# Connectivity Planning Toolkit

CONNECTED SASKATCHEWAN

COMMUNITIES FOR THE FUTURE

*Volume I: Digital Readiness*

seda®

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## Saskatchewan Economic Development Alliance (SEDA)

SEDA is the provincial backbone organization for those engaged in community and economic development in Saskatchewan. From local to regional development, we work hand-in-hand with communities to strengthen people, places, and economies. We help communities thrive.

## Acknowledgements

SEDA extends its gratitude for the expertise and contributions on this subject matter made by other jurisdictions, particularly the Province of British Columbia Connected Communities program, for freely sharing their resources.

**Disclaimer:** This document has been developed to ensure that key steps in connectivity planning are considered, and to provide communities with a starting point for assessment, prioritization, and action planning. The material enclosed within is not intended to be inclusive of every action a community may need to take when considering a broadband infrastructure project.

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# Connectivity Saskatchewan

The Saskatchewan Economic Development Alliance (SEDA) is leading the Connected Saskatchewan program to support the digital future of local governments, First Nations, and regional organizations.

Increasingly viewed as the "fourth utility," alongside water, heat and electricity, broadband is the most important differentiating infrastructure for communities and regions today. It is critical to the economic competitiveness of local businesses, and the well-being of residents. Like other basic infrastructure, its value is not derived from the digital infrastructure of broadband itself but its broader contribution and impact.

This handbook and associated resources are the first in a series of tools to help communities make informed broadband-related decisions. We must take a collaborative, inclusive approach to ensure that broadband is not just affordable and available for all citizens, but to optimize digital infrastructure to strengthen community resilience.

Connected Saskatchewan is being delivered in three phases, the first being **Digital Readiness**. Volume I of the toolkit includes:

***Digital Readiness Handbook, providing first steps to connectivity planning***

***Quick Reference Guide on 'How it Works: Technology and Terms'***

***Key Success Factors and Community Self-Assessment Tool***

These materials are available at www.connectedsask.ca. Additional volumes will be released during Phase 2 **Digital Adoption** and Phase 3 **Digital Transformation.**

Due to ongoing innovation and increasing usage, the demand for greater broadband capacity is consistently rising. Economic and social parity in Saskatchewan not only depends on how well we close the current digital divide, but on how well we anticipate and plan for the future.

Municipal and First Nation governments must not assume that the problem will be solved entirely for them by the provincial and federal governments, or the private sector. That means that although connectivity is not a core municipal/nation service, governments at a local level ought to consider the role they want to play in determining their digital future.

Whatever your current level of broadband access, this toolkit can prove useful for fostering a conversation about next steps to improve existing connectivity. Now is the time to start a discussion with residents and partners about how to address future needs in ways that best meet locally determined development goals—and ultimately become a Connected Community.

# Defining Connectivity

Broadband is often used as a synonym for the internet; however, the two are not the same. A more accurate, inclusive description of broadband is connectivity. Connectivity includes the transmission of a variety of data beyond web-based sources.

Broadband is now an essential utility integrated into almost every aspect of family, business, and community. From doing homework online at home, having a livestream business meeting, or remotely managing farm sensors from across the field or the country, reliable broadband access is a 21st century imperative for municipalities and First Nations.

Digital municipal/First Nation services are an example of broadband usage that does not link to the internet. A community broadband infrastructure can be used to connect traffic cameras or facilitate communication between community facilities without routing data through the internet. This provides the capacity for local leaders to manage how data is captured, stored, measured, and reported.

Broadband connectivity is often defined by various speeds measured in Megabits per second (Mbps) (e.g., 10 Mbps, 25 Mbps), but it is better understood as an always-on, high capacity data transmission connection that facilitates a range of uses and services—of which the internet is just one element.

Furthermore, broadband involves both upload and download speeds. In this regard broadband can either be symmetrical (the maximum speed for upload and download is equal) or asymmetrical (the maximum speed is different for upload and download, usually with higher download speeds).

For example, one could have a symmetrical 100 Mbps connection that provides the same upload and download speed or an asymmetrical connection offering 100 Mbps download speed with only 20 Mbps upload speed. Symmetrical speeds are important because they ensure users can send and receive information at equal speeds, which is important to livestream meetings or upload files. Asymmetrical connections that prioritize download speed can make it more difficult for users to share information, due to the limited capacity to upload large files in a timely manner.

Broadband is often mistaken as a choice between wireless or wired technology; however, this is not the case. Wireless connections also rely on wired infrastructure—a Wi-Fi signal in the home and a tower providing wireless access to a whole community both require a connection to a wired point-of-presence (POP). The phrase 'fibre to the antenna' is used to capture this point.

# Why Connectivity Matters

The availability of broadband has now become a minimum condition for socio-economic competitiveness, and this is particularly true for rural and remote communities.

In the past, 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 user experience as long as download speeds could be maintained.

Today,real-time video communication (livestreaming) and the high saturation of mobile devices has allowed a far greater number of consumers and businesses to upload individual video content created on their smart phones or computers. Both user segments are becomingly increasingly speed hungry. Video has grown dramatically-accounting for 81 percent of online traffic according to Cisco.com - and computing and storage is moving to the cloud.

This expectation for high bandwidth services will increase exponentially each year. The business benefits of cloud storage and computing have now been proven and many businesses have already moved to the cloud. This migration is being accelerated by software vendors who have eliminated choice from the equation, only offering new customers cloud-based software as a service (SaaS) model.

We know that artificial intelligence (AI) is fast becoming one of the most important areas of digital expansion in history and it needs to be considered in future forward connectivity planning. AI promises to transform almost every industry, including healthcare (diagnosis, treatments), automotive (autonomous driving), manufacturing (robot assembly), and retail (purchasing assistance).

In a report released in 2019, Statistics Canada calculates that as of 2017, Canada's digital economy grew 40 per cent since 2010 to 5.5 per cent of the entire economy (2.1 per cent in Saskatchewan). While it's not an industry on its own per se, Statistics Canada defines the digital economy as any economic activity that is either affected by or enabling digitization. This includes everything from e-commerce to telecommunications, and software to consumer and business services that are provided over the internet.

## How can we quantify the contribution of an investment in connectivity infrastructure?

Like any infrastructure investment, the associated impacts of broadband will be somewhat unique to each community and region. The impact is derived not from the infrastructure itself but from an extremely broad and diverse economic and social ecosystem that grows and evolves around it.

Here is a snapshot of potential return on investment to Saskatchewan communities:

## Economic Growth

Communities with high-speed broadband infrastructure may find it easier to attract investment and information technology-intensive jobs, particularly amid increasing global competition. This is especially appealing to attract information and communications technology (ICT) and digital media industries since they are prone to utilizing small businesses, independent contractors, and remote workforces. Broadband also improves productivity by promoting the adoption of more efficient business practices (e.g., marketing and inventory optimization).

According to a paper produced by the OECD, the economic influence of the Internet can be seen in various areas of the economy, from consumer welfare to firm-level productivity to the environment and education. This influence affects individuals, governments and firms.

## Industry

The impact of connectivity is pervasive in its automation of business operations and transactions, reducing procurement, warehousing, labour, and administrative costs. Management and operational efficiencies are also gained by improving internal and external communication among stakeholders.

Of course, new and increased revenue streams are made possible by providing opportunities to expand into new global markets. Leveraging online utility to increase customer satisfaction and loyalty by improving customer service and identifying customer insights will support business competitiveness.

The app economy is forecasted to grow to $6.3 trillion USD in 2021, up from $1.3 trillion USD in 2016. The app economy has enabled the gig economy, whereby freelancers (who can work from anywhere with decent bandwidth) fill jobs that are normally performed by full-time employees.

## Agriculture

At a minimum, enhanced broadband will improve communication and business opportunities in agricultural communities. It assists in elimination of the distance between producers and commodity markets, allowing producers to obtain real-time information on prices.

Remote monitoring using connected devices and applications is becoming the norm. When an issue arises, text messages, emails, or other electronic alerts can be generated, removing the need for regular on-site inspections.

A forecasted growth in precision agriculture technology (creating associated business opportunities for Saskatchewan entrepreneurs) will enable agriculturalists to collect data on weather variability, crop yields, soil moisture levels, plant health, insect damage, and weed competition per acre of land. Timely collection and transmission of a wealth of real-time data will assist farmers and agriculturalists to make better management decisions.

*High-speed reliable broadband is a significant enabler for rural businesses in the manufacturing and professional services sector, especially where there is a need to regularly move large volumes of data such as engineering data and high-resolution color images. From this perspective, the correlation between a community's local assets and economic capabilities may decrease with time. If so, then perhaps what is more important than economic development premised on local SWOT analysis is the ability of the community to recognize, utilize and leverage the type of capabilities and opportunities that digital technologies and networks are making possible.*

*—Northern Alberta Broadband Preparedness Project 2017*

## Tourism

Information is key to supporting tourism and even more so since 2020. Within a fiercely competitive tourism environment, accurate and timely information relevant to consumers' needs is often crucial to satisfying tourist demand. Broadband options help attract and retain tourists in rural areas; however, they now expect high-speed internet even while camping.

## Innovation

Broadband enables technology-based innovation in almost every sector. The internet has already facilitated numerous innovations, from e-banking to social media, online travel booking to e-government, free telephony to instant messaging—to name only a few. This has largely been possible because it is an open platform on top of which anyone can build a new service or application.

Broadband supports networking platforms and programs to encourage contacts and partnerships between companies from different backgrounds, promoting synergies between small, innovative businesses and large companies willing to develop new markets.

*"A digitized Canadian economy is going to phenomenally accelerate innovation. We will have more access to data, insights, and the power of cloud technologies, which will help our Canadian businesses innovate and scale rapidly. We will see more new products, services, and ideas."*

*—Xerxes Cooper, General Manager, Global Technology Services - IBM*

A study of more than 1,000 entrepreneurs pointed to the key role of digital technologies in supporting large-scale open innovation among geographically dispersed collaborators and in providing the tools to globally disseminate information to help business decision-making (Accenture & G20 YEA, 2014). The study's survey found 9 in 10 entrepreneurs collaborated with customers to co-create, while half to two-thirds collaborated with organizations such as public institutions, universities, or incubators. Digital technologies were considered to underpin innovation and globalization efforts, and the corresponding ability of entrepreneurs to expand their businesses and create jobs.

## Health Care

A more efficient and potentially cost-effective way to deliver health care is already being realized, with improved speed and access to health information, including the transmission of high-quality images and videos such as X-ray images and CAT scans. Effective broadband access will support remote consultations and allow rural residents to consult with medical professionals from distant medical centers, avoiding the expense and inconvenience of hospital visits.

## Education

Future innovation in the education sector is on the horizon, be it access to new technologies such as virtual reality within a physical school, or enhanced technical skills for teachers and students. Increased flexibility and access to learning evens the playing field for skills development and facilitates collaboration and interactivity among students.

