

# Update on Broadband Feasibility Research Report

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February 21, 2017



**Town of Sundre**

Department of Economic Development

Department of Finance and Administration

# Update on Broadband Feasibility Research Report





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## Update on Broadband Feasibility Research Report

**Departments:** Economic Development and Finance & Administration

**Function:** Utility and Economic Driver

**Project Name:** Broadband development

**Proposed Budget Years:** 2018 and 2019

### 1. Background and Executive Summary

This project was started by CAO Dave Dubauskas in 2015 and provided with enough funding to conduct research into the feasibility of Sundre becoming a gigabit community via broadband fibre optics, and to prepare for its installation to help the community become future-ready. For various reasons, broadband is an economic driver, the requirement for which is becoming an eventuality across the world. The move toward ensuring communities become “Gigabit communities”, in other words, communities with the capability to reach a minimum of one gigabit<sup>1</sup> (Gb) per second download and upload speeds, is happening now.

In fact, the Canadian Radio and Television Commission recently ruled in December, 2016, that “a well-developed broadband infrastructure is essential for Canadians to

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<sup>1</sup> Gb refers to gigabit. A bit is a unit of measurement, measuring the size of digital information. A gigabit is equal to 1000<sup>3</sup> bits of digital information. *N.B.: A bit is similar to, though different in size from a byte. A bit is 1/8<sup>th</sup> the size of a byte. Internet transmission speeds are typically expressed in bits, whereas most files are expressed in bytes. For example, a 1 gigabyte file will take 8 seconds to transfer on a 1 gigabit per second (Gbps) connection. Bits are expressed with a small ‘b’ (i.e. Gb) while bytes are expressed with a large ‘B’ (i.e. GB).*

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participate in the digital economy,”<sup>2</sup> and that “[b]y the end of 2021, 90% of Canadian homes and businesses should have access to broadband speeds of at least:

- **50 Mbps for downloads** (data that consumers are *receiving from* the Internet, including files, web sites, pictures, music, and movies)
- **10 Mbps for uploads** (data that consumers are *sending to* the Internet)”

With the understanding that broadband is a requirement in today’s economy prior even to the CRTC ruling, and prior to Mr. Dubauskas taking extended leave and subsequently retiring, TaylorWarwick Consulting was hired to complete an economic feasibility study. As an extension of the study, Administrative staff researched for due diligence various broadband operational options and their successes/failures and benefits/weaknesses in a number of communities. Administration also met with a number of major telecommunications companies to discuss their interest in investing into Sundre. We also learned as much as possible about current and future technology.

Part of Administration’s research also included a conduit survey on the usability of existing underground conduit located in about one quarter of the Town. This survey found that a portion of the conduit is indeed usable, which will lead to reduced investment costs, should the Town move forward in this direction.

As part of our feasibility research, since no public consultation has occurred, Administration decided to be as conservative as possible (while also being realistic) with regard to projected adoption rates. In fact, Administration instructed the consultant to update the financial projections further by reducing projected adoption rates up to a third. Administration’s intent was to calculate the viability of investing into broadband based on very conservative uptake.

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<sup>2</sup> “Internet Speed and Performance” Canadian Radio and Television Commission, date modified 2016-12-21, accessed January 6, 2016 from <http://www.crtc.gc.ca/eng/internet/performance.htm>

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The financial analysis attached to this report is the most up-to-date, and reflects multiple months of refinement. It is worth noting that the projected cost to introduce fibre-to-the-premise (FTTP) in Sundre has been reduced substantially from the initial assumed costs originally presented at the outset of this project.

The final estimate reflects the cost to deploy FTTP to 100% of Sundre's residences and businesses, via a combination of aerial deployment and buried conduit. As a community-owned network, Sundre would be eligible to deploy most of the network aerially. When including apartment units, the aerial portion of the proposed deployment would cover a full 86% of premises. It also reflects the cost associated with assembling an electronics hub that would light the fibre optics (a challenge moving forward will be determining the location of the electronics hub). The electronics hub will be approximately the size of a small room.

The Financial Review submitted by TaylorWarwick Consulting assumes that fibre optic conduit would be permitted by Alberta Transportation to cross the Red Deer River along the Red Deer River Bridge to the East Side Area of Sundre. Plus, the assumed roll-out includes aerial deployment to 27 industrial properties within the west Sundre industrial area, located in Mountain View County.

After earning a proposed \$70 per premise per month paid to Sundre by internet service providers (ISPs), a total of \$2.75 million in capital financing would be required over the initial four (4) year period of the deployment. \$1.35 million would be required the first year (2018).

The fibre network would be open to any ISP willing to pay the required carrying fee. If only one ISP were to partner with the Town, the service would be far superior to anything currently offered, though competition would still exist (similar to the way

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Calgary's publicly-owned Enmax Corporation competes with other private power companies and still makes a profit).

Once penetration targets are met, annual profits are expected to be about \$30,000 to \$80,000 from years 2023 to 2028, then \$90,000 to \$116,000+ from years 2029 and onward. In fact, assuming a 30% penetration rate within 4 years to residences and 50% to businesses, the net cumulative revenue after debt servicing (our total operational profit from positive cash flow) would be about \$540,000 by the year 2031. Cash flow positivity would commence in the year 2023 (based on a conservative 30/50 penetration rate), and earn the Town of Sundre incrementally increasing annual profits.

The fibre optic network's operations and maintenance would require no Town staff and would be completely outsourced to a third party, such as O-Net.

