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Canada



HIGH-SPEED ACCESS FOR ALL: CANADA'S CONNECTIVITY STRATEGY

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ISBN: Iu173-9/2019E-PDF
978-0-660-31570-6

Aussi offert en français sous le titre *La haute vitesse pour tous : la stratégie canadienne pour la connectivité*

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A MESSAGE FROM THE MINISTER OF RURAL ECONOMIC DEVELOPMENT

As Canada's first-ever Minister of Rural Economic Development, I am pleased to present *High-Speed Access for All: Canada's Connectivity Strategy*.

In my travels as Minister, I have heard from Canadians from coast to coast to coast that access to affordable high-speed Internet and mobile wireless coverage is critical to the continued vibrancy and success of rural Canada.

The Internet is driving social and economic progress on a scale that is comparable with past leaps forward, like bringing electricity into our communities. It increases our quality of life, and our country's prosperity.

Our government is taking real action to build high-speed networks to connect all Canadians. In 2016, we started with the Connect to Innovate program that will enhance access for more than 380,000 homes in 900 communities, including 190 Indigenous communities. Broadband projects are also eligible through a suite of programs, including the \$2 billion Rural and Northern Stream of the Investing in Canada Infrastructure Program, and the CRTC's \$750 million Broadband Fund.

In Budget 2019, we made a bold commitment to connect all Canadians to reliable high-speed Internet. This commitment came with an additional \$1.7 billion in new funding that will build upon our action to date. In total, we are delivering up to \$6 billion in investments to connect all Canadians.





Connectivity is creating new possibilities for communities – it enables economic development opportunities and access to key tools like telehealth and learning applications.

This Strategy outlines how we are aligning efforts to reach our ambitious goal through collaboration. We look forward to building on existing partnerships with the private sector, provinces, territories, municipalities, Indigenous communities, and official language minority communities. This Strategy is linked with the Rural Economic Development Strategy’s vision to build strong and resilient local communities.

We are working together with partners to ensure that all Canadians have access to high-speed connectivity, no matter where they live. It is essential that Canadians in rural and remote communities can fully engage with each other, the rest of Canada, and the global economy.

I am proud to present this commitment and action plan to my fellow Canadians.

**The Honourable Bernadette Jordan,
Minister of Rural Economic Development**



OVERVIEW

Canadians from all communities, both urban and rural, rely on access to reliable, affordable, high-speed Internet and mobile connectivity. It is essential for personal and professional communications, to grow a business, to apply to jobs, to do homework and to access government services. The ability to get a cellphone signal is also critical for public safety. High-speed connectivity will become more critical as Canada's economy evolves and embraces the technologies of tomorrow. Simply put, the Internet is no longer a luxury – it is a necessity.

Canada faces a **national connectivity gap**. Rural Canadians face the daily challenge of slower, less reliable Internet access than those in urban centres.

Canada's Connectivity Strategy is a historic commitment: to connect every Canadian to affordable, high-speed Internet no matter where they live, and to improve mobile cellular access from coast to coast to coast. The Strategy is Canada's plan for delivering on this commitment: through new investments and collaboration with our partners, ensuring *high-speed access for all*.

Overwhelmingly, rural and remote communities have identified challenges accessing affordable, high-speed Internet as the number one issue impeding their economic growth. This was the message heard loud and clear in developing Canada's Connectivity Strategy and the broader Rural Economic Development Strategy. That's what small-business owners told us. Parents. Doctors and nurses. Provincial and territorial governments. Municipalities. Indigenous communities. Non-profit organizations.

On behalf of the Government of Canada, the Honourable Bernadette Jordan, Canada's first Minister of Rural Economic Development, consulted hundreds of rural stakeholders from every province and territory on the Rural Economic Development Strategy. We heard about students having to do their homework at local coffee shops in order to access Wi-Fi, or at home in the middle of the night when speeds were better. We heard about small businesses unable to use Interac debit payment, and therefore forced to operate on a "cash only" basis. And we heard about farming operations trying to access global markets with fax machines.

That is why connectivity is central to the Rural Economic Development Strategy's vision to build strong and resilient local communities. *High-Speed Access for All: Canada's Connectivity Strategy* reinforces the goals and objectives of the Rural Economic Development Strategy. Together, both strategies will help ensure that rural and remote communities can fully maximize their potential.

In October 2018, federal, provincial, and territorial ministers of innovation and economic development resolved to make broadband a national priority. Calling for a long-term connectivity strategy, they established a number of connectivity principles designed to recognize the realities of today, while also looking toward the future. These principles inform the development of *High-Speed Access for All: Canada's Connectivity Strategy*.

How serious is the connectivity gap?

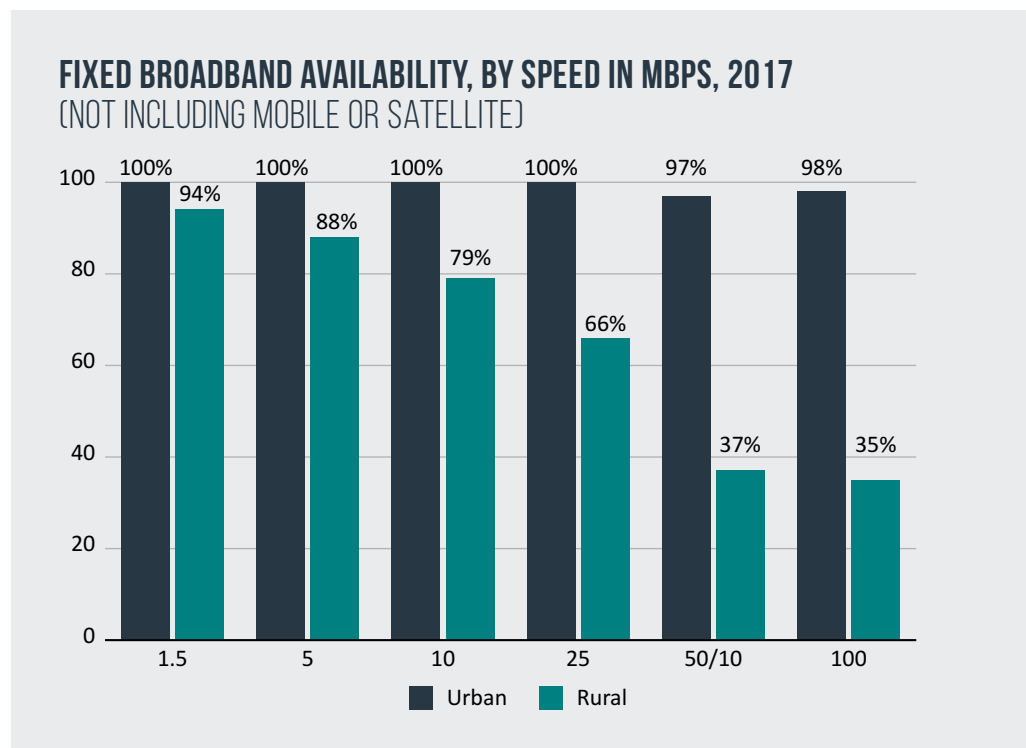
It's significant. **The problem is speed**, which is often too slow for rural and remote Canadians to be able to take advantage of even a fraction of what the Internet has to offer. As recently as five years ago, the Canadian Radio-television and Telecommunications Commission (CRTC) and governments across Canada were targeting universal broadband coverage at download speeds of 5 megabits per second (Mbps), and upload speeds of 1 Mbps. At the time, this was seen as sufficient for most consumer and business applications.

Today, we've largely achieved those goals. The overwhelming majority of Canadians can access broadband at speeds of at least 5 Mbps/1 Mbps. But the landscape has shifted.