## Government

At a minimum, connectivity can be leveraged to improve interaction between residents, businesses, and local government. Broadband can enhance government performance at various levels and locations, improving coordination across local, provincial, and federal levels. SMART technology can reduce utility consumption, increasing the efficiency of municipal operations and management, improving decision-making. Remote monitoring of municipal facilities and public spaces provides a safe environment for residents.

To fulfill its vision of an affordable and safe community that people want to move to, the City of Melfort has embraced Smart City technology. An integrated platform for environmental and resource monitoring as well as the installation of LED lights has resulted in significant short-term impacts.

Electricity consumption within municipal facilities has decreased 30 percent with an associated reduction in greenhouse gas emissions of twelve tonnes of CO2. Identified water loss from the indoor aquatic center resulted in savings of over four million gallons of water.

"From the beginning, we have focused on making the lives of residents better by taking a people-first approach. This is not just about implementing new technology; it's about engaging our citizens to create a better quality of life and more prosperous future for Melfort."

—Ryan Danberg, Melfort City Manager

## Public Safety

The dual benefit of digital infrastructure will provide the public with new ways of seeking help and accessing emergency information and at the same time, enabling public safety personnel to prevent or respond swiftly to emergencies. First responders anywhere in the province will be able to send and receive critical data (audio, image, and video) to save lives and prevent acts of crime. Well-structured and protected broadband options could reduce threats to e-commerce and online applications.

## Transportation

Modernizes transportation systems, allows more efficient route planning, and reduces greenhouse gas emissions. Through access to online scheduling and real-time transit information, broadband can make public transit more attractive.

Improves transport management via more detailed and more frequent traffic information. This is useful for trip planning and congestion avoidance (e.g., shifting from still images to videos and from hourly reports to second-by-second updates).

## Remote Working

We have now made the transition to what will likely be, at a minimum, a hybrid working environment of the future. Employers have opportunities to reduce overhead, and increase productivity and associated quality of life benefits for their employees.

Rural communities with enough bandwidth are now competing with their urban counterparts. Reduced traffic congestion also helps to eradicate the environmental impacts associated with commuting and can reduce annual CO2 emissions and air pollution.

## Entertainment

The events of 2020 highlighted the benefits of connectivity, with an increased demand for media and entertainment options such as digital movies and multi-player interactive video games. Bandwidth to download music or movies, along with quality of online audio and video is now expected.

# What is a Connected Community?

*Connected Communities are communities of the future.*

They have a vision for the long-term well-being of the community, a vision that will be realized with the integration of digital innovation.

## A Connected Community:

- Takes a **holistic and integrated approach** to long-term community planning.
- Understands how to **optimize digital infrastructure** to strengthen community resiliency.
- Is capable of **reacting and responding more quickly** to mitigate threats and seize new opportunities presented by the emerging digital economy.
- Is **well positioned** to attract and retain local and global talent, diversify the economy, improve the quality of life of residents, and better address local sustainability challenges.
- **Builds social capital**. By connecting citizens to each other—as well as to businesses, governments, and social services—broadband helps people become more informed and more active in their communities, leading to a better quality of life, and richer personal and business opportunities.

# How it Works: The Technology

This section will provide some clarity to the many technical terms used when discussing broadband and relate the relevance of these terms to decisions for planning in the community. A comprehensive Glossary of Terms section begins on page 20.

## Broadband

The term broadband commonly refers to internet access via a variety of high-speed wired and wireless networks, all of which are vastly faster than the earlier analog dial-up.

However, as highlighted earlier in this handbook, broadband does not always include access to the internet.

It is important to understand that over the past thirty years, broadband has become a fundamental and essential infrastructure. High-speed broadband internet for all communities, all businesses, all farms, and all residents is essential to the socioeconomic growth and well-being of our communities and of our province.

## Networks

The foundation of broadband is the network—the connection of computers and smart devices through the various wire, wireless or satellite medium. To understand two terms often used when referring to networks—backbone and last-mile—a water analogy may be helpful.

The big pipes, the main lines, or the backbone of the network are referred to as the **backbone**. The backbone has a high capacity and is almost exclusively fibre optic cable (more on this later). Backbone is the component of the network that connects the community to other communities and the world.

The component of the network that connects the individual households, the businesses, and the farms to each other and the backbone is referred to as the **last mile**. There are several last-mile connection mediums—wire, wireless, and satellite—each with pros and cons.

However, one of the biggest differentiators is the capacity or speed of each medium and it is important to understand these terms and the impact.

## How fast is fast?

A commonly asked question when it comes to the internet, is: How fast is fast? According to some experts, the answer is: It depends on what you need—now and in the future. Will my broadband internet serve my needs, my community's needs—tomorrow, five years from now, and beyond? If you have been living with minimal internet for some time, then any improvement is likely good. However, the reality is that it has likely constrained your business and way of life, and this pent-up demand will far outstrip any incremental improvements.

Canada has a high adoption rate for broadband internet in the world, but only at the current definition of broadband. According to the US Federal Communications Commission, "an internet service must deliver at least 25 Mbps download speed and at least 3 Mbps upload speed to qualify as broadband." A low bar to be sure. In addition, the Canadian Radio-television and Telecommunications Commission (CRTC) has been criticized by countries in the Organization of Petroleum Exporting Countries for establishing a low minimum standard—50 Mbps as a target for 90 percent of Canadians to achieve by 2021 and all to achieve by 2030.

### Defining Speed

Internet speed is measured in Megabits per second (Mbps) and is the rate that data is transferred to your computer or smart phone. 1000 Mbps is 1 Gigabit per second (Gbps).

Bandwidth is how much data can be downloaded to your computer or phone.

To complicate these standards and objectives, the internet speed you think you might get may not be consistent or the **usable speed** that you do get. This may be further compounded by the actual network design of your service provider and possibly oversubscription of the network by a large number of customers. And the more people in your household or business using the internet at the same time, the lower the speed (going back to the water analogy, think flushing the toilet and showering).

Some internet providers cap or limit the amount of data you can receive over the internet. **Data caps** control the amount and rate of flow of data across an increasingly overloaded network. Data caps are not only restrictive but excessively expensive.

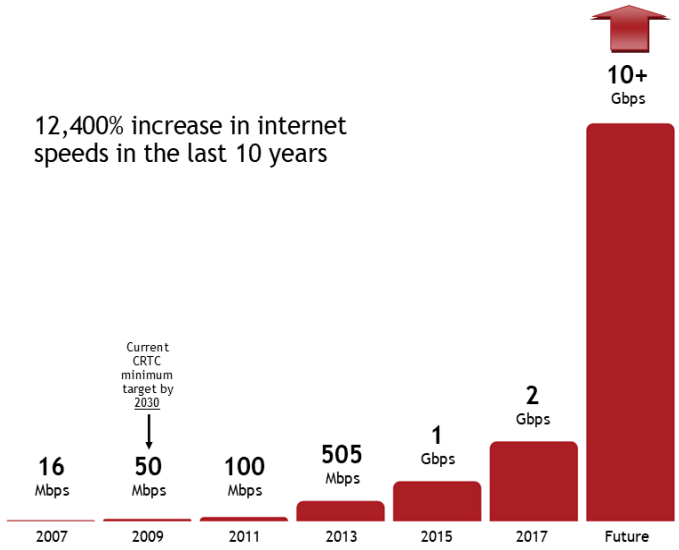



*Figure 1: Planning for the Future* *National Cable and Telecommunications Association*

## But what is the current need for speed?

The demand for faster, higher bandwidth internet speeds is growing exponentially. According to the National Cable and Telecommunications Association (NCTA) graphic (Figure 1), Canada's standard of 50 Mbps was considered a top speed in the USA in 2009, over 10 years ago. Fibre-rich networks now provide 80 percent of America with 1 Gbps and these same networks are delivering 10 Gbps to many customers. Put another way, there has been a 12,400 percent increase in top available internet speeds in the last 10 years! And to give you an idea of how fast technologies change, remember that the iPhone was introduced in the USA in 2007 and Saskatchewan in 2010 —basically, just 10 years ago.

A typical family working from home, with a SMART TV and multiple screens are now at 300 Mbps, when it is available. That is six times the minimum 50 Mbps standard. Many farms, businesses and institutions need 20 times the standard 1 Gbps. Some larger operations with many users are moving to 10 Gbps—highlighting the digital divide between those that have access to these higher internet speeds and those that do not. It is especially discouraging and isolating for those that are not yet even at the 50 Mbps base minimum standard speed.

## Our future needs: Abundance or scarcity?

If we are successful in expanding our new world economy, the demand for faster internet will continue to grow. Soon, a 10 Gbps platform will become the new standard. Imagine an abundant 10 Gbps broadband technology that freely facilitates innovation, enables the wireless 5 Gbps future. Kids could be doing their homework via virtual reality, entrepreneurs could develop new different software products from anywhere in the province and most importantly unleash innovation to developing and creating new markets, new services, new products that until now we have either not considered or deemed impossible. Autonomous farming is now becoming a reality. And an array of rapidly emerging technologies—the internet of things and sensory technologies, to name but two.

We have been so conditioned to just get by or make do with what we have—scarcity thinking. But we need to think in abundance. If we shift our thinking to what is possible with an abundance of bandwidth rather than try to rationalize the current scarcity of bandwidth, we become open to new and exciting new possibilities. We build and grow, not constrain and make do.

# So how fast is fast?

It is all relative. It depends on whether we are looking in the past with constrained thinking where we make do with the bandwidth and internet access we have. Or are we looking to the future, where we innovate, we build, and we grow? We need to shift our thinking on bandwidth from scarcity to abundance.

## The Medium—Wired

There are three primary types of wire medium currently in use—DSL or copper, coaxial cable, and fibre optic cable.

### DSL or Copper

- DSL stands for Digital Subscriber Line.
- Speed: up to 100 Mbps per user with the latest technology; however, performance deteriorates depending on the distance between the end-user and the DSL Access.
- Developed by telecoms to leverage long-standing voice (telephone) copper investment.
- DSL, while in use across Saskatchewan, is considered obsolete and is being replaced by fibre to the premise(FTTP).

### Coaxial Cable

- Speed: up to160 Mbps in the aggregate, can decline with concurrent users.
- Developed by cable companies to leverage long-standing video (television) cable investment.
- Primarily used in major centers or for local distribution of satellite in rural/ remote communities.
- Like DSL, the cable is being replaced by fibre to the premise.