It is important to note that there will continue to be competing technologies with fibre optics moving into the future. Technologies currently being developed will focus in the future on wireless internet service provision via cellular data signals. With the eventual advent of 5G wireless technology, high-speed internet will be able to be beamed into rural areas, and will likely be a technology that helps the CRTC's national objectives.

Fibre optics will however, moving into the future, continue to be superior to data signals due to the sheer bandwidth potential associated with the physical infrastructure's use of light to transmit data, and the various colour spectrum wavelengths that have yet to be exploited for the purpose of data transmission. Fibre optics are also not limited by line-of-sight issues. Line-of-sight issues will continue to be a challenge for wireless services, similar to the way we still have areas where cellular signals are weak or are lost depending on the nearby structures or physical location of a cellular device. Combatting the issue of line-of-sight will involve the construction of a great number of expensive

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wireless transmission towers. Another weakness associated with 5G includes its potential to be scaled up. For instance, according to our consultant, doing something as simple as increasing the provision of download or upload speeds would require extra capital and hardware. This compares to fibre optics, where the full potential to provide internet speeds at full capacity exists already in the fibre optic conduit and scaling speeds up would require no additional resources.

The value of the economic development potential of a fibre optic network is clear; beyond this, due to the potential earning power associated with having a community-owned network (which could be used to put profits toward reserves for future capital projects, reduced taxes, etc.), Administration believes it is a venture worth pursuing further by seeking public input.

## 2. Research to Date

### 2.1. Regulatory Framework

Certain regulatory considerations exist at various levels of government. Here is a cursory examination of several key considerations.

#### 2.1.1. Federal

The Canadian Radio & Television Commission (CRTC) regulates the use of mass communications, including the distribution of internet. In addition to helping Canadian content and companies thrive, the CRTC helps ensure that smaller entities are able to compete with the larger established telecommunications companies, such as Telus, Bell, Rogers and Shaw.

The CRTC in December, 2016 recognized the need for a “well-developed broadband infrastructure,” and established Telecom Regulatory Policy CRTC-2016-496<sup>3</sup>, and sets out actions and justification to help Canadians more appropriately connect with the digital economy. As part of their action targets, the CRTC hopes “[b]y the end of 2021, 90% of Canadian homes and businesses should have access to broadband speeds of at least:

- **50 Mbps for downloads** (data that consumers are *receiving from* the Internet, including files, web sites, pictures, music, and movies)
- **10 Mbps for uploads** (data that consumers are *sending to* the Internet)”

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<sup>3</sup> “Telecom Regulatory Policy CRTC 2016-496” Canadian Radio and Television Commission, accessed January 6, 2017 from <http://www.crtc.gc.ca/eng/archive/2016/2016-496.htm>

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With regard to regulations over internet networks, the following is a quote from the Assistant General Manager of O-Net: “[T]here is currently no requirement forcing companies to provide open access to competitors if any single company owns the network. How the network operates is entirely determined by the network owner.”

The importance of addressing the needs of the digital economy, as recognized by the CRTC represents an important consideration should Sundre follow the path to a community-owned network.

### **2.1.2. Provincial**

Following discussions with the provincial economic development specialist tasked with crafting a provincial broadband adoption toolkit, the chief provincial regulatory considerations relate to: a) the Municipal Governance Act, which is currently under review for revision, and b) provincial rights of way.

The provincial specialist acknowledged that to the best of his knowledge, provincial regulations are not heavy and or otherwise non-existent.

### **2.1.3. Municipal**

According to the Strategy and Technology Officer (STO) at the Town of Olds, who worked with utility companies and O-Net during the lead-up to O-Net’s launch, certain regulations the municipality can control to its benefit include the creation of Municipal Access Agreements with large telecom companies and utility companies. The representative recommended that agreements should stress that any conduits installed must be multi-use, and not exclusive to the large telecoms. This protects the municipality’s ability to affordably lay fibre.

Other regulations that the municipality can control include land-use mandates ensuring all new developments feature underground conduit to each premise.

## **2.2. Discussions with Municipalities**

### **2.2.1. Didsbury - Telus**

Administration met with Didsbury’s Manager of Development and Legislative Services, who informed us that Telus was a great addition to the Town. He was very happy to have Telus in Didsbury and did not remark on any outright downsides to having them come and install the fibre network.

Later, Administration discussed with their Operational Services Manager any issues pertaining to Telus’s installation. The sole issue they had was the time requirement imposed on their staff to respond to the abundance of ‘First Calls’ placed by Telus to locate utility infrastructure during the construction phase.

Although Telus installed, owns and controls the network in Didsbury, it is unclear whether they constructed an actual complete Fibre-to-the-Premise network. From our information, it is likely to be only a partial installation consisting instead of a less-desirable wireless Wide Area Network (WAN).

### **2.2.2. Vulcan - Axia**

We spoke with the Vulcan Business Development Society (VBDS), the organization responsible for economic development in the Vulcan and County area. The VBDS informed us that although uptake was generally lower than expected, Axia’s broadband is useful to help promote the community and they are still investing in the Town, indicating continued profit potential for the

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company. We were told that at least two businesses had relocated to Vulcan from High River following the installation of fibre optics (though we cannot confirm it was *because* of fibre optics; currently a consultant is conducting a study on the community economic outcome of broadband introduction to the community).

*(Full disclosure: Sundre's Economic Development Officer and author of this report worked with Axia and promoted their work during the market research and installation phases of their broadband network in Vulcan.)*

### 2.2.3. Olds – O-Net

The Strategy and Technology Officer (STO) at the Town of Olds was able to provide useful information pertaining to the logistics and legislative framework needed to prepare for the installation of a fibre optic network. The STO seems to be positive about the value of the installation.

