



# BC Connectivity Report

**Broadband Connectivity for  
Rural Communities in BC**

Prepared for Northern  
Development Initiative Trust

Fall 2019

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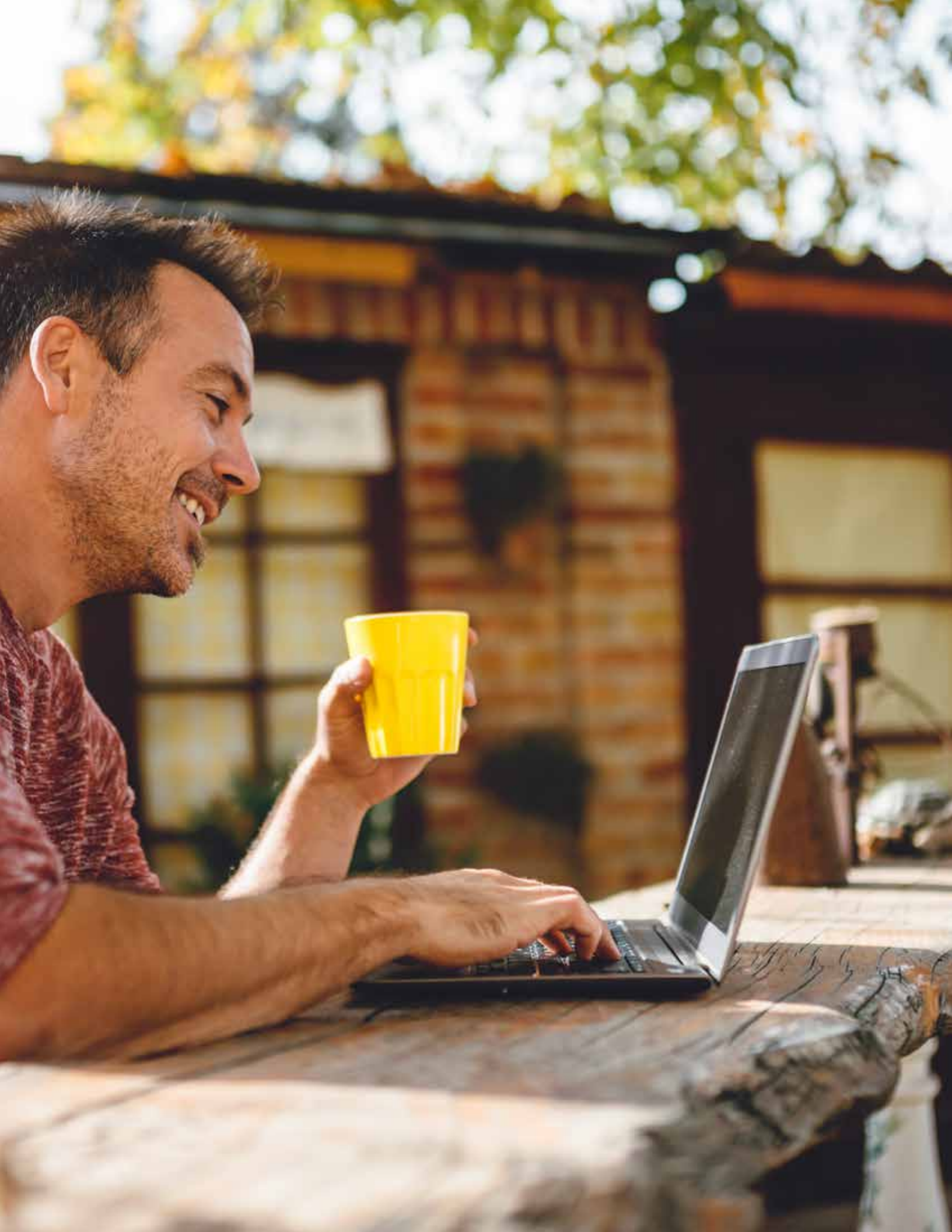
## Disclaimer

This document has been prepared by KPMG LLP (“KPMG”) for Northern Development Initiative Trust (“Client” or “Trust”) pursuant to the terms of our engagement agreement with Client dated July 9, 2019 (the “Engagement Agreement”). KPMG neither warrants nor represents that the information contained in this document is accurate, complete, sufficient or appropriate for use by any person or entity other than Client or for any purpose other than set out in the Engagement Agreement. This document may not be relied upon by any person or entity other than Client, and KPMG hereby expressly disclaims any and all responsibility or liability to any person or entity other than Client in connection with their use of this document.

Our role was to outline certain matters that come to our attention during our work and to offer our comments and observations for the Trust’s consideration. Our procedures consisted solely of inquiry, observation, comparison and analysis of Trust-provided information augmented by publicly available information sourced as footnoted. We relied on the completeness and accuracy of the information provided. Such work does not constitute an audit. Accordingly, we express no opinion on BC’s broadband landscape and information contained in this document.

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# Executive Summary

Connectivity has become a key influencing factor in our society's social and economic prosperity. Broadband connectivity enables and improves physical well-being of citizens, environmental and social sustainability, economic prosperity, resilience, diversity and inclusion, and transforms the way people live their day-to-day lives. In rural communities the transformative effects of broadband are amplified whether it be in coordinating and delivering emergency response services, providing patients with time-sensitive diagnostics and after-care services in the comfort of their homes, or online learning applications to support a skilled workforce.

The importance of broadband and its impacts on Canadian development is widely acknowledged. The most recent report released by the Canadian Radio-television and Telecommunications Commission (CRTC) highlights statistics demonstrating changes in business and consumer habits which all point towards the increased adoption and reliance on connectivity by citizens to carry out day-to-day activities and the vital role that broadband and cellular connections now play in societal structures and functions.

The importance of broadband for rural communities has gained national focus and prominence in Canada. In 2019, the federal government published two strategies: High-Speed Access for All: Canada's Connectivity Strategy, and the Rural Economic Development Strategy. These strategies outline the importance of supporting investments in broadband infrastructure to achieve high-speed internet access for all Canadians, address affordability issues, and enhance digital literacy in rural communities.

British Columbia has made significant strides in connecting its citizens compared to other Canadian jurisdictions. Since the first *BC Connectivity Report* was published in 2017, more rural communities have gained broadband access. According to the latest data published in 2018/19, access to 5+ Mbps (megabits per second) broadband improved to 98% of BC households with access to 50+ Mbps broadband edged higher to 93%, in comparison to the Canadian average of 85%.<sup>1,2</sup> However, while these numbers are impressive, they don't paint the full picture. Only 35% of BC's rural Indigenous communities and 33% of rural non-Indigenous communities have access to 50+ Mbps and much remains to be done to close the digital divide between urban and rural communities.<sup>3</sup> Provincially, as announced in March 2019, the BC government committed \$50 million in its 2019 budget for projects that will expand broadband access in rural and Indigenous communities. There is effort from the private sector too – some companies that cannot access existing infrastructure at an affordable price have come up with innovative solutions, such as using old gas or water pipes to bury fibre optic cables. These initiatives will provide much-needed funding and assistance to improve connectivity in rural BC, but the province may require faster action.

This year's *BC Connectivity Report* focuses on the importance of broadband through the lens of rural, remote, and Indigenous communities in British Columbia. We take a closer look at the benefits that investments in broadband infrastructure can bring – from day-to-day activities to enhancing business and economic prosperity and opportunity to greater access to services for communities.

Broadband forms the backbone infrastructure for cellular and other next-generation wireless technologies. As we look to the future, companies and urban communities have already started to plan opportunities to unlock the potential of emerging cellular technologies such as 5G – the fifth generation of wireless technology – which will bring faster, more reliable and capable internet speeds, along with a host of opportunities and prospects to all communities across British Columbia.

To prevent the digital divide from widening further, it is imperative that rural communities are adequately positioned and enabled (by way of infrastructure investments and digital literacy capacity building) in order to keep pace with imminent, exponential changes on the horizon brought on by connectivity. The time is now for rural communities to leverage broadband-enabled opportunities to bring greater economic diversity, resiliency, and prosperity to their communities.










1. Innovation, Science, and Economic Development Canada, *High-Speed Access for All, Canada's Connectivity Strategy*
2. CRTC, Communications Monitoring Report 2018
3. Network BC



## Highlights

For the third year, under the invitation of the Northern Development Initiative Trust, KPMG has benchmarked BC’s broadband connectivity performance with that of peer jurisdictions. This document:

- Demonstrates the important role that broadband connectivity plays in rural communities and rural areas.
- Discusses the impact of broadband connectivity on Indigenous communities, small-to-medium sized businesses, gender diversity and inclusion, and emergency alerts and preparedness.
- Provides an overview on cellular wireless connectivity and how it’s changing the way users access the internet and participate in the digital economy.
- Explains the criticality of broadband and cellular connectivity and how BC performs relative to its peers across three dimensions – access, affordability and speed. What advertised speeds can citizens access? What speeds do they actually receive? How much do they pay?
- Compares Canada’s connectivity progress on the world stage and identifies lessons learned from its peers.

## At a glance – BC’s broadband connectivity performance

Performance Metrics	BC versus CDN peers	Versus US peers
 <b>Access</b>		
 <b>Affordability</b>		
 <b>Speed</b>		

 Better than most     Comparable     Worse than most

*Note: Based on most recent available data between 2017–2019.*



# Understanding this Document

## **Purpose**

This report provides an objective analysis of BC's broadband and cellular landscape relative to select comparable jurisdictions.

KPMG LLP (KPMG) was engaged by Northern Development Initiative Trust to collect quantitative data to perform an objective analysis of BC's broadband and cellular connectivity against its peers, with a particular focus on broadband connectivity in rural and remote areas of BC. This document focuses on existing broadband delivery methods such as Digital Subscriber Line (DSL) and fibre optic cables, and highlights benchmark analysis of cellular networks. KPMG was also asked to explore additional value that greater connectivity offers to rural communities, presented in this document as "rural connectivity – delivering value and benefits". KPMG performed field work, research, and analysis from July 5 to September 6 of 2019.

## **Methodology**

KPMG collected quantitative and qualitative data from government and other sources. KPMG also collected and referenced a series of case studies and examples from BC and other provinces with focus on greater connectivity in rural areas.

## **Challenges associated with benchmarking**

Benchmarking broadband quality, particularly with an international lens, is challenging. Factors such as geographic area, population, urbanization, climate, culture, and government can play active roles in the relative ease and challenges of broadband distribution – and these traits naturally vary from region to region. Although international comparisons are insightful in providing context as to where Canada stands relative to other Organization for Economic Co-operation and Development (OECD) nations, the benchmarking analysis conducted in this document focuses on Canadian jurisdictions that are similar to BC, using attributes such as population, population density, geography, and climate. Furthermore, the UK and US were used as case studies for the purpose of capturing market trends, policies, and lessons learned that are applicable to BC and Canada.



## Primary resources

### KPMG relied on a number of primary resources to conduct the analysis

- **Broadband plan data collected from sample of ISPs across the selected jurisdictions in July 2019**
- **Canadian Internet Registration Association**
- **Canadian Radio-television and Telecommunications Commission**
- **Council of the Haida Nation**
- **Gov.uk**
- **Innovation, Science and Economic Development Canada, Canada's Connectivity Strategy**
- **M-Lab**
- **Northern Development Initiative Trust**
- **Pathways to Technology**
- **Public Service Commission of Wisconsin**
- **Sasktel**
- **Speedtest.net**
- **Statistics Canada**
- **The Economist**
- **US Department of Agriculture**
- **US Federal Communications Commission**
- **Xplornet**

It should be noted that KPMG relied specifically on data from CRTC, US Federal Communications Commission (FCC), Statistics Canada, M-Lab, Canadian Internet Registration Association and various Canadian ISP data for quantitative broadband data (e.g., metrics pertaining to access, affordability and speed) and did not verify the accuracy of the data. The quantitative analysis performed in this document reviews residential broadband connectivity only. It therefore

does not assess connectivity strengths or weaknesses for commercial plans. This was done because data collection agencies typically gather residential data only, and commercial plans will have much less representation in rural areas where there is a relatively lower level of business activity. However, the benefits of broadband are explored both from a residential and commercial perspective in this document.



### Glossary of broadband terminology

**Access, affordability and speed** comprise the three main parameters for measuring broadband.

- **Access:** The percentage of households with access to certain download and upload speed thresholds.
- **Affordability:** The affordability of residential internet service plans can be considered both in absolute terms and as a proportion of income.
- **Speed:** Internet speeds are measured in bits per second, and are broken out by download and upload speed. Download speed is the speed at which data (e.g., files, pictures, and movies) gets delivered from the internet to users. Upload speed is the speed at which data travels from users to the internet. Here, a common unit is 'Megabits per second' or Mbps (one million bits per second).

# The Importance of Internet Connectivity



According to the federal government's Rural Economic Development Strategy released in 2019, rural Canadians say that poor connectivity in a community could lead to difficulties in retaining youth, attracting talent, growing businesses, training workers, and adopting new technologies. There is an overwhelming consensus that broadband access is essential to success, and that it should be available regardless of where someone lives. Moreover, greater connectivity could pave the path for greater regional development and prosperity, and can influence the economic health of rural areas.

In the past three years alone, statistics have shown significant developments in high-speed internet connectivity through broadband and cellular technologies. Reliable and affordable high-speed internet is a critical factor in delivering public services, including education, healthcare, business, social and economic development, public safety, security, and emergency management. Accordingly, prosperity, growth, quality of life and the sustainability of communities are increasingly dependent on broadband and high-speed internet services.



# Overview of Rural Communities

In this report, we broadly define rural communities as any area with an urban core of fewer than 10,000 residents (which is aligned with Statistics Canada's definition of rural and small town areas). Rural communities play a crucial role in Canada's future, yet many still do not have access to even the foundational backbone infrastructure to connect globally. Rural, remote, and Indigenous communities supply food, water, energy, and natural resources for the rapidly growing urban centres, and sustain industries that contribute greatly to Canada's economic prosperity. The diversity and vibrancy of these communities further lead to their recognition as a key component of BC's culture and social fabric. The combination of more affordable living, lifestyle benefits and gradually improving broadband in rural communities provides an opportunity to attract individuals, businesses, and investment.

Investments that focus on enabling rural communities to become truly connected have become an increasing priority for all levels of government across Canada and around the world. This is not surprising given the number of academic and anecdotal case studies that demonstrate how connectivity can unlock economic development opportunities and provide access to key services thereby increasing the well-being and resiliency of rural and Indigenous communities. Universal 50/10 Mbps broadband access (that is, 50 Mbps download speed and 10 Mbps upload speed) can improve healthcare outcomes in rural and remote communities by connecting patients to healthcare specialists, regardless of where they live. Broadband-enabled connectivity also enhances the economic vitality of communities. According to a study from the Monieson Centre at Queen's School of Business, "broadband deployment promoted growth in employment and wages in rural regions across Canada by more than one percent per year." Distance education and the proliferation of remote work arrangements further provide opportunities for small communities to attract and retain skilled workers. Many rural communities are already starting to benefit from businesses that actively encourage employees to work remotely as the combination of affordable housing and lifestyle factors place rural communities in an excellent position to retrain and attract workers to realize these benefits.