These speeds are now too slow for cloud-based software applications. Or online learning resources. Or high-definition streaming videos. They're often too slow to support multiple users or to use telehealth services properly. They are clearly too slow when an x-ray cannot be uploaded in a Northern community unless other Internet users are temporarily kicked off the Internet.

To take full advantage of the opportunities offered by the modern Internet, 50/10 speeds are necessary, affording the capacity to download at 50 Mbps and to upload at 10 Mbps.

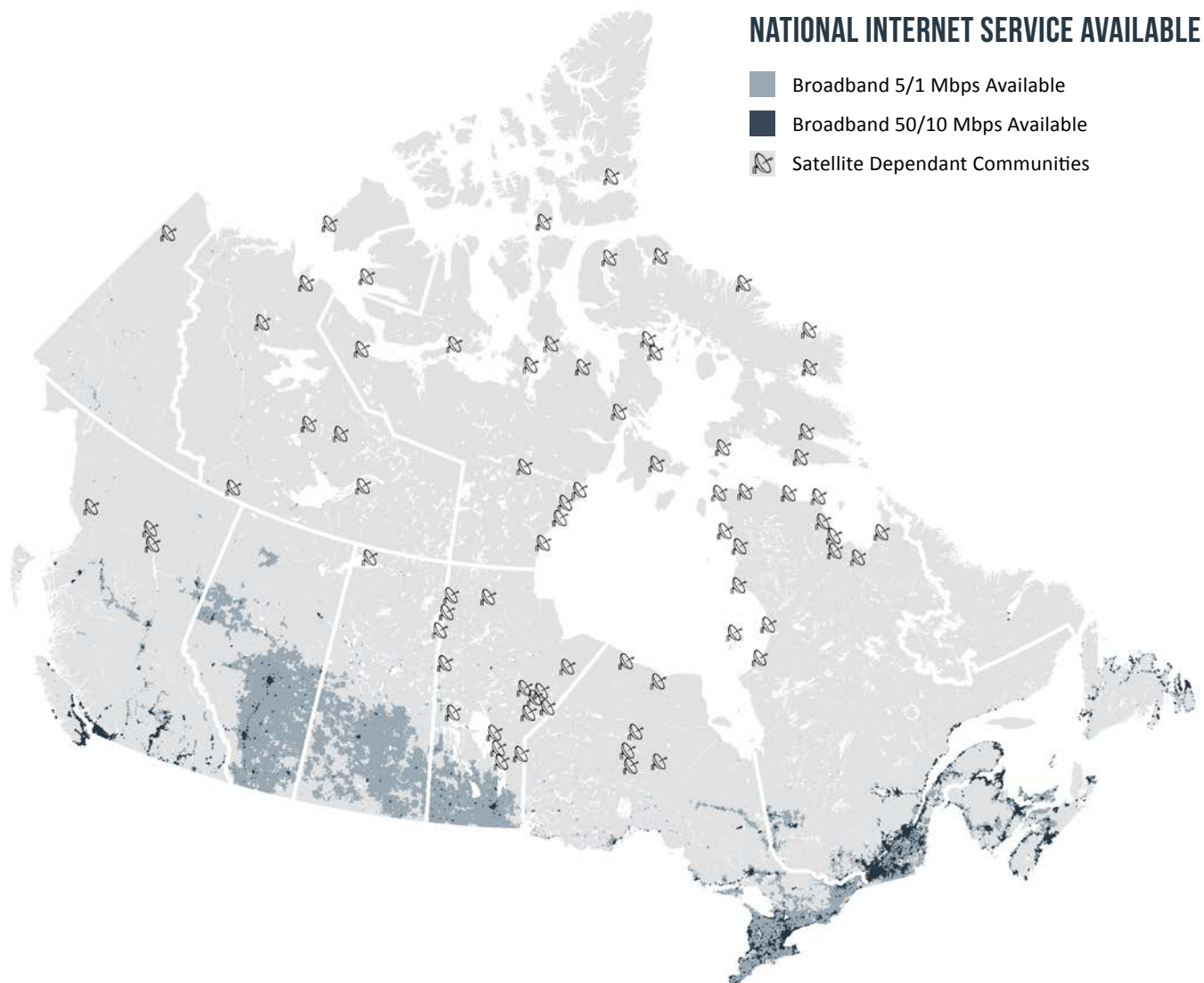
At these speeds, there is a clear divide between rural and urban Canada. In 2017, only 37% of rural households had access to 50/10 Mbps, compared with 97% of urban homes. Only about 24% of households in Indigenous communities have access to 50/10 Mbps. Overall, speeds of 50/10 Mbps are available to 84% of Canadian households, and the Government of Canada has committed to bring these speeds to 90% of Canadians in 2021, 95% in 2026 and 100% by 2030.¹



1 CRTC Communications Monitoring Report 2018 <https://crtc.gc.ca/pubs/cm2018-en.pdf>

There are also significant gaps in mobile connectivity. While approximately 99% of Canadians have some access to mobile service where they live, the coverage can be spotty. Overall, however, there is still improvement needed (both where Canadians live and work) and in addressing substantial gaps along highways and major roads linking communities. Long stretches of road without a mobile cellular signal pose a safety risk to drivers in Canada. Mobile wireless coverage must be available to Canadians both at home and on the go.

Demonstrating the scale of the infrastructure challenge, the map below shows 5 Mbps download and 1 Mbps upload, in relation to existing 50/10 Mbps coverage. Canada's population is heavily concentrated in urban areas, which mostly have 50/10 coverage.



The Government of Canada launched the \$305 million Connecting Canadians program in 2014, which is approaching completion in delivering improved connectivity for 300,000 underserved households.

The Connect to Innovate program was launched in December 2016 to expand high-speed Internet in communities underserved by the private sector across Canada. The \$500 million initiative focused on building out high-capacity infrastructure that would handle rapidly growing demand for high speeds and data usage. This infrastructure will also support enhanced mobile wireless connectivity.



The response was strong. The Connect to Innovate program will now connect more than 900 communities, including more than 190 Indigenous communities; exceeding the original 300 that had been anticipated. The program is leveraging public and private partnerships, bringing the total investment in rural and remote connectivity to \$1 billion. Projects underway include the laying of more than 20,000 kilometres of high-capacity fibre optic network across Canada. Approximately 380,000 households will have enhanced connectivity by these investments, along with more than 1,100 public anchor institutions like schools, hospitals, and libraries.

These investments are transformative. **But the Government of Canada recognizes that much more remains to be done.** That's the reason why Budget 2019 announced historic new investments that will mobilize up to \$6 billion toward universal connectivity.

A CONNECTIVITY STRATEGY FOR CANADA

High-Speed Access for All: Canada's Connectivity Strategy is the Government's plan to coordinate investments along with complementary measures to ensure a connected Canada. The Strategy considers the needs of today and growth for tomorrow. It leverages a range of tools so that all rural and remote communities can fully participate in the global economy and society. The result is vibrant and more resilient communities and a stronger, more connected Canada overall.

CANADA'S CONNECTIVITY STRATEGY HAS THREE PILLARS:

- High-Speed Access for All
- Investing for Impact
- Partnering for Progress



HIGH-SPEED ACCESS FOR ALL

The Government of Canada will work with partners to achieve universal 50 Mbps download and 10 Mbps upload speeds for all Canadians and improve access to the latest mobile wireless services where Canadians live and work, and along highways and major roads.