After also speaking with O-Net, we found that there was major concern at the Town about the fact it cost up to a total of \$18 million over several tranches. However, many of these concerns have since been allayed, as there has apparently been benefit to the community in the form of new investment, significant commercial adoption of O-Net's services, new residential recruitment, and social benefits associated with free public Wi-Fi in Uptown Olds and at the Olds hospital.

O-Net informed us that they also conducted a webpage analysis of local commercial businesses. Through this analysis, they attempted to search for and find businesses on the web, social media and other means of e-commerce. They found that four years ago, at the onset of O-Net, an astounding 82% of

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businesses had no website. A recent analysis has found that since commercial businesses have been adopting O-Net this number has been halved – now only 44% of local businesses have no online presence. Therefore, this shows that as a result of O-Net’s improved service capacity, businesses were forced to think beyond simply transactional services – they were able to get creative and improve their brands and business development tactics.

Socially, O-Net is very community oriented; they provide free internet service in Olds’s downtown and at the hospital.

### 2.3. Discussions with Internet Service Providers

#### 2.3.1. Telus

Telus is a large telecommunications company providing phone, television and internet services (referred to collectively as triple-play service). Telus initially informed us that they would be willing to consider introducing fibre optics into Sundre, however they backtracked and suggested they would not be able to install fibre optics as affordably as the Town or a smaller entity would, due to CRTC regulations (they did not specify which regulations).

On a side note, Telus’s mobility division is, however, currently offering a pilot internet provision project to rural Mountain View County. Telus is supplying a device that taps into cellular data signals and broadcasts the cellular data signal within peoples’ homes to provide internet, like a router. However, a local Telus representative informed us there is no guarantee of high-speed service, and the physical nature and location of peoples’ homes can also be an impediment (just like a weak cell service).

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### **Pros:**

- a) Ability to provide 4G wireless cell phone signals in community.

### **Cons:**

Although it is currently a moot point since Telus has indicated they will not be able to install fibre optics in Sundre, assuming they were to change this position, we did note several outcomes that we feel are not ideal about a Telus operation. In terms of our own expectations about revenue-generation and service excellence for the Town of Sundre and its residents, these issues include:

- a) Although Telus paid for the installation in Didsbury, they did not install a complete Fibre-to-the-Premise network; it was allegedly only a partial installation consisting of in part, a Wide Area Network (WAN) wireless signal. We can expect the same to occur in Sundre. This is not ideal for the speeds that will be required in the near future. It's considered a cheaper, less effective route to service delivery.
- b) Telus pays absolutely no linear taxes, fees or royalties to the municipality.
- c) Telus operates a closed network, which means it is the only company that they allow to utilize the fibre optics lines, thus not allowing for competition or business development.

*Note: new CRTC regulations might change this.*

- d) Telus will not partner with any municipality and maintains sole ownership over the network.
- e) Money going to Telus leaves the community and diminishes the potential social return on investment.

### **Conclusion**

Administration feels that a Telus-only controlled network would be the least desirable option for a) the Town of Sundre; b) consumers; and c) economic

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development potential. However, this option is moot since Telus has indicated they will not be constructing a network in Sundre.

### 2.3.2. Axia Connect

Axia Connect will soon be in nine (9) Alberta communities, providing triple-play service. Axia Connect is a wholly owned subsidiary of Axia NetMedia (together to be referred to as “Axia”), the company responsible for operating the provincial SuperNet system until 2018. Axia confirmed that they would be interested in coming to Sundre to install fibre optics, and that they would have an open network to allow competition. It is worth noting that Axia is not bound by the CRTC’s rules for the large incumbents and are not required to have an open network.

Axia’s consumer prices are similar to O-Net’s and other service providers. They provide symmetrical speeds for both uploading and downloading. This is important because upload speeds help to benefit businesses, while downloading speeds help improve service quality for consumers.

However, there are certain strategic factors that must be considered with regard to Axia and its future viability. Currently, Axia NetMedia operates the Bell-owned and Province-regulated SuperNet fibre optic system, which connects 429 Alberta communities to the internet with broadband speeds. Axia NetMedia’s contract to operate the SuperNet ends in early-mid 2018. We understand that there are rumours suggesting the province is seeking to find another operator for various reasons. According to TaylorWarwick Consulting, these reasons include Axia Connect’s “non-transparent use of the SuperNet to support Axia Connect

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communities”<sup>4</sup> (and, as noted above, the SuperNet is operated by Axia Connect’s parent company Axia NetMedia). Therefore, it’s reasonable to assume that Axia has been actively seeking communities to sign with them since the company might be able to reference the number of communities they have registered as leverage during negotiations with the province. If Axia loses the contract, the company’s financial situation might change, which could affect Axia’s ability to 1) build in Sundre, and 2) continue to operate in Sundre if they do begin installations in the community.

Administration reminds the reader that this possibility is conjecture and merely to be taken into consideration within a full situational context.

### **Pros:**

- a) Axia is very easy to work with, and provides good customer service and full Fibre-to-the-Premise internet (not relying on WAN, like Telus apparently does).
- b) Axia will pay for the entire installation of broadband.
- c) Axia provides an open network. The service is open to other companies that can pay a carrying fee to Axia to provide internet services – therefore consumers are not relegated to only Axia (as is the case with Telus), which supports competition. However, they are not bound to this.
- d) Town telephone bills would be substantially reduced with the adoption of VOIP service provided by Axia.