### Fibre Optic Cable (Fibre)

- Speeds: Limited only by the optical equipment at each end of the fibre. Residential, small businesses are using speeds of 100 Mbps to 1 Gbps (1000 Mbps) and larger commercial, institutions to 40 Gbps (40,000 Mbps). CANARIE, the national research network connecting Saskatchewan post-secondary and research institutions with others across Canada and around the world, operates its backbone connections at 100 Gbps and is in the process of upgrading. In theory, fibre can transmit at speeds up to 27 Tbps or 27,000,000 Mbps.
- Fibre has enough carrying capacity to meet foreseeable future demands, and the transfer technology used in fibre networks is constantly improving and becoming more efficient, allowing for ongoing improvements.
- Fibre is more expensive initially, but much less expensive over the life of the fibre than any other option.
- Once capital costs (including conduit deployment) are paid, fibre is relatively cheap to maintain and upgrade.
- Fibre lasts quite a long time—several estimates suggest an operational lifespan of 40-50 years, with some estimates as high as 100 years. This depends on the quality of the fibre cable and the conditions it is installed in.
- Fibre supports other forms of wireless network—fixed and mobile wireless.
- Distance is not a barrier in fibre networks—the data transfers just as quickly over long distances.
- Fibre is a symmetric connection, which means that upload and download speeds are the same.
- Future-proof: As speeds of fibre connections are limited by the electronics attached to the end of the fibre optic cables, there is no need to upgrade the network infrastructure itself.

## The Medium—Wireless

There are three types of wireless medium currently in use: fixed wireless, mobile wireless, and satellite.

### Fixed Wireless

- Speed: up to 100 Mbps in the aggregate; however, this has to account for a download/upload split (e.g., 80 Mbps download, 20 Mbps upload), and this aggregate is further divided by several concurrent users (e.g., five concurrent users mean 16 Mbps download and 4 Mbps upload each).
- Typically slower than wired connections; however, in some cases, wireless can outperform DSL.
- Fixed Wireless Broadband is a system that transmits information via radio waves from towers to fixed points.
- For most spectrum bands, the receiver must be within the line of sight of the tower to connect.
- Towers connect to backbone infrastructure either through wireless microwave backhaul, which is more commonly used, or by wired connections (e.g., fibre), which are less common.
- Ideal for remote and sparsely populated areas.

### Mobile Wireless

- Connections are provided by licensed wireless spectrum from towers to mobile devices (e.g., smartphones or mobile broadband hubs).
- Range of standards for mobile wireless communication (e.g., High-Speed Packet Access—HSPA and Long-Term Evolution—LTE).
- Speed: 4G LTE advanced technologies can achieve speeds up to 100 Mbps.
- Requires licensed spectrum and a supporting ecosystem of devices (handsets/mobile distribution hubs).
- Mobile wireless also requires a fibre backbone network to connect the towers.
- The next generation of mobile wireless is 5G. It has extremely high capacity but exceedingly small coverage. It is unlikely that 5G will be relevant outside of major cities or potentially trade routes (TransCanada, Yellowhead).
- Data caps are typical with the corresponding service plans from providers.

### Satellite (ground-based dish)

- Available anywhere: A solution for remote locations or when other alternatives are not immediately feasible.
- Speeds: typically, 10 Mbps but up to 25 Mbps.
- High latency: the time it takes for the signal to go from your computer to the source computer and back. This service is not ideal for voice applications such as video conferencing because of high latency.
- Useful in disaster scenarios but can be vulnerable in bad weather.
- Expensive with prohibitive data caps and often involve long-term contracts.

### Satellite (Low earth orbit—LEO)

- High-tech, low-flying satellites, and lots of them could be the answer to current limitations with traditional satellite internet service.
- Currently under development by several companies: Starlink (Elon Musk), Telesat, and others.
- Speeds: to be determined but expected to be faster than traditional satellite; in the range of 100-150 Mbps but much lower than fibre.
- Somewhat portable: you can take it with you, but clearly not as portable as mobile.
- Unmatched availability providing there is visibility to the sky.

## A comparison of capability

As illustrated by Figure 2 fibre optic cable provides the ability to handle significantly more bandwidth, more data at higher speeds than any of the other technologies. DSL and cable are being replaced by fibre and wireless, and satellite technologies have niche applications.

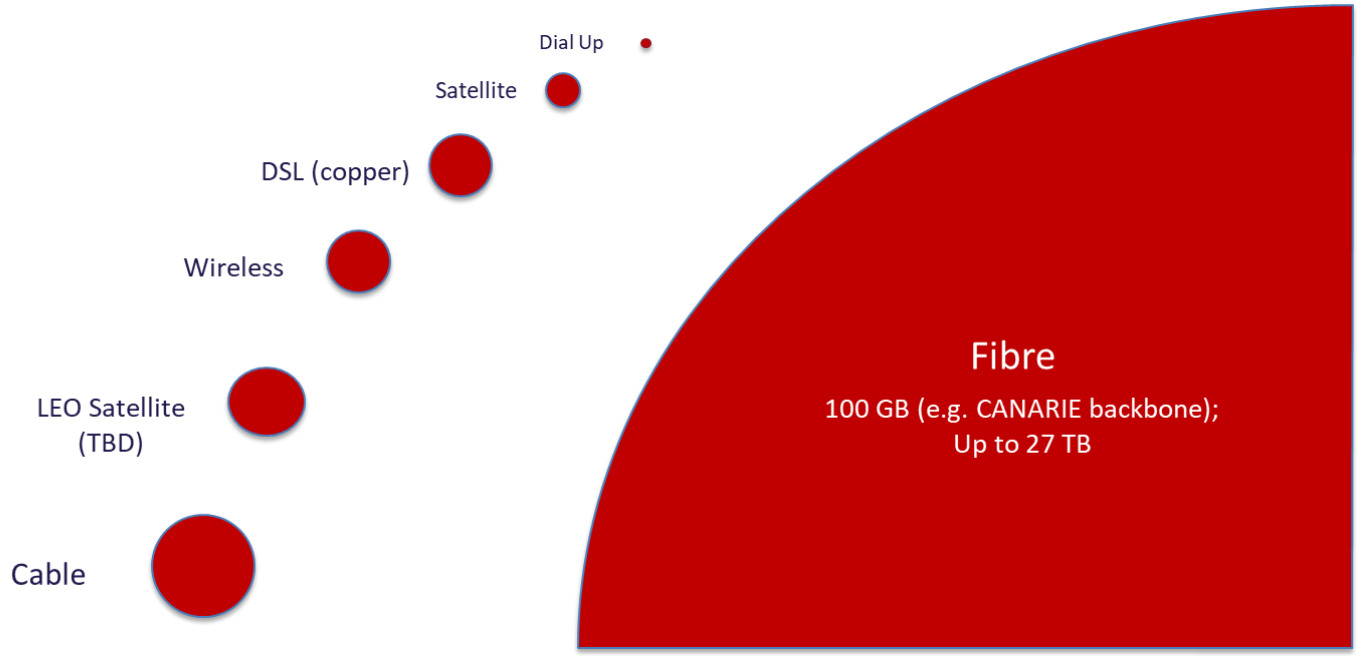



*Figure 2 Comparison of speeds*

# Connectivity Planning

Today, every aspect of community planning involves connectivity--directly or indirectly. A formal connectivity planning approach has the potential to:

- increase awareness of community development opportunities (economic, social and environmental) that can be made possible through new or improved broadband access;
- attract future grant funding for broadband infrastructure into the region;
- implement SMART community applications that improve quality of life;
- attract investment from major carriers and last-mile infrastructure providers such as smaller internet service providers;
- attract new business to the area;
- sustain rural and remote community populations; and
- increase regional collaboration and cooperation on critical services.

Communities are at different stages of broadband development. Your community may very well have one or more internet service providers and you may already be engaged with assessing how broadband connectivity can be improved.

For local leaders, developing a plan for improved connectivity is a process that involves working with various partners to assess needs, assets, opportunities, and infrastructure. It is not necessarily a linear process, but rather a set of steps that communities can undertake, often simultaneously.

# Key Success Factors

Connectivity and community development are inextricable. Infrastructure decisions will be informed by an understanding of how digital will change community needs and opportunities going forward. The Province of British Columbia, in partnership with BC communities, identified five key elements that create the conditions for long-term community benefits to be realized through connectivity.

You can use a programmable Excel document based on these five success factors as a useful engagement tool to start the process of community-driven connectivity planning. We have adapted the document for Connected Saskatchewan with the permission of the Province of British Columbia and it is accessible at www.connectedsask.ca

## Leadership and Vision

Connected communities have a vision for how digital can enhance community development strategies. Implementing these requires leadership, governance, collaboration, and the effective use of resources. Moving forward on a broadband solution requires long-term thinking.

## Connectivity

Access, Affordability and Speed are the three characteristics that must be present for communities to receive the full benefits of connectivity, driving resiliency, and sustainable growth. People, businesses, and organizations need the ability to connect and collaborate virtually.

## Digital Capability

Broadband access, adoption, and utilization are not the same concepts. People must also connect and use broadband enabled solutions to nurture innovation that drives business opportunities and improves livability.

## Sustainability

Sustainable communities are rooted in a diversified economy that respects, supports, and leverages the environment and community values. The need to adapt, grow, and innovate requires workforce attraction, support structures, programs for entrepreneurs, and environmental stewardship.

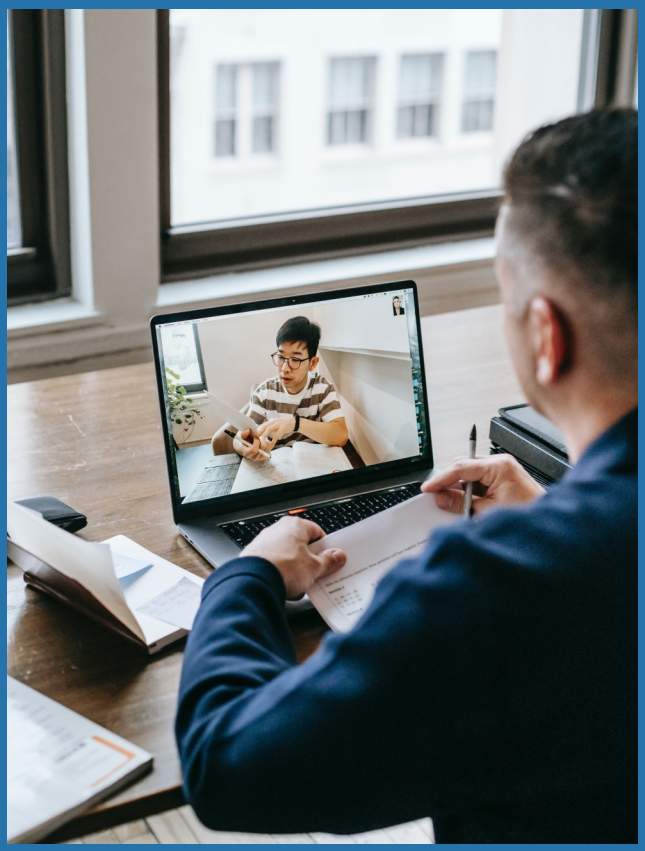
## Community Well-Being

Healthy communities support quality of life. Citizen and business engagement is central to shaping community identity and building community well-being.

