RURAL CONNECTIVITY TASK FORCE

DISCUSSION PAPER

DECEMBER 2020

APAS
Agricultural Producers Association of Saskatchewan

INTRODUCTION

Too many Saskatchewan agricultural producers and other rural residents lack adequate internet service to meet their day-to-day needs in an interconnected world. Poor internet connectivity hurts both the rural economy and the social fabric of rural communities.

The Agricultural Producers Association of Saskatchewan (APAS) began working on the issue of rural connectivity in 2019, when it conducted a survey that found high levels of dissatisfaction and service disruption amongst respondents.

The APAS survey results were in line with other research showing significant differences between internet service in rural and urban communities.

For example, the 2018 Canadian Radio-television and Telecommunications Commission (CRTC) Monitoring Report noted that 37% of rural households had access to minimum service standards, compared to 97% of urban households.

In April 2020 APAS launched an updated survey to see how rural internet and cellular service was holding up in the context of the COVID-19 pandemic. The results were clear: COVID-19 has made internet service even worse for many rural residents.

We hear time and time again that rural Saskatchewanians are experiencing chronically low internet speeds, insufficient service, and mass frustration.

More needs to be done to improve rural connectivity in Saskatchewan, and that is why APAS launched the Rural Connectivity Task Force in September 2020.

The Task Force is meeting with industry experts, service providers, and regulators to learn more about the technical and regulatory barriers to improving rural internet, plus identify ways to fix the problem.

Currently in its research phase, the Task Force has met with several experts in the field, including Dr. Michael McNally (University of Alberta), Dr. Reza Rajabiun (Ryerson

MINIMUM SERVICE STANDARDS

In 2018 the CRTC set out national standards for the level of internet service that Canadians need to engage in a digital society. The CRTC levels are set at 50 Mbps (downloads) and 10 Mbps (uploads). This is commonly referred to as "50/10".

50/10 is considered fast enough for Canadians to use streaming services and cloud-based applications, and for multiple users in the same household to use the internet at the same time.

University), Dr. Gregory Taylor (University of Calgary), and Craig Dobson (Taylor Warwick Consulting).

The purpose of this report is to summarize the information gathered to date, and to define key terms and concepts related to internet connectivity in Saskatchewan and Canada.

Following the completion of its research, the Rural Connectivity Task Force will release a final report in early 2021, which will include recommendations and next steps.

According to the Canadian Wireless Telecommunications Association (CWTA), the value of connecting rural Saskatchewan could total up to $1.2 billion in additional GDP for the province.

THE IMPACTS OF POOR RURAL CONNECTIVITY

Economic Impacts

There is a clear economic cost to inadequate rural connectivity. Both business owners and consumers responding to the APAS surveys made it very clear they were missing out on market access because of their inability to connect.

Survey respondents noted productivity loss, an inability to use software or apply for programs, difficulty buying and selling goods online, the high cost of education, and disincentives for rural investment as major challenges.

For example, without reliable cellular and internet service, a rural trucking company is not able to ensure timely logistics, payments, and other services. A professional living rurally is unable to telecommute to their job in the city. A small business owner living in a town or village is not able to move online and connect with new customers. And an agricultural producer without service in the field is unable to make use of sophisticated agricultural technology.

Poor connectivity results in barriers to economic growth in rural communities that do not exist in cities. Without adequate service levels, rural communities are unable to compete.

When we consider the potential for productivity gains, job growth, and wage growth, connecting rural Saskatchewan to minimum internet service standards is not only necessary but could result in significant economic gain.

Social Impacts

The need for good connectivity extends far beyond being able to stream Netflix. APAS research has identified the social costs resulting from poor connectivity, including impacts on health, education, safety, and the environment.

The COVID-19 pandemic has brought these issues into sharp focus. In 2019, when APAS conducted its first rural connectivity survey, respondents were already noting that poor connectivity made it difficult to take advantage of online learning, and that children were unable to complete homework.

Since then, additional online learning due to COVID-19 has resulted in serious consequences for rural students. Many parents commented that they were forced to limit their children's online classroom participation. Some even noted that children had to leave their homes to participate in online learning.

The challenges associated with COVID-19 have served to highlight the educational inequalities that already existed between rural and urban communities.