## The Challenge

Despite these opportunities, there remains a national connectivity gap between urban and rural areas – the “digital divide” wherein many rural Canadians experience slower and less reliable internet access than urbanites. Rural and remote communities have identified challenges accessing affordable, high-speed internet as a key issue impeding economic growth. According to High-Speed Access for All: Canada’s Connectivity Strategy, published in 2019, the significant lack of internet speed in rural and remote parts of Canada present a barrier to the many opportunities the internet has to offer. This connectivity gap exacerbates challenges faced by rural areas such as a stagnant workforce, stifled innovation, and migration of young people to urban centres due to lack of education and employment opportunities.

## The Benefits to Rural Connectivity

British Columbians from all communities rely on access to affordable, high-speed broadband in their day-to-day lives. In rural communities, the transformative effects of broadband are amplified; for example, in coordinating and delivering emergency response services and retaining skilled and specialist workers. To frame the profound impact that connectivity can have in rural communities, this report explores four key areas that benefit from rural connectivity: Indigenous communities, small-to-medium sized businesses, digital equality, and emergency alerts and preparedness.

### Four pillars of value

Indigenous  
Communities

Small and Medium  
Enterprises in  
Rural Communities

Digital  
Equality

Emergency  
Alerts and  
Preparedness



# Indigenous Communities



Network BC reports that as of 2018, only 35% of BC's rural Indigenous communities and 33% of rural non-Indigenous communities have access to 50/10 Mbps broadband service. A majority of Indigenous communities work with inadequate technology, underpowered broadband connections, and under-nourished IT budgets. The vast majority of Indigenous communities across BC are in rural areas, each with distinct needs and aspirations.

Digital equality – both in terms of digital literacy and access to connectivity – represents a divide in access to opportunities and prosperity between Indigenous and non-Indigenous people in BC. More equitable access to broadband supports cultural and community well-being, including language preservation, access to education, health services, and improved opportunities for economic growth to support families living on reserve. Digital connectivity has enabled businesses in the Heiltsuk Nation, for example, to share their herring spawn-on-kelp successes on the world stage. It also facilitates continued knowledge-sharing and collaboration between Nations; sharing lessons learned, successes, and enabling conservation initiatives such as the Coastal Guardian Watchmen program.

Digital connectivity is an important step forward in the BC government's commitments to reconciliation with Indigenous peoples through the adoption of the United Nations Declaration of Rights of Indigenous Peoples and the Truth and Reconciliation Commission's Calls to Action. The BC government's recent \$50 million investment to expand high-speed internet service across rural and Indigenous communities, as well as ongoing investments from organizations such as the All Nations Trust Company (ANTCO) continue to make impactful changes in rural and Indigenous communities across BC.

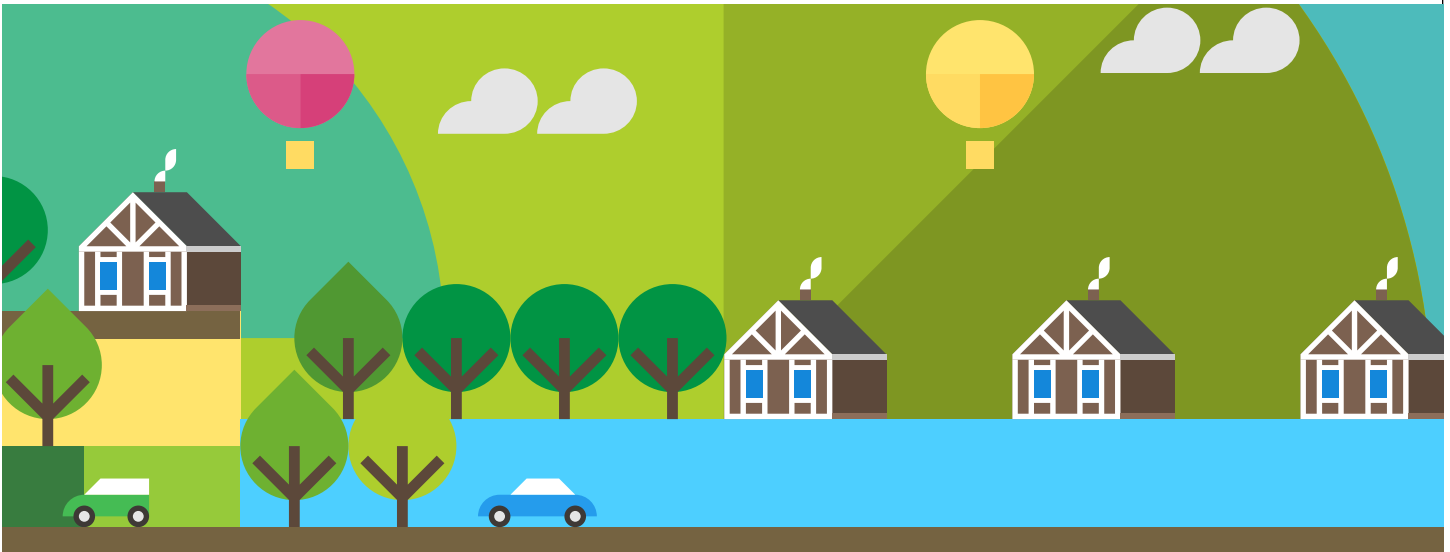
In addition to supporting economic and business opportunities for rural Indigenous communities, a recent study by ANTCO examined how connectivity access impacted all aspects of life for Indigenous peoples in BC. It found marked improvements in overcoming barriers to health, safety, education, and flourishing communities, noting that "the work being undertaken relies critically on broadband internet and the applications driven by this connectivity."<sup>4</sup> The study found a number of instances where Indigenous organizations have had to curb their product or vision and — ultimately — the benefits or reach of the initiative due to bandwidth capability limitations. This highlights the importance of digital connectivity as a key enabling factor to improve and enhance the well-being and the economic sustainability and opportunities for rural Indigenous communities.

Digital connectivity can enable the creation of new businesses and improve employment opportunities, especially in rural communities. It supports community members who may otherwise have to relocate to find employment, particularly youth and skilled workers. For Indigenous persons who have relocated, it enables them to stay connected to their community and all their relations. Retaining and employing community members is one way to foster resilient and prosperous communities, while furthering Indigenous communities' right to self-determination and increased opportunity.

*Other sources: Centre for the Study of Living Standards, The Contribution of Broadband to the Economic Development of First Nations in Canada, July 2013*

*CRTC, Submission to the Government of Canada's Innovation Agenda, December 2016*

4. Pathways to Technology, Summary of Findings on Broadband Internet as a Sustained Infrastructure for Social Services in the First Nations Communities



## Case Study

### Penelakut Island

Located just 7km offshore of the Vancouver Island town of Chemainus, Penelakut Island is home to approximately 700 members of Penelakut Tribe. Small satellite dishes attached to homes were previously the only source of home internet access – a 6 Mbps connection. This was the case until December 2018, when Pathways to Technology funded and facilitated Penelakut’s connection to TELUS’ fibre optic network with speed capability up to 750 Mbps. Penelakut’s band office, elementary school, adult learning centre, daycare and health centre now finally have access to high-speed internet.

Improved services and access to information has been immediate. The band office is able to update their social media and website to share useful information with the community members both on and off the island. Education materials can now be accessed and delivered reliably to support learning in a way that was not possible with the 6 Mbps connection. Telehealth services delivered via videoconferencing is now enabled, which supplements and relieves some pressure on the high demand health centre and its staff while improving the lives and health of the community.

Access to high-speed internet is also enabling individuals to develop their home-based businesses and access continued training and business resources online – growing not only individual businesses but a thriving and more economically diverse community. This is particularly liberating for some of the First Nation’s community members as they are able to stay connected with their community even when in a different physical place, and perhaps eventually feel the pull to return home where remote work is now an option.

Source: <http://www.pathwaystotechnology.ca/community-spotlight/penelakut-island>

## Case Study

### Coastal Guardian Watchmen

In 2005, a collective of Haida Gwaii, North and Central Coast First Nations established the Coastal Guardian Watchmen, a regional initiative that continues to monitor, steward and protect the coastal territories according to traditional laws. With the support of Coastal Funds investments, the Guardian Watchmen program plays a critical role in all aspects of stewardship and environmental management, and has recently benefited from improved access to broadband connectivity.

In response to a 2018 connectivity investment announcement, Peter Lantin, who was at the time President of Council of Haida Nation said, “We have more than 100 watchmen who patrol our territories each day. They gather data using iPads. Today, uploading data can take between 1-3 hours each day. Faster connectivity is going to have an enormous impact on how they do their jobs.”

While patrolling the lands and waters of their territories, the men and women of the Guardian programs protect and monitor their Nations’ resources and cultural assets with the support of connected tools. Whether it is collecting audio samples, tracking ecosystem health, or tracking the impacts of industrial activity, broadband connectivity has facilitated the program’s continued success. It also allows for the sharing of data of findings and traditional knowledge. Beyond creating and sustaining jobs for community members, protecting species and territories, the thriving program empowers and strengthens community well-being.

Sources: <https://coastfunds.ca/wp-content/uploads/2019/06/Talking-Stick-10-Years-of-Conservation-Finance-Spring-2019.pdf>

[http://www.haidanation.ca/?nooz\\_release=coastal-first-nations-says-faster-internet-will-transform-coastal-communities](http://www.haidanation.ca/?nooz_release=coastal-first-nations-says-faster-internet-will-transform-coastal-communities)

<https://thenarwhal.ca/first-nations-lead-transition-to-conservation-based-economy-in-great-bear-rainforest-haida-gwaii/>

# Small and Medium Enterprises in Rural Communities



Small and Medium Enterprises (SMEs) form the social and economic fabric of a rural community. They provide day-to-day goods and services to local residents and welcome visitors to the region. They connect residents with each other in the community and businesses to the rest of the province and global economies. Based on 2015 information made available by Statistics Canada, SMEs in non-census metropolitan areas made up approximately 10% of the province's GDP, highlighting the economic importance of SMEs in their respective rural communities, and contributions provincially.

Small and medium enterprises are particularly important for rural communities because the size of the labour force available in rural communities is typically too small to supply larger firms; as such, SMEs typically provide proportionately greater employment opportunities than larger enterprises in rural settings. The Organisation for Economic Co-operation and Development (OECD) corroborates the importance of SMEs in rural communities in their publication, *Modernising the Rural Economy*, noting that SMEs play a critical and enabling role in introducing new sectors and products.

As the digital divide between urban and rural communities continues to widen, rural communities and their SME ecosystems face growing challenges to keep pace with providing goods and services to their communities, and connecting with the broader economy. In the Business Development Bank of Canada's *Expand Online Study*, only approximately 43% of SMEs in Canada reported selling, receiving and taking orders online. In rural communities, the proportion of businesses leveraging e-commerce or with an online presence likely declines even more drastically, and there most likely is a near-absence of such activities for communities without broadband connectivity. Broadband access provides SMEs, often with limited financial capacity to invest in or explore broadband alternatives compared to large multi-national corporations, with opportunities to connect with the global economy and supply chain thereby unlocking economic potential and building sustainable and adaptable economies in rural communities. In the context of today's economic landscape and supply chain networks, participation in global markets is key to realizing the growth potential of rural areas.

The digital divide has greater, ripple-effect implications, particularly in the sustainability of skilled and specialist labour supply for rural communities. The lack of such labour supply is likely to subsequently stunt or halt the potential for growth and change for rural communities over the long term. The Federation of Canadian Municipalities raised concerns around the lack of growth in populations of youth between the ages of 24 and 29, noting many young people tend to finish training in Canada's colleges and universities and are less likely to seek employment opportunities in rural communities.<sup>5</sup> The decline in rural youth population growth has resulted in SMEs in BC voicing concerns on the shortage of local workers trained in skilled-areas needed<sup>6</sup> to provision vital goods and services supplied in rural communities such as aircraft pilots, programmers, and healthcare workers.

Generally, the lack of skilled labour is compounded by two factors in rural communities without broadband access: the lack of local supply; and challenges with attracting talent to relocate from urban centers. These challenges have manifested, for example, in marked declines in high-tech businesses in rural communities with limited or no broadband connectivity. Between 2014 and 2017, the number of high-tech businesses declined outside of the most populated regions of Lower Mainland, Vancouver Island, Okanagan, and Kootenays.<sup>7</sup> The labour supply shortage for SMEs will become increasingly constraining for rural communities if the digital divide between rural and urban communities is not addressed.

Small and medium enterprises bring a layer of economic vibrancy, diversity, and resiliency to all communities. In rural communities particularly, they also reflect the unique characteristics and economic development opportunities its residents have seized. The ecosystem of SMEs are key economic contributors in rural communities, providing employment opportunities and, more importantly, goods and services that help with place-building where community ties are built and strengthened.





### Case study

#### CRAdvantage (Campbell River, BC)

Originally founded as a logging camp, Campbell River is now a vibrant and growing community that is internationally renowned for its quality of life and recreational activities. However, Campbell River had a problem. As advancements in technology continued to change the world, the City recognized that a lack of high-speed, affordable internet was a barrier to attracting new businesses, investment, and tourism.

In response, the municipal council devised a strategy to bring Campbell River up to speed. The council envisioned a supportive ecosystem for technology and innovation which would diversify the local economy and make the city more livable. In 2017, Campbell River launched CRAdvantage, a City-owned fibre optic backbone that provides businesses and the public access to inexpensive broadband internet. Funded by the City of Campbell River and the Island Coastal Economic Trust, CRAdvantage delivers speeds of up to 1 Gbps – comparable to the fastest speeds in urban centres like Vancouver and San Francisco. Being an open-access model, third-party providers can sell and administer broadband on the network, providing choice and competitive pricing for consumers.

The response to the program was positive and immediate. Not only has the city seen an increase in the number of businesses and entrepreneurs locating in Campbell River, existing businesses are enabled to expand their capabilities. Looking to the future, Campbell River can now explore further opportunities to enhance the city with new initiatives such as public Wi-Fi, smart street lights, smart traffic signals, and smart irrigation.

Source: <https://www2.gov.bc.ca/gov/content/employment-business/economic-development/bc-ideas-exchange/success-stories/technology-sector/cr-broadband>

### Case study

#### Retreat Guru (Nelson, BC)

Increasingly, many types of businesses are realizing benefits from access to a high-speed, fibre optic network to meet their requirements and to remain competitive in the digital age. Launched in 2014, The City of Nelson's fibre optic infrastructure (Nelson Fibre) increases the capacity and speed of networks and internet traffic.

One of the biggest drivers behind the City of Nelson investing in a fibre optic network is the economic stimulus that a state-of-the-art information technology infrastructure creates for a community. Helping local business take advantage of Nelson's broadband fibre networks are goals for Nelson Fibre and the Nelson and Area Economic Development Partnership (NAEDP). Community Futures offers services and workshops to help local businesses learn how they can benefit from broadband fibre.