"The newly formed South Saskatchewan Regional Economic Partnership (SSREP) recognizes that technology is advancing dramatically each year. Our businesses and residents are increasingly needing to stream video and large amounts of data for meetings, business operations, learning, and cloud-based services.

To ensure we maintain our quality of life and further economic growth, we must be future-focused on the level of broadband we require in the region. Settling for today's minimum broadband standard will not meet the needs of our communities in five years. We know that becoming a 1 Gbps (or higher) region is necessary to attract new residents and businesses, as well as serve our current ratepayers."

—Sharon Adams, Chairperson, SSREP



# Planning Roadmap

This section provides a roadmap of the major activities involved in advancing connectivity planning in your community or region. Like any potential infrastructure commitment, partnering with neighboring municipal governments, First Nations, and anchor institutions will assist in building economies of scale.

This roadmap is not necessarily a sequential process. It may be effective to jump to Activity 6 first and determine the internet service providers (ISPs) that could potentially serve your region. ISPs will better understand the terrain that is involved in bringing connectivity to your area and can potentially help with the technical assessment. A list of Saskatchewan ISPs is found on page 19.

A reminder to refer to the Glossary of Terms section beginning on page 20 for clarity on terminology.

> "MSMA communities in total represent more than 2,600 businesses of which more than 70 percent are self-employed. Residents, visitors, and local businesses alike rely on high-speed internet for their business and day-to-day activities. Lack of high-speed internet coverage has been identified by MSMA as an issue negatively impacting economic growth in our area as well as our ability to attract domestic as well as foreign investment.
>
> We now understand that the level of broadband investment required in Saskatchewan today will demand many internet service providers investing resources, challenging each other on services and rates, and building a level of service (1,000 Mbps and beyond) across rural Saskatchewan that is worthy of the majority (58 percent) of the population of the province choosing to live in rural communities."
>
> —Celine Favreau, Director of Operations & Planning, MidSask Municipal Alliance

## Activity 1: Establish Connectivity as a Priority

Consider passing a motion at council or establishing a policy declaring broadband an essential utility and that equitable access to the Internet is a right of every resident and business. The rationale being that in the digital age equitable access to the Internet is a determinant of equal access to healthcare, education, government, and marketplaces. Include broadband infrastructure in your official community plan.

Establish a core team to steer the course of broadband planning. In addition to staff, community representatives (business owners, students, seniors, etc.) in the working group can help in a needs assessment.

Communities and regions in Canada have adopted strategies and targets for high-speed broadband that go well beyond the CRTC's basic service objectives. For example, Ontario's York Region adopted the following vision statement: "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, York Region established the following broadband targets:

| Land Use Type | 5-year Target | | 10-Year Target | |
|---|---|---|---|---|
| | 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 |

Source: York Region Broadband Strategy 2014

## Activity 2: Determine the Role of Community

As leaders, we have the opportunity to positively shape the future rather than passively receive it. We are currently in a time of linear change, riding a curve that is rapidly accelerating. Linear change (as compared to cyclical change which is easy to understand and predict) only happens once and transforms the world in one direction. An example of linear change is the smartphone, created a short ten years ago.

**With respect to connectivity and its place in the future of your community, leadership has three options:**

1. Let the market operate on its own, which is what has largely existed to date.
2. Consider a community-owned and operated broadband network.
3. Partner with ISPs and secure infrastructure funding from other sources, enabling ISPs to serve your community/region with a level of service that will ensure a sustainable future for residents and businesses. Some ISPs may offer a blended solution with a greater degree of engagement from the community/region.

**The rest of the roadmap deals primarily with option three, which is the most common approach.**

Should you consider a community-owned broadband network, a formal feasibility study is recommended. Leaders are encouraged to research community owned models and assess their development experience and return on investment. A few models that exist already, include but are not limited to:

- Olds. Alberta
- Hamiota, Manitoba
- Campbell River, British Columbia
- Stirling, Alberta
- Katlodeeche First Nation, Northwest Territories
- Eastern Ontario Regional Network (EORN)

*The Town of Olds, home to Canada's first community-owned Fibre-to-the-Premises network, has demonstrated proven benefits for the local community and economy since the $6 million dark fibre network started in 2011. As an initiative of the Olds Institute for Community and Regional Development (OICRD), the fibre network was the answer to their question from a 2004 workshop with city leaders, businesspeople, and senior government ministers: "What do we need to do to make our community sustainable, vibrant, and what is in the future for us to gain a competitive edge?"*

*It reflects the Institute's philosophy that economic development should be driven by the community. O-NET, the ISP, created by the community to light and bring services onto the dark fibre, offers internet, telephony and video TV services as well as free Wi-Fi access in the Olds Hospital and Care Centre and throughout the community with over 80 hotspots.*

*This network granted Olds College the distinction of the first Gigabyte campus in the nation and enables the use of cutting edge connected technologies to support teaching and learning. In addition to uptake by major public institutions, the network and O-NET has enabled the retention of major employers such as Olds Soft Gels (previously Banner Pharma Corps), the attraction of new engineering firms and professionals, companies including Mistras Canada and Mountain View Credit Union.*

## Activity 3: Environmental Scan

Identifying and analyzing the following local, regional, and global conditions and trends will help shape your connectivity goals and strategies.

**Geographical**

- Distance to POP/availability of backhaul infrastructure
- Density and geographical spread
- Topology and climate (fixed wireless solutions)
- Trenching considerations (fibre solutions)

**Community and Socio-cultural**

- Community demographics and trends (aging in place, youth retention)
- Attitude toward community/municipal ownership (e.g.: history of cooperatives) and public/private partnerships ( e.g., partnering with an ISP)
- Cultural nuances—entrepreneurial thinking
- Community engagement—input on needs and priorities

**Regulatory**

- Federal and provincial broadband and infrastructure programs and legislation
- Modern telecommunications services—The path forward for Canada's digital economy (Telecom Regulatory Policy CRTC 2016-496)
- Other federal/provincial policies
- Municipal and Nation governance, rights of ways, and bylaws

**Economic**

- Employment patterns/major employers and industry
- Diversification opportunities
- Considering small business use/advantages
- Financials including a local municipal/nation budget, funding support, grants, amortization models, the willingness of leaders to invest in infrastructure

**Technology**

- Existing broadband infrastructure and service providers (especially existing dark fibre)
- Asset mapping (see Activity 5)
- Potential uses/demands of broadband
- Both current and future technology trends

**Partnership and Competition**

- Thinking and looking regionally—What are other communities doing? How can we work together?
- Existing service providers (within and outside the community) partnering with ISPs
- Negotiating with ISPs/previous best practices

## Activity 4: Community Needs Assessment

It is important to engage with stakeholders throughout the connectivity planning process to gather ideas about digital economy interests, community wellbeing priorities and explore what new possibilities are available for communities in the digital era. These may include plans for housing, economic diversification, environmental and social developments, etc. This information creates a unique snapshot of the community's digital readiness. The location and type of infrastructure are informed by the community aspirations amongst other important technical considerations.

Needs may already be identified through your existing planning process (e.g., official community plan, strategic plan, or emergency plan). If not, broad community engagement is important. Residents, visitors, sector experts, and special interest groups may identify an array of needs across sectors such as health, education, recreation, emergency preparedness, and the economy.

Where these needs intersect, potential areas of opportunity may exist that create a partnership to co-fund infrastructure and e-services. This could illuminate opportunities for infrastructure investment not recognized through a lens of providing services to every dwelling.

Residents and businesses can use the Internet Speed Test for Saskatchewan to test actual service bandwidth. The test gives people living anywhere in Saskatchewan the chance to test their internet speeds against what their contracts promise. This test is made available via a partnership between Agricultural Producers of Saskatchewan (APAS) and the Canadian Internet Registration Authority (CIRA), which works to improve the safety and accessibility of the internet for Canadians.

**See Appendices A and B for example of resident and business needs assessment surveys.**

## Activity 5: Community Technical Assessment

Local planning teams can learn more about technology and service options by speaking directly with broadband providers, equipment suppliers, and other communities about what technology and services they chose and what factors were important.

Here are three steps to move your assessment ahead:

1. **Begin defining and documenting your current situation** with a map of the area that illustrates location, regional boundaries, number and extent of populated areas, existing broadband infrastructure, and service availability.

   Use Google Earth to create and exchange maps and related information. This free software tool is versatile, powerful, and a common standard for illustrating and sharing such information.

   Ensure that all unserved or underserved communities (e.g., neighboring RM) and/or targeted service areas are marked/located on the map with place names. Once a complete list of unserved or underserved areas is established, that list should be made publicly available with sufficient detail to enable service providers to comment. Document existing infrastructure/service coverage for both cell and internet services.

2. **Organize baseline data and key contact information** for communities within the study area as well as ISPs serving those areas. Include population and estimated numbers of households, businesses, and institutions. Use spreadsheet software (e.g., Microsoft Excel/Google Sheets) to organize the data.

   Note the types of available service offerings from ISPs (e.g., fibre fixed wireless), including any related issues such as capacity or speed limitations. Note the types and extent of carrier infrastructure and services (e.g., fibre, cable, points of presence, cellular phone sites/service coverage) including any related issues such as capacity or speed limitations.

3. **Prepare a brief narrative overview** using document software (e.g., Microsoft Word/ Google Docs) to describe the communities and/or targeted service areas within your area/region, including their current situation with internet service available from national ISPs and local ISPs.

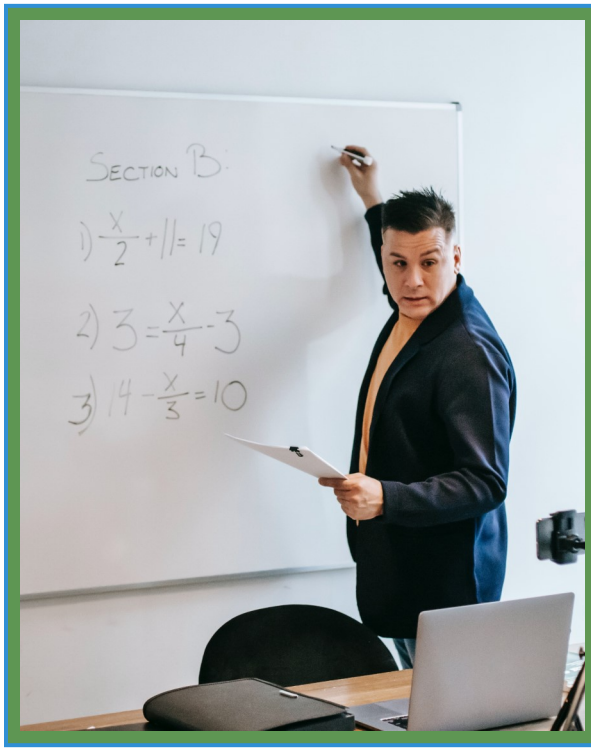
## Activity 6: Vendor Assessment

Assessing which ISPs could potentially serve your area could be an effective step to undertake early in the planning roadmap. Potential ISP partners can help define the types of technology solutions that will support your desired community outcomes, cost-effectively and how much funding support, if any, will be required. Generating a Request for Information (RFI) can solicit potential partners to assist in the community technical assessment as previously described.