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<sup>4</sup> Email from Craig Dobson, of TaylorWarwick Consulting Ltd., to Jon Allan, Economic Development Officer with Town of Sundre on January 30, 2016 at 06:56 am.

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### **Cons:**

- a) Axia pays absolutely zero linear taxes, fees, royalties or otherwise to the municipality.
- b) Axia maintains complete strategic control and ownership over the network.
- c) Axia is not willing to partner or share a stake in the ownership of the broadband network.
- d) Money going to Axia leaves the community and diminishes the potential social return on investment.

### **Conclusion**

If a Town-developed network were not feasible, then Axia might remain a viable secondary option. However, due to the fact that Axia will provide no property taxes and will lead to capital flight out of the community, we believe that in the medium to long-term it is not ideal.

### **2.3.3. Shaw Communications**

Shaw Communications Ltd. (Shaw) is a large national media company headquartered in western Canada, similar to Telus; it provides triple-play services, as well. Administration met with Shaw in November 2016, after the company expressed an interest in returning to Sundre as a service provider. Shaw was very eager to become an ISP on a Sundre-owned network, but they were explicit about the fact they will not be investing into any sort of network on their own.

Their reasoning was similar to Telus's: the CRTC regulations imposed on the large telecoms are different versus community-owned or smaller networks.

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### **Pros:**

- a) Shaw could pay Sundre a monthly amount per premise per month in perpetuity to the Town of Sundre as a carrying fee if they sign on as an ISP, depending on the partnership model and negotiated agreements.
- b) The addition of another competitor in Sundre will help drive consumer rates down.

### **Cons:**

- a) Should they decide to partner with the Town, the presence of Shaw would merely be as a service provider, not as an invested network operator.

### **Conclusion:**

In addition to other ISPs such as O-Net, Shaw would be a sought-after client that could use a Town-owned network and pay the Town a fee for doing so. By offering multiple service providers to residents and consumers, the likelihood of an ISP using a Town-owned network increases, therefore increasing the odds of Sundre earning revenue from multiple sources off the single network.

#### **2.3.4. O-Net**

O-Net operates a community-owned full service company providing triple play service. According to O-Net, their most lucrative service is internet. Although O-Net is the service provider, the Olds Institute owns the physical fibre optics. O-Net is owned by Olds Institute (OI). As noted in a section above, approximately \$18 million was spent establishing O-Net and the OI-owned broadband infrastructure, of which, we were informed that \$2.5 million came from provincial coffers via the Government of Alberta's Major Community Facilities Program; a portion of funds also came from the Rural Alberta Development Fund (which, according to sources, is currently not funded).



O-Net went through some issues initially while starting up their company. These problems were twofold. First, they attempted to utilize a European technology for the provision of television services, which did not function. This problem caused customers to question the viability of O-Net, and it led to expensive lessons learned. And second, they used a 10-year debenture to pay for their capital expenditures instead of a safer 30-year repayment plan, thus forcing debt servicing repayments beyond which they had prepared for.

Now, 4 years into operations O-Net has allegedly become operationally profitable, despite these challenges.

**Pros:**

- a) O-Net is a community-oriented organization and is not purely profit-motivated.
- b) O-Net generates revenue that can be reinvested directly into the community.
- c) O-Net could pay Sundre about \$70 per premise per month in perpetuity to the Town of Sundre as a carrying fee, depending on the partnership model and negotiated agreements.
- d) Capital would remain regionally local.
- e) Town telephone bills would be substantially reduced with the adoption of VOIP service provided by O-Net.

**Cons:**

- a) Should they decide to partner with the Town, the presence of O-Net would merely be as a service provider, not as an invested network owner.

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### **Conclusion**

O-Net is a highly desirable partner. If Shaw were to become an ISP partner as well, by offering multiple service providers to residents and consumers, the likelihood of an ISP using a Town-owned network increases, therefore increasing the odds of Sundre earning revenue from multiple sources off the single network. Since O-Net has finally managed to grow to a point that their problems are minimized, and since they have expressed a willingness to provide internet services to public facilities at no cost, they represent the most ideal company to partner with to launch broadband into Sundre. O-Net has also indicated they would be capable of providing full service maintenance of the network, for an operational fee.

## **2.4. Other Considerations**

### **2.4.1. Technological Considerations**

Fibre optics currently utilize just a fraction of the light-colour spectrum available to transmit information; as fibre optic technology advances, a fibre optic network will be able to be more fully utilized.

Meanwhile, as information communications technology evolves, non-FTTP technologies such as point-to-multipoint wireless WAN will continue to improve - though line of sight and building construction materials today still affect service quality. Companies like Google, Cisco and Qualcomm are currently developing impressive advances in this field, particularly in the area of 5G. Qualcomm in particular has shown substantial success developing the next iteration of this cellular technology.

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In the future, assuming cellular service providers do not gouge consumers, 5G will be able to affordably connect everything outside of the home with broadband (including driverless cars and drones); and with home internet routers connected to data or cell towers, broadband internet in the future will be streamed into the home via home internet routers that connect with mobile signals, as opposed to requiring physical lines like fibre optics. Wireless technology and fibre optics are in effect complementary: one offers mobility, while the other offers bandwidth. As the Town of Sundre’s consultant with TaylorWarwick noted, “[w]hen one is used to substitute for the other, there are trade-offs to be made.”<sup>5</sup> Noteworthy, in Sundre tests using wireless technology with the existing 4G network are currently being undertaken by Telus.