As testament to this, one local business that has benefited from the City's investment in its fibre optic network is Retreat Guru – a website that connects teachers, students, and retreat organizations. It processes more than \$110 million in bookings a year and offers more than 57,000 different events and retreats. The Retreat Guru office is located in Nelson where it uses broadband to connect the world to these activities. Nelson's investments and the establishment of businesses like Retreat Guru has positioned the community as a strong candidate for the roll out of 5G, and has resulted in TELUS investing in infrastructure to make the community 5G-ready.

Source: <https://retreat.guru/about>

5. Federation of Canadian Municipalities, *Rural challenges, national opportunity*
6. BC Small Business Roundtable, *Small Business Task Force Final Report*
7. Ministry of Jobs, Trade and Technology of BC, *Small Business Profile 2018*

# Digital Equality



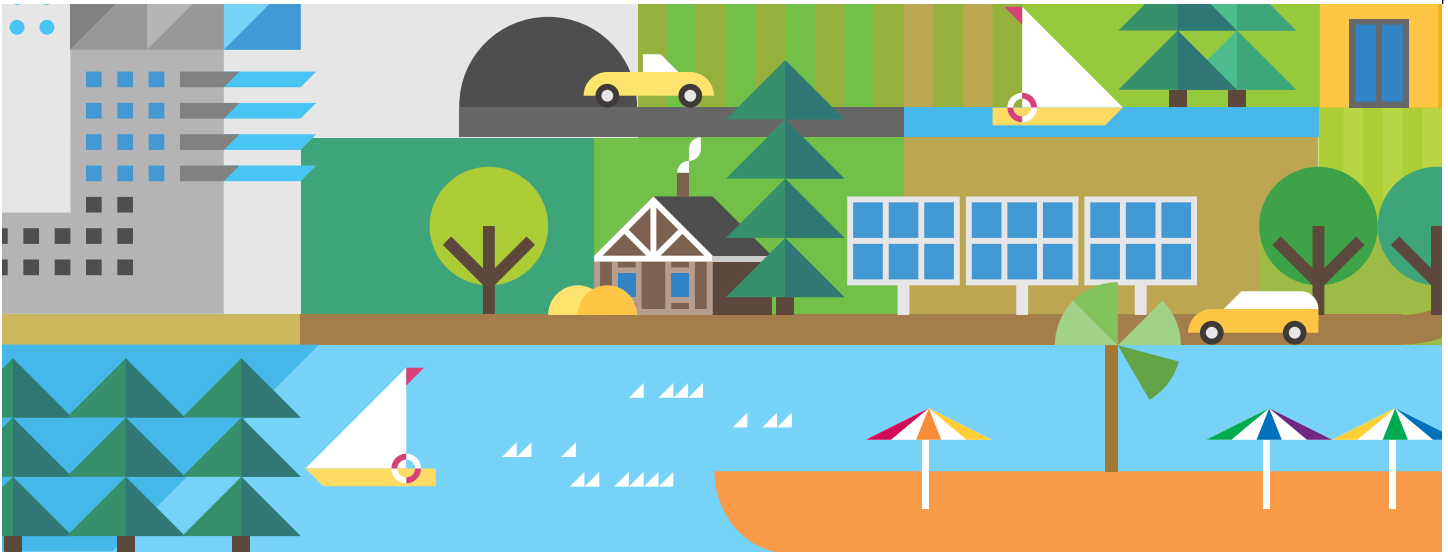
Digital equality, achieved through broadband investments and increasing digital literacy among rural communities, will help BC become more inclusive and will provide opportunities for diverse populations to become more connected socially and economically. The benefits of engaging a diverse workforce that reflects the local community has been widely reported. Examples of bottom-line impacts to businesses include boosting global competitiveness, and a greater customer focus and understanding thus increasing productivity and profitability.<sup>8</sup>

Diverse workforces, particularly in rural communities where labour supply pools are smaller than their urban counterparts, provide businesses with opportunities to leverage broader skillsets in innovative ways. Harvard Business Review indicated that a diverse workforce and leadership team is strongly correlated to accelerated business growth and a strong culture of embracing change and innovation<sup>9</sup> – critical outcomes that business ecosystems in rural communities stand to benefit from in the long-term as part of creating a sustainable, resilient, and adaptive economy.

Business for Social Responsibility, a global non-profit focused on social justice and sustainability, reported on a range of studies demonstrating the positive economic benefits when women in developing economies are given access to cellular and internet-enabled technologies: increased income opportunities, greater independence, and individual empowerment, among others.<sup>10</sup> In BC, more than 38% of small businesses are owned by women, greater than the national average.<sup>11</sup> As such, enabling broadband connectivity in rural communities brings together two key propositions: involvement of a more diverse workforce, and further strengthening entrepreneurialism in small and medium business ecosystems that form the social and economic fabric of rural communities.

Statistics Canada reported that households in rural areas are more likely than those in urban areas to be on the wrong side of the digital gap. These households are almost twice as likely to not have home internet access and they're almost 10 times more likely to report quality issues as a reason for preventing internet adoption.<sup>12</sup> Improving connectivity improves accessibility of economic and social opportunities. Statistics Canada also reported that about two-thirds of households without internet access at home also do not regularly connect outside their home<sup>13</sup>, highlighting the importance of household connectivity beyond connectivity for a rural community in general. Broadband connectivity supports digital equality as greater accessibility enables individuals to work from home and remotely – allowing all citizens to flexibly participate in digital economies and societies.

In 1995, the Federal Government committed to using the Gender-Based Analysis Plus (GBA+), to make steps toward addressing gaps in diversity and inclusion. GBA+ is an analytical tool used to assess how diverse groups of women, men and those who identify as non-binary may experience or be impacted by policies, programs and initiatives. The "plus" in GBA+ acknowledges that GBA goes beyond biological (sex) and socio-cultural (gender) differences.<sup>14</sup> GBA+ also considers many other identity factors, like race, ethnicity, religion, age, and mental or physical ability.



Since much of modern learning occurs online, individuals in poorly connected, remote communities who seek to pursue economic and academic development in fields that rely on broadband connectivity are at a disadvantage. These individuals may choose to relocate in their search for greater opportunities. This migration can disproportionately affect small, rural cultural groups, including Indigenous communities, by separating families and disrupting social networks. According to Peter Lantin, former President of Council of the Haida Nation and a Coastal First Nations director, “The lack of broadband contributes to fragmentation of our communities. Often students are forced to move for training and education because online training is impossible to get on the coast. Faster internet connections will change that.”

Improving connectivity to rural communities and improving digital equality increases inclusion and diversity, benefits isolated and stigmatized individuals, and strengthens and protects communities. Connecting rural communities improves access to education and training enables individuals in rural communities to participate in digital economies and societies.

## Case Study

### Iskwew Air

Launched in 2019 out of Vancouver International Airport, Iskwew Air is a 100% Indigenous woman-owned airline dedicated to “connecting people with each other and to the land.” Currently servicing many of British Columbia’s rural and remote communities via chartered services, Iskwew Air plans to further expand to include a scheduled service offering—at which time their online presence will transform into a critical e-commerce platform. Iskwew Air, and initiatives alike, have the potential to broaden pathways for both local and international travelers to engage with a diverse array of BC communities, ecosystems, and trade opportunities—and vice versa. More broadly, improved internet connectivity (particularly in rural communities) will become an increasingly critical factor in enabling Iskwew Air and other burgeoning entrepreneurs to grow and maintain physical and virtual connectivity across the province.

Source: <https://www.iskwew.ca/about>

8. Business Development Bank of Canada, *Why workplace diversity benefits your business*
9. Harvard Business Review, *How Diversity Can Drive Innovation*
10. Business for Social Responsibility, *Improving the Lives of Women and Girls through Technology*
11. Ministry of Jobs, Trade and Technology of BC, *Small Business Profile 2018*
12. Statistics Canada, *Internet connectivity: Technology, service availability and cost*
13. Idem
14. Government of Canada, *What is GBA+?*

# Emergency Alerts and Preparedness



The BC Emergency Management System dedicates itself to four pillars of emergency management: mitigation, preparedness, response, and recovery. Broadband connectivity enables communities to develop more effective plans within each of the four pillars. Connected communities are better able to plan for and mitigate against emergencies and these communities are then better prepared to alert to, respond to, and recover from an emergency when it occurs. The benefits to rural communities are amplified given that they tend to be more remote, dispersed, and difficult to access.

Connectivity plays a significant role in emergency preparedness. The Sendai Framework for Disaster Risk Reduction, supported by the United Nations and adopted by the federal government, takes an all-of-society approach to disaster risk reduction. Although all levels of government continue to enhance and build out their emergency management platforms, many remote and Indigenous communities are unable to participate in coordinated disaster planning and emergency simulation exercises without access to broadband. These exercises are vital to improving preparedness and developing the necessary skills to respond in an emergency. Communicating and sharing local knowledge and emergency response best practices is made easier by connecting communities.

When an emergency does occur, in the first phase of response, the BC Emergency Alerting System issues public safety alerts. These alerts are broadcasted through radio and television networks, and a compatible wireless device connected to a high-speed wireless network. By extension, resilient communication connections to and within remote communities improve the delivery and dissemination of alerts in the event of an emergency. A robust and fully functioning alert system has the ability to save lives and reduce the suffering of those affected by an emergency.

Immediately following a disaster, recovery efforts begin and aid is provided to those affected by the emergency. Rural and Indigenous communities that are poorly connected face additional challenges communicating their situation and their needs. Connected communities are better able to coordinate with emergency services to reduce possible conflicts between various assistance strategies and ultimately recover faster.

Connecting remote and Indigenous communities decreases the risk of an emergency occurring, increases preparedness prior to an emergency, increases the resiliency of the community after an emergency, and most importantly, decreases loss of life and suffering when an emergency does occur.

15. Pathways to Technology, Summary of Findings on Broadband Internet as a Sustained Infrastructure for Social Services in the First Nations Communities [pdf from Ministry]



### Case study

#### Earthquake Early Warning in British Columbia

Seismic instruments can rapidly detect an earthquake as it begins to unfold and communicate a warning before shaking arrives. The detection of an earthquake by many sensors can provide rapid estimates of the location and magnitude of an earthquake as it occurs. This information can be used to determine the estimated arrival time and intensity of ground-shaking at specific locations across a region, allowing protective actions to take place before the shaking starts.

Ocean Networks Canada (ONC) operates real-time sensor networks under water and on land by using an advanced data management system: Oceans 2.0. ONC also has the capability to deploy sensors close to the Cascadia Subduction Zone. This proximity to the fault adds valuable warning time to decision-makers and for those in harm's way.

Digital connectivity is a key enabler to earthquake early warning systems, with fibre optic cables and high-speed connectivity forming the vital infrastructure and means of data and information transmission and exchange in alerting authorities and emergency services.

Earthquake early warning is a collaboration among government, academia, industry, and communities including: Ocean Networks Canada, Natural Resources Canada, the BC Ministry of Transportation and Infrastructure, The University of British Columbia, United States Geological Survey, and the University of Washington.

*Source: Ocean Networks Canada, <https://www.oceannetworks.ca/innovation-centre/smart-ocean-systems/earthquake-early-warning>*

### Case study

#### British Columbia and the Tsilhqot'in national

The Collaborative Emergency Management Agreement is the first tripartite agreement of its kind in Canada and a significant step in federal, provincial and Tsilhqot'in national governments working together, learning together, and starting to implement practical changes necessary to help people in the event of an emergency situation in the community. The agreement will also benefit the region, inform work with other Indigenous governments and communities, and contribute to the larger commitment to improve overall emergency management in British Columbia.

Under the Agreement, the three governments will work together to identify leading practices and build on the capacity of the Tsilhqot'in communities in emergency management. The foundation for this work will be the lessons learned during the unprecedented 2017 wildfire season in British Columbia.

The goal of this agreement is to build trust, relationships, strong lines of communication, and enhance connectivity of the community to deliver emergency services in the most efficient and effective way for all British Columbians in the region.

*Source: Government of British Columbia, [https://archive.news.gov.bc.ca/releases/news\\_releases\\_2017-2021/2018IRR0011-000638.htm](https://archive.news.gov.bc.ca/releases/news_releases_2017-2021/2018IRR0011-000638.htm)*



# Provision of Broadband Infrastructure in Rural Communities



Providing universal access to high-speed internet in rural BC and providing cellular connectivity along unconnected highways is important for safety and accessibility. The diverse terrain and geographically dispersed population in much of the province results in high capital costs per person served.<sup>16</sup> This challenge proves to be one of the biggest barriers to making universal 50/10 Mbps a reality in BC.

Timely and affordable access to passive infrastructure across BC is essential to the province's connectivity goals. This type of infrastructure generally refers to the physical assets, such as utility poles, underground ducts and highway rights-of-ways required by telecommunications providers to deploy their networks. It also includes cell towers, building structures, pipelines, and railway rights-of-way.

Responsibilities over access to hydro poles and highway rights-of-way are currently shared across multiple bodies and levels of government, which presents challenges for efficient and effective network deployment. Removing network deployment barriers and using government assets effectively can substantially reduce costs and accelerate the expansion of connectivity in rural BC.

The economic realities of dealing with challenging terrain, low-density coverage (thus limited economy of scale), and, in some instances, limited existing foundational infrastructure to support broadband for many rural and remote communities means broadband infrastructure may not be possible without assistance from other levels of government. This challenge is receiving growing attention. The federal government is acting to review antenna siting and support structure regulations to promote access and the federal government's 2019 budget committed an additional \$1.7 billion over 13 years, beyond previously announced programs, to increase connectivity in

rural areas through investments in fixed fibre; low Earth orbit (LEO) satellites for hard-to-reach communities; expanded access to 'passive infrastructure' comprising poles, towers, and underground pathways; and additional wireless spectrum, among other initiatives.

Provincially, the BC government committed \$50 million in its 2019 budget for projects that will expand broadband access in rural and Indigenous communities.<sup>17</sup> There is effort from the private sector too. Some companies that cannot access existing infrastructure at an affordable price have come up with innovative solutions, such as using old gas or water pipes to bury fibre optic cables.<sup>18</sup> These initiatives will provide much-needed funding and assistance to improve connectivity in rural BC.

## Case study

### Broadband Expansion for the Williams Lake Indian Band

For years, the T'exelc people living near Williams Lake shared a single fibre connection to the band office. In July 2019, BC announced a \$177,000 investment through its Connecting British Columbia program to support a TELUS project that brings fibre optic internet directly to residences and businesses in the community, allowing speeds of up to 750 Mbps. Residents will be better enabled to conduct business online, participate in distance education, and stay connected to family and friends.

Source: [https://archive.news.gov.bc.ca/releases/news\\_releases\\_2017-2021/2019CITZ0047-001504.htm](https://archive.news.gov.bc.ca/releases/news_releases_2017-2021/2019CITZ0047-001504.htm)

16. INDU, Evidence, 1st Session, 42nd Parliament, 8 February 2018, 1535 (Meldrum John)
17. Province of British Columbia Strategic Plan 2019/20 – 2021/22
18. INDU, Evidence, 1st Session, 42nd Parliament, 8 February 2018, 1645 (Pierre Collins)



# Connected Communities

A connected community applies a digital mindset to reimagine itself in the interconnected world of today. Connected communities purposefully integrate technology into all aspects of community development to improve livability, workability and sustainability while leveraging existing resources in new ways to achieve greater economic, social, and environmental outcomes. Communities that are not well-connected and working in this mindset run the risk of becoming isolated and unsustainable.

