



SOUTHGROW BROADBAND PROFILES PROJECT MASTER PLAN

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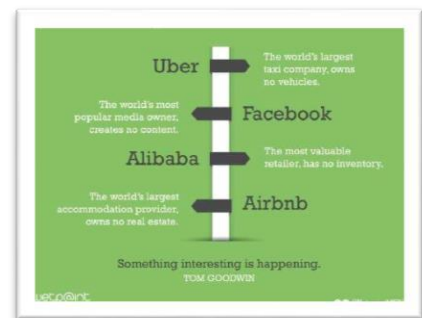
produced specifically for online audiences on platforms like Netflix or Hulu, people can view entertainment on their own schedule.

In addition to high functionality and customizability, the Internet of things is creating a cultural shift in moving responsibility from the individual to physically manage and operate the various elements in one's life, to technology performing these actions. This paradigm shift can be seen in innovations under development and currently available such as:

- Robotic vacuums that vacuum floors by themselves
- Computer chips in vehicles
- Self driving cars

This shift is readily accepted by younger generations, but older demographics fear it to some degree because they cannot be in control of managing the technology. Whereas the layman mechanic could once change spark plugs or make minor vehicle repairs, this is not possible in newer vehicles. There is a clear divide amongst the population between those who are comfortable allowing technology to manage daily functions, and those who are not.

Finally, technology and connectivity are changing the way that industries operate, and are defining new methods by which goods and services can be delivered. Regular citizens can participate in offering goods and services in record numbers without major cost outlays for infrastructure, permits, businesses licenses or adhering to industry-established requirement and standards.



The rapid development of technology-enabled functions in all segments of life have demonstrated a few commonalities worldwide. Two significant trends are:

- Innovation is driven by the private sector and champions, not government.
- Youth are the fastest adopters of technology.

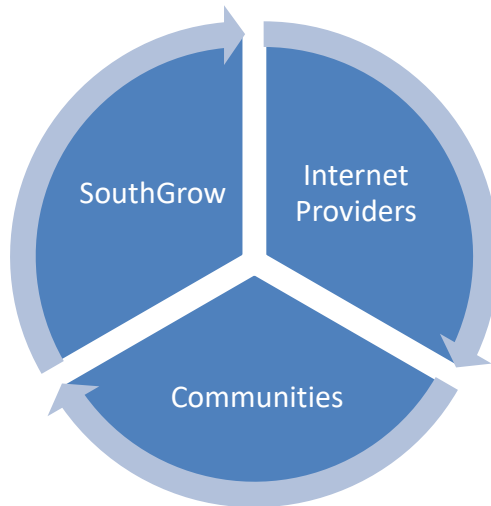
These trends are important to acknowledge as they will provide both opportunities and challenges to the SouthGrow Region. Opportunities exist in creating communities that support innovation and which facilitate entrepreneurs having the freedom to establish operations. Ground breaking inventiveness can take place anywhere now that has Internet connectivity. Small, rural communities with Internet connectivity are no longer at a disadvantage when it comes to fostering globally successful organizations. This opportunity also speaks to retaining youth in small communities, and attracting younger demographics to small communities rather than migration to larger centres. The old pattern of youth leaving rural communities to attend post secondary schools or get jobs in the cities may well change as technology and connectivity provide youth with the potential to learn, develop and create their own successes right from home.

The challenges associated with these trends affect mainly communities without connectivity or a culture that supports and encourages innovation. Lack of connectivity is becoming a deal breaker for young families looking for a community to call home, and especially for businesses and organizations who want to conduct businesses beyond their immediate surroundings. Even businesses who tend to only serve their immediate neighbours will require basics like email and the ability to upload and download documents and software. Communities who cannot secure sustainable Internet infrastructure into the future will likely see negative impacts.

Wi-Fibre – Wi-fibre is another Local WISP that was spoken of very highly. They offer rates from \$40/month-\$80/month for service speeds at 3mbps-12mbps. Although speeds are not high, discussion with this local champion/entrepreneur yielded the discovery that they will be improved upon over time.

Xplornet – Xplornet is a hybrid service of WISP and satellite access. They offer internet speeds of 5mbps across multiple plans, ranging from \$65/month - \$99/month. Speeds do not increase with higher tier plans, instead the data limit range is from 10GB-50GB. The satellite coverage is available to nearly every person, however that expensive technology is near time for an upgrade. Xplornet has announced that they are launching a new satellite capable of offering 25mbps service. This will be good for communities if service rates are not too expensive. Xplornet is a large company that Canada wide has been working to service small communities, and is known to purchase smaller WISPs (like Platinum, a company that previously operated in the SouthGrow region). Consistent reliability and speed issues were reported throughout the SouthGrow Region related to the available service from Xplornet.