The healthcare system has also been severely disrupted during COVID-19, with many clinics and other healthcare centres moving to a remote healthcare model to protect patients.

These telehealth services require sufficient internet speeds to be effective. And health outcomes are worse in areas without adequate service to call for help when an emergency occurs.

Rural depopulation is yet another social cost of poor connectivity. Between 2010 and 2018, 1,350 rural counties in the United States lost a combined 790,000 people to migration. Researcher Steven Ross has identified a correlation between poor internet service and lower rates of population growth, and argues that higher levels of broadband internet adoption are associated with higher income and lower unemployment rates[1].

Without young people, our rural communities cannot thrive long term.

[1] http://www.bbpmag.com/Features/1114feature-BadBroadband.php

As a teacher I relied on connectivity to teach my students. Many times during Zoom meetings I would be kicked out of the session and experience freezing. My students could not hear me at times or else they could not connect due to no access or very poor service at their homes.

- APAS survey respondent

Our internet service is so slow on the farm that our children could not participate in any interactive online learning. Videos won't load, Zoom meetings won't work. Our cell phone service has been a problem for our business for years, but while we were on quarantine after traveling this winter we had to get in our vehicle and drive miles in order to download email or texts.

- APAS survey respondent
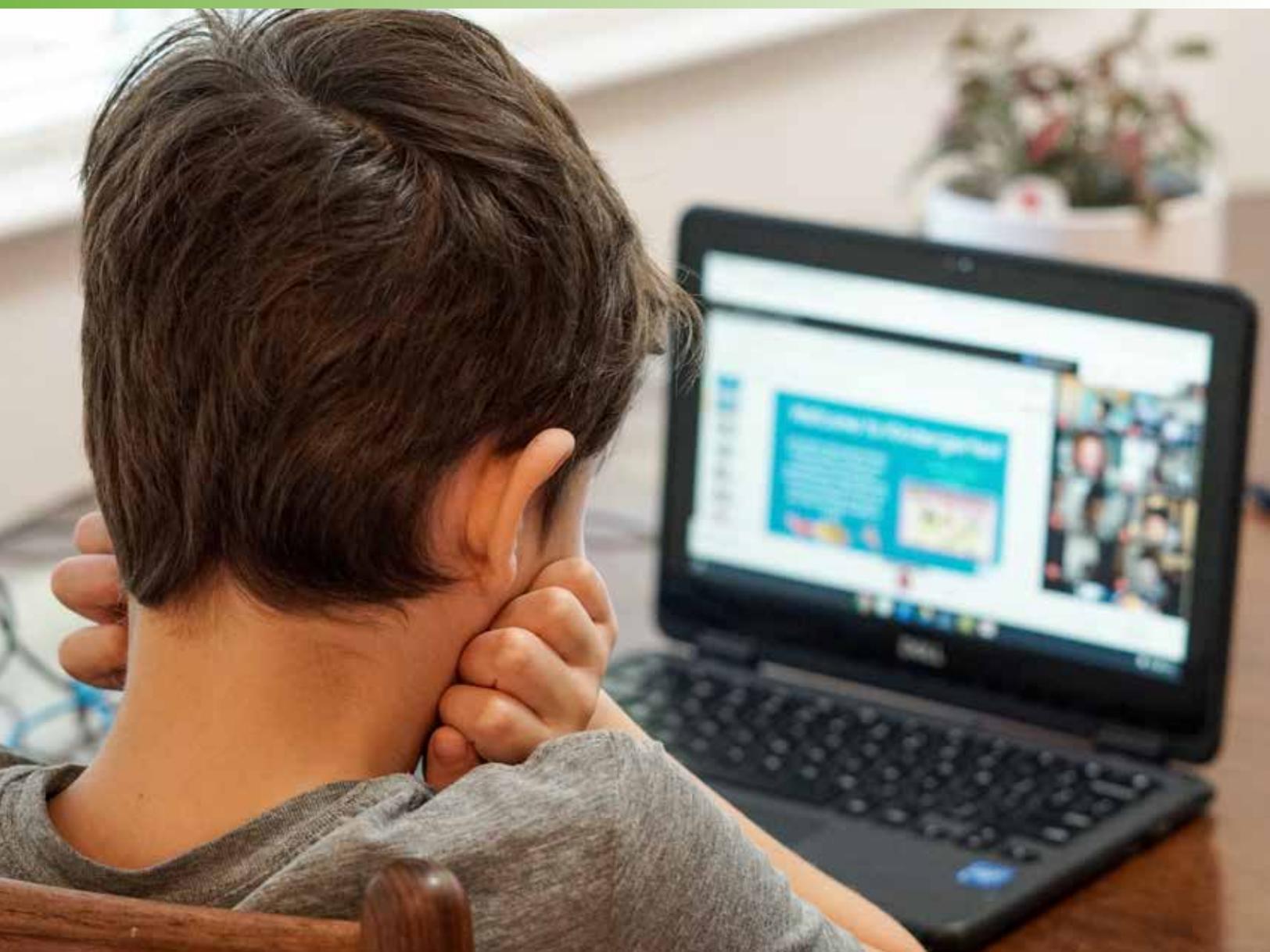
WIRELINE VERSUS WIRELESS

