAIT utilizes the SuperNet connection as provided to the Spruce Grove municipality, which to this point has performed satisfactorily. In addition, IBI Group also asked questions focused upon the future of NAIT within the Spruce Grove community, to which Darrell responded by stating that NAIT's future growth plan is currently hinged upon the Blatchford development, but NAIT does value Spruce Grove as one of its central locations. In conclusion to the interview Darrell communicated that as a result of positive previous relations with the City of Spruce Grove, NAIT would be open to discussions around a broadband partnership.

#### **Public School Board Meeting**

IBI Group met directly in person with IT Director, Mark Kraki, on September 25th to gain insight on the Public School Board's current stance on broadband services. The key messages in terms of broadband services revolved around the school board's comfortability in staying connected with SuperNet services. As a result of the funding provided by Alberta Education for the SuperNet service, there is a strong financial incentive to use the service.

In addition, Mark also expressed satisfaction with the reliability and security of the SuperNet service. Despite the public school board currently having 10 schools residing within the Spruce Grove municipality, and each school having 1GB connectivity, Mark has never experienced a break in connection. However, despite the satisfaction the Public School Board currently enjoys with SuperNet, Mark did express that if an affordable alternative were available they would be open to partnerships with the City of Spruce Grove.

#### **Evergreen Catholic School Board**

During September 26th IBI Group consulted with Evergreen Catholic School Board representatives Ryan Elsenheimer, Manager of Networks, and Sime Fatovic, Director of Facilities and Technology, at the School Board's administration building. During the course of the meeting Ryan and Sime communicated that the Catholic School Board is currently connected to SuperNet. Although Ryan and Sime expressed satisfaction with their current service, they did indicate that a large persuading factor in signing with SuperNet was the funding provided through Alberta Education for the service. In addition to pricing, the Evergreen School Board also communicated satisfaction with the stability of the connection; as they have maintained without issue, a 1GB connection within each of their 5 Spruce Grove Schools. Following questions regarding the Catholic School Board's connection satisfaction, the conversation shifted towards their future expansion plans within the Spruce Grove community. In response, both Ryan and Sime stated that the school board is constructing an expansion project, the Copperhaven Expansion, in the next 3-5 years. Furthermore, there is also the potential to expand existing Evergreen elementary schools by 100 students through the utilization of modular classrooms. Such expansions parallel a future increased requirement of broadband, which is expected to be met by SuperNet.

#### In Regards to Your Key Facilities:

#### QUESTION 1: WHERE ARE YOUR KEY DEPARTMENTAL FACILITIES?

- Horizon Stage, 330 seat theatre
- Library
- Art Gallery
- Box Office
- Indoor Artificial Ice (Spruce Grove Agrena)
- Premier Outdoor Sports Fields (Fuhr Sports Park)
- Gymnastics Centre (Border Paving Athletic Centre)
- Community Social Centre (Elks Community Hall)
- Destination Outdoor Water Feature (Jubilee Water Spray Park)
- Fire Hall
- RCMP and Enforcement
- Queen Street Place
- Lion's Log Cabin

#### QUESTION 2: WHERE ARE THE MAJOR FACILITIES?

- Horizon Stage Calahoo Road
- Library King Street
- Agrena on Agrena Road just off King Street
- Border Paving Athletic Centre Jennifer Heil Way near TLC
- TransAlta Tri-Leisure Centre Jennifer Heil Way
- Fire Hall on Fifth Avenue
- RCMP and Enforcement on Fifth Avenue, but new facility is being construction on Hwy 16A
- Queen Street Place
- Lion's Log Cabin

#### QUESTION 3: IF PLANNED, WHERE ARE YOUR FUTURE FACILITIES INTENDED TO BE BUILT?

- Horizon Stage City Centre
- Library TBD
- TBD
- Fire Hall next to the current station (on Fifth Avenue) and anticipated to be completed in June 2020
- RCMP and Enforcement new facility is being constructed on Hwy 16A; joint venture with Town of Stony Plain; anticipated completion date is Fall of 2019
- TBD, may include Hub type model involving multi-service providers and/or a series of smaller offsite "provisional space" at offsite locations