Connectivity infrastructure projects are as diverse as the communities they serve and a one-size-fits-all approach would not be appropriate. Programs supporting projects aligned under the 50/10 target will also consider the affordability and quality of the service being built, the needs of different users, such as schools, hospitals, and businesses, along with opportunities to reach the higher speeds that will inevitably be needed in the future. Projects will not be limited to the use of particular technologies; instead, a variety of network types and technologies will be needed to achieve the targets in this Strategy.

The Strategy aims to deliver 50/10 connectivity to 90% of Canadians by 2021, 95% of Canadians by 2026, and the hardest-to-reach Canadians by 2030. Canadians will also have enhanced mobile connectivity on highways and major roads.

INVESTING FOR IMPACT

The Government of Canada is making significant investments to deliver universal connectivity. These will be targeted to where they are needed most, and will be paired with actions that reduce cost and remove barriers to investment.

THE GOVERNMENT IS:

- Investing \$1.7 billion in new funding for broadband infrastructure. This includes a new Universal Broadband Fund to support broadband projects across the country. It also includes a top-up for the successful Connect to Innovate Program, support for low-Earth orbit satellite capacity, and two new Statistics Canada surveys to measure broadband usage.
- Supporting broadband projects through the \$2 billion Rural and Northern Stream of the Investing in Canada Infrastructure Program.
- Extending broadband infrastructure through the CRTC's newly announced \$750 million Broadband Fund.
- Supporting connectivity projects through the Canada Infrastructure Bank, which will seek to invest \$1 billion over the next 10 years, and leverage at least \$2 billion in additional private sector investment.
- Using the Accelerated Investment Incentive to encourage Internet service providers to invest in high-speed connectivity across the country.



To meet our goals, our investments must be *effective*. The Government of Canada will sequence and align its programs and minimize overlap with partners' investments and target investments to areas where there is a limited private-sector business case for investment. In addition, the Government will consider open-access provisions – which allow smaller and independent telecommunications providers to rent space on larger providers' existing infrastructure, often at favourable wholesale rates – to ensure that benefits of the investments are maximized.

Another area that enables effective investments in networks involves use of the radio-frequency spectrum – the airwaves used to transmit sound and data wirelessly. The Government of Canada is actively managing this limited resource to maximize economic and social benefits to Canadians, including those in rural and remote communities.

A major cost of building and operating networks is associated with the poles, underground ducts, towers and other structures, otherwise known as passive infrastructure, that make it possible to build networks. The Government of Canada will engage partners to work to reduce these costs, so that networks are less expensive and can connect Canadians sooner. This involves reviewing policy and regulatory frameworks on antenna towers and support structures, considering related advice from the forthcoming review of communications legislation, engaging internally to advance the issue and promote best practices, and raising awareness of the issue among stakeholders.

PARTNERING FOR PROGRESS

While the Government of Canada is playing a leadership role by providing funding and financial support, it is imperative that all orders of government across Canada, as well as the private sector, Internet service providers and other stakeholders, lend support and resources to closing the broadband gap and achieving the targets set out in this Strategy.

It is clear that connecting Canadians will require a fundamentally agile, locally tuned approach. There is no one-size-fits-all solution to the diversity of connectivity challenges that rural communities face; this is why we must work together and directly engage provincial, territorial and local governments so together we can achieve our national objectives.

THE GOVERNMENT WILL:

- Continue to engage with Canadians, the provinces and territories, the private sector, non-profit organizations, municipalities and Indigenous communities to support connectivity and broadband investments.
- Ensure the design and eligibility criteria for Government of Canada investments are designed to enable projects that best meet local needs and demonstrate strong local engagement.
- Reduce administrative burden and increase effectiveness by working with partners to align application requirements where possible, and improve information and guidance on how to access funding.
- Ensure strong internal governance and accountability via new coordination frameworks.
- Share broadband data with partners and stakeholders and link relevant datasets, while respecting confidentiality and related provisions concerning stewardship of data.
- Launch a web portal, accessible even at low Internet speeds, that will host the Strategy as well as other Government of Canada connectivity initiatives and coverage information.
- Establish an expanded Centre of Expertise to improve broadband coordination.



1 HIGH-SPEED ACCESS FOR ALL

Canadians need high-speed connectivity throughout our country, not just in the cities. It is critical for Canada to grow and thrive.

Recognizing the rural and urban digital divide, the Government defined objectives for delivering fixed and mobile connectivity to Canadians. Working with partners to promote scalable investments with consideration of the needs of the end-user, and by leveraging different technologies, this Strategy will give Canadians access to connectivity that suits their needs.

The minimum target speed for all Canadians is 50 Mbps download and 10 Mbps upload. But connectivity demands are expected to continue to increase beyond the 50/10 Mbps target. New applications and uses will continue to be developed and introduced into the market. Recognizing this, the 50/10 Mbps target is a minimum, and **investments will make every effort to be scalable to higher speeds in the future**, including up to speeds of 1 gigabit per second (Gbps; 1 Gbps is equivalent to 1,000 Mbps).

Fortunately, the infrastructure that is capable of providing speeds of 50/10 Mbps today is generally scalable, meaning that it can support even higher speeds with incremental investment. The push toward scalability will require investment focus on fibre optics, at a minimum, as part of transport links. An expansion of the fibre optic network allows service providers to leverage the technology's substantial scalability.

The Government of Canada committed \$1.7 billion in Budget 2019 to support various connectivity initiatives. Included in this is the Universal Broadband Fund, which will make a significant contribution toward connecting unserved and underserved rural and remote communities. The program will be designed based on the action items in this Strategy and will target the key factors relevant to connecting Canadians as effectively and as quickly as possible.



1.1 MEETING THE NEEDS OF HOUSEHOLDS AND BUSINESSES

Speeds of 50 Mbps download and 10 Mbps upload reflect what is needed for Canadians to be fully engaged online, and align with the CRTC’s universal service objective.²

DOWNLOAD INTERNET SPEEDS	BENEFITS
1 Mbps	Insufficient speed to meaningfully participate online. Allows for browsing and email services.
5 Mbps	Adequate for single users and basic Internet activities, such as accessing government services, social media and basic streaming videos.
50 Mbps	Speed identified by the CRTC for Canadians to take advantage of cloud-based software applications, multiple government services (e.g., telehealth services, business support) online learning resources and high-definition streaming videos. Can support use by multiple simultaneous users.

While most urban regions of the country already have access to broadband that meets this target, it will take time and substantial investments for all rural households and businesses to have access to the 50/10 Mbps target. The Government of Canada’s investments will aim for 90% of Canadians to have access to this target by the end of 2021, for 95% to have access by 2026, and for the remaining 5%, in the hardest-to-reach areas, to have access by 2030.

High-speed Internet is critical for **businesses in rural and remote areas** to thrive. These businesses often require the same access to technology services as those in urban centres, whether it is processing cloud-based software or a credit-card sale. Rural and remote businesses have challenges attracting skilled labour, more so than their urban counterparts; hence, improved connectivity can help attract talent. **Scalability** is particularly important for businesses as we continue to upgrade our networks and given how they use connectivity.

There is potential to support economic growth by meeting these connectivity needs. Almost all industries now rely on connectivity to improve their productivity and work more efficiently. One of the major challenges to business development in rural and remote communities is the lack of infrastructure, particularly telecommunications infrastructure.



² CRTC Telecom Regulatory Policy 2016-496 <https://crtc.gc.ca/eng/archive/2016/2016-496.htm>

Limited Internet has proven to be a real and significant challenge for Indigenous communities. For example, of the First Nations funded by the federal eHealth Infrastructure Program (eHIP), all had some Internet connectivity, yet the connections were not fast enough or consistently reliable. Investments by the Connect to Innovate program are improving access in 190 Indigenous communities. Telehealth services can be particularly valuable for northern First Nations, Inuit and Métis communities, which may be inaccessible by road. Telehealth reduces travel time, travel costs, and displacement from families and communities.