There are two ways to connect to the internet: with wireline and wirelessly. **Wireline** systems use different types of cable such as fibre optics and copper cable (e.g., coaxial cable and digital subscriber line) to connect devices to the internet. **Wireless** systems use parts of the radio spectrum and physical stations (e.g., towers or satellites) to connect devices to the internet.

Wireline

Wireline communications are the foundation of how we are connected. Wireline runs between our cell phone towers, in the deep ocean, and to large data centres used by companies such as Facebook and Google.

There are two main types of wireline that connect our various devices: **fibre optic** and **copper**.

Historically the most common wireline was copper cable, which was used to deliver telephone and television service to almost all households. Copper wireline uses electrons to send signals between devices, with voltage being interpreted into binary code.

Since it is already installed almost universally, copper cable is still used as a cost-effective means to deliver internet service. For example, 2.5% of SaskTel's capital expenses in 2019/20 have gone toward building out copper wireline.

The other main type of wireline is fibre optics. Fibre optics use light itself to transfer data through ultra thin tubes, traveling approximately 200,000 kilometres per second. This is much faster than copper wireline, giving fibre optics a significant advantage in long distance communication, reduced latency, and the potential to be of continued value into the future (i.e., "future-proofing").

Copper is, however, much cheaper than fibre optics. The result is that most Saskatchewan households still use copper wireline to get "last mile" service directly to their premises. This copper wireline is generally linked to a larger fibre optics network.

The widespread use of older copper lines helps explain why so many rural residents have seen their service decline over years: the older infrastructure is simply not able to keep up with the growing demand.

The cost of fibre optics is quite significant and can be a barrier. U.S. estimates show the cost of fibre optics wireline to be 45% of the total cost to service a home. This grows to 54% of the total in rural areas.

This cost is significant for companies working to serve rural communities, especially in comparison to copper. Going forward there is a hope that continued innovation will help lower the cost of fibre optics.

LAST MILE

"Last mile" is a phrase widely used in the telecommunications industry to refer to the final leg of the telecommunications networks that deliver services to retail end-users (customers). More specifically, it describes the portion of the telecommunications network chain that physically reaches the end-user's premises.