#### **Government of Alberta**

On October 9th, 2018, IBI Group consulted with Stephen Bull, Government of Alberta Assistant Deputy Minister Provincial Telecommunications and Registries, and Claudette Dunsing, Manager, Provincial Broadband Strategy. Throughout the course of the interview, discussions were focused upon the future direction of SuperNet services, availability of telecommunication funding, and the future of the provincial broadband strategy. When addressing SuperNet Services, a major focus point was the transferal of infrastructure ownership back to Bell from Axia. However, due to changes implemented under Axia control, Bell is in the process of conducting a current state analysis of the network. Following such analysis, Mr. Bull expressed that access to SuperNet infrastructure within the Spruce Grove community will be much more accessible through Bell management. In conclusion to SuperNet-focused discussions, Stephen Bull moved to provide information in regards to potential avenues of funding for provincial telecommunication infrastructure. Currently the two largest funds available through the CRTC fund of \$750 million and the "Connecting Canadians" fund of \$500 million. Additionally, there is also a provincial costsharing program implemented under the "Investing in Canada Infrastructure Program (ICIP)" with which the Alberta Government has currently requested \$170 million. Such funding is intended to enable provinces' ability to cost share infrastructure developments with local municipalities. The intent of the ICIP program is to equally distribute the cost of a broadband development between the municipal, provincial, and federal governments; ultimately making broadband more feasible for smaller remote municipalities.

However, due to scarcity of services in rural communities, funding will be prioritized to those communities. Furthermore, Mr. Bull acknowledged that the Spruce Grove letter of intent has been received, and following the formation of a provincial broadband strategy, letters will be revisited and evaluated. In respect to the timeliness of the funding, if an acceptable strategy is placed in front of provincial decision-makers by December, 2019 then it is a reasonable expectation for funding to be available in April 2019.

#### **Spruce Grove Chamber of Commerce**

On October 10th, 2018, IBI Group consulted with Spruce Grove Chamber of Commerce representatives Chair; Dorcas Kilduff, Director; and Brenda Johnson, President. During discussions with the Chamber, key themes revolved around the barriers to broadband existing in the industrial region; potential avenues of financing broadband initiatives; and the desire for a regional approach to broadband.

The Chamber acknowledges the critical need for broadband to retain and attract businesses in the Spruce Grove community, and also expressed that there are additional barriers to attraction that need addressing Including transportation infrastructure and off-site levies. As a result, developments have become scarce and the attractiveness of the area has been ultimately weakened.

The Chamber of Commerce recognizes the need for a broadband strategy, they are however in favour of a regional initiative, opposed to a municipal approach. As such strategy would see increased collaboration and coordination with Parkland County and the Town of Stony Plain with the intent of providing businesses and residents, rural and urban, equal access to high quality broadband services. The final focus of the conversation discussed potential approaches to financing a broadband initiative. Although no single decision was derived, several options were considered viable. One option in consideration was the treatment of broadband services as a utility. Under such model, businesses would be expected to pay a uniform monthly rate to finance the service and cost of construction. Whereas a second option would see businesses paying upfront construction fees for last mile connectivity with a reduced month to month service charge.

Regardless of the approach chosen, the Chamber of Commerce is in consensus that broadband must be treated as a need among businesses, and is no longer just a desire.

Table 16 below provides the municipal workshop contact list.