Shockware – Shockware advertises rates around 10mbps but doesn't advertise pricing plans. They were unavailable for comment.



Community Segments - Fibre, Served, Underserved

Broadband

Broadband refers to any dedicated internet connection via satellite, antenna (wireless) or cable, and ranges in speed from dial up to high speed.

Broadband internet is - a dedicated access or connection to high speed internet.

Fibre

Fibre refers to the newest and most advanced form of broadband Internet with theoretically **no limit** to speed, capacity or expansion potential.

Fibre is considered future-proof because of its unlimited potential.

Classifying each type of Community

Fibre

- A fibre community is a community which has a currently operating fibre optic connection running through the community, and a large majority of the community has access to, or can access, the fibre network.

Served

- A served community is a community that has an Internet connection healthy enough to support the current or estimated usage of Internet. A served community can be subject to interpretation, based on the timeframe of reference (i.e. a community could be classified as currently served, but if accounting for expected growth they could be underserved).

Underserved

- An underserved community is a community that cannot handle the demand for Internet, based on the current usage or estimation of usage.

Note: These three classifications mirror language that the CRTC is using, but has yet to put definitions to. These definitions were developed for the purpose of this report to assist SouthGrow in identifying where member communities might fit on the spectrum of Internet access and capacity.

The Broadband Index

How we determine classification

The broadband classification is determined by assigning a broadband index value. A value of less than 1 means the internet option is not sufficient for the demand. A broadband index of 1 means the internet is exactly sufficient for the demand, with no room for growth. Lastly a value of greater than 1 means the internet connection is sufficient and demand for broadband has room to grow. The higher the number, the more room for growth within the existing option.



Broadband Index Value

- the internet connection is sufficient and demand for broadband has room to grow

Broadband Index Value

- Internet options are not sufficient for the demand

The broadband index is determined with the following algorithm:

$$\text{Broadband Index} = \frac{-\left(\left(\frac{\text{Mbps}_m}{\text{Mbps}_d * \left(\frac{\Phi^n - (-\Phi^{-n})}{\sqrt{5}}\right)}\right) * \left(\frac{\text{GB}_m}{\text{GB}_d * \left(\frac{\Phi^n - (-\Phi^{-n})}{\sqrt{5}}\right)}\right)\right)}{\sqrt{\left(\left(\frac{\text{Mbps}_m}{\text{Mbps}_d * \left(\frac{\Phi^n - (-\Phi^{-n})}{\sqrt{5}}\right)}\right) * \left(\frac{\text{GB}_m}{\text{GB}_d * \left(\frac{\Phi^n - (-\Phi^{-n})}{\sqrt{5}}\right)}\right)\right)^2 - 4 \left(\frac{\$m}{\$d}\right)}}$$

The algorithm compares the prime market option to the needs/wants (Internet Speed, Cost, and Limit) of a subject (which could be a community, individual, or business), then it predicts the increase of the needs over a set period and outputs an index score for the subject at that point in time.

Since the needs/want and prime market option is different for every subject, the more granular the test is done the more accurate the test is. Below are some examples of what the index would output for the various types of households and internet options.

Broadband Index Demo for various (users/subjects)

A casual/light Internet user is someone who doesn't spend much time on the Internet. Activities might include email checking, basic online research, and the occasional SD (standard definition) online video (short). They don't require a high Internet speed, nor do they require large amounts of data.

The average modern family owns a group of devices, typically multiple per person. Smart phones are always connected while home, along with some Wi-Fi enabled devices like TV's and printers. HD Movie streaming and gaming requires a solid connection of 25Mbps. A higher data limit is also required due to the amount of downloaded information. Heavy internet user(s) have multiple high demand devices connected, such as streaming UHD movies (Ultra High Definition) while others are also streaming content or playing games. Multiple constantly connected devices, smartphones, tablets, laptops, printer, and various IoT devices (thermostat, smoke detectors, speakers, etc.).