KPMG's 2018 Connected Communities in BC report introduced the Connected Communities BC Digital Roadmap and highlighted the relationship between access to connectivity, community aspirations and quality of life. Since then, the significance of this relationship has continued to emerge. Based on observations from nearly 30 Connected Community engagements since 2018, a truly Connected Community is one that continuously evolves and innovates, embraces change, and purposefully harnesses connectivity to shape the future in which residents want to live. These communities understand that connectivity infrastructure builds can be as critical and complex as other public utility infrastructure; therefore, they develop connectivity plans that enable them to make better, more informed decisions and develop more targeted investment attraction strategies to achieve greater economic and well-being benefits. They understand that the value of supporting investments for long-term community benefit is the starting point for good strategic positioning.

For local governments, developing a plan for improved connectivity is a multi-step process that involves working with various partners to assess needs, assets, opportunities and infrastructure. Hallmarks of Connected Communities include engaging residents in collaborative and inclusive community building, and taking advantage of the local, regional, and international partnerships that emerge from being globally connected.



## Case study

### Connecting Cumberland (Cumberland, BC)

When the lumber mills and mining activities closed down, the Village of Cumberland struggled. Once a village of more than 3,000 residents, the population fell to fewer than 800 as people moved away due to a lack of jobs.

Being located in the beautifully forested Comox Valley on Vancouver Island, Cumberland had an opportunity to transform itself into a vibrant, youthful, working community. Cumberland is an ideal location for recreational activities such as mountain biking and hiking. Over time, Cumberland leveraged its geography – drawing on the same rivers, lakes and forests that enabled resource extraction, choosing to preserve and enhance its environmental assets and promote other uses of the community-owned forest. At the same time, the village welcomed broadband internet and promoted culture, lifestyle and openness – striving to become a connected community. This has drawn in new residents and provided support to local businesses. There are 180 kilometers of biking trails in the forest, built and maintained by volunteers in the mountain-biking community, which has established Cumberland as an international destination. Its reputation, built through social media networks, has translated to Cumberland playing host to international motocross competitions thus attracting world-class entertainment for locals and visitors. In the words of Leslie Baird, Mayor of Cumberland, “Cumberland is about sharing our ideas across the fence and around the world.”

Today, Cumberland is a growing and prosperous community of more than 3,500 residents. Many young families have moved to the village, bringing new ideas and vibrancy to the community. Further, connectivity has allowed the village to remain rural without being isolated. Residents are able to maintain ties that often aren't available to rural communities, and businesses utilize the internet to work and communicate with clients remotely.

Source: <https://www.northerndevelopment.bc.ca/connecting-british-columbia-success-stories/>



# BC Connectivity Performance



# Broadband Connectivity



Broadband internet refers to connections enabling a download speed of 1.5 Mbps or greater; however, the CRTC has established target speeds of 50 Mbps download and 10 Mbps upload (50/10) for all broadband connections in Canada.

The speed and latency experienced by end-users depends on the capacity of the broadband infrastructure connecting the user to the wider internet. This infrastructure consists of three stages: the 'backbone', the 'middle mile', and the 'last mile'.

The backbone consists of large capacity trunks (usually fibre optics) that transmit large amounts of data, and BC has had successes in extending the fibre optic backbone to many rural communities through its *Strategic Plan*. The middle mile links the backbone to the telecommunication provider's core networks and anchor institutions, such as universities.

The last mile connects the residents of small businesses of a community to the internet, and includes both wireline and wireless delivery methods, including digital subscriber lines, fibre, coaxial cable, and fixed wireless.

Investment in all three stages is required to improve broadband connectivity in rural communities. Innovations and programs to enhance last-mile connections are of particular importance to rural and remote locations due to the challenges inherent in connecting a geographically dispersed population. For these communities, tapping into BC's fibre optic cable backbone lays the foundation for becoming *Connected Communities*.




## A guide to download speeds

Download Speed	Enabling Last-mile Infrastructure	Use Cases
50+ Mbps	<ul style="list-style-type: none"> <li>– Fibre-to-the-Premises (FTTP)</li> <li>– Coaxial cables (TV cables)</li> <li>– 5G-based fixed wireless</li> </ul>	Supports multiple users of cloud-based software applications, telehealth, online learning resources, HD video streaming, VoIP
6 Mbps	<ul style="list-style-type: none"> <li>– Coaxial cables (TV cables)</li> <li>– DSL (phone lines)</li> <li>– Radio-based fixed wireless</li> <li>– Satellite</li> </ul>	Adequate for single user for email, basic web browsing, social media, standard definition video streaming, VoIP
1 Mbps	<ul style="list-style-type: none"> <li>– DSL (phone lines)</li> <li>– Radio-based fixed wireless</li> <li>– Satellite</li> </ul>	Inadequate for online participation – supports basic email and web browsing

Sources: Canadian Radio-television and Telecommunications Commission, *Broadband Report (2011)*; Innovation, Science and Economic Development Canada, *Canada's Connectivity Strategy (2019)*; Federal Communications Commission, *Measuring Fixed Broadband Report (2016)*; Public Service Commission of Wisconsin, *Broadband Reference Guide (2014)*







### Selecting peer jurisdictions

This document compares BC’s broadband connectivity performance against three Canadian provinces, given that they exhibit similar characteristics to BC in terms of geography, population makeup and broadband ecosystem. As such, they face many of the same challenges and conditions as BC when advancing connectivity. Household data and statistics presented in this section is a count relative to population.

 Geography	 Population	 Broadband Ecosystem
<ul style="list-style-type: none"> <li>- Terrain</li> <li>- Landmass</li> <li>- Proximity to BC</li> </ul>	<ul style="list-style-type: none"> <li>- Demographics</li> <li>- Density</li> <li>- Indigenous presence</li> </ul>	<ul style="list-style-type: none"> <li>- ISPs</li> <li>- Competitiveness</li> </ul>

Québec	✓	✓	✓
Ontario	✓	✓	✓
Alberta	✓	✓	✓
Washington	✓		✓
Oregon	✓	✓	✓

### At a glance – BC’s broadband connectivity performance

Performance Metrics	BC versus CDN peers	Versus US peers
<b>Access</b>		
<b>Affordability</b>		
<b>Speed</b>		

 Better than most       Comparable       Worse than most

*Note: Based on most recent available data between 2017–2019.*

# Access

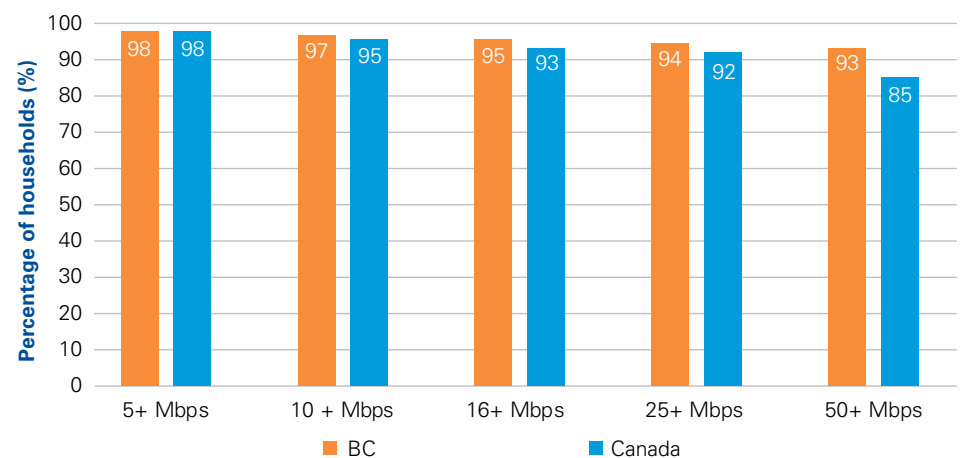
Broadband access is the first facet of participation in the global internet community. It opens opportunities for all BC citizens to join the digital economy and access resources worldwide. These internet-based benefits have an even larger economic and socioeconomic impact for rural or remote areas as broadband levels the playing field for access to opportunities.

Three key components of access are examined: (1) service availability by speed category, (2) data caps on broadband plans, and (3) subscription rates to available plans.

## Highlights

- **BC access above the Canadian average:** British Columbia has a higher access rate than similar jurisdictions within Canada.






## Households with access to various download speeds, 2017



Source: CRTC Communications Monitoring Report 2018

- **Rural communities lack access to high data caps:** Data requirements are increasing as the global internet community becomes more data-intensive.
- **High broadband demand:** BC continues to exhibit one of the highest subscriber rates for broadband among its peers, demonstrating the province's appetite for internet when it is made available.

### Comparison of access metrics

	BC versus CDN peers	Versus US peers
<b>Access metrics</b>		
 Access to basic broadband (5+ Mbps) (2017)	→	↘
 Access to standard broadband (10+ Mbps) (2017)	→	↘
 Access to high-speed broadband (25+ and 50+ Mbps) (2017)	→	↘
 % of plans with data caps versus without data caps (2019)	↘	↘
 Subscription rates (2017)	→	→

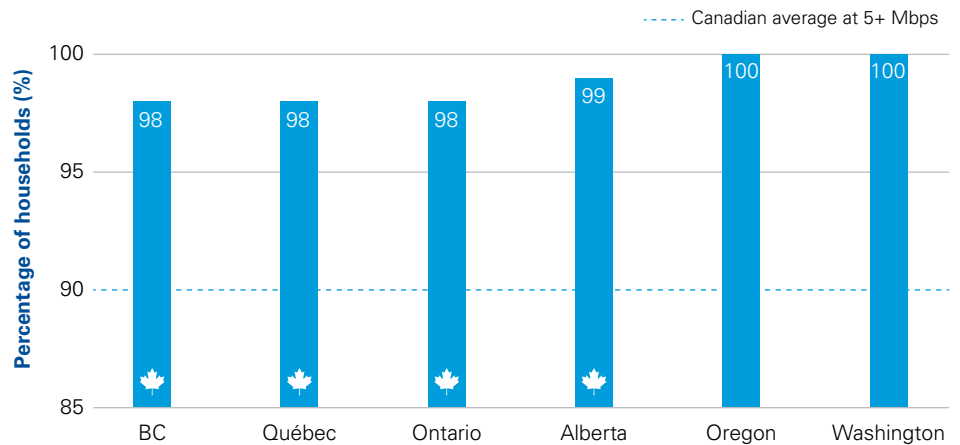
→ Better than most      → Comparable      ↘ Worse than most

Note: Based on most recently available data between 2017-2019

#### Access to broadband (5 Mbps)

Broadband speed of 5 Mbps is considered to be the minimum for many internet activities in today’s modern internet environment. Access to 5+ Mbps has improved to 98% of BC Households – well above the Canadian average of 90%. However, BC lags behind similar American jurisdictions.

#### Households with access to 5+ Mbps broadband, 2017 (Canada and US)

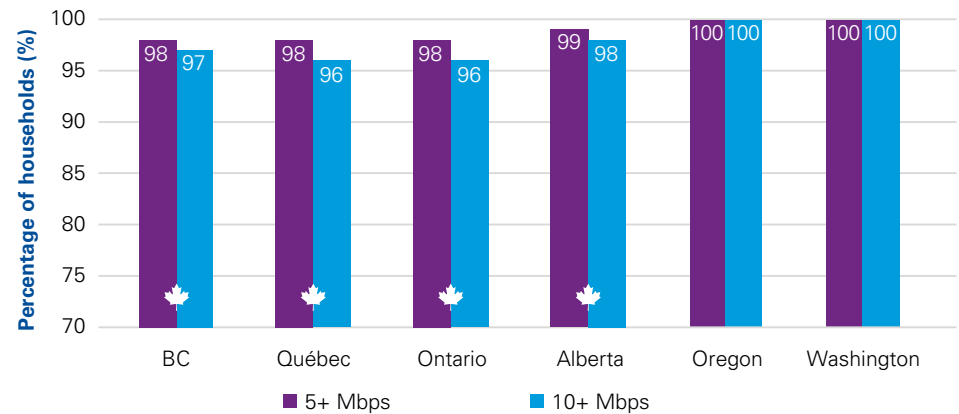


Source: CRTC Communications Monitoring Report 2018, FTC Broadband Deployment Report 2019

### Access to broadband (10+ Mbps)

Access to 10+ Mbps allows for more sophisticated internet activities. Reaching 97% of BC's population, it has surpassed the Canadian provincial average of 96%. However, similar to 5 Mbps speeds, BC lags behind American jurisdictions.

#### Households with access to 5 / 10+ Mbps broadband, 2017 (Canada and US)

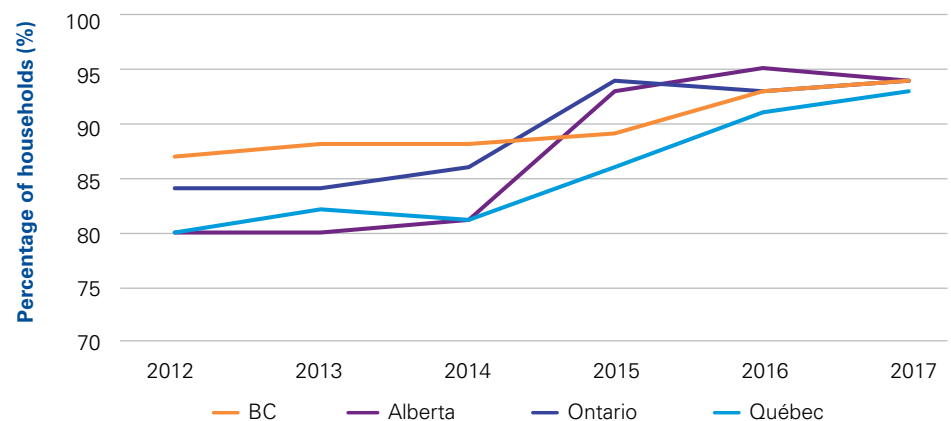


Source: CRTC Communications Monitoring Report 2018, FTC Broadband Deployment Report 2019

### Access to higher broadband speeds (25+ and 50+ Mbps)

Across the province, 94% of households have access to broadband speeds of at least 25 Mbps – an improvement over previous years. However, there appears to be convergence of other Canadian provinces towards similar accessibility to 25+ Mbps broadband.