### **Municipal Workshop Contact List**

NAME	DEPARTMENT	EMAIL	
Brent Oliver	Culture	boliver@sprucegrove.org	
Celeste Kemzar	CAPS Admin	ckremzar@sprucegrove.org	
Dave Walker	Economic Development	dwalker@sprucegrove.org	
Freddie Martinez	IT	fmartinez@sprucegrove.org	
Karla Gould	Economic Development	kgould@sprucegrove.org	
David Wolanski	Community and Protective Services	dwolanski@sprucegrove.org	
Chad Priebe	Fire Services	cpriebe@sprucegrove.org	
Ken Luck	Recreation	kluck@sprucegrove.org	
M. Punar – Buick	Corporate Services	mpbuick@sprucegrove.org	
L.Frostad	Chief Financial Officer	lfrostad@sprucegrove.org	
Tracy Chliboyko	Corporate Services	tchliboyko@sprucegrove.org	
Neil Riley	Human Resources	nriley@sprucegrove.org	
Tania Shepherd	City Clerk	tshepherd@sprucegrove.org	
Corey Levasseur	Planning and Infrastructure	clevasseur@sprucegrove.org	
Mark Hussey	Engineering	mhussey@sprucegrove.org	
Kevin Stener	Public Works	kstenar@sprucegrove.org	
Debra Irving	Planning and Development	dirving@sprucegrove.org	
Paul Simons	Facilities and Fleet	psimons@sprucegrove.org	
Rik Kaminsky	Chamber of Commerce, Chair	rik@solaredistributors.com	
Dorcas Kelduff	Chamber of Commerce, Director	dkilduff@ sprucegrovechamber.com	
Brenda Johnson	Chamber of Commerce, President	bjohnson@ sprucegrovechamber.com	
Stephen Bull	Government of Alberta Assistant Deputy Minister,		
Ryan Elsenheimer	Evergreen Catholic School Board, Manager of Networks,		
Sime Fatovic	Evergreen Catholic School Board, Director of Facilities and Technology		
Daryl Allenby	NAIT, Director of Infrastructure and Operations		

Table 16 – Municipal Workshop Contact List

## Appendix C

## Public/Private Sector Funding Mechanisms

#### **Funding Analysis**

This section of the report explores possible funding sources (public and private) available to support the development and expansion of the broadband system within the City.

#### Internet as a Basic Service (CRTC)

Internet as a Basic Service (Telecom regulatory policy CRTC 2016-496): in December 2016 the CRTC announced this policy which provides for broadband internet as a basic service, defined as 50Mbps download and 10Mbps upload. The objective of the fund is "to ensure that by 2021 that 90% of Canadian homes and small businesses have access to fixed broadband services, with a minimum of 50Mbps download and 10Mbps upload, with an unlimited data allowance. An additional objective is that Canadians have access to the latest wireless technology at their homes, small businesses and on the road."

The announcement identified the mechanism to create a fund of \$750M over the next 5 years to support investment in broadband networks to achieve these service goals with the fund: (i) being complementary to existing and future private investment and public funding (ii) focus on undeserved areas and (iii) be managed at arm's length by a 3rd party.

Announcements were expected in late 2017, and now deferred until 2018 to define the details of the funding mechanisms that will be available and eligibility of broadband projects to receive consideration for funding.

A preliminary indication of the funding eligibility criteria is as follows (excerpts from CRTC 2016-496 Appendix 1):

#### **Eligible Recipients:**

Eligible recipients will be required to meet the following criteria:

- Be legal entities, incorporated in Canada, that already operate or intend to operate broadband infrastructure. These include private sector companies; provincial, territorial, regional, municipal, and First Nations entities; and non-profit organizations. Individuals and federal entities (including Crown corporations) are not eligible.
- Demonstrate experience in deploying and operating broadband infrastructure. If the entity does not itself have a track record in operating broadband infrastructure, it must demonstrate that it has appropriate resources with experience deploying and operating broadband infrastructure as part of its project team or contractual resources.
- Demonstrate solvency and reliability through supporting documentation.

#### **Eligible Costs**

#### Terrestrial Component of the Fund

Eligible costs will include costs associated with activities such as engineering and design, environmental scans and assessments, as well as the purchase and installation of equipment and infrastructure (including the provisioning of backhaul capacity and other one-time access-driven costs). These eligible costs will include, for example,

- Equipment costs, including the costs of servers, switching and transmission equipment, fibre-optic cable, repeaters, radio and microwave equipment, towers, poles, shelters and enclosures, backup power supplies, and network broadband connectivity devices including upgrades and adaptions;
- Material costs associated with the set-up and performance of the proposed project;
- Labour costs, including the one-time costs associated with the engineering and installation of capital equipment, network deployment, and service provisioning;
- Labour-related travel costs, such as those associated with engineering, installation, network deployment, and service provisioning, considered on a case-by-case basis; and
- Other direct costs associated with the project start-up.