	Casual/Light internet user	Average Modern Family	Heavy Internet User(s)
Internet Needs/Wants	Internet speed required: 4mbps Minimum Download Limit: 10-30GB Internet Budget: \$75	Internet speed required: 25mbps Minimum Download Limit: 100GB Internet Budget: \$75	Internet speed required: 50mbps Minimum Download Limit: 300GB Internet Budget: \$85
Rural Satellite Internet <ul style="list-style-type: none"> • 5mbps download • 20GB limit • \$75/month 	Current: 1.25 2 Years: 0.91 3 Years: 0.35	Current: 0.04 2 Years: 0.03 3 Years: 0.01	Current: 0.00 2 Years: 0.00 3 Years: 0.00
Average WISP <ul style="list-style-type: none"> • 12mbps • No Limit • \$65/month 	Current: 3.46 2 Years: 2.52 3 Years: 0.96	Current: 0.55 2 Years: 0.40 3 Years: 0.15	Current: 0.31 2 Years: 0.23 3 Years: 0.09
Average Town/City Plan <ul style="list-style-type: none"> • 40mbps • 300GB Limit • \$76/month 	Current: 148.02 2 Years: 107.99 3 Years: 41.25	Current: 4.74 2 Years: 3.56 3 Years: 1.32	Current: 0.89 2 Years: 0.65 3 Years: 0.25
Fibre / top tier city internet <ul style="list-style-type: none"> • 150mbps • 1000GB Limit • \$85/month 	Current: 1654.41 2 Years: 1206.88 3 Years: 460.99	Current: 52.94 2 Years: 38.62 3 Years: 14.75	Current: 10.00 2 Years: 7.29 3 Years: 2.77

The Broadband Index & SouthGrow Municipalities

The Broadband Index Value is a number that measures **how well internet is being utilized**. Using the formula, the Broadband Index can measure anything - entire communities, an individual household, individual people, or a business.

In evaluating the Broadband Index values generated for SouthGrow communities, the following should be considered:

- A. *Limited information for each community was available.* The larger the subject, the more challenging it is to apply the Index because greater information is needed. The information used to generate values in SouthGrow consisted of published internet access from ISP's, and general descriptions of use by community contacts. More detailed information about how the community uses Internet will give a more accurate value.
- B. *The Broadband Index Value changes based on usage.* As usage increases, the value will **lower**.
 - For fibre communities, this is a good thing as it recognizes greater uptake of the connectivity and use of the resource. Eventually, as the Index value lowers into single digits, more capacity can be opened as needed, which will then raise the Index value again. This demonstrates how fibre is future-proof. Capacity is unlimited.

- For non-fibre communities, a lower value still demonstrates use of the resource, but at some point (value of 1.0 or lower), capacity will be maximized. After that point, more capacity needs to be added either through upgraded services, or a fibre build.

C. *Values generated should not be used as hard and fast numbers.* Values generated by the Broadband Index, as applied to SouthGrow communities, should be used as a starting point for discussion and further information gathering, or to measure general changes in usage of the resource.

Identifying the Ideal Broadband Index Value

Each community should consider what value they would like to achieve when using the Broadband Index. It has been suggested that the Index goal should be 1.20, as this value represents that the available access is being utilized almost entirely, while still allowing room for growth. However, new technology is being introduced at a rapid pace and conceivably, a non-fibre community could go from 1.20 to below 1.00 very quickly if suddenly, most residents made use of a new technology that requires Internet access.

While it might seem preferable to have a high value to demonstrate that there is a lot of room for growth, a high value also shows that available access is being underutilized. This could be compared to developing a new sub-division complete with all necessary infrastructure, then letting it sit unoccupied for years. The capacity for growth is there, but it is not being utilized. Communities who have newly acquired fibre will have high values to start. However, as they start to adapt to their new capacity and make use of it, they should find their values lowering.

Communities should strive for a good balance that makes the best use of the Internet access they have toward supporting the general goals of the community. This could mean any value they determine is best for them, but ideally it should be anywhere from 1.20 to 4.00.