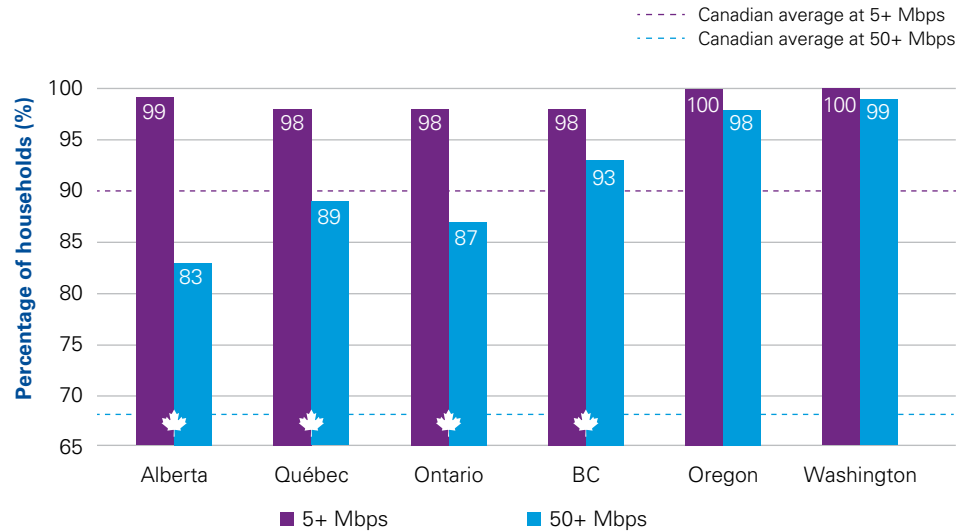
#### Households with access to 25+ Mbps broadband, 2012–2017



Source: CRTC Communications Monitoring Report 2018

BC is ahead of the Canadian average of 85.4%. Connecting the final 6% of BC households will require overcoming challenges such as geographic location, topography, and low population densities. On the other hand, only 33% of rural non-Indigenous communities across British Columbia have access to 50+ Mbps.

**Households with access to 5 / 50+ Mbps broadband, 2017 (Canada and US)**



Source: CRTC Communications Monitoring Report 2018, FTC Broadband Deployment Report 2019

**Access to higher data caps**

With the modern data and technology environment, the strain on data caps is increasing significantly. Limiting the quantity of internet available for people severely limits the capabilities of their internet experience. In contrast, unlimited plans (i.e., No Data Caps) give users the ability to experience the internet uninhibited by constraints. These users can take full advantage of what the modern internet has to offer and can connect with the global environment.

**Practical guide to monthly data caps**

	10 GB	200 GB	300 GB
Email	1,000	10,000	20,000
Video Conferencing	40 hours	400 hours	800 hours
Video Streaming	10 hours	100 hours	200 hours

Source: SaskTel, Xplornet

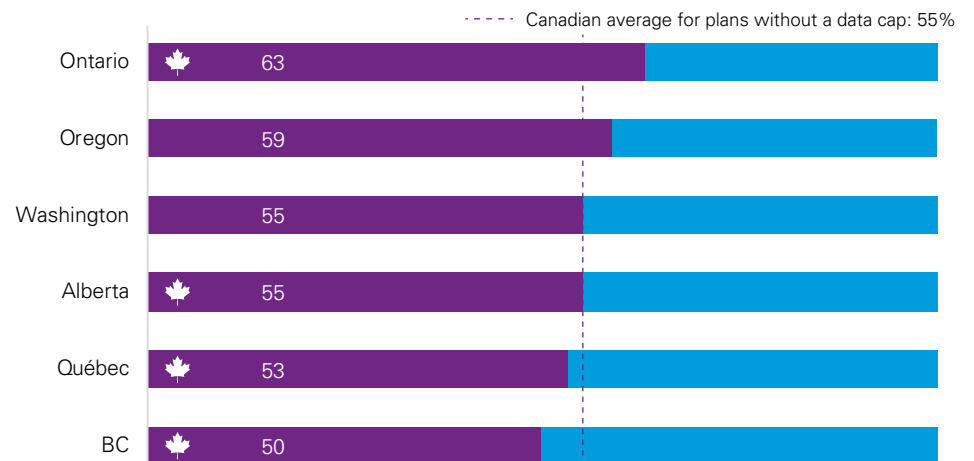
A low data cap is the amount of internet services available to subscribers without incurring any additional fees or experiencing significantly slower speeds which reduce the quality of internet services available.



### BC has the lowest percentage of plans without data caps

KPMG sampled more than 650 broadband plans across peer jurisdictions. The results indicated that Ontario has a higher number of broadband plans without a data cap (i.e., unlimited data), and therefore fewer constraints on subscribers. In comparison, BC has the lowest amount of broadband plans without a data cap, at 50%. This places BC below the 2019 Canadian national average of 55% for proportion of broadband plans without a data cap. The 2019 Canadian national average represents an increase in comparison to the 2018 average of 41%, indicating increasing availability for plans without data caps.

### Broadband plans with and without a data cap, 2019 (Canada and US)



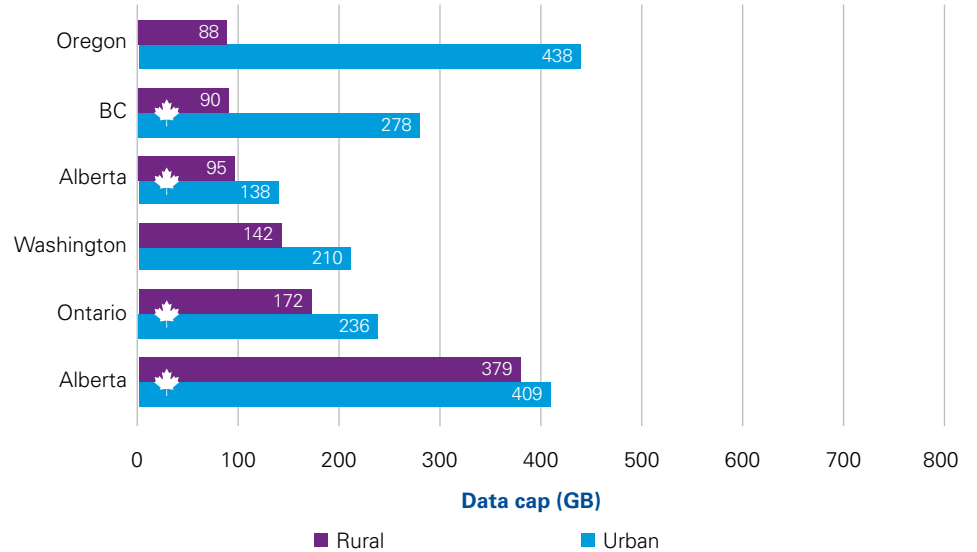
Source: Broadband plan data collected from a sample of ISPs across the selected jurisdictions in July 2019. Figures do not include applicable taxes. Conversion from USD to CAD based on a presumed exchange rate of 1.3 USD/CAD.



### Average size of data caps

BC's rural communities are subject to low data caps on broadband plans, averaging only approximately 90 GB per month. This is significantly less than BC urban communities where the average data cap is 278 GB.

### Average size of limited data caps, 2019 (Canada and US)



Source: Broadband plan data collected from a sample of ISPs across the selected jurisdictions in July 2019

# Affordability

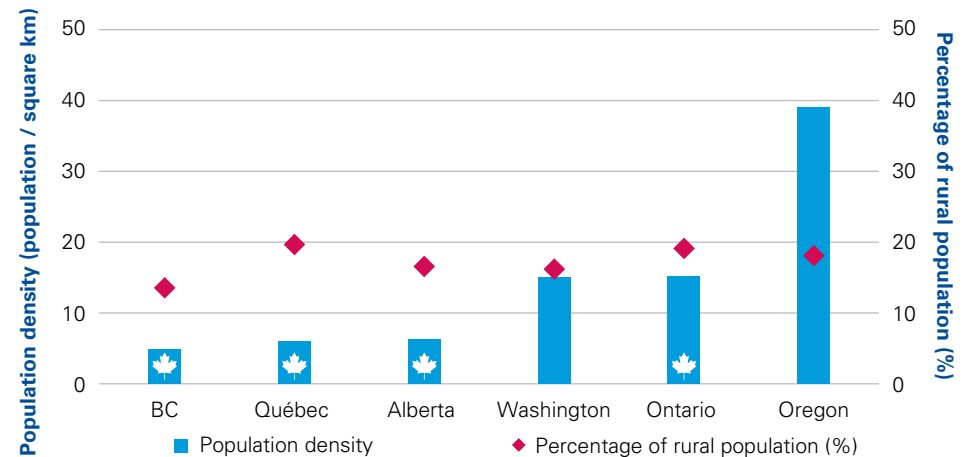
Broadband access and speed increases are important for improvements to communities and businesses, but do not guarantee that these services will get purchased. Broadband needs to be an affordable service in order to enable the bridging of the digital divide in rural communities and for small businesses to capitalize on the changing consumer preferences.

Affordability of broadband is generally a function of population density, geography, local competition, and proximity to backhaul infrastructure. ISPs are able to serve more households in denser populated areas with less infrastructure. This creates downward pressure on market prices in urban areas due to ease of distribution and resulting competitiveness.

## Highlights










- **High internet spending** – BC's internet access spending continues to grow at fast rates and is outpacing the rate of inflation.
- **Rural versus urban price disparity** – The price of a 1-199 GB data cap plan is significantly higher in rural communities than in urban areas.

## Population density and percentage of rural population



Source: StatCan, US Census

### Comparison of affordability metrics

		BC versus CDN peers	Versus US peers
Affordability metrics			
For plans with data caps of 1-199GB and 200+ GB	 Average monthly prices in urban communities		
	 Average monthly prices in rural communities		
	 Price difference between urban and rural areas		

 Better than most     Comparable     Worse than most

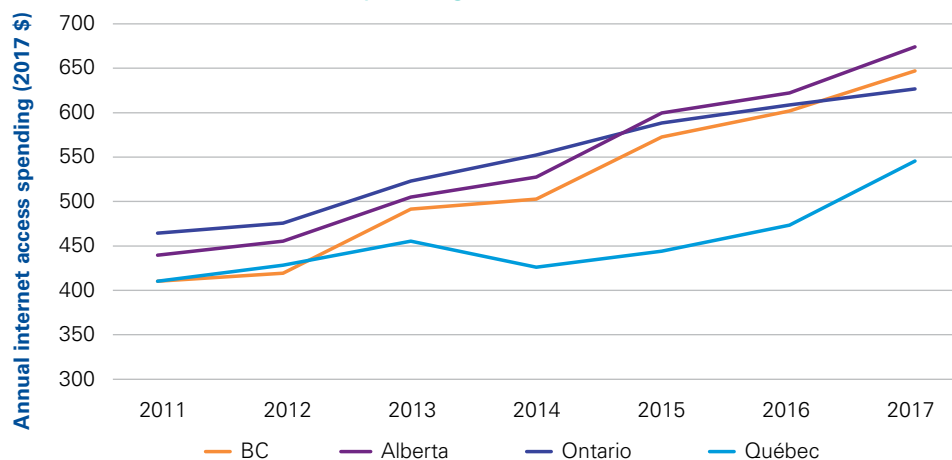
*Note: Based on most recently available data between 2017-2019*



## Internet access spending

Internet access spending continues to increase at a comparatively high rate. In the period between 2011 and 2017, the BC household internet access spending has increased 59% to \$691. The average growth rate in Ontario, Québec, and Alberta is 39% for the same period. From 2016 to 2017, the CRTC reported a growth of 8% in BC's internet access spending. This growth is at a higher rate than peer jurisdictions and outpaced the BC's income growth rate. The BC median household income has increased 6.6% for the period between 2010 and 2015.

### Household internet access spending, 2011–2017

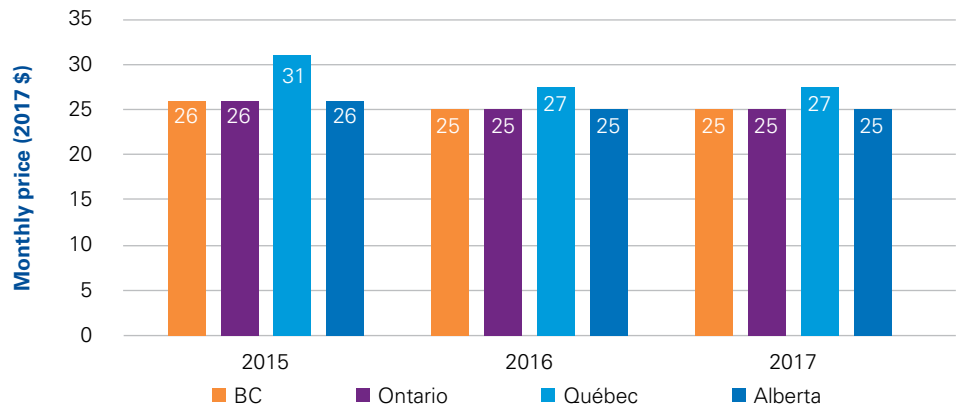


Source: CRTC Communications Monitoring Report 2018

### Broadband plan prices

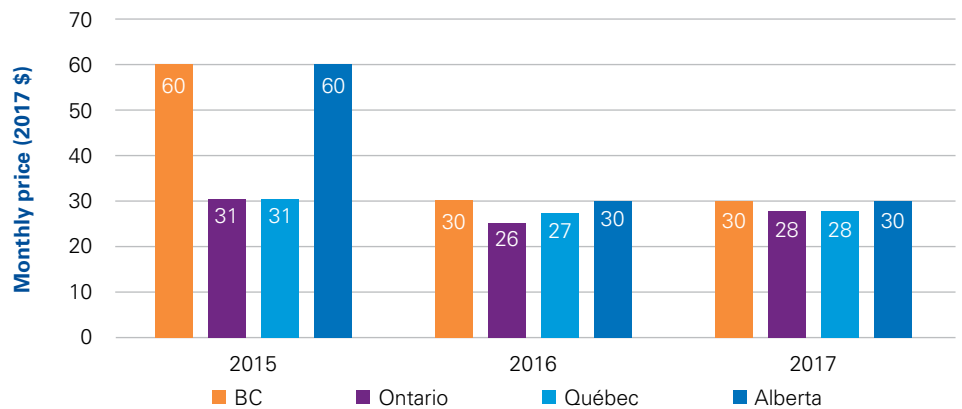
The minimum monthly price for a 5 Mbps plan in urban communities has remained consistent since 2015. In rural communities, the price nearly halved to approximately \$30 in 2016. The \$30 price continued into 2017. More citizens of rural communities can now have access to a 5 Mbps plan at a more affordable price, which enables core online health and education services.

#### Minimum price for a 5 Mbps plan in **urban** communities, 2015–2017



Source: CRTC Communications Monitoring Report 2018

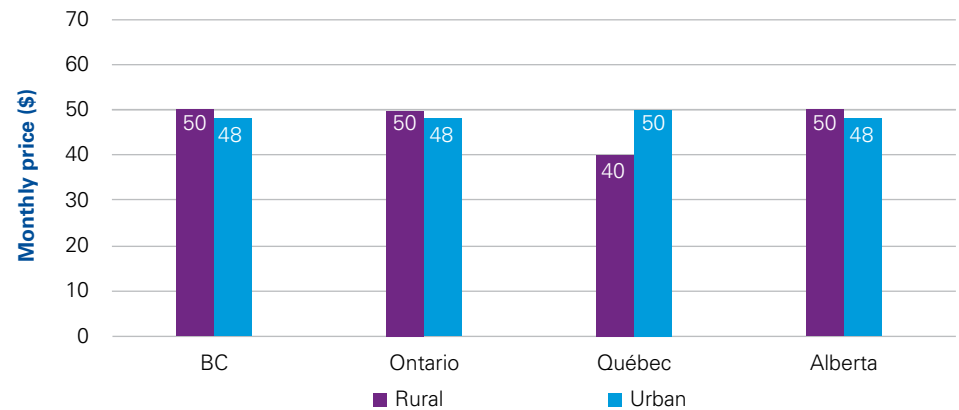
#### Minimum price for a 5 Mbps plan in **rural** communities, 2015–2017



Source: CRTC Communications Monitoring Report 2018

The minimum monthly price for a 50 Mbps plan across different provinces is identical between the urban and rural areas. This indicates that rural residents have more affordable access to CRTC target internet speeds.