#### **Satellite Component of the Fund**

For satellite-dependent communities, eligible costs are the costs associated with improving the speed, capacity, and quality of broadband Internet access services in the community. These eligible costs will include those listed above, as well as satellite capacity and equipment costs, such as the portion of the direct purchase or lease of bandwidth or capacity, modems, satellite links, and any other costs directly related to building and maintaining earth stations.

#### **Assessment Criteria**

Applications will be assessed based on the following factors, with a view to minimizing, if possible, overlaps in multiple projects and overbuilding existing coverage:

- **Speeds:** Applications will be given more weight the greater the expected improvement in download and upload speeds for the community's broadband Internet access services (measured in Mbps).
- **Capacity:** Applications will be given more weight the greater the expected improvement in data transfer capacity per household in the community (measured in GB).
- **Quality of Service:** Applications will be given more weight the greater the quality of service that can be provided to customers in terms of latency, jitter, and packet loss.
- **Government Funding:** Applications will be given more weight the greater the level of financial contribution of the total project costs from a government entity.
- **Private Investment:** Applications will be given more weight the greater the level of financial contribution of the total project costs from private investment.
- Scalability: Applications will be given more weight the greater the capacity of the proposed project to do the following over a five-year period after project completion: (i) provide higher speeds, (ii) provide increased network capacity, (iii) expand to serve more clients (households and businesses) within the proposed project area, and (iv) expand to serve a larger area.
- Wholesale Access: Applications will be given more weight if wholesale access to elements of the network is proposed.

- **Mobile Coverage:** Applications will be given more weight if mobile wireless coverage in addition to fixed broadband Internet access service is proposed.
- **Timeliness of Project Rollout:** Applications will be given more weight the earlier the proposed completion dates.
- **Service Coverage:** Applications will be given more weight the more households and businesses served and the greater the geographic area covered.
- **Coverage Density:** Applications will be given more weight the greater the proportion of undeserved households and businesses within the proposed project area.
- **Cost per Household:** For the terrestrial component, applications will be given more weight the lower the cost per household.
- **Sustainability:** Applications will be given more weight the greater the potential of the proposed project to support long-term use of the network (as demonstrated in the operations plan, subscriber estimates, financial forecast, and technology solution).
- **Pricing:** Applications will be given more weight the lower the monthly price for subscribers for a broadband Internet access service plan that includes a higher data transfer.

This fund and its stated objectives are closely aligned with the needs and requirements of The City of Spruce Grove, and should be prioritized for monitoring and follow up on the anticipated timing of funding criteria announcements. In addition, monitoring and follow up on policy stemming from the April of 2018, a Report of the Standing Committee on Industry, Science and Technology, "Broadband Connectivity in Rural Canada: Overcoming the Digital Divide" (referenced earlier in this report) should be undertaken.

## **Investing in Canada Plan**

### **Canada Infrastructure Bank**

As part of Budget 2017, announced March 22, 2017, the Canada Infrastructure Bank was announced as "an additional tool that provincial, territorial, municipal and Indigenous partners can use to build infrastructure across Canada. The projects the Bank invests in will contribute to our long-term economic growth and support the creation of good, well-paying jobs for the middle class.

The Bank will use federal support to attract private sector and institutional investment to new revenue-generating infrastructure projects that are in the public interest. By leveraging the capital and expertise of the private sector, the Bank will help public dollars go further and keep our grant dollars for those projects that are more appropriate for traditional grant funding mechanisms"

While specific details and investment criteria are not yet published, budget 2017 documents published reference a success criteria as "*High-speed internet in more rural and remote communities.*" (2)

There has been no specific funding or eligible projects criteria published with respect to broadband that has been published by the Canada Infrastructure Bank.