Score	Below 1.00	Below 1.20	Equal to 1.20	Above 1.20	Above 10
Action	Bad News – Need exceeds available capacity.	Not Great – You will likely need to upgrade soon. Carefully gauge usage and don’t be afraid to invest.	Great – Balanced usage and availability. Start testing the waters for an upgrade.	Good – More than enough availability to grow usage. Continue to promote innovation.	Underutilized – A plethora of available capacity is not being used. Innovate and encourage Internet usage.
Classification	Underserved	Served	Served	Served	Served – Possibly Fibre

Where communities fit (which categories) & why

	Classification (present)	Note(s)	Classification (Year 2 projection)	Note(s)
Arrowwood	Served (1.69)	Arrowwood is currently served. Although the available speeds are not spectacular, the community seems to be happy with their provider.	Served (1.23)	Arrowwood will still be served in the immediate future. However, the speeds will need to be increased very soon.
Barnwell	Fibre (22.06)	Well serviced for broadband internet, they also have Axia in their community.	Fibre (16.09)	With fibre technology, the community is well served going into the future.
Cardston	Served (15.88)	The town of Cardston is well serviced. A strong business community seems to lend in internet investment.	Served (11.58)	Based on our observed information and current market options, Cardston is well served for the immediate future.
Cardston County	Underserved (0.98)	With very limited data on the area it isn't easy to determine internet usage.	Underserved (0.72)	Based on our information, this area will be underserved.
Carmangay	Served (1.58)	Carmangay seems to have options with the local wireless providers, complaints about some providers and their reliability are cause for concern.	Served (1.15)	With the excellent turnout at the broadband interview it is possible that Carmangay will accelerate usage faster than others.
Coaldale	Fibre (20.56)	The town of Coaldale will be future ready with their fibre network. Index is based on the advertised rates by Telus, however the fibre network should handle significantly more traffic	Fibre (15.02)	Due to the capabilities of Fibre, this index number will be significantly higher as Telus offers a larger internet package.
Coalhurst	Served (22.06)	Although Coalhurst does not have Fibre, Shaw is offering a solution with the same advertised speed. With a lower internet demand, the community is well served.	Served (16.09)	Coalhurst will likely see investment from private internet companies over the next few years, but will be serviced well until that time.

	Classification (present)	Note(s)	Classification (Year 2 projection)	Note(s)
Coutts	Served (1.03)	Although technically serviced, a member in the community mentioned that the service area doesn't reach everyone and alternatives are poor.	Underserved (0.76)	Coutts' current connection likely will not support the growth in usage that appears to be coming.
Lethbridge County	Served (1.18)	In interviews, it seems people were more likely to pay slightly more for faster internet. However, providers were often limited in reaching most of the population.	Underserved (0.86)	Utilization of mobility options has been a good alternative for Lethbridge County. As demand increases this may no longer be an effective option.
Lomond	Served (1.61)	The village of Lomond benefits from having access to local WISPs. Based on the interview we determined that the community is served for their needs.	Served (1.17)	As the village starts to use more and more broadband they will need to increase their available speeds to stay competitive.
Magrath	Fibre (22.06)	Well serviced with broadband internet, they also have Axia in their community.	Fibre (16.09)	With fibre technology, the community is well served going into the future.
Milk River	Served (1.03)	The town of Milk River is served, and has a few flexible options. Their index score is lower than expected due to the high cost of their top available internet packages.	Underserved (0.76)	As demand increases for broadband the cost for the top end packages will need to be more approachable for the mass market.
Milo	Served (1.69)	Milo is relying heavily on a local entrepreneur's WISP. Encouraging new business use with the VBDS should help.	Served (1.23)	If they are successful in attracting young businesses they will need to develop their internet speed further.

	Classification (present)	Note(s)	Classification (Year 2 projection)	Note(s)
Nobleford	Fibre (22.06)	The village of Nobleford is equipped with Axia's fibre network. Current market packages do not fully utilize the technology, but offer more than enough.	Fibre (16.09)	The village of Nobleford will be serviced regarding internet connectivity for quite some time thanks to fibre technology.
Picture Butte	Served (22.06)	Picture Bute like other communities has access to a fast broadband connection through Shaw. Even though the community does not have Fibre, they are currently served.	Served (16.09)	Based on the information gathered during the interview the community should be well served for the next while.
Raymond	Fibre (22.06)	Well serviced for broadband internet, they also have Axia in their community.	Fibre (16.09)	With fibre technology, the community is well served going into the future.
Stirling	Fibre (22.06)	The village of Stirling is equipped with Axia's fibre network. The available packages do not fully utilize the maximum capability of the product, but handle the current needs very well. Approximately 60% of the community is believed to be using Axia's service.	Fibre (16.09)	The village of Stirling will be serviced for a long while to come. As the current market options become too slow, Axia will further tap into the potential of their fibre network.
Taber	Fibre (20.56)	The town of Taber will be future ready with the available fibre network from Telus. It will handle a lot more traffic then what is currently sent its way.	Fibre (15.02)	Due to the capabilities of Fibre, this index number will be significantly higher as Telus offers a larger internet package in the future.
Taber, MD of	Served (1.40)	It appears the area is willing to spend slightly more, increasing the number of people with higher tiered internet packages.	Served (1.02)	Based on the information we have this community will be barely served in 2 years.