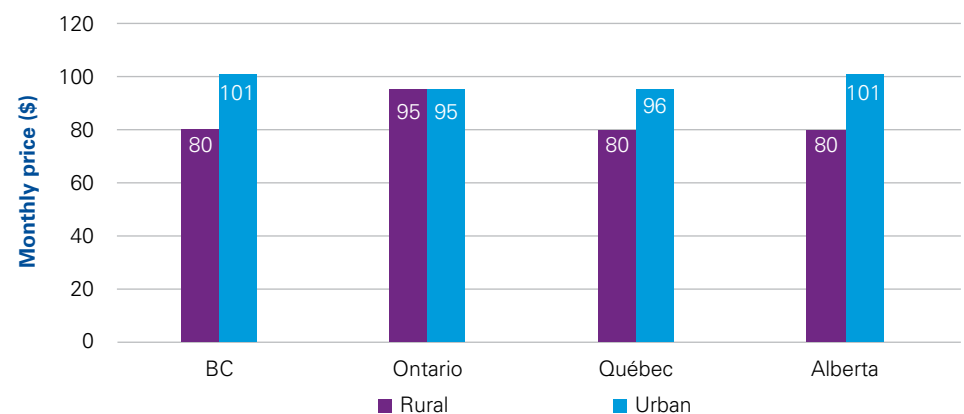
### Rural and urban **minimum** price comparison for a 50 Mbps plan, 2017



Source: CRTC Communications Monitoring Report 2018

The maximum monthly price for a 50 Mbps plan is \$110 in urban BC, which is higher than rural BC's \$80. This trend is similar in Alberta. In comparison to last year, the difference between urban and rural areas has increased. The trend indicates that the variance in prices between urban and rural communities is not balancing.

### Rural and urban **maximum** price comparison for a 50 Mbps plan, 2018



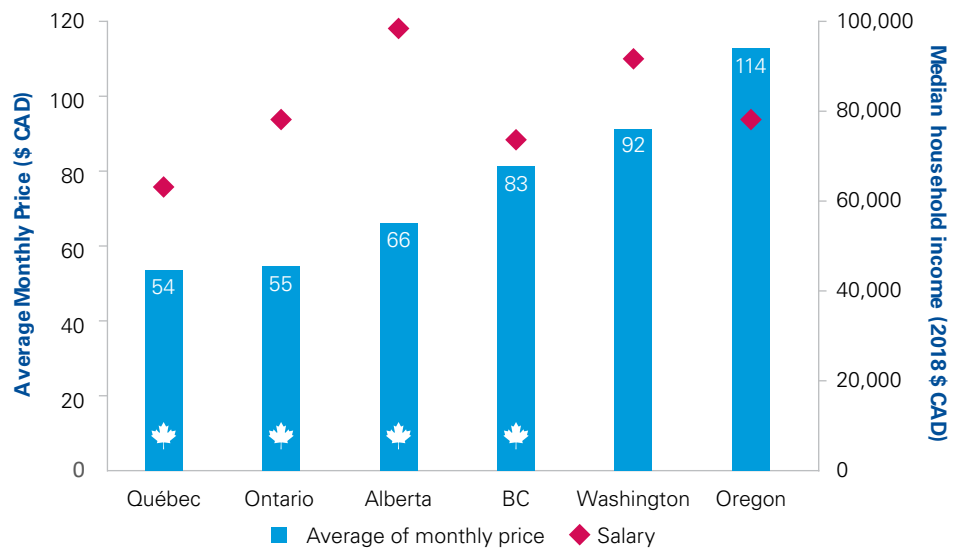
Source: CRTC Communications Monitoring Report 2018

### Broadband plan prices by data cap

Average data usage in Canada has increased 30% to 166.2 GB per month from 2016 to 2017 (according to a CRTC Communications Monitoring Report). This is largely driven by entertainment streaming services and the growth in connected devices. As this data usage increases, broadband plans need to remain affordable at higher data caps in order for subscriptions to maintain access to quality internet.

BC has one of the highest rural broadband prices for 1-199 GB data cap plans when compared to the median household income in the province. ISPs generally charge a premium over urban communities as a method to recuperate some of the costs of the expensive infrastructure to bring broadband to rural areas. BC's comparatively lower income to other jurisdictions makes broadband plans more unaffordable. Residents may lack the financial means to purchase the plans, which limits access to internet services.

#### Prices for a 1–199 GB data cap plan in rural communities, 2019 (Canada and US)

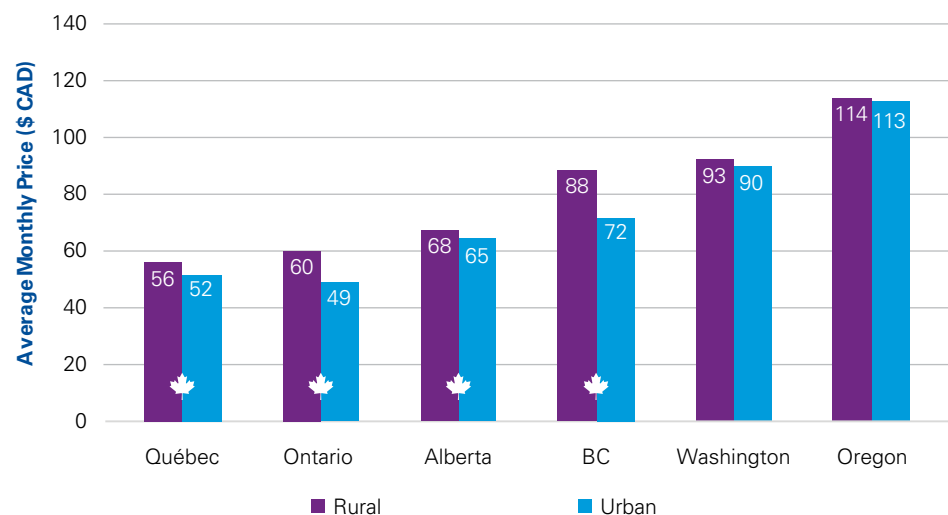


Source: Broadband plan data collected from a sample of ISPs across the selected jurisdictions in July 2019. Figures do not include applicable taxes. Conversion from USD to CAD based on a presumed exchange rate of 1.3 USD/CAD. StatCan. US Census.



BC’s rural communities were reported to have a 23% price premium compared to urban communities for 1-199 GB cap broadband plans. The average markup for the same plan for the other jurisdictions surveyed was approximately 15%. This indicates that BC’s rural communities pay a significantly higher premium relative to the urban communities compared to other jurisdictions.

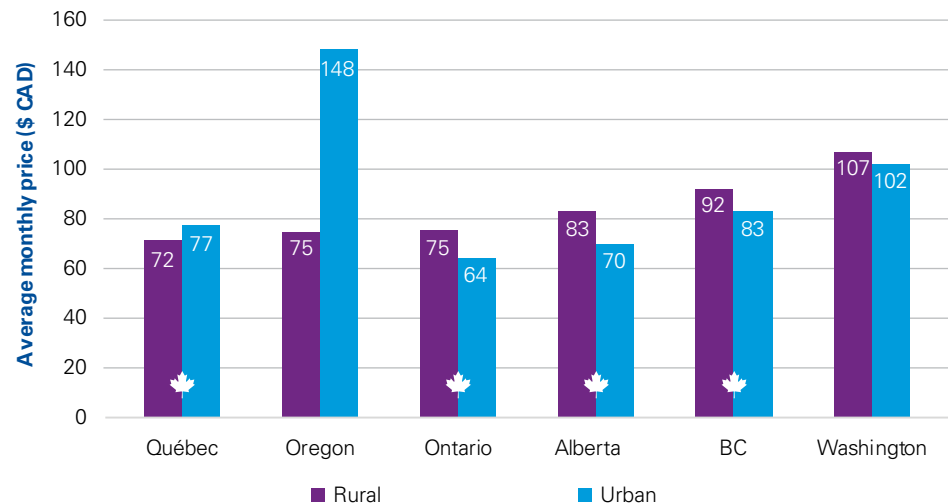
**Price comparison for plans with 1–199 GB data caps, 2019 (Canada and US)**



Source: Broadband plan data collected from a sample of ISPs across the selected jurisdictions in July 2019. Figures do not include applicable taxes. Conversion from USD to CAD based on a presumed exchange rate of 1.3 USD/CAD.

For 200GB+ Data Cap Plans, BC’s rural communities command an 11% markup compared to urban communities.

**Price comparison for plans with 200+ GB data caps, 2019 (Canada and US)**



Source: Broadband plan data collected from a sample of ISPs across the selected jurisdictions in July 2019. Figures do not include applicable taxes. Conversion from USD to CAD based on a presumed exchange rate of 1.3 USD/CAD.

# Speed

Speeds experienced by the end-consumer may differ from the advertised speeds. Reasons can include the number of devices being used on the connection, router distance, site traffic, time of day, and more. Internet access is limited by the speed of the end-consumer. Analyzing the performance of BC's broadband speed rounds out the broadband performance assessment.

The analysis performed is limited to the download and upload speeds. (Other internet performance metrics such as latency, jitter, and others are not provided at the provincial or US state level.)

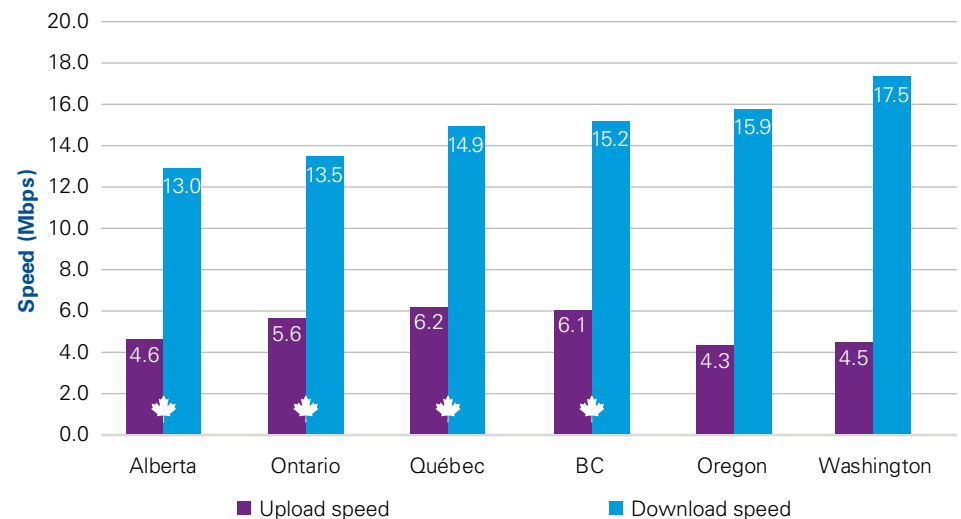
## Highlights

- **Leading download speeds in Canada:** At 15.2 Mbps, BC's median broadband download speed leads all peer Canadian jurisdictions, indicating a high quality of existing broadband infrastructure.
- **Significant improvements in upload speed:** BC experienced an increase of 1.9 Mbps (45%) in upload speed during 2018.

## Actual download and upload speeds

M-Lab's 2018 speed test shows BC's median download speeds have decreased slightly since 2017 from 16.3 to 15.2 Mbps. However, the upload speed for BC has improved from 4.2 to 6.1 Mbps in the same period. BC ranks first for median download speed and second for median upload speed amongst its Canadian peers.

### Median broadband download and upload speeds, 2018 (Canada and US)

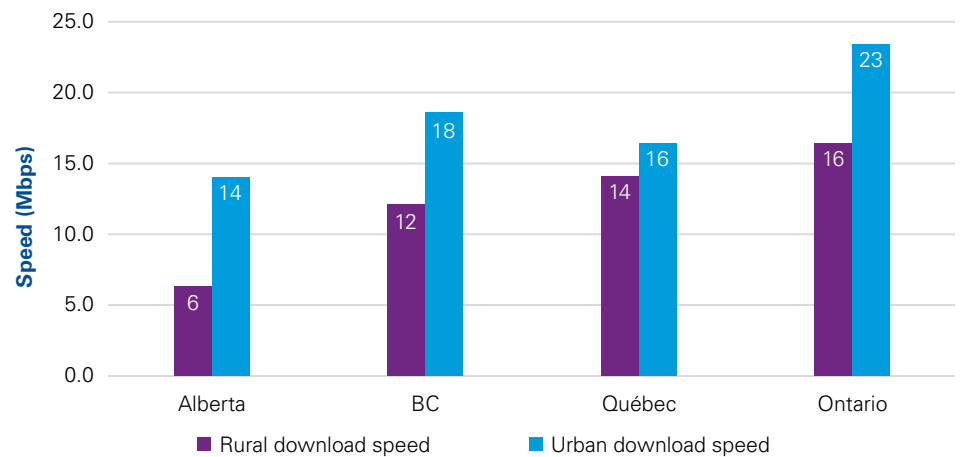


Source: M-Lab Data as of July 2019

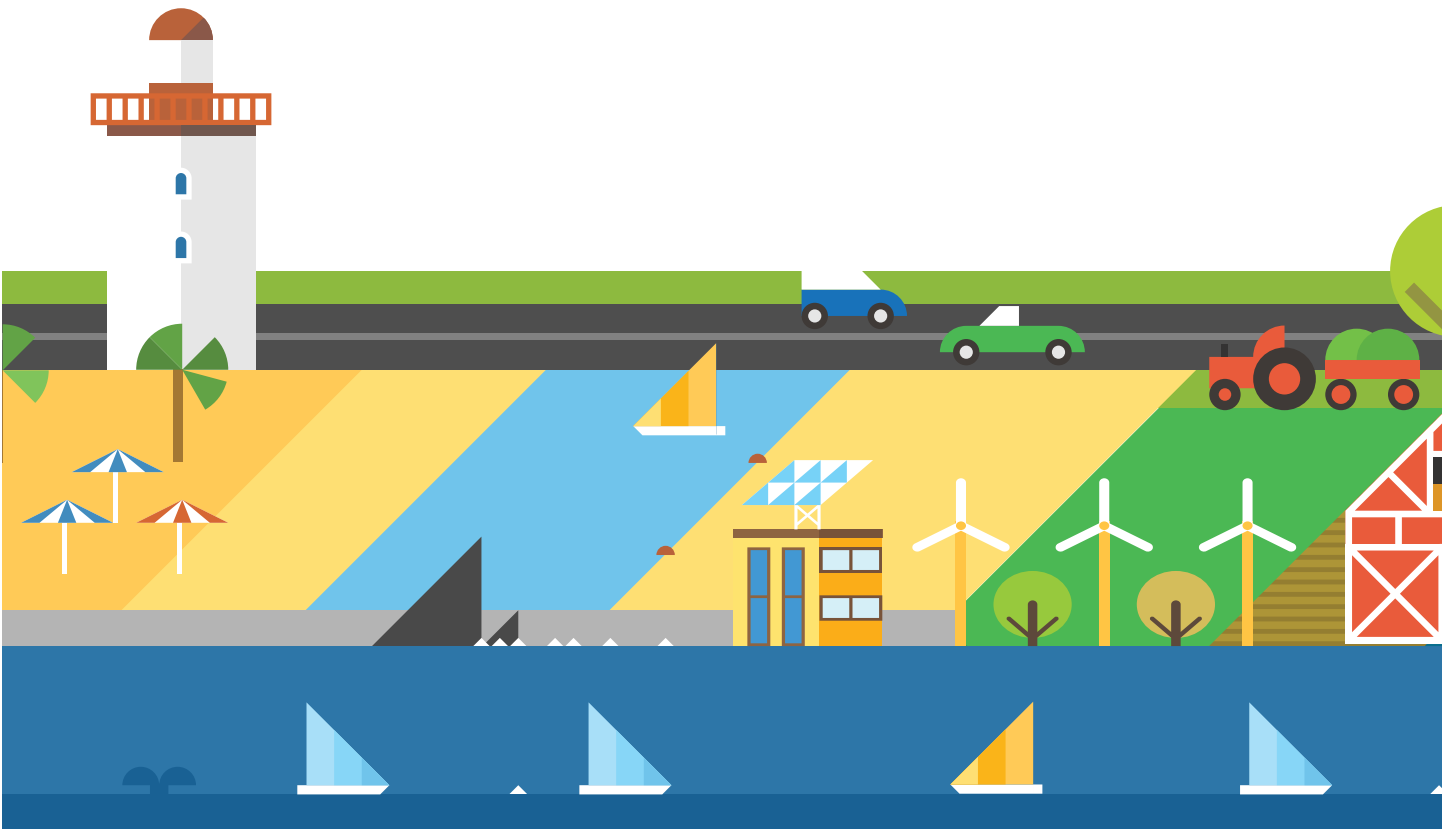
## Difference between download speeds in urban and rural areas