According to CCG Consulting (a telecommunications consultancy), via the company’s blog site, “very few people realize ... that almost none of the supposed 4G networks in [the USA] actually meet 4G standards.”<sup>6</sup>

“[L]ong before we see an actual 5G deployment, we are first going to see the deployment of LTE (Long Term Evolution)-Advanced followed by generations of improvements that are best described as pre-5G.”<sup>7</sup>

Although “the ultimate goal of 5G is to be able to deliver 50 Mbps speeds everywhere,”<sup>8</sup> based on advice by our consultant with TaylorWarwick

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<sup>5</sup> Email from Craig Dobson, of TaylorWarwick Consulting Ltd., to Jon Allan, Economic Development Officer with Town of Sundre on January 30, 2016 at 06:56 am.

<sup>6</sup> “Looking Closer at 5G,” POTs and PANs blogsite by CCG Consulting, October 3, 2016, accessed January 25, 2017 from <https://potsandpansbyccg.com/2016/10/03/looking-closer-at-5g/>

<sup>7</sup> *ibid.*

<sup>8</sup> *ibid.*

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Consulting, fibre optics will, moving into the future, continue to be superior to 5G data signals for multiple reasons, including:

a) The sheer bandwidth potential associated with fibre optics' physical infrastructure's use of light to transmit data, and the various colour spectrum wavelengths that have yet to be exploited for the purpose of data transmission;

b) Line-of-sight issues, which will continue to be a challenge for wireless services as well, similar to the way there are still areas where cellular signals are weak or are lost depending on the nearby structures or physical location of a cellular device;

c) Planning considerations, due to the fact that for a proper wireless broadband data network to be installed in an urban area, multiple pieces of transmitting equipment will need to be installed – as densely as one every block (including on towers, roof tops, street lights, etc.);

d) Most upload speeds provided by wireless cellular signals will not be provided symmetrically (we can expect to see 50 Mbps down, and only 10 Mbps up); and

e) The cost to scale up speeds will be very high since data signals are limited to the hardware on the tower, which would need to be replaced to scale up, unlike fibre optics which has the potential to provide essentially unlimited bandwidth through its physical infrastructure right from the start.

It's worth noting that the telecommunications industry will likely finalize their standards for 5G rollout by the year 2020. However, upgrading to 5G "in steps will be expensive for the cellular providers and they are not likely to implement changes too quickly."<sup>9</sup> Therefore, it would "not be surprising to be at least until 2030 until there is a cellular system in place that fully meets the 5G standard" in

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<sup>9</sup> *ibid.*

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the United States – and we can expect Canadian infrastructure to be in synch with theirs.

Physical obstructions notwithstanding, and assuming mobile service providers compete with fair pricing, in the future 5G internet supplied by wireless carriers will likely suffice for many consumers so long as signals supplied by 5G are high enough in data speeds.

### 2.4.2. Consumer Usage Considerations

According to Cisco, “80% of cellphone use is done indoors, mostly using WiFi.”<sup>10</sup> With the growing adoption of internet-connected devices, broadband usage is growing rapidly. In fact, broadband usage requirements typically double every 2 years according to ‘Neilson’s Law,’ which has been fairly accurate in its estimates since the 1980s. According to Neilson’s Law, if the typical (U.S.) household requires 20 Mbps of service today, 150 Mbps requirement will be essential in five (5) years – and a full 1 Gbps will be required in ten (10) years, which with current technologies only fibre optics can meet. Home-based broadband requirements are increasing due to the sheer number of connected devices – including everything from thermostats to dishwashers. See Figures 1 and 2, below, which were taken from a presentation by Calix Inc. to O-Net, to see graphs depicting broadband requirements according to Neilson’s Law.<sup>11</sup>

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<sup>10</sup> *ibid.*

<sup>11</sup> Calix Presentation at O-Net Offices in Olds, Alberta on July 26, 2016

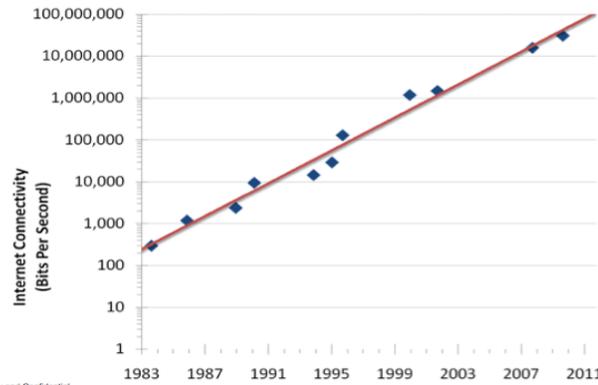
Fig. 1

## Peak Bandwidth Growth over Time?

Following somewhat behind Moore's Law

### Nielson's Law

- Internet peak consumption doubles every 2 years



© Calix – Proprietary and Confidential

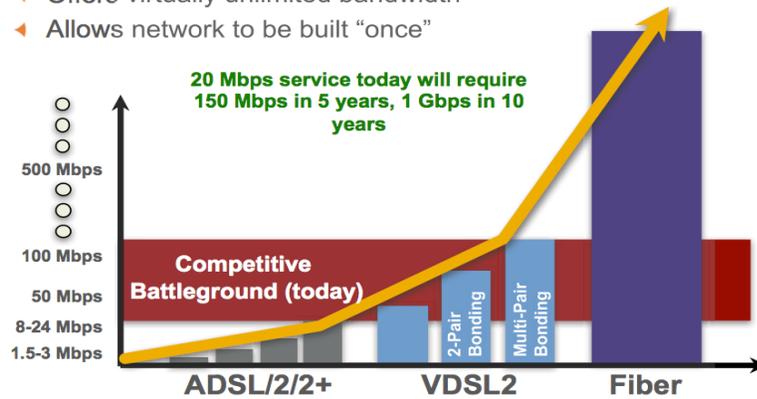


Fig. 2

## Why Fiber?

Bandwidth growth is exponential

- Fiber is the path to long-term sustainability
- Offers virtually unlimited bandwidth
- Allows network to be built “once”



**We have already experienced this rate of growth**

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### 2.4.3. Government-funding Considerations

The federal department of Innovation, Science and Economic Development (ISED) previously funded a project called 'Connecting Canadians,' which supplied internet access to underserved rural and remote areas.