Building and maintaining infrastructure in rural and remote areas is expensive, and ISPs—public and private—have to manage the bottom line. Capital investments are followed by maintenance costs, depreciation, and ongoing investment to keep technology current. In many cases, the cost to build last-mile infrastructure within a rural community is prohibitive. In rural Saskatchewan, homes can be spread out over  a large region;the cost to bring fibre to the home may outweigh any potential for a commercial return on investment in fibre-to-the-premise (FTTP) builds. In some cases, wireless technologies may be more cost-effective.

ISPs' business cases are based on the volume of subscribers and thus infrastructure builds will favor areas of density, even in rural and remote areas. Proximity to high-speed transport (the virtual equivalent of a major highway) can often be the primary determinant in being able to bring high-speed internet to the home. Both high-speed transport and last-mile infrastructure in the community need to be in place along with technical capacity and affordable cost structure to ensure the subscriber can realize the potential benefits of the service.

New technologies like 5G promise fibre-to-the-home speeds with the flexibility of a mobile wireless connection, combining high-speed wireless services and basic cell services when it is implemented, and capabilities estimated by the industry include wireless speeds capable of up to a Gigabit (1000 Mbps). However, 5G will likely be deployed in high-profit areas first, then over time in less profitable areas.




### Saskatchewan Internet Service Providers

- Access Communications
- Bell
- CIKtelecom
- Connectmoi
- Redbird Communications
- FlexNetworks
- GotGeek
- Inet2000.com
- KRAKR Enterprises Inc.
- Primus
- Sasktel
- Shaw
- SPYR Network Ltd
- Xplornet

# Glossary of Terms

**5G:** Fifth-generation of mobile technology, 5G will provide significant bandwidth improvements over the current 4G, which is also known as long term-evolution (LTE) technology.

**700 MHz Spectrum:** With respect to telecommunications, it is a frequency range allocated to mobile use. The majority of it has been allocated to commercial carriers, but a specific section known as Band 14 has been allocated to the Public Safety Broadband Network in both Canada and the U.S.

**Active Ethernet:** Type of access service that provides fibre to the home through dedicated fibre between the home and central office.

**Aerial Deployments** Deployment of cables using above ground utility poles.

**Analog or Analog Signal:** A signal where the information is transmitted in a continuous wave form, as opposed to digital signal where the information is sampled.

**Anchor Tenant or Institution:** One or more key early customers on a network, often a business or government entity that provide a base revenue stream for the service provider. Anchor tenants are important to identify for network sustainability and business stability.

**Antenna**: Small cells and other infrastructure used to deliver LTE, 4G or 5G networks. It is an exterior-transmitting device—or group of devices—used to receive and/or to transmit radiofrequency (RF) signals, microwave signals, or other federally licensed communications energy transmitted from, or to be received by, other antennas. Includes an antennae an equipment shed.

**Areas of Need:** Refers to communities that are unserved or underserved (do not meet the CRTC's basic service objective of 50 Mbps download/10 Mbps upload).

**Backbone Infrastructure:** Refers to infrastructure built to connect to technologies. Also known as major data routes that connects a telecommunications service provider's infrastructure using a point of presence as an access point. It is often fibre optic based but it can be made up of a range of technologies including microwave and satellite service.

**Backhaul or Transport:** A network connection that transports data traffic from one point-of-presence to another or from a point-of-presence to a location that contains the internet gateway. An example would be a fibre connection that transports data between a small town to another location where it is offloaded to the internet.

**Bandwidth:** Bandwidth refers to how fast data flows through the path that it travels to your computer; it's usually measured in kilobits, megabits or gigabits per second.

**Bit:** Basic unit of digital information used in communication.

**Broadband (or High-speed internet):** A high-capacity internet connection that enables quick and reliable online services.

**Byte:** Unit of digital information or data consisting of eight bits.

**Cable:** Insulated wire, sets of wires, or fibre optic strands, used to carry telecommunications signals. Provides an internet connection through a cable modem and uses the same cables that transit cable TV services (e.g., coaxial cables).

**Cable Modem:** Refers to a type of broadband connection that brings information to homes and businesses over ordinary television cable lines.

**Canadian Internet Registration Authority (CIRA):** A non-profit organization responsible for administering the country code top-level domain (ccTLD). Any .ca internet domain is operated either by CIRA or one of their certified registrant partners. The role of CIRA is also to support small projects through grants, secure Domain Name System services and in partnership with private-sector cybersecurity services.

**Capacity:** Ability of the network to provide a specific level of data service or a defined number of users.

**Cellular Network:** Used interchangeably with mobile to refer to a communication network where the last link to the user is wireless, and the user's receiver or handset may be portable.

# Glossary of Terms

**Central Office:** Location where historically the telephone switching equipment or exchange was located. It is now often the site of point-of-presence and fibre connections.

**Cloud and Cloud-Based Services:** Applications, services and other resources provided over the internet using equipment and software maintained offsite by third parties.

**Coaxial or Coax:** Copper cable used by cable and telephone companies. Coaxial cable is sometimes used by telephone companies from their central office to the telephone poles near users. It is widely installed for use in Ethernet and other types of local area networks.

**Co-Location:** An agreement between telecommunication service providers to share their facilities or infrastructure.

**Coverage:** The geographic area where a wireless tower can provide service, or the area serviced by a wireline service.

**Coverage Gap:** The geographic area where users are unable to access the internet due to limited infrastructure (synonymous with areas of need).

**CRTC or Canadian Radio-Television and Telecommunications Commission:** An independent public authority in charge or regulating and supervising Canadian telecommunications.

**Dark Fibre:** Unused fibre-optic cable. For example, this happens when companies install more cable than necessary to allow for growth.

**Data Cap:** Used to describe the practice by service providers of limiting the amount of data that a subscriber can transmit or receive on a monthly basis.

**Demarcation Point:** A point that separates the customer premise equipment and network from the service provider's network infrastructure equipment.

**Dependencies:** Also known as order of build, this is where separate projects depend on the completion of other projects to proceed and become operational.

**Dial-Up Internet:** It cannot support broadband, because the signal is sent over a landline serviced by a public telephone network. A computer or other device shares the line as the telephone, so they cannot be active at the same time. The average download speed is 0.056 Mbps.

**Digital Subscriber Line (DSL):** Wireline transmission technology that transmits data faster over traditional copper telephone lines already installed to homes and businesses. Unlike dial-up, DSL is always "on" because it uses two lines. That means the phone is not tied up when the computer is connected. The download speed averages 1.5 Mbps–15 Mbps.

**Direct-to-Home (DTH):** Refers to satellite service providers.

**Download:** Data traffic travelling from the internet to the end user.

**Downstream speed:** Refers to the speed at which data flows from the information server to your computer.

**Download Speed/Throughput:** Measure of the capacity of the user's broadband connection. Higher speeds are more desirable, as it allows the user to retrieve data more quickly.

**Ethernet:** Technology protocol commonly used to allow computers and devices to talk to each other on networks.

**Fibre:** Refers to the fibre optic medium and the technology associated with the transmission of information as light impulses along a glass, plastic wire or fibre. Fibre can carry much more information than copper wire and is less subject to electromagnetic interference. It can also send data over longer distances than copper wire.

**Fibre-to-the-Home (FTTH):** Refers to fibre optic communication delivery system where fibre extends from a concentrator, remote or central office to a residence.

**Fibre-to-the-Premises (FTTP):** Installation of optical fibre direct to individual buildings (e.g., single-family units, multi-unit residential, and businesses) to provide high-speed broadband access. FTTP dramatically increases connection speeds and reliability for broadband networks compared to legacy copper infrastructure.

# Glossary of Terms

**Fixed Broadband:** Home or business internet connections using technology where the consumer is located a fixed location. The receiving device is fixed in place. Technology includes fibre, DSL, fixed wireless, satellite.

**Fixed Wireless:** Refers to a type of broadband connection where information is sent between computers through transmission towers by way of high frequency radio signals. Technology typically does not support roaming or mobility of the user connection.

**Frequency:** Refers to the particular wave band at which a system broadcasts.

**Geosynchronous:** Refers to the orbit of a satellite that is positioned and remains over a specific area of the Earth.

**Gigabit (GB):** It is a measure of data size equal to a billion bytes or 1,000 megabytes. It is quickly becoming a standard offering speed by many ISPs.

**High-Speed Transmission Technologies:** Includes DSL, cable, satellite (which are all legacy infrastructure), wireless, and fibre-optics.

**High-Speed Internet:** Also referred to as broadband. A high-capacity internet connection that enables quick and reliable online services.

**Hybrid Fibre Coaxial:** Refers to the cabling infrastructure used by cable companies to provide internet service.

**Internet Gateway:** A network connection that provides access to the internet for the service provider's network or last-mile distribution system.

**Internet of Things (IoT):** The inter-networking of physical devices, vehicles (referred to as connected devices and smart devices), buildings, and other items embedded with electronics, software, sensors, and network connectivity which enable these objects to collect and exchange data via the internet.

**Internet Service Providers (IPSs):** Those that enable you to connect computers, tablets, and other devices to the web. Many ISPs offer in-home equipment that allow you to access the internet. They also offer Wi-Fi equipment so you can connect to the internet wirelessly on mobile devices and computers in your home.

**Internet Protocol (IP):** A set of rules governing the format of data sent over the internet or other networks.

**Jitter:** The variation in time between packets arriving at their destination, caused by network congestion, timing drift, or route changes.

**Kbps:** Stands for Kilobits per second, or thousands of bits per second. For example, most analog modems transmit at 56 Kbps or 28.8 Kbps.

**LAN or Local Area Network:** A data network intended to serve an area of only a few square kilometers or less.

**Last Mile or Last-Mile Infrastructure:** The final leg in connecting homes, businesses and other institutions to a high-speed network connection(Point-of-Presence). This may include routers, towers, antennae, fibre optical, cable, Digital Subscriber Line (DSL) equipment, cable modems etc.

**Latency:** Is the measure of the time of delay that occurs between when a digital file or signal is sent and when it is received at its destination. A low latency is required for high-quality real-time applications.

**Lit Fibre:** Fibre optic cable that has been installed and activated.

**Locale:** Can refer to a neighbourhood, community, subdivision, town site, reserve or village in a rural or remote area.

**Long-Term Evolution (LTE):** Is a standard for wireless broadband communication for mobile devices and data terminals. It increases the capacity and speed using a different radio interface together with core network improvements.

**Low-Earth Orbit (LEO) Satellite:** An orbit that is relatively close to Earth's surface (e.g., between 500 and 2,000 kilometres). The trip around the Earth is shorter because their orbit is closer, so the latency is lower than LEO satellites than for those further out.