2 https://www.budget.gc.ca/2017/docs/themes/Infrastructure\_en.pdf (April 2018)

Budget 2017 also references a Budget 2016 announcement and an allocation of a previously announced \$500M with funding allocations for rural broadband identified by year as summarized below in Table 17.

#### **Budget 2016 Funding Summary**

YEAR	FUNDING
2016 – 2017	\$6M
2017 – 2018	\$81M
2018 – 2019	\$253M
2019 – 2020	\$108M
2020 – 2021	\$52M

Table 17 - Budget 2016 Funding Summary

This appears to be a restatement of the funding previously announced under the Connect to Innovate program (see information).

With the retirement of the New Building Canada Fund, including the Small Communities Fund, in 2017, both of which previously supported broadband projects it would be reasonable to assume that the Canada Infrastructure Bank would fund future broadband infrastructure investments in a similar fashion, however there has been no formal indication nor announcement of this approach.

#### **Smart Cities Challenge**

On November 23, 2017 Infrastructure Canada announced the details of the Smart Cities Challenge ③ program. Preliminary information on this program indicates that the intent of the Smart Cities Challenge program is to fund investments in technology that would require the use of broadband services, however, the Smart Cities Challenge program would expect that municipalities use existing programs, such as the Connect to Innovate and Internet as a Basic Service (referenced in other sections of this document) to fund investments in broadband networks, this program is not viewed as a viable source for funding direct broadband investments.

#### **Connect to Innovate**

The Connect to Innovate (CTI) program was launched in December 15, 2016 and the intake for applications closed on April 20, 2017.

The program provided for one-time, non-repayable contributions to eligible and approved applicants.

Costs supported include:

- Direct labour and capital costs for the deployment of high-speed Internet infrastructure
- · Related purchases of hardware and software or upgrades of equipment
- Eases of satellite capacity, and other costs directly related to the program's eligible activities, including rental of equipment

(3) http://www.infrastructure.gc.ca/plan/cities-villes-eng.html (April 2018)

 Fees for associated contracted services (e.g. environmental assessment consultants or professional engineers)

The program operates on a cost-sharing basis. Typically the maximum amount of funding that an applicant could request for new backbone and new last-mile is up to 75% of the total eligible costs. For satellite-dependent and remote communities, the program contribution limit for new backbone projects could be up to 90 percent of eligible backbone costs.

The program provides up to 50 percent of eligible costs for all projects that propose backbone resiliency or capacity upgrades and partially served last-mile.

According to the program information, no additional application intake is expected, although announced Connect to Innovate project funding to date has only totaled \$300.84M of the total \$500M identified.

Within Alberta, \$17.1M in funding has been announced, with an additional \$5.4M coming from other contributors for a total of \$22.5M.

The organizations receiving federal funding are  $\frac{4}{2}$ :

- Arrow Technology Group GP Limited \$7.05 million to provide 10 communities—five of which are Indigenous communities—and 29 institutions with access to high-speed Internet services;
- Buried Glass Inc. \$7.34 million to provide 18 communities and 116 institutions with access to high-speed Internet services;
- Beacon Broadband Inc. \$476,000 to provide three communities and four institutions with access to high-speed Internet services;
- Cardston County \$212,000 to provide a community and an institution with access to high-speed Internet services;
- Rigstar Communications \$216,000 to provide enhanced Internet connectivity to 164 households in the community of Kew;
- GPNetworks \$521,000 to provide one community and three of its institutions with access to high-speed Internet service; and
- Missing Link Internet Inc. \$1.33 million to provide five communities and nine institutions with access to high-speed Internet services.
- The \$22.5 million in funding is for backbone networks that will bring fibre optic cable to 39 communities, connect or enhance connectivity for up to 168 institutions, and indirectly improve Internet connections for a number of households across Alberta.

For additional project information please refer to: <u>https://www.canada.ca/en/innovation-</u> science-economic-development/programs/computer-internet-access/connect-to-innovate/ announced-projects.html

All projects funded under the program are expected to be substantially complete by March 31, 2021.