Administration discussed with ISED management a proposal that they submitted to the federal government caucus for a new project that would be an expansion of the Connecting Canadians program.

In December 2016, Administration learned the program would be accepting grant applications starting in January 2017, but that a Sundre-owned network would not be eligible for grant funding as a result of the existence of the SuperNet.

Worthy of note is the CRTC ruling that all Canadians must have access to 50 Mbps service by the year 2021, meanwhile the grant program only assists rural and remote communities achieve access to 5 Mbps.

As a result of the SuperNet, ISED has indicated that most of Alberta will not be eligible since the SuperNet acts as a point-of-presence (POP) capable of supplying access to broadband internet. However, Administration is not content with this decision by ISED, since having the SuperNet POP does not guarantee broadband access to the general community and population; it is tantamount to there being a large water tower, full of water, on Snake Hill, with no pipes to provide the water to any of the premises in Town.

### **3. Case Studies on Effects of Being a Gigabit Community**

#### **3.1. Longmont, CO (NextLight)**

Some of the fastest internet in the US; funded via bond-offering to raise required \$40.3 million. Prices are fairly low and adoption rates are allegedly profitable. Service is only about 2 years old.

#### **3.2. Sandy, OR (SandyNet)**

Same as above – utilized bond to pay for investment. SandyNet has been operational for 15 years (initially as a DSL provider, now as a fibre optic provider) and does not require tax-payer subsidies; it is profitable.

#### **3.3. Charleston, SC (GigaFi)**

Service developed to attract young and educated employees for a new Boeing facility; it worked.

#### **3.4. Key Takeaways for Market Adoption**

Offer a differentiated experience.

- 1) Ensure that the service offers the right service mix (i.e. including the option to sign up for up to 1 Gig service speeds);
- 2) Showcase the superiority of a broadband network in their home;
- 3) Develop strong brand identity and know your consumers' behaviour. (O-Net has a developing brand identity, though market research would still be required to more properly understand Sundre residents'/consumers' behaviour).

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### 3.5. Key Business Success Factors

- 1) Most important is to get **high penetration rates** (break even could be 15% adoption; but the real money is made with >35% adoption).
- 2) Ensure a **higher ARPU** (annual revenue per unit, or household) – but since penetration is even more important, ensure rates are competitive enough to drive demand.
- 3) Have **fast service velocity** –ensure that newly installed services translate into cash flow by registering customers quickly (in other words, speed of deployment).
- 4) **Lower operating costs** – and invest into **skilled people**.

## 4. Socio-Economic and Financial Impacts to Sundre

### 4.1. Socio-Economic Analysis

Administration has learned more about the beneficial outcomes associated with broadband investment. Separated into three subsections below, here are some of our key socio-economic findings.

#### 4.1.1. Business - Enterprise

Fibre optics are a fundamental element of modern economic development; they are required to be future-ready, and to compete in an information-driven society. Although becoming a so-called Gigabit community cannot guarantee growth, there is significant risk to doing nothing (especially in the future).

This is why companies like Telus, Google and Axia are developing Gigabit communities of their own. Consumers and businesses will be forced to utilize the technology as we move into the future, which makes the investment into the infrastructure very strategic. Broadband infrastructure is needed to compete now and into the future.

Some companies, like Telus, have installed partial fibre optic networks and relied on WAN to fill the gaps; this is insufficient. Consider the following: Although most people might only have a requirement for 20 Mbps today. In 5 years the average requirement will be 150 Mbps – and it will be 1 Gbps in ten years. Since the 1980s, data usage has doubled approximately every 2 years (this trend has been projected correctly since the 1980s, according to ‘Nielson’s Law’).

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Broadband helps entrepreneurs create businesses and to serve technology savvy consumers and businesses. It is a fundamental requirement to competing in an increasingly global information-driven economy.

### 4.1.2. Residents - Consumers

To allow for people to maintain the quality of living that they expect, and further to attract workers to communities, developing fibre optic networks is a strategy that has been used successfully (for example in Charleston, SC as above, and in Olds). Broadband infrastructure supports the lifestyle that the modern workforce expects.

By becoming a Gigabit community, Sundre would remain attractive as a destination for many new residents and families into the future. There would be no constraints, no boundaries, no limits, and with the highest quality video, voice and data service.

Even with regard to our large baby-boomer and seniors' population, the infrastructure would allow this increasingly connected retiring population to remain connected to family, friends, and information.

### 4.1.3. Social – Community

Some proponents of broadband assert that the average assessment value of properties in a community will increase by up to 2% once broadband is introduced, which if true would increase municipal revenues. Unfortunately, all assertions in this regard have been found to be only anecdotal and without data.