**Mbps:** Stands for Megabits per second, or millions of bits per second. This is a measurement of how much data can be transmitted through a connection. For example, 6 Mbps is approximately 200 times faster than a 28.8 Kbps analog modem.

# Glossary of Terms

**Middle Mile:** Segment of a telecommunications network linking a network operator's core network to the point of presence.

**Mobile:** May refer to portable internet-capable devices, or to access to the internet via smartphones or other portable devices.

**Mobile Broadband:** Term used to describe the delivery of internet services from an antenna usually on a tower to a mobile location, where the service will continue to function uninterrupted as the user moves location.

**Mobile Wireless:** Uses cell towers; will be available to everyone in the vicinity of a tower. This leads to less bandwidth and higher (worse) latency. It was made for small bursts of internet usages (compared to fixed wireless). This device can transition to any part of the network. Examples include cellphones, tablets, and mobile USB sticks.

**Modem:** A device that connects a personal or home network to the service provider's infrastructure.

**National Broadband internet Service Availability Map:** Online map describing retail broadband internet services and wholesale backbone infrastructure in Canada.

**Network:** A computer network is a data communications system that interconnects computer systems at different sites. A network may be composed of any combination of local area networks (LANs), metropolitan area networks (MANs) or wide area networks (WANs).

**Packet:** A sequence of bits arranged in a specific format, containing control data and possibly user data, that is transmitted and switched as a whole. Packets are separated and then regathered together to move information faster.

**Packet Loss:** The failure of a packet to travel through the network to its destination. internet traffic is carried as internet Protocol packets. Due to network congestion or impairments, some packets do not reach their destination intact. These are considered to be lost packets.

**Point-of-Presence (POP):** A facility where internet service providers house servers, routers, switches, and other communications equipment. A POP is where an internet service provider's last-mile infrastructure connects to an internet gateway or extends to another point-of-presence that has an internet gateway.

**Point-to-Point (P2P):** Refers to a broadcast from one place or point to another single point (different from point-to-multipoint, P2MP, PTMP, PMP).

**Public Safety Network:** Telecommunications mobile network used by public safety workers such as police, fire, paramedics, and public works.

**Radiocommunications:** Any transmission, emission or reception of signs, signals, writing, images, sounds or intelligence of any nature by means of electromagnetic waves of frequencies lower than 3,000 GHz propagated in spaces without artificial guide (i.e., physical things, such as wires or cables). It refers to the means of transmission as opposed to the content or nature of the transmission (e.g., broadcasting or telecommunications), which is why it is treated quite differently than the *Broadcasting Act* or *Telecommunications Act*.

**Resellers:** Companies that provide services using the network infrastructure of telecommunications common carriers.

**Rights-of-Way:** The legal right, established by usage or grant, to pass along a specific route through grounds or property belonging to another.

**Router:** A router is a device that communicates between the internet and the devices in your home that connect to the internet. As its name implies, it "routes" traffic between the devices and the internet.

**Satellite:** Satellites are stationed far from Earth (e.g., 36,000 kilometres), and travel in geostationary orbits, moving at the speed of Earth's rotation. The signal travels from Earth, providing a delayed connection compared to cable and DSL. The speed depends on a customer's line of sight to the orbiting satellite and the weather.

# Glossary of Terms

**Service Providers:** There are many different types of service providers for communications. They include: i) Incumbent TSPs, ii) Cable-based Carriers; iii) Television and Radio; iv) Other facilities-based service providers; and v) Wholesale-based and Non-facilities-based TSPs.

**Spectrum:** The radio frequencies used to transmit wireless signals. Also known as the airwaves along which wireless signals travel. More use of spectrum leads to increased congestion. As a result, the Minister of ISED is responsible for spectrum planning, the allocation of spectrum to specific uses or services, and the assignments of spectrum to specific users.

**SWOT:** SWOT analysis is a strategic planning technique used to help a community or organization identify strengths, weaknesses, opportunities, and threats related to business competition or project planning.

**Symmetrical:** Refers to a telecommunications signal that is transmitted in equal speeds in both the download and upload direction.

**Telecommunications:** Any emission, transmission, or reception of intelligence by any wire, cable, radio, optical, or other electromagnetic systems. Some examples include landline, internet communications, fibre optics, cables, etc.

**Terabyte (TB)**: 1,024 gigabytes (GB), while a petabyte consists of 1,024 TB.

**Terrestrial Service:** Used to describe internet service that is provided through ground-based infrastructure, as opposed to satellite.

**Universal Service Objective:** Defined in CRTC Telecom Regulatory Policy 2016-496, it is defined as the availability of a fixed broadband internet access service with at least 50 Mbps download, at least 10 Mbps, as well as the option for unlimited data allowance (i.e., 50/10/Unlimited).

**Unserved/Underserved Communities:** Refers to communities that do not have service that meets the CRTC's basic service objective of 50 Mbps download and 10 Mbps upload speeds. They are also referred to as areas of need.

**Upload Speed/Throughput:** Measure of how fast data can be transmitted from the residence or subscriber to the internet. Higher speeds allow for more pictures, music, and documents to be uploaded and shared faster. Fast upload speeds are critical for video conference, cloud storage, and other popular productivity applications used by Canadians working and learning from home.

**Wholesale-Based Service Providers or Non-Facilities-Based Service Carriers:** Companies that generally acquire telecommunications services from other providers and either resell those services or create their own network from which to sell services.

**Wi-Fi:** Refers to a facility that allows computers, smartphones, or other devices to connect to the internet or communicate with one another wirelessly (without wires) within a particular area. Hotspots are provided by telecommunication service providers (TSPs) to differentiate their services from each other and extend their brands.

**Wireless:** Technology providing broadband service through a radio link to premise.

**Wireless Internet Service Provider (WISP):** Any entity providing fixed wireless services. The infrastructure used is a network that was invested in and built as their own last mile, not reselling someone else's network. There are over 250 WISPs in Canada, and one-third are in Ontario. They often have between 200 and 20,000 subscribers.

**Wireline:** Technology providing broadband service through a fibre or cable direct to a premise.

# Appendix A

## Sample Residential Connectivity Survey

**Purpose:** The (name of community) is conducting a survey of residents, businesses, organizations and institutions to obtain information and feedback about existing internet and cellular services in (name of community) to assist with future planning and strategy development intended to improve broadband service.

### Please complete this survey if you are a RESIDENT of (name of community).

If you run a business, organization or institution in (name of community), **please also complete** the Business/Organization/Institutional Connectivity Survey at (link to other survey).

Survey responses are anonymous and will be used to document the existing state of connectivity within (name of community) and to identify gaps between existing services and where services are needed. Wide participation in this survey is a critical piece to improving the state of connectivity in (name of community).

Please answer as many questions as you can. The entire survey should take no more than 10 minutes to complete. To make it easier, we recommend that if you have internet service, you have your internet service bill in front of you before you begin.

You may pick up and return this survey at the town/nation office.

We greatly appreciate your time and input.

**All information collected is kept confidential. Thank you for your time.**

## Demographic Questions

1. Do you live within (name of community)?

   ❑ Yes ❑ No

2. What type of residency do you maintain as a resident?

   ❑ Full time ❑ Part time/seasonal

3. Please select your age group.

   ❑ 17 years and younger ❑ 18 – 25 years ❑ 26 – 49 years ❑ 50 – 64 years ❑ 65 years +

4. Please select your employment status.

   ❑ Full time ❑ Part time/seasonal ❑ Retired ❑ Semi-retired
   ❑ Full time caregiver for children or family members ❑ Person with disability ❑ Student ❑ Unemployed

5. If you are employed which of the following best describes your place of employment?

   ❑ Work at home ❑ Employed outside the home within community ❑ Work outside community

6. Do you have children at home that are receiving home schooling and need internet connectivity for their education either normally or due to health regulations?

   ❑ Yes ❑ No

7. Does anyone in your home have a need for tele-health services either normally or due to health regulations?

   ❑ Yes ❑ No

8. Is anyone in your home a member of a vulnerable population for COVID-19 or related virus?

   ❑ Yes ❑ No ❑ Don't know

# Appendix A

## Sample Residential Connectivity Survey

### Questions About Your Internet

9. How important is internet service to you?

❑ Not important ❑ Somewhat unimportant ❑ Somewhat important ❑ Very important ❑ Critical

10. Do you have internet access at your home?

❑ Yes ❑ No

11. If you **do not** have internet at your home, why not? (Please check all that apply.)

❑ Cost ❑ Don't want it ❑ Poor quality ❑ Not available ❑ Other (please specify)

12. If you do not have internet at your home, please skip to question 33—otherwise, who is your current internet service provider (ISP)?
(List ISPs which serve the area)

13. What type of home internet service do you have?

❑ Optical fibre ❑ Cable/CATV ❑ Wireless ❑ DSL ❑ Cellular ❑ Satellite ❑ Dial-up
❑ Don't Know ❑ Other (please specify)

14. What do you use the internet for? (Please check all that apply.)

❑ General communication (e.g., email) ❑ Education ❑ Financial ❑ Healthcare

❑ Accessing information ❑ Employment ❑ Entertainment ❑ Other (please specify)

15. What is the average cost of your internet per month over the last six months?

❑ $0-$49 ❑ $50-$99 ❑ $100-$149 ❑ $150+ ❑ Don't know

16. Is your internet service bundled with other services?

❑ Yes ❑ No

17. If you answered Yes to the previous question, which services are bundled?

❑ Cable TV ❑ Phone ❑ Other (please specify)

18. Does your internet plan have a usage limit after which you pay additional charges?

❑ Yes ❑ No ❑ Don't know
Specify limit (if known)

19. During the past year, how many months have you had to pay overage charges?

❑ 0 ❑ 1-3 ❑ 4-6 ❑ 7-9 ❑ 10-12

20. What are your average overage charges **per month** in the last year?

❑ $0 - $49 ❑ $50 - $99 ❑ $100 - $149 ❑ $150+ ❑ Don't know

# Appendix A

## Sample Residential Connectivity Survey

21. What is your internet service speed? To test your internet speed, you can go to https://performance.cira.ca. Please run a test and provide the results below.

| | Don't know | Less than 1 Mbps | 1-5 Mbps | 5-20 Mbps | 20-50 Mbps | 50+ Mbps |
|---|---|---|---|---|---|---|
| Download | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| Upload | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |

22. If your speed is less than you require, why?

❑ Higher speeds not available ❑ Too expensive ❑ Poor quality

❑ Other (please specify)

## Opinions About Your Internet

23. How would you rate the overall quality of your internet service?

❑ Poor ❑ Fair ❑ Good ❑ Very good ❑ Excellent

The next five questions ask about your satisfaction level with your internet service.