The Connect to Innovate program has been identified as commentary to the CRTC Internet as a Basic Service Program (with funding criteria for Internet as a Basic Service yet to be announced).



## **Building Canada Fund**

#### **Small Communities Fund**

As part of the New Building Canada Fund, confirmed in the Federal Budget of 2014 the Small Communities Fund designated \$94M in federal funding to support infrastructure projects in Alberta communities with a population of 100,000 or less. Investments in Broadband Infrastructure were eligible under the fund criteria, including in investments in High-speed backbone, points of presence, local distribution within communities and satellite capacity. Funding under this program was based on matching funds from the provincial and municipal levels, with each level of government funding 1/3 of the total expenditure.

This program is closed to new applications.

### **Province of Alberta**

#### **Community and Regional Economic Support (CARES)**

As part of the Alberta Jobs Plan, the Alberta government has allocated \$30 million over 2 years to 2018 to promote long-term economic growth and prosperity in Alberta's communities and regions through the new Community and Regional Economic Support (CARES) program.

Through Budget 2018, the CARES program has been extended to 2020.

The CARES program is focused on the following outcomes (5):

- Improving local business environment and/or regional economic collaboration
- Increasing support for entrepreneurs and small and medium-sized enterprises (SMEs) to grow and succeed
- Enhancing support for businesses and industries that provide diversification to a community or a region
- Increasing industry and sector competitiveness to lay the foundation for investment and job creation

While this program cannot be used to fund major broadband infrastructure, however it could be used to fund the planning of next steps toward a broadband infrastructure, including the development of detailed business plans, detailed design assessments and the planning of future pilot projects.

Funding is based on a matching funds program with the municipality on a 1:1 basis.

The next intake for applications for this program will open on June 1, 2018 for 30 days.

#### **Municipal Sustainability Initiative (MSI)**

The Municipal Sustainability Initiative (MSI) helps support local infrastructure priorities and build strong, safe and resilient communities. Municipal Affairs has allocated almost \$9.6 billion to municipalities since the program launched in 2007. This has meant communities across Alberta have been able to build and rehabilitate their roadways and bridges, water and wastewater systems, public transit facilities, and recreation and sport facilities, and address other key local priorities.

5 https://www.alberta.ca/community-regional-economic-support-program.aspx#toc-4 (May 2018)

6 https://www.alberta.ca/community-regional-economic-support-program.aspx#toc-4 (April 2018)

Telecommunications Infrastructure is eligible under the MSI program, including investments in fibre optic or copper cable, radio, cell towers and satellite links.

Most municipalities have fully allocated their MSI funding towards traditional infrastructure investments (roadways, bridges, etc.); However it is recommended internal discussions take place within the municipal governance structure to determine if (i) telecommunications investments could be made within the scope of traditional infrastructure projects for a very small incremental costs (e.g. including the installation of fibre optic conduit at the time of roadway/ bridge widening or rehabilitation) (ii) given the strategic direction of the municipality, a re-allocation of MSI funding to planned telecommunication system investments.

#### Gas Tax Fund (GTF)

The federal Gas Tax Fund (GTF) was confirmed as part of the federal Budget 2014, and will run from 2014 to 2024. As part of the New Building Canada Plan, the renewed federal GTF provides predictable, long-term, stable funding for Canadian municipalities to help them build and revitalize their local public infrastructure while creating jobs and long term prosperity. Under the GTF, Alberta is expected to receive \$229 million in 2018-19, for a total of \$1.08 billion since 2014-15.

GTF funding is provided to provinces and territories which in turn flow this funding to municipalities. Municipalities can pool, bank and borrow against this funding, providing significant financial flexibility.

Under the program municipalities determine projects and activities to be funded by the GTF based on local priorities, within the general qualification criteria set out in the administrative guidelines. The funding provided under this program is in addition to other provincial grant funding, such as the Municipal Sustainability Initiative, and non-grant funding of municipal infrastructure. It is intended to cover capital costs only and may not be used for maintenance costs, operating costs, debt reduction, or replacement of existing municipal infrastructure expenditures 7.