A Canadian study found that, historically, broadband deployment across Canada has promoted growth in aggregate employment and average wages, particularly in rural regions. This same study estimates that providing broadband access in Canada where it did not exist previously would increase employment growth and average wage growth in service industries by 1.17 and 1.01 percentage points respectively per year in rural regions.³

Canada’s Indigenous communities face unique connectivity challenges. First Nations, Inuit and Métis people shouldn’t have to move elsewhere because of the lack of basic infrastructure and services to pursue education, undergo training, or find employment. We must therefore ensure that investments are made effectively so that the youngest and fastest growing sector of our population can uncapped the full potential of the Internet. The Government of Canada will continue to work with Indigenous communities to implement connectivity projects and meet their unique needs.

Another factor being considered is affordability. It is important that prices charged be reasonable so that Canadians can meaningfully subscribe and use the services in question. It is not enough for a service to be available, for if the cost is out of reach, Canadians cannot take advantage of it. It should be noted, moreover, that the monthly price is not the only factor in affordability. For example, the data usage available including whether an unlimited data option is offered, is just as important.

Public investments in rural connectivity can make services more affordable. Having high-capacity infrastructure in place enables service providers to offer lower prices, as the price is often a result of inadequate infrastructure. The Government of Canada will consider affordability as an objective in connectivity programs. One way it will do this is by including it in the assessment criteria and requiring partners to maintain open access. Providing access and the ability to subscribe to faster and more reliable services is only one part of the connectivity equation – these services should be financially accessible as well.

The importance of mobile connectivity also continues to grow. The use of smartphones and other mobile devices is increasingly integral to the daily lives of Canadians. However, lack of coverage is still too common in rural and remote areas, with many gaps along highways and roads. By the end of 2017, 14% of major Canadian roads and highways still lacked mobile wireless coverage.⁴ These gaps in coverage pose safety concerns for motorists and travellers in need of emergency services, among other challenges. A fully connected Canada must include access to high-speed mobile broadband services, such as Long-Term Evolution (LTE). The Government of Canada will use programs and other tools to expand mobile services where Canadians live and work, and on highways and major roads. This includes the Government’s Accelerated Investment Incentive that is prompting the private sector to expand mobile services along roads and the CRTC’s \$750 million fund, launched in 2019. The Government will continue to look at ways to improve mobile wireless coverage across the country as an important tool for communication and public safety. These measures help meet the needs of Canadians, wherever they are.

3 Olena Ivus and Matthew Boland, “The Employment and Wage Impact of Broadband Deployment in Canada,” *Canadian Journal of Economics* 48, no. 5 (December 2015): 1803–30, <https://doi.org/10.1111/caje.12180>, pages 1804 and 1805.

4 CRTC Communications Monitoring Report 2018 <https://crtc.gc.ca/pubs/cmr2018-en.pdf>

1.2 MEETING THE NEEDS OF ANCHOR INSTITUTIONS

Government investment will give special consideration to the needs of anchor institutions, such as libraries, schools, hospitals, and local government buildings. Connect to Innovate is connecting more than 1,100 anchor institutions because of their key placement as hubs in communities.

Anchor institutions generally require much higher network speeds than homes. This is because there are more people using the connection at once, or because they are using more sophisticated applications. Connecting anchor institutions to high-speed broadband networks strengthens the capacities of local health and education systems, improves access to government services, and enhances the social and economic opportunities of rural and remote residents. It also improves the business case for extending broadband to households and businesses in the surrounding areas.

Speeds of 1 Gbps are often necessary to maintain reliable service quality. For example, in hospitals, clinics and nursing stations, connectivity requirements are constantly increasing as new technologies emerge (e.g. HD video conferencing, 3D imaging, and high-quality image transfers) and the available networks in rural and remote communities are not meeting their growing needs.

Schools and learning centres are often the centre of rural and remote communities, where people meet and share knowledge. High-speed Internet facilitates many of the educational and community activities that could take place at these sites, including digital education and training, video conferencing and distance learning. Schools in remote communities are often unable to send teachers to an urban centre for professional development, so training offered online could improve teaching quality in rural and remote schools. Teachers can access an enormous amount of teaching material online, while online high schools allow students to stay in their home communities to finish their diplomas and offer more choices for courses.

1.3 CAPITALIZING ON TECHNOLOGY

What technology will we use?

Because Canada is a large country with varied geographic and topographical challenges, no single technology is appropriate in all circumstances. Different ones will be needed in order to reach universal connectivity, including wireline, wireless, and satellite. The Government of Canada will leverage the use of different technologies so that connectivity projects can provide access at the target speeds and above to rural and remote Canadians as soon as possible and in a sustainable manner that is suited to the local context.

LOW-EARTH ORBIT (LEO) SATELLITES

The satellite sector is undergoing considerable change with the advent of new low-Earth orbit (LEO) technologies currently under development. Planned LEO broadband systems involve large numbers of satellites called constellations. They will substantially increase capacity and offer speeds of 50/10 Mbps and above. They will have an orbit approximately 36 times closer to the Earth than traditional communications satellites. This will mean better signal strength for users, while using less power. Budget 2018 announced \$100 million to help develop LEO and next-generation satellite technologies. New investments as part of Budget 2019 include securing capacity on a LEO constellation to deliver services in more challenging areas.



A key consideration related to access to connectivity is the quality of the network. The quality of the network is expressed not only in terms of speed, but also in terms of whether the signal is sometimes delayed. Delays affect how users experience online services such as real-time video communication or cloud-based software hosted online. For example, business productivity tools such as spreadsheets and other services are increasingly stored on the Internet instead of on users' computers. Similarly, it is important that service is consistent and reliable. If network quality is poor, users may experience glitches or pauses in the online experience, audio or video dropping out, or an online application stalling. This is not just frustrating but it can also prevent effective use of these applications.

Programs funding connectivity will consider user experience and quality of services in the application phase. The CRTC has also set Quality of Service standards and has launched a new iteration of its broadband performance testing program. Over the coming years, these ambitious metrics will represent important performance objectives, in addition to the 50/10 speed target.

Network resiliency is also critical, especially in communities in the far North. Communities in these areas are generally reliant on a few fibre optic routes that connect the North to southern Canada, or on satellites that connect them to the rest of the world. If there is a cut in the fibre or a service outage on the satellite, these communities can find themselves without service even where the last-mile connection to homes and businesses may be of high quality. Investments in network such as designing the fibre optic network in a ring instead of a line, can mitigate this: if there is a cut at one place, the signal can be re-routed.

1.4 SUMMARY OF ACTION ITEMS: HIGH-SPEED ACCESS FOR ALL

The Government of Canada will work with partners to achieve universal 50 Mbps download and 10 Mbps upload speeds for all Canadians and improve access to the latest mobile wireless services where Canadians live and work, and along highways and major roads.

THE GOVERNMENT WILL:

- Consider the scalability of our investments toward increased speeds, e.g. up to 1 Gbps speeds where possible.
- Leverage different technologies based on suitability and context.
- Consider the needs of different users including Indigenous communities, businesses, and public institutions during planning, program design, and project selection.
- Consider the affordability of service to the end user.
- Recognize the importance of resiliency, reliability and low latency of network connections.