	Classification (present)	Note(s)	Classification (Year 2 projection)	Note(s)
Vauxhall	Served (1.07)	Based on the sample size we have of Vauxhall some appear to be big internet users, but are limited to outdated options from Telus and wireless technology that cannot currently hit speeds required.	Underserved (0.78)	Vauxhall does appear to have a decent ISP. However, based on the interview they appear to need a faster option soon.
Vulcan	Fibre (12.86)	Vulcan has an Axia fibre network, and this community identifies as a tech savvy place to live. From our observations, they use more than average data.	Fibre (9.38)	Vulcan is well positioned for the future. As demand goes up Axia can tap further into the capability of Fibre technology and fill demand.
Vulcan County	Served (1.35)	Some WISP services are available but not covering the entire region. More detailed data is needed to provide an accurate measuring.	Underserved (0.99)	Speed increases, range, and reliability increases will help the WISPs of Vulcan county.
Warner	Served (1.40)	Based on ISP advertised, availability and rates, Warner should be serviced well, however in our interview access did not seem to be that way. More in-depth primary research is needed	Served (1.02)	The available rates should be sufficient. However, if network reliability is still a considerable issue, the service level will decrease rapidly. More data is required.
Warner County	Served (1.84)	More detailed information is needed to give an accurate measurement. Although reach of some WISPs is not perfectly defined, most of the county appears served.	Served (1.34)	The country appears to be served and should remain this way for the near future, eventually network speed will need to increase.

Assessing the SouthGrow Region

Just how fast does internet need to be?

The following table provides some perspective on the requirements for internet access in these everyday tasks. The potentially world changing elements of the internet come into play with real-time communication across large distances, and a consistent 10mbps internet speed (upload and download) is considered sufficient for today's video conferencing/telecommunicating. However, as picture quality and standards increase so do file size requirements.

	Downloading an e-book	15 iPhone photos	Downloading a (1hr) HD-Movie
1mbps	30-seconds	6-minutes	260-minutes
5mbps	5-seconds	1.2-minutes	52-minutes
10mbps	3-seconds	39-seconds	26-minutes
25mbps	1.2- seconds	14.4-seconds	10.5-minutes
50mbps	<1 second	7.2 seconds	5-minutes

***This indicates the download time for the relative file sizes, actual time can vary depending on the reliability of a connection, technology of the device, and equipment grades in the home.*

In most cases the 10-mbps is sufficient to see much of the benefits from broadband internet. While 25mbps is more than enough for modern families to fully utilize the internet, it also seems to be enough of a package that many residents will not pay any additional costs to get speeds greater than 25mbps.

Internet usage escalates quickly with multiple devices. As each household is paying for Internet access, the connected devices are sharing the purchased bandwidth. If 5 separate Internet users in a house are all streaming HD-video content, each user would experience 5-mbps (5 users * 5mbps = 25mbps total).

Collecting more accurate and more useful information

Stages of Broadband access and development within the SouthGrow Region vary by community. SouthGrow community leaders generally express a desire for faster and more reliable Internet to help the community grow and prosper. However, not all communities have done complete assessments to determine their position on the matter. Whether aiming for a publicly managed utility or privately created network, each community needs to completely understand the position of their residents to project future needs of the community, create a business case for investment, and classify themselves as underserved.

A mass collaborative effort to collect this information could be undertaken. Leveraging services such as [Ookla's speed test \(http://www.speedtest.net/\)](http://www.speedtest.net/) on a town, region, province, or nation wide digital poll would collect mass amounts of data on access, speeds, Internet service provider and potential demand for better Internet connectivity. Initiatives on a federal level have been initiated, but could be slow, and communities might not have access to all the relevant data.

Additionally, market research via surveys or face-to-face engagements directly with consumers could be undertaken.

Choosing the most appropriate broadband solution

In most cases a privately-owned fibre network is the best option from a performance perspective. As costs for developing a network can be incredibly expensive, making a business case fits more into the role of community economic development than operation of an Internet network. Publicly owned networks can be a good solution for net neutrality and making it very accessible cost wise, but maintaining reliability, security and service can be more than most municipal offices are prepared for. However, if the business case is risky, it could be difficult to get this Internet model to move in. From here, communities need to decide which solution fits their needs best.