Telecommunications Infrastructure is eligible under the GTF program, including investments in network connectivity infrastructure, including high-speed backbone networks, fiber optic cables, servers and server applications, data storage infrastructure, satellite capacity, local distribution networks and transmitting towers.

Most municipalities have fully allocated their GTF funding towards traditional infrastructure investments (roadways, bridges, etc.); however it is recommended internal discussions take place within the municipal governance structure to determine if (i) telecommunications investments could be made within the scope of traditional infrastructure projects for a very small incremental costs (e.g. including the installation of fibre optic conduit at the time of roadway/ bridge widening or rehabilitation) (ii) given the strategic direction of the municipality, a re-allocation of MSI funding to planned telecommunication system investments.

#### **Private Grants/Programs**

There are few private programs that have been identified with examples provided below of private sector organizations making contributions toward improving broadband in municipal and rural environments.

7 http://www.municipalaffairs.alberta.ca/federal-gas-tax-fund (April 2018)

1. Pipeline Company Contributions: On March 3, 2015: The Municipality of Parkland County and the Trans Mountain Expansion Project announced they have entered into a Memorandum of Understanding for a Community Benefit Agreement that will see a \$225,000 contribution in funding the Intelligent Community Project to develop reasonably priced, high speed broadband and/or the acquisition of equipment to facilitate the advancement of economic and community development in the municipality (8).

It appears that this funding was negotiated in exchange for the approval of pipeline rights of way through the County, as well as to compensate the County for the inconvenience to residents during planned construction activities. This approach could be used by the City of Spruce Grove as it discusses future pipeline infrastructure in the City.

2. **TELUS:** Borrowing the Internet (9): In 2017, Parkland County partnered with the TELUS provider and 4 rural county libraries to launch the Borrow the Internet project, which loans out Internet hubs to library members. Each hub may be borrowed for one week and works in any area with electricity and cellphone coverage. For residents without the necessary devices to run the hubs, the libraries also maintain an inventory of tablets and laptops to be signed out as needed.

Though the project is only one year old, it has met with great success. The hubs have had consistent waiting lists since their introduction at all four libraries, and TELUS has committed to providing more devices to alleviate those wait times. Beginning in 2018, the county will be introducing subsidized rates on Internet and hubs for all residents enrolled in distance learning programs through Athabasca University. Similarly, TELUS has launched a program called Internet for Good in Alberta to subsidize Internet rates for families and individuals on government support to help close the digital divide.

This approach could be replicated within the City of Spruce Grove in order to improve digital literacy and reduce the digital divide for residents within the County. It is unlikely it would be applicable to businesses.

3. Google (Alphabet) Project Loon (10): A few big media players such as Google are making big 'bets' (high risk investments) in technologies to expand internet to rural and/or undeserved areas. The technology successes get a lot of headlines, but there are also quite a few situations of the technology not performing as planned or taking much longer than expected to commercialize. In the case of this project (Free Space Optics + balloons) particular technology, it was used/ deployed successfully to deliver interim cellular LTE services to Puerto Rico after the hurricane. There are no examples of commercial deployment to deliver business internet services in large numbers.

It is important to remember that these technologies are targeted to regions where absolutely no broadband connectivity exists, including a lack of commercial cell phone services, with the aim to provide rural residents basic broadband capability. With this project Google is not focused on rural North American locations where mobility services are already deployed and thus the City of Spruce Grove would not be an eligible location for Google to consider. The actual technology (Free Space Optical Communications) has actually been around for quite some time, and it is less expensive to deploy vs. fibre



https://www.transmountain.com/news/2015/parkland-county-and-trans-mountain-signa-225-000-community-benefit-8 agreement (April 2018)