| | Very dissatisfied | Somewhat dissatisfied | Neutral | Somewhat satisfied | Very satisfied |
|---|---|---|---|---|---|
| 24. Choice of internet service providers | ❑ | ❑ | ❑ | ❑ | ❑ |
| 25. Internet service speed | ❑ | ❑ | ❑ | ❑ | ❑ |
| 26. Overall cost/value | ❑ | ❑ | ❑ | ❑ | ❑ |
| 27. Reliability of service | ❑ | ❑ | ❑ | ❑ | ❑ |
| 28. Customer service | ❑ | ❑ | ❑ | ❑ | ❑ |

29. How likely are you to switch to an internet service with higher **SPEEDS** for an extra cost of:

| | Very unlikely | Somewhat unlikely | Neutral | Somewhat likely | Very likely |
|---|---|---|---|---|---|
| $50/month | ❑ | ❑ | ❑ | ❑ | ❑ |
| $100/month | ❑ | ❑ | ❑ | ❑ | ❑ |
| $100+/month | ❑ | ❑ | ❑ | ❑ | ❑ |

30. How likely are you to switch to an internet service with higher **LIMITS** for an extra cost of:

| | Very unlikely | Somewhat unlikely | Neutral | Somewhat likely | Very likely |
|---|---|---|---|---|---|
| $50/month | ❑ | ❑ | ❑ | ❑ | ❑ |
| $100/month | ❑ | ❑ | ❑ | ❑ | ❑ |
| $100+/month | ❑ | ❑ | ❑ | ❑ | ❑ |

# Appendix A

## Sample Residential Connectivity Survey

31. Do you have a choice of internet service providers in your area?

❑ Yes ❑ No ❑ Don't know

32. I would use the internet, or I would use it more, if it (please check all that apply):

❑ Was more reliable ❑ Was faster ❑ Was less expensive ❑ Nothing would change my usage

❑ Other (please specify)

For the next five questions, we would like your views on internet service in (name of community). Please rate your level of agreement with the following statements.

| | Strongly disagree | Somewhat disagree | Neutral | Somewhat agree | Strongly agree |
|---|---|---|---|---|---|
| 33. Internet service is an essential service. | ❑ | ❑ | ❑ | ❑ | ❑ |
| 34. There is a need to improve internet service in (name of community) | ❑ | ❑ | ❑ | ❑ | ❑ |
| 35. Improved internet will make (name community) more attractive to potential residents and businesses. | ❑ | ❑ | ❑ | ❑ | ❑ |
| 36. Improved internet will result in greater economic activity in (name community). | ❑ | ❑ | ❑ | ❑ | ❑ |
| 37. There will be significant benefits to improved connectivity in (name of community). | ❑ | ❑ | ❑ | ❑ | ❑ |

38. Would you benefit from faster internet speeds, higher data limits or more reliable internet? (Check all that apply.)

❑ Faster speeds ❑ Higher limits ❑ More reliable service

# Appendix A

## Sample Residential Connectivity Survey

### Cellular Service

In this next series of questions, we would like more information about cellular services to help us understand where cellular services need improvement.

39. How concerned are you about safety due to lack or quality of cellular service?

❑ Very concerned ❑ Somewhat concerned ❑ Neutral ❑ Somewhat unconcerned ❑ Not concerned

40. Do you currently have cellular/mobile service?

❑ Yes ❑ No

41. If you **do not** currently have cellular/mobile service, why not? (Select one.) If you do not have cellular service, after answering this question, please go to question 51.

❑ Unavailable ❑ Cost ❑ Not desired ❑ Poor quality ❑ N/A
❑ Other (please specify)

42. If you do have cellular/mobile service, what is your data allocation (GB per month)?

❑ Up to 10 GB ❑ 10–20 GB ❑ 20–50 GB ❑ 50–100 GB ❑ 100+ GB

For the next four questions, we would like to determine your level of satisfaction with cellular service in the region.

| | Very dissatisfied | Somewhat dissatisfied | Neutral | Somewhat satisfied | Very satisfied |
|---|---|---|---|---|---|
| 43. Cellular coverage | ❑ | ❑ | ❑ | ❑ | ❑ |
| 44. Reliability of cellular service | ❑ | ❑ | ❑ | ❑ | ❑ |
| 45. Cost of cellular service | ❑ | ❑ | ❑ | ❑ | ❑ |
| 46. Level of customer service | ❑ | ❑ | ❑ | ❑ | ❑ |

47. What do you generally use cell service for? (Check all that apply.)

❑ Phone calls ❑ Employment ❑ Safety ❑ Mobile internet ❑ Messaging
❑ Other (please specify)

48. Would you support additional cellular sites or towers in your community?

❑ Yes ❑ No

49. If you do not support additional cellular towers, why not? (Check all that apply.)

❑ Too many already ❑ Radiofrequency safety concerns ❑ Visual appearance
❑ Other (please specify)

50. Have you ever found yourself in an emergency situation without the ability to call for help due to a lack of cell phone coverage?

❑ Yes ❑ No

# Appendix A

## Sample Residential Connectivity Survey

### Final Questions

51. Providing internet service in remote and rural areas can be costly and does not generally make business sense for an ISP and often requires government funding. This question seeks your input on how internet service to these areas should be paid for and what sources of funding are appropriate.

I support (name of community) pursuing improved internet service through (check all that apply):

- ❑ Internet service provider builds the infrastructure to provide service and owns it. (Name of community) provides non-monetary support only. All control and future responsibilities are the responsibility of the provider. (Keep in mind that this may mean some areas don't get service.)
- ❑ (Name of community) provides support to the service provider and subsidizes the cost (through federal grants (gas tax or other). The service provider still owns the infrastructure, and all control and future responsibilities are the responsibility of the provider.
- ❑ (Name of community) provides service by building, owning and maintaining an internet utility. Costs would be covered through a combination of sources like federal and provincial grants (gas tax or other), (name of community) contributions. A new ongoing taxpayer funded (name of community) service would be established and control and future responsibilities are the responsibility of (name of community).
- ❑ (Name of community) partners with private industry partners to get service provided and shares costs, control and responsibility.
- ❑ Other

**52. Optional**

If you would like to discuss this initiative further, please send an email to:

### Comments

Please feel free to include any additional comments:

_____

_____

_____

_____

_____

***You have now completed the survey. Thank you for taking the time.***

# Appendix B

## Sample Business/Organization/Institution Connectivity Survey

**Purpose:** The (name of community) is conducting a survey of residents, businesses, organizations and institutions to obtain information and feedback about existing internet and cellular and internet services in the (name of community) to assist with future planning and strategy development intended to improve broadband service.

### Please complete this survey if you are a BUSINESS, ORGANIZATION, OR INSTITUTION located in (name of community).

If you are also a resident of (name of community), **please also complete** the Residential Connectivity Survey at (link to other survey).

Survey responses are anonymous and will be used to document the existing state of connectivity within (name of community) and to identify gaps between existing services and where services are needed. Wide participation in this survey is a critical piece to improving the state of connectivity in (name of community).

Please answer as many questions as you can. The entire survey should take no more than 10 minutes to complete. To make it easier, we recommend that if you have internet service, you have your internet service bill in front of you before you begin.

You may pick up and return this survey at the town/nation office.

We greatly appreciate your time and input.

**All information collected is kept confidential. Thank you for your time.**

## Questions About Your Business/Organization/Institution

1. Is your business located within (name of community)?
   ❑ Yes ❑ No
2. Do you operate your business:
   ❑ Full time ❑ Part time/seasonal
3. How many people do you employ, including yourself
   ❑ 1 ❑ 2-5 ❑ 6-20 ❑ 20-50 ❑ 50+
4. What type of business?
   ❑ Industrial/commercial ❑ Retail ❑ Tourism ❑ Tech/IT ❑ Arts
   ❑ Professional service ❑ Real estate ❑ Science ❑ Healthcare ❑ Hospitality
   ❑ Not-for-profit group ❑ Agriculture ❑ Institution/government agency
   ❑ Other (please specify)

# Appendix B

## Sample Business/Organization/Institution Connectivity Survey

### Questions About Your Business Internet

5. Do you have internet access at your business?
   ❑ Yes ❑ No

6. If you **do not** have internet at your business, why not? (Please check all that apply.)
   ❑ Cost ❑ Don't want it ❑ Poor quality ❑ Not available ❑ Other (please specify)

7. If you do not have internet at your business, please skip to question 30—otherwise, who is your current internet service provider (ISP)?
   (List ISPs which serve the area)

8. What type of business internet service do you have?
   ❑ Optical fibre ❑ Cable/CATV ❑ Wireless ❑ DSL ❑ Cellular ❑ Satellite ❑ Dial-up
   ❑ Don't Know ❑ Other (please specify)

9. How many users would be on the internet in your business at once?
   ❑ 1 ❑ 2-5 ❑ 6-20 ❑ 20-50 ❑ 50+

10. How does your business use the internet? (Please check all that apply.)
    ❑ General communication (e.g., email) ❑ Cloud services (e.g., Office 365) ❑ Tech/IT ❑ Point of sale/financial transactions
    ❑ Outside resources (research) ❑ Guest services ❑ Advertising ❑ Connecting location (VPN)
    ❑ Remote access ❑ Accessing large files ❑ Phone service ❑ Human resources and admin
    ❑ Guest Wi-Fi ❑ Other (please specify)

11. What is the average cost of your internet per month over the last 6 months?
    ❑ Under $100 ❑ $101-$200 ❑ $201-$299 ❑ $300+ ❑ Don't know

12. Is your internet service bundled with other services?
    ❑ Yes ❑ No

13. If you answered Yes to the previous question, which services are bundled?
    ❑ Cable TV ❑ Phone ❑ Other (please specify)

14. Does your internet plan have a usage limit after which you pay additional charges?
    ❑ Yes ❑ No ❑ Don't know
    Specify limit (if known)

15. During the past year, how many months have you had to pay overage charges?
    ❑ 0 ❑ 1-3 ❑ 4-6 ❑ 7-9 ❑ 10-12

# Appendix B

## Sample Business/Organization/Institution Connectivity Survey

16. What are your average overage charges **per month** in the last year?

❑ $0-$49 ❑ $50-$99 ❑ $100-$149 ❑ $150+ ❑ Don't know

17. What is your internet service speed? To test your internet speed, you can go to https://performance.cira.ca Please run a test and provide the results below.

| | Don't know | Less than 1 Mbps | 1-5 Mbps | 5-20 Mbps | 20-50 Mbps | 50+ Mbps |
|---|---|---|---|---|---|---|
| Download | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| Upload | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |

18. If your speed is less than you require, why?

❑ Higher speeds not available ❑ Too expensive ❑ Poor quality

❑ Other (please specify)

## Opinions About Your Business Internet

19. How would you rate the overall quality of your internet service?

❑ Poor ❑ Fair ❑ Good ❑ Very good ❑ Excellent

The next five questions ask about your satisfaction level with your internet service.