CONNECT TO INNOVATE

The federal government launched the Connect to Innovate program in December 2016. The program was created to invest \$500 million in expanding high-speed Internet in communities underserved by the private sector across Canada. It focused on building out high-capacity infrastructure that would handle rapidly growing demand for high speeds and data usage in rural and remote communities. The program, originally intended to connect 300 communities, is now connecting more than 900, including 190 Indigenous communities. Overall, more than 380,000 households will benefit from these investments along with more than 1,100 public anchor institutions like schools, hospitals and libraries.

The Connect to Innovate program is helping to achieve the goals in this Strategy.

The Dempster Highway project is a good example of joined-up investments extending connectivity further than would otherwise be possible. The project involves installing approximately 800 kilometres of fibre between Yukon's existing fibre-optic line with the Government of Northwest Territories' Mackenzie Valley fibre-optic line in Inuvik. Once completed, it will create a fibre loop running from Inuvik, NT, to Dawson and Whitehorse, YT; from Whitehorse, YT, to Fort Nelson, BC; and from Inuvik, NT, to Fort Nelson, BC. The loop will provide 101 communities in the territories of Yukon (51), Northwest Territories (19), Nunavut (25) and in northern British Columbia (6) with redundancy by allowing for data to flow in another direction in the event of damage to the fibre at any point. This fibre loop will protect Internet, telephone, cellular and essential government services throughout the region.

Funding is being provided by the following partners:

- Innovation, Science and Economic Development Canada (ISED) is investing up to \$30 million through Connect to Innovate.
- Infrastructure Canada will invest up to \$29 million through the Small Communities Fund.
- The Government of Yukon will invest up to \$5 million.
- Northwestel will invest up to \$15 million.



2 INVESTING FOR IMPACT

Meeting the sizeable, national challenge of connecting all Canadians is estimated to require a total investment in the order of \$8 billion. With the Government of Canada and its partners working together, this challenge will be met. That's why the Government made significant investments in Budget 2019. These investments will mobilize up to \$6 billion to help make universal high-speed connectivity a reality. Other orders of government have also announced new programs that work toward achieving the Strategy's targets with investments of their own.

To make the most of these public investments, the Government of Canada is working with partners to focus efforts where they are most needed and coordinate complementary measures. We will work closely with all partners to ensure investments are coordinated and effective.

This coordination includes ensuring access to the existing infrastructure and spectrum so that the goal of universal high-speed connectivity is met as quickly as possible, and providing a stable and predictable timeline for investments to help all partners in the Strategy maximize their resources and plan accordingly.

In short, Government of Canada investments will deliver connectivity to Canadians more effectively and efficiently than would otherwise be possible.

2.1 INVESTMENTS IN CONNECTIVITY

Budget 2019 initiatives

The Government of Canada committed \$1.7 billion in Budget 2019 to support various connectivity initiatives. These include more funding for the Connect to Innovate program, satellite capacity to cover the hardest-to-reach regions of the country, and the launch of a new broadband program, the Universal Broadband Fund.

The Universal Broadband Fund will help connect Canadians as effectively and as quickly as possible to reliable, high-speed Internet. The Government of Canada will partner with provinces, territories, municipalities, Indigenous communities, companies and others, and will roll out the Fund in two phases. The design and eligibility criteria will ensure projects will best meet local needs and demonstrate strong local engagement. Consultations will take place during the first phase to ensure that community needs are met by the Fund and to maximize the impact of public investments. The second phase in 2020 will invite applicants to provide solutions to connectivity gaps in unserved and underserved rural and remote areas.

CASE STUDY — NUNAVIK CTI PROJECT

Nunavik is a remote northern region of Quebec – spanning across roughly 440,000 km². All communities are fly-in only, with no access to the electric grid. Its population is 90% Indigenous and the region was entirely dependent on satellite access.

Under the Connect to Innovate program, the Kativik Regional Government is undertaking a transformative investment to expand connectivity infrastructure, and move from relying only on satellite to a mix of fibre optic, fixed wireless and improved satellite connectivity. This project can empower all who live in Nunavik's 14 communities with freedom to run multiple applications simultaneously, to not have to worry about how much bandwidth is left for important tasks, and to engage in distance education and telework. In short, the improved access opens up a world of new possibilities for both residents and businesses. In addition, the upgrade will enable improved cellular telephone service in every Nunavik community, and has the potential to connect up to 28 public anchor institutions, including schools, hospitals, nursing stations and government offices, allowing them all to provide new online services for residents.

The additional funding for Connect to Innovate announced in Budget 2019 builds on the \$500 million already committed to the program. This funding will help ensure continued progress on building and expanding networks. This program is another example of the Government of Canada working with provincial and territorial governments, Indigenous communities and private-sector firms to deliver enhanced connectivity for Canadians from coast to coast to coast.

Investments in both Budget 2019 and Budget 2018 include new measures to connect the hardest-to-reach areas in Canada through low-Earth orbit (LEO) satellites. These satellites can offer speeds that meet the Strategy's 50/10 Mbps target, and help deliver applications such as cloud computing and advanced telemedicine that are difficult to offer with traditional satellites. This satellite capacity could also be used to support mobile wireless services in remote communities.

CRTC's \$750 million Broadband Fund

On June 3, 2019, the CRTC launched its \$750 million Broadband Fund. This Fund is accepting applications for projects that include Canada's territories and satellite-dependent communities, where there is a great need for improved broadband and mobile wireless networks. A second call for applications will launch in fall 2019 to support all project types in underserved rural and remote areas throughout Canada.

Rural and Northern Stream of the Investing in Canada Infrastructure Program

The Rural and Northern Stream of the Investing in Canada Infrastructure Program provides up to \$2 billion to support various infrastructure projects that improve the quality of life in rural and northern communities. The Rural and Northern Stream of the Investing in Canada Infrastructure Program addresses these communities' specific infrastructure needs, including improved broadband connectivity.

Canada Infrastructure Bank

The Canada Infrastructure Bank can support connectivity projects by investing up to \$1 billion through funding tools including loans, equity and loan guarantees. These investments can further leverage at least \$2 billion in private investment, making the impact of publicly funded projects and dollars go further.

Accelerated Investment Incentive

The Accelerated Investment Incentive introduced in the Government of Canada's 2018 Fall Economic Statement encourages businesses to invest in assets such as land, buildings and equipment. Telecommunications firms can use this Incentive to invest in fibre connectivity, wireless services, and broadband infrastructure. The Incentive is already helping accelerate the deployment of next-generation high-speed Internet; since the introduction of the Incentive, several telecommunications carriers have announced plans to expand high-speed broadband and mobile wireless coverage to rural areas, including along highways and major roads.

2.2 MAKING THE BEST USE OF INFRASTRUCTURE

High-speed broadband and mobile wireless networks are not just a collection of advanced electronic gear. They also include infrastructure assets – namely, the non-electrical pieces (e.g., underground conduits, utility poles and wireless towers) to roll out a network. These assets can be referred to as passive infrastructure. Efficient access to, and use of, these assets while respecting safety and other concerns can dramatically reduce deployment costs.

In Canada, responsibility for infrastructure assets is shared across multiple bodies and levels of government, meaning private sector operators and federal, territorial, provincial, municipal governments and Indigenous communities each can play a role to cooperate on how they are used.

An efficient way to expand connectivity as quickly and cheaply as possible is to take advantage of infrastructure assets that are already built and in place. This is why **it is vital that measures be explored to reduce deployment costs, speed up deployment and reduce barriers to entry.**

The Government of Canada will promote the importance of access to infrastructure assets. Indeed, improving access to existing infrastructure can reduce deployment costs by as much as 50%.