(9) https://www.intelligentcommunity.org/tags/parkland\_county (April 2018) 10 https://x.company/loon/ (April 2018)

optic construction. Because the technology operates in the near visible light spectrum (infrared), it suffers from weather effects (heavy rainstorms, snowstorms, smoke) and is also quote sensitive to slight antenna movements (e.g. swaying due to wind gusts, movements due to birds). Google (Alphabet) is deploying it in a fashion where they are hoping to deliver a 10Mbps LTE network to rural areas and in the India deployment to implement backbone network. The technology will certainly save some build costs vs. a traditional fibre optic deployment, but deploying it in a way to distribute business internet services would require a fair amount of customized network design and testing to ensure it would work. Traditional fibre optic based networks and services for Internet and TV distribution are very mature, network equipment is "off the shelf" and there are many people with the skill sets to maintain it and support it.

#### Summary

The following Table 18 provides a summary of the public and private funding sources to support the development of broadband systems.

GRANT	SOURCE	ELIGIBILITY	TIMING
Internet as a Basic Service (CRTC)	Federal Government	Yes – Supports municipal investment in broadband systems infrastructure	Fund details expected in 2019
Canada Infrastructure Bank	Federal Government	Yes – Supports municipal investment in broadband systems infrastructure	Additional details expected in 2019
Smart Cities Challenge	Federal Government	No – Supports initiatives that would be enabled by broadband	Currently active, next intake expected in early 2019
Connect to Innovate	Federal Government	Yes – however program is not currently accepting any new applications	Program is not currently accepting any new applications
Community and Regional Economic Support (CARES)	Alberta Provincial Government	Yes – Supports the development of business plans, feasibility/ preliminary design, however can't be used for infrastructure	Next application intake opens on May 1, 2019 for 31 days
Municipal Sustainability Initiative (MSI)	Alberta Provincial Government	Yes – Supports municipal investment in broadband systems infrastructure	Ongoing annual program
Gas Tax Fund (GTF)	Alberta Provincial Government	Yes – Supports municipal investment in broadband systems infrastructure	Ongoing annual program
Pipeline Company Contributions	Private Sector	Yes – As applicable	TBD
TELUS: Borrowing the Internet	Private Sector	Yes – As applicable	Currently active in Parkland County
Google (Alphabet) Project Loon	Private Sector	No	Active in India

#### **Summary of Funding Sources**

#### **Observations and Recommendations**

The following observations and recommendations are provided with a view to prioritize activities and focus within the City with respect to grants available to fund future broadband initiatives:

- 1. The Internet as a Basic Service Fund, is strongly aligned with the needs and objectives of the City, and provides the best possible source for future funding. While the funding terms of this fund have yet to be announced, the municipalities should consider allocating some matching funds to be available should the terms of this fund be favorable and support the future investment priorities of the City. As was seen with the Connect to Innovate program, application intake periods are sometimes very short (e.g. 4 months), and these programs seek to fund 'shovel ready' projects, thus all the necessary feasibility and planning studies must be completed beforehand to support the applications.
- The CARES program, can support future investments in the development of detailed business plans, detailed design assessments and the planning of future pilot projects as an investment prerequisite to the Internet as a Basic Service Fund application, or to MSI/ GTF funding applications.
- 3. While the Connect to Innovate program is officially announced as not being open to future application intakes, it has only announced \$300M of its program budget of \$500M. Should this program announce a future application intake, it should be pursued as a priority as its program objectives are in close alignment with the City needs.
- 4. The MSI and GTF programs offer stable year over year funding sources for capital infrastructure programs. As municipalities prioritize the need for broadband as important infrastructure, a re-allocation of these grants to support broadband programs should take place within municipal administrations.
- 5. Many infrastructure funding programs, including the MSI and GTF programs, along with the Investing in Canada Plan and the Canada Infrastructure Bank are designed to fund necessary investments in municipal infrastructure (e.g. roads, bridges, water systems, etc.). As these projects are scoped within municipalities, a view to including conduit systems along roadways and bridges and the need to connect municipal water systems using fibre optic infrastructure should be considered. Often the cost of including conduit and fibre optic cable is negligible compared to the cost of the base infrastructure, and this small investment provides strategic value as part of a larger broadband infrastructure plan.



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