Public vs Private

Various portions of a network can be publicly owned and operated, however most ISPs have high standards of equipment and network deployment and will not use systems they did not install themselves. Whether public or private, the standards of network implementation (especially with Fibre) should not be an area for cost saving shortcuts. Instead of shortcuts, considering policies that allow for services to split the cost of trenching at any given time, such as a one dig policy, is a good idea.

	Private (Large)	Private (Small)	Public
Pros	<ul style="list-style-type: none"> • Low community capital investment • No maintenance costs 	<ul style="list-style-type: none"> • Lower community investment cost • Not responsible for maintenance • Local Business/Money stays local 	<ul style="list-style-type: none"> • Potential revenue source • Control of quality and speeds
Cons	<ul style="list-style-type: none"> • Little Control of the network • Little control of future development • Rarely services 100% of population • No control of pricing • No control of internet throttling/capping 	<ul style="list-style-type: none"> • Less Start-up capital – may need assistance from community. • Less control of Pricing and market options • Little control of future development 	<ul style="list-style-type: none"> • Expensive to install • Higher risk of failure • Managing network issues and IT related issues (not always related to the ISP) • New technologies could render the network useless • Responsible to Quality and Speeds

Network Options

Fibre is the best network option; however high costs make implementing a fibre network unrealistic for many cases without a dense population or private investment. The main cost of a fibre network is in the placement of the conduit. Trenching or mounting the conduit on power poles has been reported to account for most of the costs. New technology in this area is very focused on making it easier to lay the fibre conduit, but hasn't yielded a significant enough difference to make the technology widely available.

Wireless has been significantly more approachable, but the technology has limitations. Line of sight to broadcast points need to be maintained, making it unreliable in some geographical locations. Wireless technology has made significant improvements in recent years though, and current technology will be viable for the near future. These networks require upgrading in the future as demand increases and existing antennas cap out.

	Wireless	Fibre
Pros	<ul style="list-style-type: none"> Affordable over longer distances (without obstructions, 3-25miles range) 	<ul style="list-style-type: none"> Incredible Internet Speeds Considerably more “future proof”
Cons	<ul style="list-style-type: none"> Unreliable in extreme weather Will be replaced in 2-5 years Geographical obstructions can make impossible 	<ul style="list-style-type: none"> Expensive Under-utilized

Other options are available, though are less recommended for community endorsement or long-term Internet solutions on a community scale.

	Satellite	Mobility	Cable
Pros	<ul style="list-style-type: none"> Reaches almost everyone 	<ul style="list-style-type: none"> Reaches almost everyone Less initial cost for a consumer (low/no install cost) 	<ul style="list-style-type: none"> Occasionally, already installed/available
Cons	<ul style="list-style-type: none"> Expensive Is rarely upgraded Speeds are low in comparison to other high-speed broadband options. 	<ul style="list-style-type: none"> Difficult to manage multiple devices (Weak for IoT) Low data caps Speeds are low in comparison to other high-speed broadband options. 	<ul style="list-style-type: none"> Been replaced with fibre technology.

Elements of Success

Throughout the SouthGrow region, there are elements common to communities experiencing success in the attraction of fibre investment and/or upgrades by ISP's. These elements also appear to affect other areas important to creating sustainable, vibrant communities, such as successful economic development and a high quality of life for residents. The elements common to communities succeeding in these areas are described below.

Planning

Municipalities who have engaged in planning processes tended to have a clear understanding of their priorities, and criteria against which decisions are made. These municipalities have assessed several factors specific to their community including:



While attaining high-speed broadband connectivity was not always identified as a priority by these communities, the very fact that they had gone through a planning process that allowed Council and administration to understand community needs and plan for the future, put these municipalities in a better position to recognize and act on opportunities.

Positioning

Each community has elements that make it unique. These span the range from physical community features and amenities, to intrinsic community culture and values. Municipalities who have spent time identifying what makes their community unique were better able to promote themselves for investment of upgraded Internet services and/or fibre installation.

Positioning relates to planning. Each requires the community to take an honest look at itself and identify core strengths and areas of opportunity. Honesty is a key element if the process though. Positioning only works for a community if it is based in fact, and if helps the community to distinguish itself from the other communities in the region.