One way to make the best possible use of infrastructure assets is through a consistent and streamlined approach to issuing permits. Rendering this process more timely and efficient will help to standardize and streamline the construction, installation, and maintenance of infrastructure assets.

CASE STUDY – PARTNERING IN PEI

In March 2019, the governments of Canada and Prince Edward Island (PEI) announced investments to deliver high-speed broadband Internet services to almost 30,000 households across PEI through a combination of fibre and fixed wireless technologies. This will significantly increase the quality of services with a stable and faster broadband experience. This project will also create new potential for innovation and economic development by helping business owners connect with new markets, providing better access to services, and giving students the ability to broaden their studies through high-speed broadband.

The Government of Canada is contributing more than \$33.1 million through the Rural and Northern Infrastructure Stream of the Investing in Canada infrastructure plan. The Province of PEI will provide over \$3.5 million, while Bell Canada and Xplornet together will provide more than \$37 million.



Since building or expanding networks generally means running wires underground or on poles, it is recommended to lay fibre or conduits while other work is underway, such as road construction or repair, allowing telecommunications service providers to connect or add fibre to their networks later on at a significantly reduced cost.

Other opportunities to accelerate progress include sharing databases and mapping of existing assets. This would allow telecommunications providers to take advantage of existing networks, such as those owned by provincial energy utilities, while still respecting the ownership and confidentiality of data.

Government regulation can also help lower costs and reduce barriers to expanding network access, especially where mobile wireless services are concerned.

2.3 SPECTRUM REGULATORY MEASURES

An important tool for ensuring universal high-speed broadband coverage and improved mobile wireless access across the country is the Government's role in regulating how the radio frequency spectrum is used. Spectrum is a finite – and valuable – public resource used to deliver wireless services over the air. The Government of Canada regulates the use of spectrum, and makes spectrum available through auctions and other processes.

Access to spectrum opens up opportunities to use mobile wireless, fixed wireless and satellite technologies to connect the hardest-to-reach Canadians. Without access to spectrum, the technology needed to connect rural and remote Canadians would be prohibitively expensive.

Making additional spectrum available is an important part of addressing the increasing demand by Canadians for wireless connectivity. In *Spectrum Outlook 2018 to 2022*, the Government of Canada sets out a five-year plan to release enough spectrum to help service providers meet this demand. Any changes to the use and allocation of spectrum will take into account the need to support and encourage connectivity for rural and remote communities across Canada.

When making additional spectrum available, the Government of Canada establishes rules that advance

Fifth generation (5G) technologies are expected to revolutionize the world in the coming years. 5G is capable of offering fibre-like speeds over wireless networks, delivering more data to more devices more quickly.

Many major telecommunications providers are making significant investments so that Canadians will be among the first in the world to benefit from 5G technologies. For example, federal and provincial governments, together with private-sector partners, have developed ENCQOR, a \$400 million 5G testbed for Canadian innovators.

Rural and remote communities in particular will benefit significantly from 5G. According to a report from Accenture, 5G-based fixed wireless access can reduce the initial cost of establishing last-mile connectivity by as much as 40% compared to fibre, as well as significantly accelerate rollout times by eliminating the need to lay cables. These communities will also benefit from 5G-enabled services like remote health care and smart agriculture.

The federal government is working to ensure that its spectrum policies enable and support 5G. Spectrum in several key 5G bands, such as the 600 MHz, 3500 MHz, 3800 MHz and mmWave bands, has either been released or is expected to be released within the next three years. In addition to making additional spectrum available, the government is developing or updating various policies to support 5G, such as frameworks governing access to and sharing of passive infrastructure such as towers and poles.



Canada’s spectrum and telecommunications policy objectives. Those objectives include reliable and affordable, high-quality telecommunications services in both urban and rural areas in all regions of the country.

For example, in November 2018 the Government proposed a new policy allowing smaller geographic areas or tiers for spectrum licences, an approach that will make auctioned licences more affordable for smaller providers. The Government also has conditions for spectrum licenses that support service in rural and remote areas. In addition, ISED is examining the secondary market for spectrum, where service providers get spectrum access not from ISED directly, but from an existing licensee of that spectrum, to explore improvements to how this market functions. These efforts are designed to help improve access to spectrum in rural areas.

Radio licence fees are one mechanism designed to promote both the effective use of spectrum and to earn a fair return for the Canadian public for the privilege of access to this public resource. Working with service providers, stakeholders and others, the Government of Canada continues to monitor and examine new approaches and technologies to improve how it manages spectrum. These new approaches include reducing fees for more efficient use of spectrum – thereby encouraging providers to invest in the deployment of innovative new technologies – and new regulatory solutions that allow more efficient sharing of spectrum between multiple services and users.

The Government has also introduced rules for **non-geostationary satellite orbit** (NGSO) satellite systems. These systems are made up of smaller satellites rather than traditional, larger satellites. One type of NGSO satellite in particular, known as low-Earth orbit satellites, is anticipated to deliver very high-speed Internet to Canadians living in rural and remote communities, including those in the North.

The Government’s new framework requires operators of these satellite systems to offer Internet connectivity covering 100% of Canadian territory and to maintain the ability to meet Canadian capacity needs. These changes will also streamline the licensing process for NGSO systems, resulting in more satellite systems being approved faster before they enter the market.

Taken together, these approaches, policies and regulatory measures will help promote improved service and coverage, as well as lower costs, in rural and remote areas.

2.4 SUMMARY OF ACTION ITEMS: INVESTING FOR IMPACT

THE GOVERNMENT IS:

- Investing \$1.7 billion in new funding for broadband infrastructure. This includes a new Universal Broadband Fund to support broadband projects across the country. It also includes a top-up for the successful Connect to Innovate program, support for low-Earth orbit satellite capacity, and two new Statistics Canada surveys to measure broadband usage.
- Supporting broadband projects through the \$2 billion Rural and Northern Stream of the Investing in Canada Infrastructure Program.
- Extending broadband infrastructure through the CRTC's newly announced \$750 million Broadband Fund.
- Supporting connectivity projects through the Canada Infrastructure Bank, which will seek to invest \$1 billion over the next 10 years, and leverage at least \$2 billion in additional private sector investment.
- Using the Accelerated Investment Incentive to encourage Internet service providers to invest in high-speed connectivity across the country.

The Government is targeting areas where the markets are not working and bringing a range of complementary tools to bear to ensure investments are maximized.

THE GOVERNMENT WILL:

- Provide a stable and predictable timeline for broadband investments to help all partners in the Strategy maximize their resources and plan accordingly, and formalize additional partnerships where opportunity permits.
- Target investments to unserved and underserved areas where there is limited private sector business case for investment.
- Minimize overlap with other investments, including those from other partners.
- Consider open access provisions to maximize benefit from public investments and promote affordability.
- Review the policies and regulatory frameworks, led by ISED and the CRTC within their respective jurisdictions, on antenna towers and support structures.
- Consider advice from the forthcoming review of communications legislation as to whether legislative changes are warranted to improve access to infrastructure.
- Raise awareness among infrastructure stakeholders of the importance of access to passive infrastructure.
- Continue to make spectrum available for the various services that offer connectivity to Canadians living in rural and remote areas.
- Develop and administer licensing frameworks that 1) facilitate access to spectrum, 2) prepare for next generation satellites, and 3) consider new approaches that will support and encourage service provision in rural and remote areas. These policies will be developed in a transparent manner through consultation.



3 PARTNERING FOR PROGRESS

How will we move forward? Collaboration is a foundational element of this plan to tackle the connectivity divide in Canada. The next steps to connect Canadians will be taken together and with partners and stakeholders.