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Regardless, the social return on investment by broadband – if managed and controlled by the community – has been found in other areas, including:

- a) via the connections made possible with distant relatives for seniors;
- b) via the ability to augment competitiveness and business development for small businesses and non-profits;
- c) via the provision of broadband for medical servicing and file sharing;
- d) via the access to information and creativity possible at educational institutions;
- e) via the ability to have residents augment their quality of life by connecting more to the ‘internet of things’;
- f) via the ability to have municipalities develop ‘smart’ infrastructure that can continually track, send and receive data about any myriad of things (i.e. gas lines monitoring; water and wastewater monitoring; synchronization of traffic lights in large communities; transit; etc.); and
- g) when community-owned, via the municipality earning dividends off the service that can be used to help pay for community services.

## 4.2. Financial

### 4.2.1. Capital Cost Funding Model Options to Move Forward

As part of the review process, administration reviewed several funding models with the Town’s consultant TaylorWarwick Consulting Ltd. Through an exhaustive review, it was determined that a modified Model D provided the best option as it results in a high return on investment while limiting risk.

**Model A** – Town pays for entire network up front and works with ISP to maximize penetration and market adoption.

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**Model B** – All paid for upfront, but Town only pays for dark fibre while separate entity pays for electronics portion to light the fibre via P3.

**Model C** – Town pays for whole network, but only homes and areas as demand necessitates.

**Model D** – Town pays for whole network, but first only to homes and areas serviceable by aerial installation, then install buried conduit once enough operational profit is generated by the aerial-installed zones.

**Modified Model D** – Town pays for whole network, but in first year only to homes and areas serviceable by aerial installation, then in second year install buried conduit in those areas unable to be serviced with aerial fibre. Operations would be contracted out and the Town would receive a wholesale fee from ISPs on a per connection basis.

**Model E** – Town engages the services of a third party, such as Axia, to provide the capital infrastructure and broadband services to the community.

### 4.2.2. Financial Impact on Sundre

Attached is a *Financial Review, 2016-11-05, by TaylorWarwick Consulting Limited* based on the modified Model D option stated above.

In developing the financial review the consulting firm was directed to reduce the market penetration rates to more conservative estimates for both residential and commercial connections. Over four years, we conservatively estimated that maximum residential market penetration will

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be 30% and maximum commercial penetration will be 50%. Original estimates utilized a market penetration rate in year four of 40% for residential and 60% for commercial. While the original estimates may be achievable for the Town of Sundre, utilizing a lower penetration rate reduces the risk to the Town as the lower rates are more easily achieved.

In addition, the modified Model D reduces the level of capital required from \$4,000,000 to \$2,742,519. The reduction arises from utilizing greater aerial connectivity and utilizing a portion of existing conduit where available. It also reflects the income generated in the first years as a result of the business model utilizing a wholesaling fee to be charged to ISPs. The reduced borrowing requirements will result in a lower annual debenture repayment schedule over a twenty-year period. The lower annual payment again reduces the risk to the Town.

Administration, in reviewing the financial estimates of the consultant have modified the consultant's estimates further, as follows:

- Reduced residential and commercial annual growth from 2.8% to 1.0%. The reduction more accurately reflects the population growth over the 2011 to 2016 time period of 4.6% as identified in the 2016 Statistics Canada census.<sup>12</sup> This change reduces the number of residential and commercial units potentially available for connection. Utilizing a more conservative growth rate again reduces the risk associated with the project.

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<sup>12</sup> "Population and Dwelling Count Highlight Tables, 2016 Census" Statistics Canada, accessed February 15, 2017 from <http://www12.statcan.gc.ca/census-recensement/2016/dp-pd/hltfst/pd-pl/Table.cfm?Lang=Eng&T=302&SR=1&S=86&O=A&RPP=9999&PR=48#map-popup>

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- Increased revenue inflation index from 1% to 2% annually. The increase in the inflation index for revenue matches the inflation index used for expenses. The wholesale fee rate is established by Council and would be charged to ISPs through an agreement with each provider. The rate is controllable by Council and could be increased or decreased above the model 2% estimate whenever an agreement is negotiated with an ISP.

The revised financial estimates are attached for Council's review. In summary the revised estimates demonstrate:

- After two years, there is a positive operational cash flow (revenue minus expenditures not including capital expenditures) that grows over the remaining 13-year time horizon.
- After five years, there is a positive net cash flow (revenue minus expenditures including capital expenditures) that grows over the remaining 10-year time horizon.
- At the conclusion of 15 years, there is an accumulative \$540,000 available for reserves or other uses as determined by Council.
- Following the 15 years, net cash flows of approximately \$130,000 or more will be available to future Councils, per year.

### 4.2.3. Tax implications

Under the modified Model D option there is potentially no impact on the mill rate or taxes.

The model utilizes the infrastructure reserve to provide funding to offset the shortfalls in the first five years of operations; total borrowed from the infrastructure reserve will peak at \$246,801 by the fifth year. Thereafter,

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wholesale broadband operations begin repaying the funds to the infrastructure reserve with full repayment occurring in the eleventh year.

Following full repayment, if net operational profits are allocated to the infrastructure reserve, it would result in an additional \$540,000 contributed to it by the fifteenth year.

There is risk associated with the endeavour. If the wholesaling of broadband operations were unsuccessful after full implementation of debenture borrowing, the Town would be responsible for annual debenture payments of \$187,441 for the balance of the 20-year debenture. Based on the current Town assessment of \$362,397,820 such an imposition would result in an additional 0.542 mills for both the residential and commercial mill rates. The 2016 residential mill rate of 7.291 would increase 7.43% to 8.133 mills while the commercial mill rate of 11.200 would increase 4.84% to 11.742 mills.