A Canadian comparison of actual download speeds between urban and rural areas reinforces the notion of the urban-rural divide. Using data collected from the Canadian Internet Registration Authority, the urban-rural difference is especially prominent in Ontario and Alberta with a difference of 7.6 Mbps and 7.7 Mbps respectively. For BC, the difference between urban and rural is not as dramatic, at 6.1 Mbps. There is room for improvement for download speeds in BC's rural areas, but the province is mainly in line with its provincial counterparts.

### Average rural and urban download speeds, 2015



Source: Canadian Internet Registration Association as of December 2016



# Cellular Connectivity

In 1991, the first generation of mobile data was introduced. It enabled users to make person-to-person calls through mobile phones. The next generation, 2G, or GSM, had additional key capability to send text messages between mobile phones. 2G was also capable of offering users multimedia messaging services, or MMS, including GPRS and EDGE (enhanced data options and speeds) on mobile phones.

With the introduction of 3G technology, wireless access to the internet through mobile devices paved the way for greater connectivity worldwide, wherever the technology was supported. Despite their introduction in the early 2000s, 3G technologies have not become available everywhere in Canada.

4G was introduced in 2010. According to the International Telecommunications Union Radiocommunication Sector, 4G must offer worldwide functionality and roaming, compatibility of services, networking with other radio access systems, and enhanced peak data rates (100 Mbps downstream for high-mobility and 1Gbps for downstream for low-mobility).

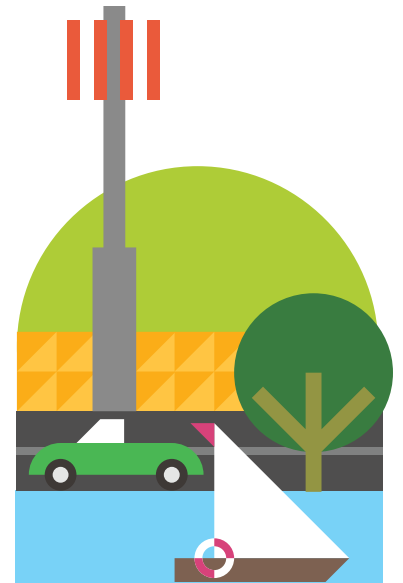
Long-Term Evolution, or LTE, is 4G technology that improves upon 4G, but is not substantial enough to qualify as new generation. It is reported that users are expected to experience the fastest connection to mobile internet experience; i.e., 10 times faster than 3G. As of 2017, 93% of BC's population has access to LTE wireless coverage, which is less than the Canadian average. There is opportunity to expand LTE coverage in rural BC for both mobile coverage and fixed wireless connections.

## The 5G Revolution

The fifth generation of wireless technology – 5G – has the ability to provide fibre-like speeds over wireless networks, delivering more data to more devices, more quickly. It is expected to revolutionize the world in coming years through new capabilities. In rural communities, interconnected autonomous farm equipment, miniaturized weather stations, and soil sampling – all enabled by 5G – can result in higher crop yields and profits for farmers. Advancements in 5G-enabled telehealth solutions, such as virtual physical therapy, could improve rural and remote health outcomes by broadening access to specialized healthcare.

5G also has the potential to significantly expand access to 50/10 broadband internet in rural communities. According to a report by Accenture<sup>19</sup>, 5G-based fixed wireless could reduce the initial cost of establishing last-mile connectivity by up to 40% and accelerate roll out compared to fibre-to-the-premises; as of 2019, Canadian telecommunications providers are exploring such technologies.

For rural communities in BC, the propagation of 5G-enabled technology would provide many opportunities, but there is still much work to be done to connect rural communities to LTE networks and the fibre-based internet backbone.

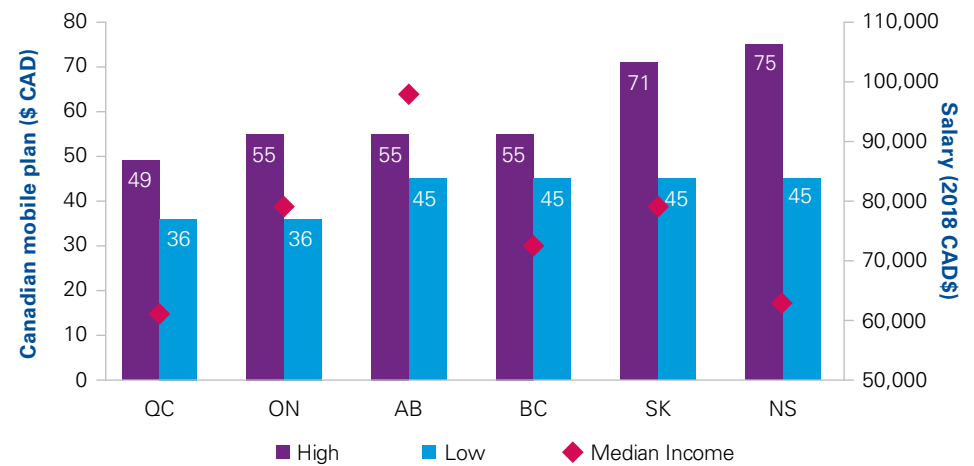


19. [https://www.5gcc.ca/wp-content/uploads/2018/06/CWTA-Accenture-Whitepaper-5G-Economic-Impact\\_Updates\\_WEB\\_06-19-2018.pdf](https://www.5gcc.ca/wp-content/uploads/2018/06/CWTA-Accenture-Whitepaper-5G-Economic-Impact_Updates_WEB_06-19-2018.pdf)

### Affordability

British Columbia’s cellular prices are higher than Canadian peers with a high-end monthly price of \$55 and a low-end monthly price of \$45 for an Unlimited Talk + 5GB Data Mobile Plan. Prices in BC are comparable to Alberta and higher than Ontario, despite those provinces having a higher median household income. The result is that British Columbians have to spend a higher proportion of their income on cellular plans.

### High / Low Cellular Prices (Unlimited Talk + 5GB Data) plotted with Median Income

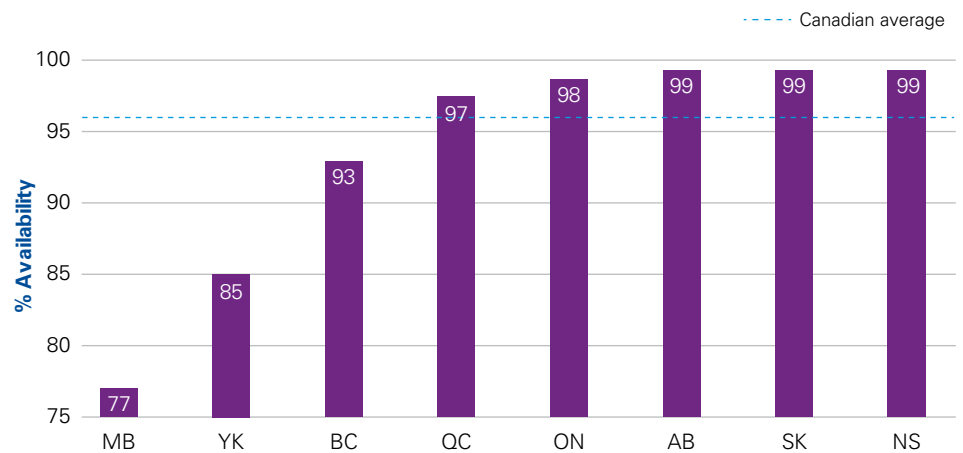


Source: CRTC Communications Monitoring Report 2019, StatCan

### Access

In 2017, 93% of BC’s rural population had access to LTE wireless coverage. This ranks 3% below the Canadian average. This is indicative of much-needed infrastructure and connection capabilities in certain rural areas in BC.

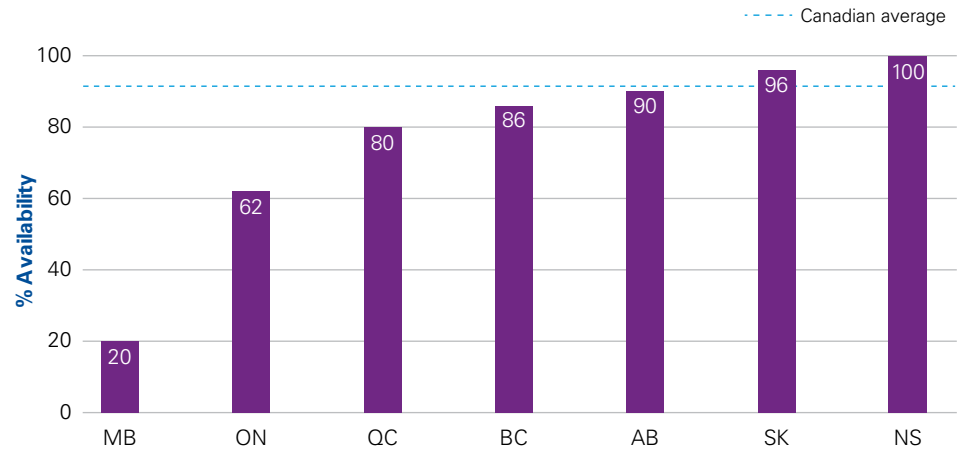
### Rural Community Mobile Service Availability (LTE)



Source: CRTC Communications Monitoring Report 2019

In 2018, BC's indigenous reserve mobile LTE availability is 86% of the population, which is above the Canadian average by 14%. Some Canadian provinces, such as Saskatchewan and Nova Scotia have the highest LTE mobile service availability in Indigenous reserve areas.

### Indigenous Reserve Area Mobile Service Availability (LTE)

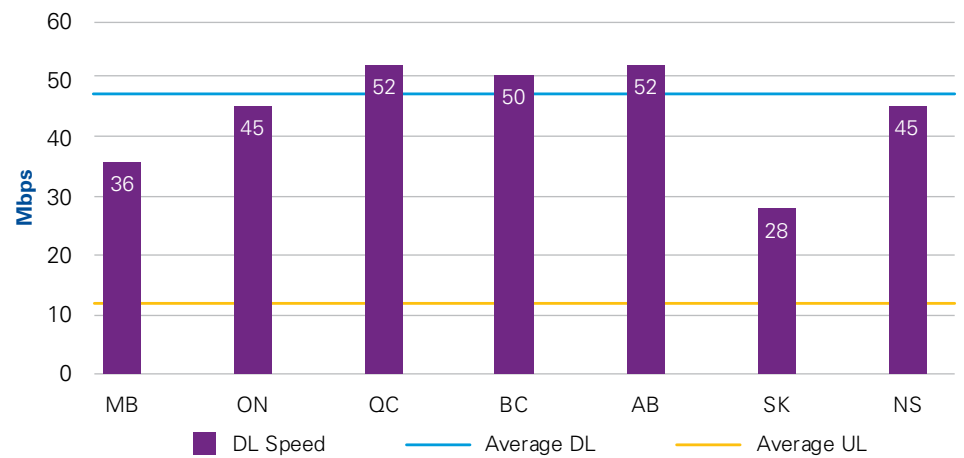


Source: CRTC Communications Monitoring Report 2019

### Speed

Cellular download speeds across Canada average 47 Mbps with a large disparity between the fastest and slowest provinces. At an average speed of 50 Mbps, BC is ahead of the national Canadian average but lags behind some other provinces.

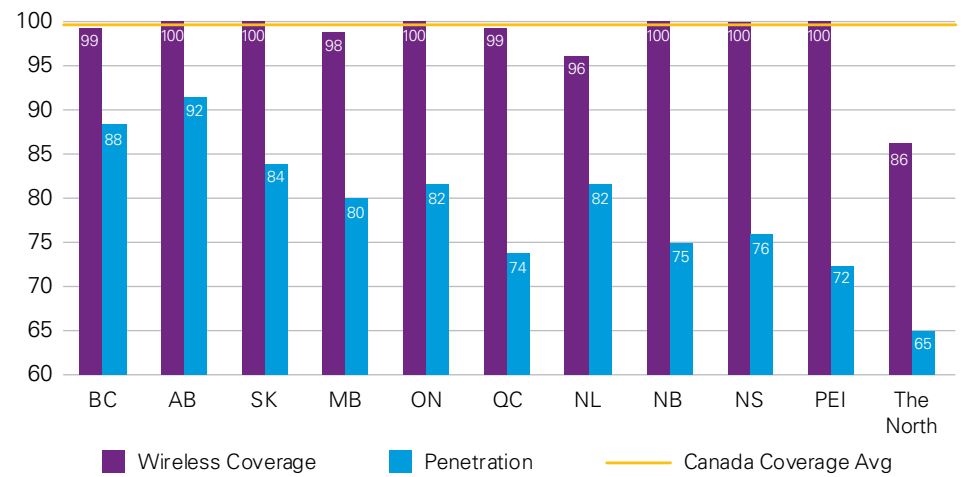
### Cellular Download and Upload Speeds



Source: Speedtest Canada Mobile Report 2018

Wireless coverage (proportion of Canadians covered by a cellular network) is consistent among Canadian provinces, with the three territories (the North) lagging behind. All provinces had over 95% coverage. BC ranks among the best for wireless penetration at 88%, signaling consumer appetite for services requiring wireless connections.