At the end of the day, all the stakeholders for this Strategy – telecommunications companies, regional municipalities, provincial and territorial governments, the Government of Canada and others – are in the business of serving Canadians. Providing all citizens with reliable and complete telecommunications coverage is a huge undertaking in a country the size of Canada. No matter where you fit into the Strategy, there are challenges and obstacles we all share. It makes sense to collaborate and take a common approach.

3.1 REDUCED ADMINISTRATIVE BURDEN AND IMPROVED DATA SHARING

The Government of Canada sees opportunity for improvement in making it easier to apply and in harmonizing applications, so that those developing connectivity infrastructure can focus on implementation. When designing new programs, partners will strive to **reduce the administrative burden** by coordinating application requirements, and then continuing conversations afterwards.

Detailed maps and data are critical planning tools for companies and municipalities to make informed project proposals and for federal, provincial and territorial governments to make clear decisions. ISED and the CRTC

Of particular interest will be continuing our efforts to reflect what we have heard about the unique circumstances and connectivity needs of Canada's First Nations, Inuit and Métis communities in the future broadband program design and implementation. Access to reliable and affordable connectivity services can enable the revival of Indigenous languages. It can allow for distance education, help unlock the talents of Indigenous youth, and provide for new business opportunities. By continuing to engage with First Nation, Inuit and Métis communities in the implementation of this Strategy, these possibilities can become a reality.

ISED's Connect to Innovate program and the Province of Quebec's connectivity program Québec branché used a common application form for applicants that wished to apply to either of the programs. The intake periods for both programs also aligned, further reducing the administrative burden for applicants.



maintain comprehensive and precise mapping data that describes connectivity in Canada. This mapping data compares the specific location of network infrastructure in relation to demographic information such as population/households, communities, and roads. Overlaying coverage data in relation to demographic information allows the government to assess which areas have access and where there are gaps. This approach ensures coverage statistics are as accurate as possible. When considering potential projects, comparing the projected coverage expansion is important to evaluate whether it duplicates existing infrastructure or other project proposals. The mapping platform will continually be improved.

Mapping data that is publically available is presented at a lower resolution. This ensures confidentiality of sensitive private-sector information, but presents challenges for stakeholder planning. ISED is working with the CRTC to **enable mapping data to be shared to the highest level of detail possible** while respecting confidentiality. The aim is to enable stakeholders such as provinces and territories, service providers and municipalities to obtain more detailed coverage information to assist in decision-making, in turn assisting applicants and partners in prioritizing and targeting underserved areas.

ISED and the CRTC will regularly publish maps, summary statistics, and geospatial and household data, which will enable stakeholders to leverage this data to benefit the planning and implementation of connectivity projects.

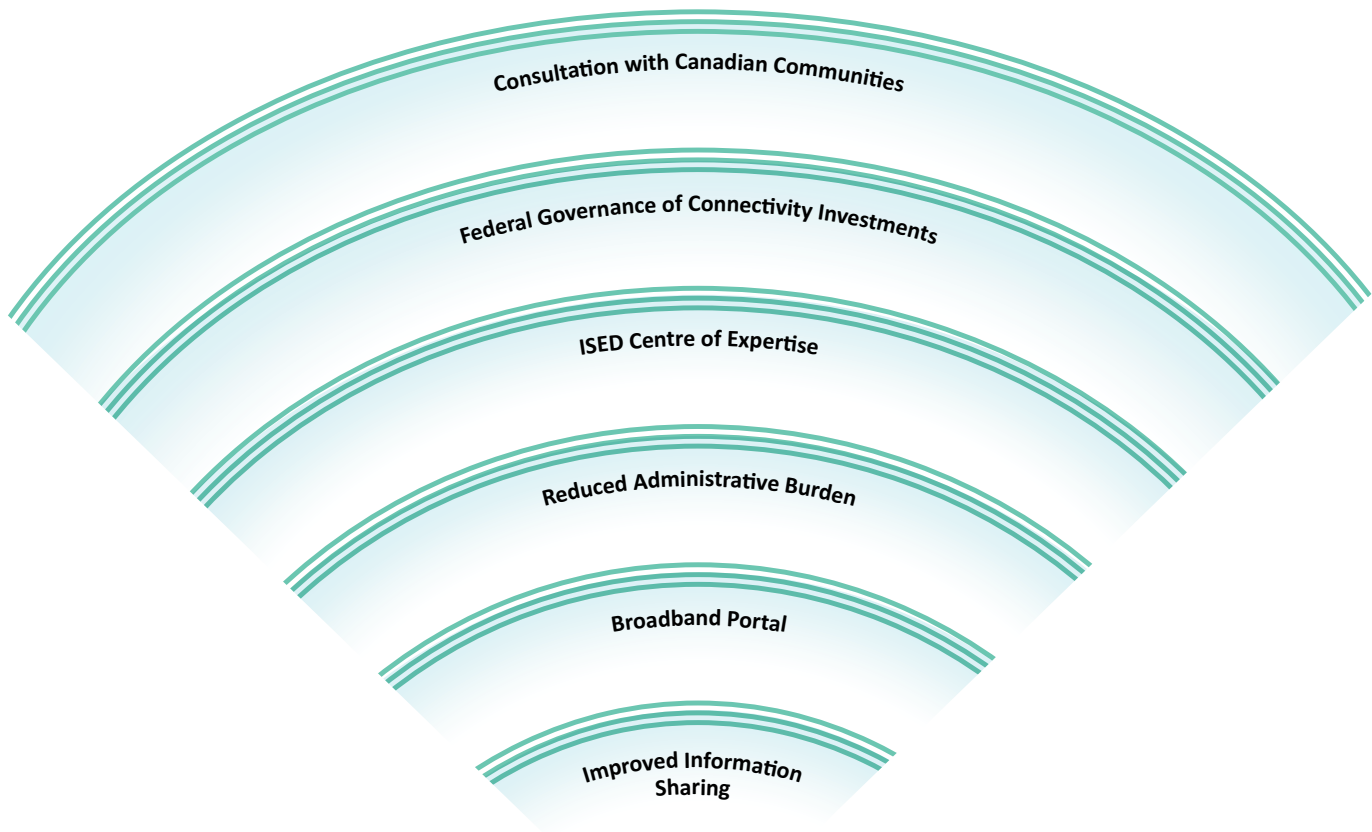
3.2 COORDINATION

Bringing together the program details for the different initiatives into a **client-focused portal** will assist potential applicants and all connectivity partners in identifying how and where to apply to connectivity opportunities. Key coverage information and program information from provinces, territories, or stakeholders can be incorporated as appropriate. For those without Internet access, information can also be obtained by calling ISED's main enquiry line at 1-800-328-6189 or by mail at:

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Many rural municipalities have very limited administrative resources. Some 60% of rural municipalities have fewer than five administrators, and many have only one. We must make sure that application processes are as simple and efficient as possible so that programs are accessible. We also need to support municipalities as eligible applicants for funding to develop broadband infrastructure, while recognizing that some municipalities have the fiscal capacity to step in as go-to service providers.

ENGAGEMENT



ISED will take on an expanded role in coordinating between federal and non-federal partners and in facilitating information sharing between government departments.

Because connectivity touches on many aspects of Canadians' lives, it is an important consideration for the public policy objectives of various Government of Canada departments. A **deputy ministers' committee** has been created to ensure alignment of initiatives.

A key area of work is to manage best-fit direction for applications to Government of Canada programs. The goal is to ensure that projects are funded through the most appropriate funding vehicle. This will be done while respecting the independence of arm's length bodies such as the CRTC and the Canada Infrastructure Bank.