| | Very dissatisfied | Somewhat dissatisfied | Neutral | Somewhat satisfied | Very satisfied |
|---|---|---|---|---|---|
| 21. Choice of internet service providers | ❑ | ❑ | ❑ | ❑ | ❑ |
| 22. Internet service speed | ❑ | ❑ | ❑ | ❑ | ❑ |
| 23. Overall cost/value | ❑ | ❑ | ❑ | ❑ | ❑ |
| 24. Reliability of service | ❑ | ❑ | ❑ | ❑ | ❑ |
| 25. Customer service | ❑ | ❑ | ❑ | ❑ | ❑ |

26. How likely are you to switch to an internet service with higher **SPEEDS** for an extra cost of:

| | Very unlikely | Somewhat unlikely | Neutral | Somewhat likely | Very likely |
|---|---|---|---|---|---|
| $50/month | ❑ | ❑ | ❑ | ❑ | ❑ |
| $100/month | ❑ | ❑ | ❑ | ❑ | ❑ |
| $100+/month | ❑ | ❑ | ❑ | ❑ | ❑ |

27. How likely are you to switch to an internet service with higher **LIMITS** for an extra cost of:

| | Very unlikely | Somewhat unlikely | Neutral | Somewhat likely | Very likely |
|---|---|---|---|---|---|
| $50/month | ❑ | ❑ | ❑ | ❑ | ❑ |
| $100/month | ❑ | ❑ | ❑ | ❑ | ❑ |
| $100+/month | ❑ | ❑ | ❑ | ❑ | ❑ |

# Appendix B

## Sample Business/Organization/Institution Connectivity Survey

28. Do you have a choice of internet service providers in your area?
    ❑ Yes ❑ No ❑ Don't know

29. I would use the internet, or I would use it more, if it (please check all that apply):
    ❑ Was more reliable ❑ Was faster ❑ Was less expensive ❑ Nothing would change my usage
    ❑ Other (please specify)

For the next five questions, we would like your views on internet service in (name of community). Please rate your level of agreement with the following statements.

| | Strongly disagree | Somewhat disagree | Neutral | Somewhat agree | Strongly agree |
|---|---|---|---|---|---|
| 30. Internet service is an essential service. | ❑ | ❑ | ❑ | ❑ | ❑ |
| 31. There is a need to improve internet service in (name of community) | ❑ | ❑ | ❑ | ❑ | ❑ |
| 32. Improved internet will make (name of community) more attractive to potential residents and businesses. | ❑ | ❑ | ❑ | ❑ | ❑ |
| 33. Improved internet will result in greater economic activity in (name of community. | ❑ | ❑ | ❑ | ❑ | ❑ |
| 34. There will be significant benefits to improved connectivity in (name of community). | ❑ | ❑ | ❑ | ❑ | ❑ |

35. Would you benefit from faster internet speeds, higher data limits or more reliable internet? (Check all that apply.)
    ❑ Faster speeds ❑ Higher limits ❑ More reliable service

36. Does your current internet service or lack thereof negatively impact or restrict your business?
    ❑ Yes ❑ No
    Please describe:

37. Would you be more likely to expand if you had better, more affordable internet service?
    ❑ Yes ❑ No ❑ Maybe
    Comment:

38. Would you be likely to employ more people if you had better internet service?
    ❑ Yes ❑ No ❑ Maybe
    Comment:

39. Do you believe you lose business to competitors who have faster or more reliable internet?
    ❑ Yes ❑ No ❑ Do not know

# Appendix B

## Sample Business/Organization/Institution Connectivity Survey

### Cellular Service

In this next series of questions, we would like more information about cellular services to help us understand where cellular services need improvement.

40. How concerned are you about safety due to lack or quality of cellular service?

❑ Very concerned ❑ Somewhat concerned ❑ Neutral ❑ Somewhat unconcerned ❑ Not concerned

41. Do you currently have cellular/mobile service for your business?

❑ Yes ❑ No

42. If you **do not** currently have cellular/mobile service, why not? (Select one.) If you do not have cellular service, after answering this question, please go to question 52.

❑ Unavailable ❑ Cost ❑ Not desired ❑ Poor quality ❑ N/A
❑ Other (please specify)

43. If you do have cellular/mobile service, what is your data allocation (GB per month)?

❑ Up to 10 GB ❑ 10-20 GB ❑ 20-50 GB ❑ 50-100 GB ❑ 100+ GB

For the next four questions, we would like to determine your level of satisfaction with cellular service in the region.

| | Very dissatisfied | Somewhat dissatisfied | Neutral | Somewhat satisfied | Very satisfied |
|---|---|---|---|---|---|
| 44. Cellular coverage | ❑ | ❑ | ❑ | ❑ | ❑ |
| 45. Reliability of cellular service | ❑ | ❑ | ❑ | ❑ | ❑ |
| 46. Cost of cellular service | ❑ | ❑ | ❑ | ❑ | ❑ |
| 47. Level of customer service | ❑ | ❑ | ❑ | ❑ | ❑ |

48. What do you generally use cell service for? (Check all that apply.)

❑ Phone calls ❑ Employment ❑ Safety ❑ Mobile internet ❑ Messaging
❑ Other (please specify)

49. Would you support additional cellular sites or towers in your community?

❑ Yes ❑ No

50. If you do not support additional cellular towers, why not? (Check all that apply.)

❑ Too many already ❑ Radiofrequency safety concerns ❑ Visual appearance
❑ Other (please specify)

51. Have you ever found yourself in an emergency situation without the ability to call for help due to a lack of cell phone coverage?

❑ Yes ❑ No

# Appendix B

## Sample Business/Organization/Institution Connectivity Survey

### Final Questions

52. Providing internet service in remote and rural areas can be costly and does not generally make business sense for an ISP and often requires government funding. This question seeks your input on how internet service to these areas should be paid for and what sources of funding are appropriate.

I support (name of community) pursuing improved internet service through (check all that apply):

- ❑ Internet service provider builds the infrastructure to provide service and owns it. (Name of community) provides non-monetary support only. All control and future responsibilities are the responsibility of the provider. (Keep in mind that this may mean some areas don't get service.)
- ❑ (Name of community) provides support to the service provider and subsidizes the cost (through federal grants (gas tax or other). The service provider still owns the infrastructure, and all control and future responsibilities are the responsibility of the provider.
- ❑ (Name of community) provides service by building, owning and maintaining an internet utility. Costs would be covered through a combination of sources like federal and provincial grants (gas tax or other), (name of community) contributions. A new ongoing taxpayer funded (name of community) service would be established and control and future responsibilities are the responsibility of (name of community).
- ❑ (Name of community) partners with private industry partners to get service provided and shares costs, control and responsibility.
- ❑ Other

**53.Optional**

If you would like to discuss this initiative further, please send an email to:

### Comments

Please feel free to include any additional comments:

_____

_____

_____

_____

_____

***You have now completed the survey. Thank you for taking the time.***

# References

## Defining Connectivity

**Understanding Community Broadband: The Alberta Broadband Toolkit**
The Toolkit was authored by: Dr. Michael B. McNally, Assistant Professor, School of Library and Information Studies, University of Alberta; Dr. Rob McMahon, Assistant Professor, Master of Arts in Communications and Technology Program, Faculty of Extension, University of Alberta; Dr. Dinesh Rathi, Associate Professor, School of Library and Information Studies, University of Alberta;Hanne Pearce, Master of Library and Information Studies, Master of Arts in Communications and Technology Candidate, University of Alberta; Jennifer Evaniew, Master of Library and Information Studies, Master of Business Administration, University of Alberta; Chardelle Prevatt, Master of Arts in Communications and Technology, University of Alberta; Creative Commons 4.0 Attribution License (CC-BY-4.0)

## Why Connectivity Matters

**Northern Alberta Preparedness Project**, Northern Alberta Development Council

**OECD Directorate for Science Technology and Innovation**

**Understanding Community Broadband: The Alberta Broadband Toolkit**
The Toolkit was authored by: Dr. Michael B. McNally, Assistant Professor, School of Library and Information Studies, University of Alberta; Dr. Rob McMahon, Assistant Professor, Master of Arts in Communications and Technology Program, Faculty of Extension, University of Alberta; Dr. Dinesh Rathi, Associate Professor, School of Library and Information Studies, University of Alberta;Hanne Pearce, Master of Library and Information Studies, Master of Arts in Communications and Technology Candidate, University of Alberta; Jennifer Evaniew, Master of Library and Information Studies, Master of Business Administration, University of Alberta; Chardelle Prevatt, Master of Arts in Communications and Technology, University of Alberta; Creative Commons 4.0 Attribution License (CC-BY-4.0)

## What is a Connected Community?

**Connected Communities**, Province of British Columbia

## How it Works: The Technology

**The Future of Superfast Internet**, NCTA The Internet and Television Association

**SaskTel Date for iPhone Service Uncertain**, CBC News Canada

## Connectivity Planning

**Connected Communities**, Province of British Columbia

# References

## Planning Roadmap

**Futureview**, Daniel Burrus

**Town of Canmore Broadband Strategic Plan**, Prepared by the IBI Group 2018

**Understanding Community Broadband: The Alberta Broadband Toolkit**
The Toolkit was authored by: Dr. Michael B. McNally, Assistant Professor, School of Library and Information Studies, University of Alberta; Dr. Rob McMahon, Assistant Professor, Master of Arts in Communications and Technology Program, Faculty of Extension, University of Alberta; Dr. Dinesh Rathi, Associate Professor, School of Library and Information Studies, University of Alberta;Hanne Pearce, Master of Library and Information Studies, Master of Arts in Communications and Technology Candidate, University of Alberta; Jennifer Evaniew, Master of Library and Information Studies, Master of Business Administration, University of Alberta; Chardelle Prevatt, Master of Arts in Communications and Technology, University of Alberta; Creative Commons 4.0 Attribution License (CC-BY-4.0)

## Glossary of Terms

**Broadband Connectivity, A Municipal Roadmap**, Rural Ontario Municipal Association

**Connected Communities**, Province of British Columbia

**Understanding Community Broadband: The Alberta Broadband Toolkit**
The Toolkit was authored by: Dr. Michael B. McNally, Assistant Professor, School of Library and Information Studies, University of Alberta; Dr. Rob McMahon, Assistant Professor, Master of Arts in Communications and Technology Program, Faculty of Extension, University of Alberta; Dr. Dinesh Rathi, Associate Professor, School of Library and Information Studies, University of Alberta;Hanne Pearce, Master of Library and Information Studies, Master of Arts in Communications and Technology Candidate, University of Alberta; Jennifer Evaniew, Master of Library and Information Studies, Master of Business Administration, University of Alberta; Chardelle Prevatt, Master of Arts in Communications and Technology, University of Alberta; Creative Commons 4.0 Attribution License (CC-BY-4.0)

## Appendices A and B

**Cariboo Regional District**, British Columbia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COMMUNITIES FOR THE FUTURE

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# Connectivity Planning Toolkit

## Volume I: Digital Readiness

May 2021