**Wireless coverage percentage – proportion of population covered by a cellular network**



Source: CRTC Communications Monitoring Report 2017



# Internet Connectivity Internationally

In 2018, *The Economist magazine* (in partnership with Facebook) ranked Canada tenth in an inclusive internet index ranking (out of 86 countries). According to the 2019 index, Canada has been promoted to number six in inclusive internet index global ranking (out of 99 countries).



Global ranking in 2019		Country
1		Sweden
2		Singapore
3		United States
4		Denmark
5		United Kingdom
6		Canada
7		Finland
8		Spain
9		South Korea
10		France
11		Poland
12		Japan
13		Portugal
14		Switzerland
15		Australia

*Note: The Economist's ranking includes wireless cellular internet connectivity in their scoring. Scores are assessed on "availability, affordability, relevance and readiness." Source: The Economist, The Inclusive Internet Index 2019.*



### Why the following countries were selected for comparison with Canada with respect to access, affordability and speed

#### US

The United States is similar to Canada in geographic size and diversity. Our analysis also compares select west-coast states with BC and similar Canadian jurisdictions.

#### UK

The UK exemplifies strong and effective government action to increase broadband connectivity, and is similar to Canada in government structure.

#### Australia

Australia has similar geographic features, native population, population density, and is a case study for government intervention in broadband connectivity.

The following illustrative diagram compares Canada's internet performance against the US, UK, and Australia based on availability, affordability, relevance and readiness. Similar to the results from last year, the UK showcases better overall ranking across the spectrum in comparison to Canada, with better connectivity infrastructure and higher percentage of connected population. The results also suggest that internet service in Canada offers superior speed in comparison to the US. Furthermore, Australia demonstrates the weakest connectivity availability and affordability.

### Canada's ranking on key internet performance dimensions versus select leading countries based on four key domains, 2018

	Availability	Affordability	Relevance	Readiness
1	UK	Canada	US	UK
2	US/Canada	US	Australia	Australia
3	N/A	UK	Canada	Canada
4	Australia	Australia	UK	US

The Inclusive Internet Index 2019 research measures four domains:

**Availability:** quality and breadth of available infrastructure required for access and levels of internet usage

**Affordability:** cost of access relative to income and the level of competition in the internet marketplace

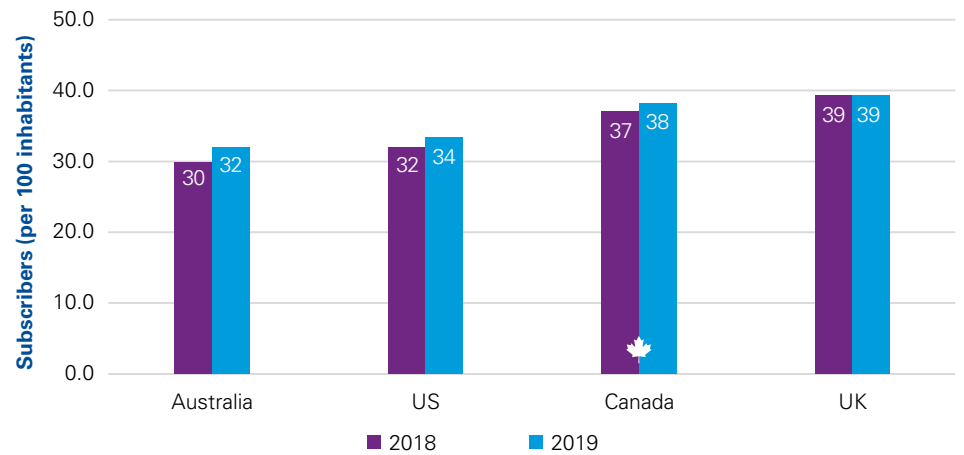
**Relevance:** existence and extent of local language content and relevant content

**Readiness:** capacity to access the internet, including skills, cultural acceptance and supporting policy

Source: *The Economist, The Inclusive Internet Index 2019*

According to *The Economist*, The Inclusive Internet Index 2019, Canada was ranked ahead of the US and Australia in terms of the number of fixed-line broadband subscribers. The latest data from International Telecommunication Union (ITU) suggests that the number of fixed-line broadband subscribers in 2018 were subject to a 2% increase, in comparison to figures reported in 2017.

### Fixed-line broadband subscribers, 2018–2019

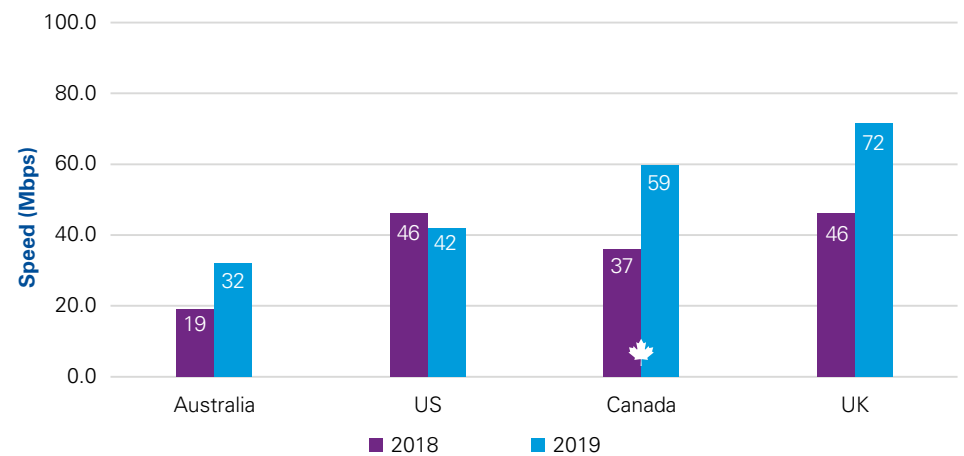


Note: EIU Data for access measures such as access to different broadband bandwidth are not available.

Source: *The Economist*, *The Inclusive Internet Index 2019*

Canada has made significant progress to achieve 68.8 Mbps in average fixed broadband download speed in comparison to 2016 (25.9 Mbps) and 2017 (36.6 Mbps). With a 61% increase in average fixed-line broadband download speed, Canada recorded the highest level of percentage increase over the US, Australia and UK.

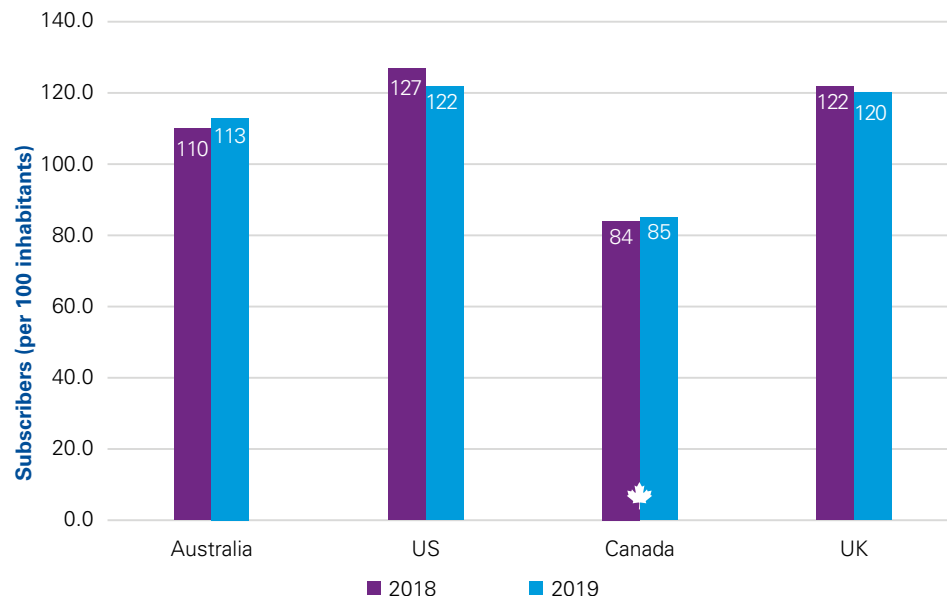
### Average fixed broadband download speeds, 2018–2019



Source: *The Economist*, *The Inclusive Internet Index 2019*

The world's population relies increasingly on their mobile devices to access the internet. In 2018, there were 85.9 mobile cellular telephone subscribers per 100 inhabitants. The figures represent 2% increase in the number of subscribers from 2017.

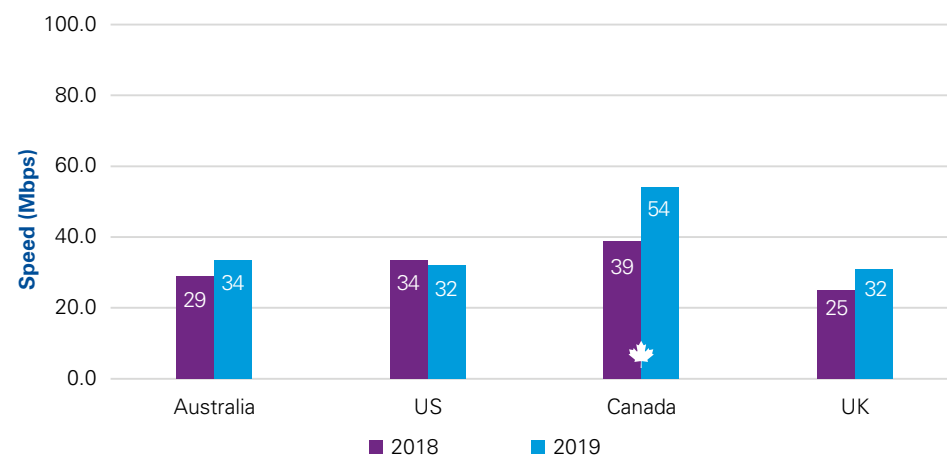
### Mobile-cellular telephone subscribers, 2018–2019



Source: *The Economist, The Inclusive Internet Index: Measuring Success 2018*

Canada is ranked 4/100 in average mobile download speed, ahead of the UK, US, and Australia. Based on data collected by Cisco and OpenSignal, Canada demonstrated a 38% increase in average mobile download speed in 2018 in comparison to 2017. This is ahead of the progress demonstrated by Australia (+20%), UK (+26%) and US (-5%).

### Average mobile download speeds, 2018–2019



Source: *The Economist, The Inclusive Internet Index: Measuring Success 2018*

## United Kingdom

New government policies and initiatives express strong commitment to successful delivery and roll out of superfast broadband across the UK. In July 2018, The Future Telecoms Infrastructure (FTIR), announced as part of the government's modern Industrial Strategy, proposed a series of changes that are needed to give the majority of the population access to 5G, connect 15 million premises to full fibre broadband by 2025, and provide full fibre broadband coverage across all of the UK by 2033<sup>20</sup>. Furthermore, given that 5G technology is heavily reliant on existing fibre infrastructure, it's crucial that the 5G roll out is not compromised by the lack of infrastructure to accommodate the technologies needed.

In November 2018, the House of Commons published a Briefing Paper titled Superfast broadband in the UK. The paper reiterated the importance of the "Superfast broadband programme," under which local bodies and the devolved Administrations draw up broadband delivery plans and procure contracts with broadband providers to build infrastructure to target areas in their regions.

Furthermore, the government provides a series of support schemes to those without superfast broadband, including but not limited to:

- **Voucher schemes:** Set to run until December 31, 2019, the UK's Better Broadband Scheme provides vouchers to homes and businesses that are unable to access a broadband service with a download speed of at least 2 Mbps by way of affordable broadband connection. According to superfast broadband in the UK, an affordable broadband connection is defined as one that costs the customer no more than 400 GBP (British pounds) in the first year. The vouchers are available to support the cost of installing gigabit-capable connections in rural areas and to small and medium sized businesses anywhere in the UK.
- **Universal Service Obligation (USO) – from 2020:** USO provides a legal right to request a broadband connection of 10 Mbps download speed and 1 Mbps upload speed, up to a cost threshold of 3,400 GBP. The scheme is planned to be available in 2020, and is currently undergoing preparation for practical delivery of the USO.
- **Community-led schemes:** Those communities without superfast broadband can consider developing their own community-led scheme to introduce fibre broadband to their area. The government has published a series of guidelines and case studies that provide more information about how communities can submit requests for funding and support.

**Lessons learned:** To ensure that planned investments in high-speed connectivity meet the demand of long-term demand, it's important that basic infrastructure systems are in place to accommodate for future infrastructure demands. Moreover, governments should explore how financial supports could be put in place to rural populations in order to meet the cost of installing high-speed internet connections to individual households or businesses.

20. Gov.UK, Forging a full fibre broadband and 5G future for all, 2018



## United States

Almost 20% of the American population lives in rural areas. Of those, one quarter have access to less than 10 Mbps internet connection. According to the Federal Communications Commission (FCC), nearly 15 million people in rural areas across the country are still waiting for reliable threshold internet speed. In tribal areas, nearly one-third of the population lacks access to threshold internet speed. FCC's Eighth Broadband Progress Report notes that broadband is not yet being deployed in a reasonable and timely fashion across the US. The report concludes that until the Commission's Connect America reforms are fully implemented, these gaps are unlikely to close.

In response to some of the existing broadband connectivity gaps in rural areas, the United States Congress passed the Consolidated Appropriations Act, 2018, which established a new broadband loan and grant pilot program, titled the Rural eConnectivity Pilot Program (ReConnect Program). The United States Department of Agriculture (USDA) reports that the Act will expand its upcoming level of longstanding programs in rural telecommunication infrastructure investment by almost double to allow for additional funds to expand rural broadband infrastructure in unserved rural areas and tribal lands. The Act offers up to \$600m USD in loans and grants (\$200m USD for grants, \$200m USD for loan and grant combinations, and \$200m USD for low-interest loans) to be used on expedited basis<sup>21</sup>.

**Lessons learned:** Local and federal governments can support better connectivity by creating legislations, laws, policies and incentives to engage and attract community-led enterprises, co-ops and companies to take part in advancement and development of high-speed internet connectivity in rural areas.

21. <https://www.usda.gov/reconnect/program-overview>  
<https://www.usda.gov/media/press-releases/2018/12/13/usda-launches-new-program-create-high-speed-internet-e-connectivity>

# Appendix - Glossary of Terms

Acronym	Definition
50/10	50 Mbps download speed and 10 Mbps upload speed
5G	Fifth generation of wireless technology
AI	Artificial Intelligence
ANTCO	All Nations Trust Company
CRTC	Canadian Radio-television and Telecommunications Commission
DSL	Digital subscriber line
EMBC	Emergency Management BC
FCC	Federal Communications Commission
GBA+	Gender-Based Analysis Plus
Gbps	Gigabits per second (one billion bits per second)
GIS	Geographical information system
LTE	Long-Term Evolution
Mbps	Megabits per second (one million bits per second)
NAEDP	Nelson and Area Economic Development Partnership
OECD	Organization for Economic Co-operation and Development
ONC	Ocean Networks Canada
SME	Small and medium enterprise
USDA	US Department of Agriculture



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