Noteworthy, once fully constructed, there would be an impact on our debenture borrowing abilities, as the broadband project would require \$2,742,519 over the first four years of the operations. Such an amount is potentially limiting to the Town for other capital projects. However, it would not impact the 2017 – 2021 capital plan and the projects contained in the plan that require borrowing.

The primary rewards of the modified Model D option include:

- Economic benefits to the business and residential communities of Sundre.

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- Based on 2% annual revenue inflation and a conservative 30/50 penetration rate, there would be a positive cash flow commencing in the 11<sup>th</sup> year.
- No annual operational requirements on the Town's operations or staff, as the operations will be contracted out to a third party.

The primary risks of the modified Model D option include:

- If the operations fail, the Town becomes responsible for the payment of the annual debenture associated with the broadband operations, resulting in increases in the mill rate for both residents and the business community.
- Future technological advances may compete against fibre-based operations (ie. 5G).

It must be noted that Model E provides the same economic benefits to the business and residential communities without incurring any financial risk, as all operational and capital costs are the responsibility of the ISP.

However, in such a situation the Town has no opportunity to participate in the downstream financial benefits as any surplus remains with the private provider. Additionally, the provider may restrict other ISPs to the network, thus reducing potential competition resulting in higher fee charges to the resident and business communities. The Town would also lose any opportunity for strategic control over the infrastructure asset.

## 5. Administrative Recommendations

### 5.1. Recommendation

Administration recommends that, when weighted against costs, benefits, risk and opportunity, the Town of Sundre move forward with determining the public support for a Town-owned broadband fibre optic network since it is potentially quite feasible, vis-à-vis a fully private model (Model E).

*NOTE: With the understanding that the projections presented in the financial model are an exceptionally conservative scenario, there are caveats that would need to be met before moving forward with an actual Town-owned network.*

*Caveats are:*

- 1) Conduct recommended comprehensive public consultation to determine actual projected penetration rates;*
- 2) If penetration rates are favourable, ensure carrying-fee negotiated with ISPs such as O-Net is sufficient to generate a net operational profit within 5 years;*
- 3) Need to continue advocating for funding from either province or federal government (i.e. via expanded and updated Federal 'Connecting Canadians' program, perhaps) to assist with making launch more lucrative.*

Once the public consultation is completed, and assuming the caveats above were met, to see the network come to fruition Administration would likely recommend moving forward with **Capital Cost Modified Model D** shown in section **4.1.1** above.

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**Modified Model D – Primary preference:** Town pays for whole network, but in first year only to homes and areas serviceable by aerial installation, then in second year install buried conduit in those areas unable to be serviced with aerial fibre. Operations would be contracted out and the Town would receive a wholesale fee from ISPs on a per connection basis.

### 5.2. Alternative Recommendation

Town Administration does not conduct a public study to determine demand, and instead invites Axia to own, install, operate and control a private broadband utility network.

### 5.3. Rationale for Not Recommending Other Options

**Model A** – Town pays for entire network up front and works with ISP to maximize penetration and market adoption.

This would put an exorbitant amount of capital pressure on the Town; it is more feasible to spread it out over two years, as noted in modified Model D.

**Model B** – All paid for upfront, but Town only pays for dark fibre while separate entity pays for electronics portion to light the fibre via P3.

This would curtail the operational profits available to the Town, and potentially force the payback period to take longer. However, it is an option worth exploring under the right conditions.

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**Model C** – This would involve investing into broadband infrastructure as demand necessitates by zone and selling wholesale network access to an ISP.

This route would slow down penetration rates, which are essential to generating income quickly and maximizing profit.

**Model D** – This would involve investing into the 86% of premises and households in Sundre that may be provided network access via aerial deployment first. Then, it would involve waiting until this proportion of the network generates enough operational profit to cover the equivalent debt servicing cost of paying for the remaining 14% of the community that would require a buried conduit.

If this route were followed, the total savings between 2018 and 2025 (when underground deployment would likely occur) would be just \$86,000. Yet the lack of service to those residences without aerial deployment would create the semblance of a two-tiered public system. Moreover, the opportunity cost in terms of lost revenue potential from the 14% of the community that would remain unserved would reach a total of almost \$400,000 by 2031, therefore completely negating the initial \$86,000 in deployment savings.

## 6. Next Steps

### 6.1. Recommendation – Modified Model D

- 1) **Ongoing:** Advocate for provincial and federal funding to subsidize the cost of this unique and progressive project.
- 2) **February:** Initiate recommendation to conduct public consultations, in order to:
  - a. Determine market demand for broadband internet; and
  - b. Determine if public is open and willing to having the Town invest public dollars into broadband infrastructure as a revenue-generation opportunity.
- 3) **June:** Return to Council with updated report to determine whether Town should proceed.
- 4) **Summer:**
  - a. Conduct survey with Fortis of 582 aerial poles in Sundre to ensure they would be prepared to carry the weight of fibre cable. *(Note: our consultant is confident that they almost certainly would, but the survey is a necessity for due diligence)*
  - b. Issue Request for Proposal for company to undertake deployment.
  - c. Determine location in Town to house network electronics hub.
  - d. Finalize required financial structure prior to deployment.
  - e. Advertise open network opportunity and set up agreements with willing internet service providers.
- 5) **Fall 2017:** Inclusion into the 2018 capital plan for the buried conduit portion.

### 6.2. Alternative Recommendation

If Council declines to undertake the broadband initiative, invite Axia to install fibre optics in the community, with the understanding that Sundre would maintain zero



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control over the network and receive no direct financial return in equity or royalties or linear taxes in perpetuity.