3.3 MEASURING SUCCESS

The Government of Canada recognizes the importance of tracking progress toward the objectives and action items stated in this Strategy. In particular, mapping information regarding the new networks that will be published. The CRTC will also report progress through its Communications Monitoring Report, which is released annually.

The impact of these investments on adoption will also be measured, including via Statistics Canada surveys and other projects, supported by Budget 2019 funding. This will inform the next steps and further action items taken under this strategy by the Government.

3.4 SUMMARY OF ACTION ITEMS: PARTNERING FOR PROGRESS

THE GOVERNMENT WILL:

- Continue to engage with Canadians, provinces and territories, the private sector, non-profit organizations, municipalities and Indigenous communities to support connectivity and broadband investments.
- Support municipalities in developing broadband infrastructure.
- Reduce administrative burden and increase effectiveness by working with partners to align application requirements where possible, and improve information and guidance on how to access funding.
- Ensure strong internal governance and accountability.
- Share broadband data and link relevant datasets, while respecting confidentiality and related provisions concerning stewardship of data.
- Launch a web portal that will host the Strategy, other Government of Canada connectivity initiatives and coverage information.
- Establish an expanded Centre of Expertise to improve broadband coordination.





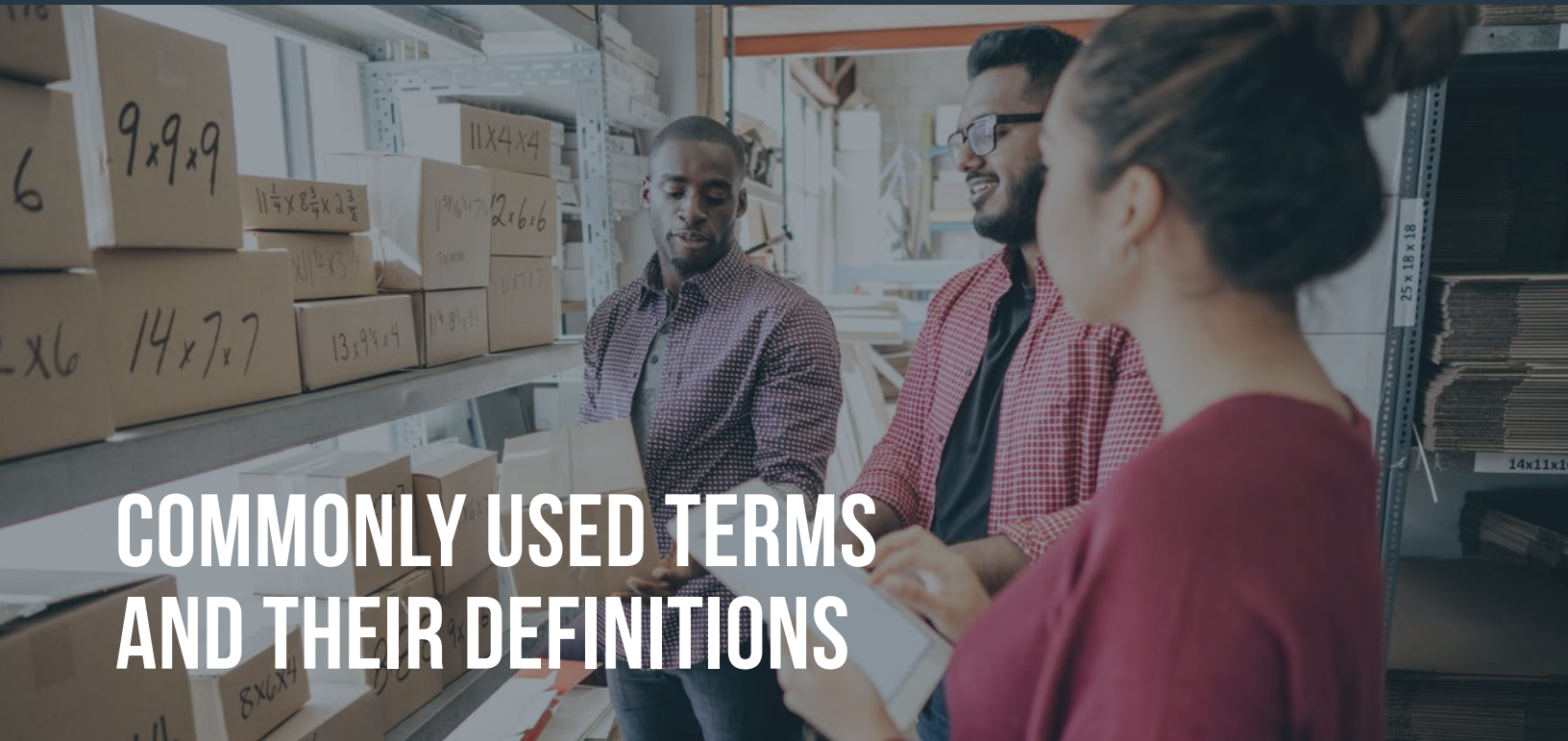
ACHIEVING HIGH-SPEED ACCESS AND PREPARING FOR THE FUTURE

With this Strategy and significant investment and support from all stakeholders, we will connect all Canadian homes and communities, businesses and public institutions.

We've heard loud and clear that connectivity is the roadmap to the future. Connectivity creates all kinds of opportunities for all Canadians, especially those in rural Canada: new skills, access to essential services, and the ability to attract new talent and retain jobs in small communities.

The Government of Canada has taken a number of steps to move towards its ambitious goal to connect everyone; but to achieve it, all partners must work together.

We are not only connecting Canadians to catch up to the technologies of today, we are investing in the future of our country, to help create jobs, grow our economy, and build safe and sustainable communities from coast to coast to coast. By working as one, we can ensure no one is left behind, and that everyone has access to the world at their fingertips.



COMMONLY USED TERMS AND THEIR DEFINITIONS

Download speed	The speed at which the user receives data from the Internet – for example, the speed at which a large file can be downloaded from a website.
Fibre optic line	A type of cable that uses glass threads or plastic fibres to transmit data using pulses of light. Fibre can offer much faster speeds than, for example, copper wires.
Fixed wireless	This is service for providing high-speed Internet to a fixed location, such as a home or business. The wireless signal is typically transmitted from a tower to an antenna installed on the roof of the home or business in question.
Gigabits per second (Gbps)	There are 1,000 megabits in a gigabit. Therefore, 1 gigabit per second means 1,000 megabits per second.
Long-Term Evolution (LTE)	A standard for wireless communications (e.g. for smartphones and other devices). LTE is commonly referred to as 4G (fourth generation) cellular technology.
Low-Earth orbit (LEO) constellation	A system of satellites that orbit much closer to the earth than traditional communications satellites. A LEO constellation can have hundreds of satellites.
Megabits per second (Mbps)	The most common unit of measurement for describing the speed of high-speed Internet connections.
Network resiliency	The ability of a network to provide “back-up” service in the event of an issue with normal network operation.



Passive infrastructure	The non-electrical elements needed for network deployment. Examples of passive infrastructure include telephone poles, underground ducts or conduit, and wireless towers.
Scalability	The ability of network infrastructure to be upgraded later to offer higher speeds.
Spectrum	Airwaves used to transmit sound and data wirelessly.
Telehealth	A method of providing health care services remotely using digital technology including computers and mobile devices.
Upload speed	The connection speed at which the user can send data, such as the speed to upload a video to a social media website.
Wireless	A connection using wireless signals rather than wiring. For example, a signal can be transmitted from a wireless tower to mobile devices such as phones or to fixed locations such as houses.
Wireline	An Internet connection provided directly to a home or business using some form of wire or cable.