CABLE
1,000 Mbps

DSL (COPPER)
100 Mbps

4G
65 Mbps

FIBRE
10,000 Mbps
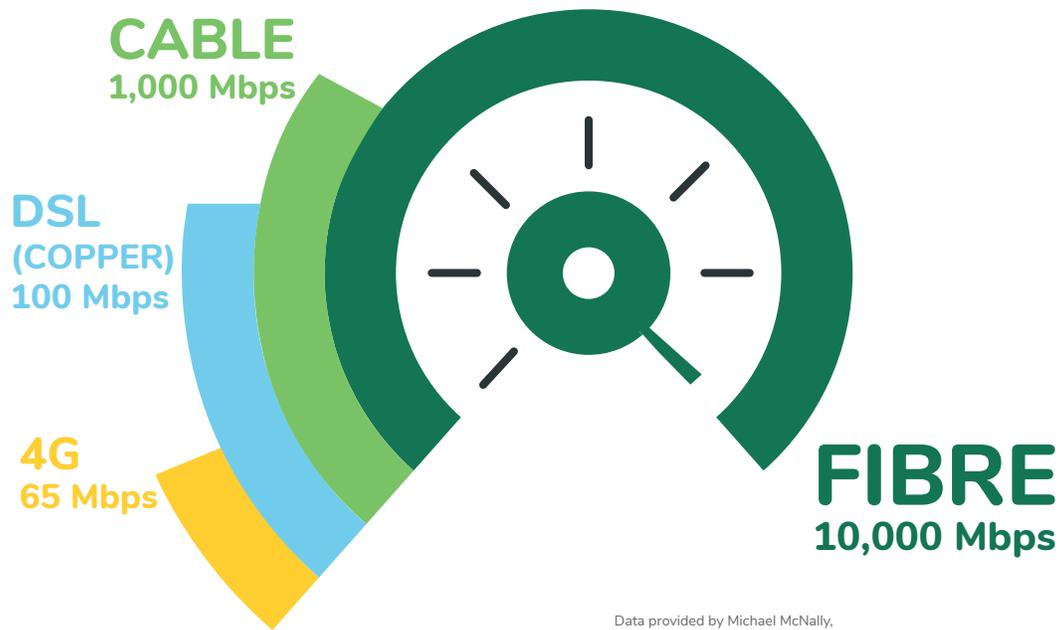
Data provided by Michael McNally,
University of Alberta

Wireless

"Wireless" is not an entirely accurate term to describe what happens when wireless devices are connected to the internet. Rather, we can think of the "last mile" being connected using wireless technology.

In other words, small slices of radio waves (called spectrum) are used to send signals between a wireless device and a connecting point such as a cellphone tower, modem, or satellite. From there the signals are converted into light and sent through the fibre optic network.

This creates much greater mobility for our devices and has allowed our devices to travel with us.

However, there are several factors that limit the use of spectrum as a communications technology. For example, radio waves can easily be blocked or degraded by physical objects, weather conditions, and other electromagnetic waves. We are also unable to connect devices directly through radio waves because of the curvature of the earth.

Saskatchewan is at an advantage due to our relatively flat landscape, which gives radio waves significant range and makes it cheaper to install backhaul (i.e., connections between cell towers and the rest of the network).

Satellites offer another wireless option to rural and remote areas. For example, Xplornet's geostationary satellites provide service across Saskatchewan by beaming radio waves into high orbit. Unfortunately, a limitation of this technology is the distance from Earth, which can cause a significant time delay.

Newer Low-Earth Orbit (LEO) satellites by companies like Telesat, SpaceX, Amazon, and Microsoft are becoming available and provide another opportunity to connect more people and communities across the province.

The costs to connect wirelessly are significant. In 2019 SaskTel estimated it would cost approximately $1 million to construct each large tower and connect it to the rest of the SaskTel network. And the Canadian Wireless Telecommunications Association (CWTA) estimates that between 1985 and 2017 approximately $48 billion was invested in wireless communications infrastructure in Canada[2].

[2] https://www.cwta.ca/facts-figures/

INTERNET POLICY & REGULATION

For the most part, Canadian telecommunications are regulated at the federal level through *The Radiocommunications* Act and *The Telecommunications Act*. Both Acts are currently under review.

These two pieces of legislation give regulatory and policy authority over telecommunications to Innovation, Science and Economic Development Canada (ISED) and the Canadian Radio-television and Telecommunications Commission (CRTC). Their overlapping authority makes the responsibility for solutions more complex, and this regulatory structure makes Canada an outlier compared to similar developed countries.

Service Standards

As societies have become more interconnected and dependent on the internet, governments around the world have set minimum standards and targets for internet service to accelerate infrastructure development and build accountability.

The CRTC has set a goal for Canadian service standards of 50/10 Mbps, to be achieved by 2026.

OECD NATIONAL BROADBAND TARGETS

COVERAGE (% of households)

EU
100%
30 Mbps

DENMARK
100%
100 Mbps

CANADA
90%
50 Mbps

US
80%
100 Mbps

10 Mbps   30 Mbps   50 Mbps   100 Mbps

QUALITY (download speeds)
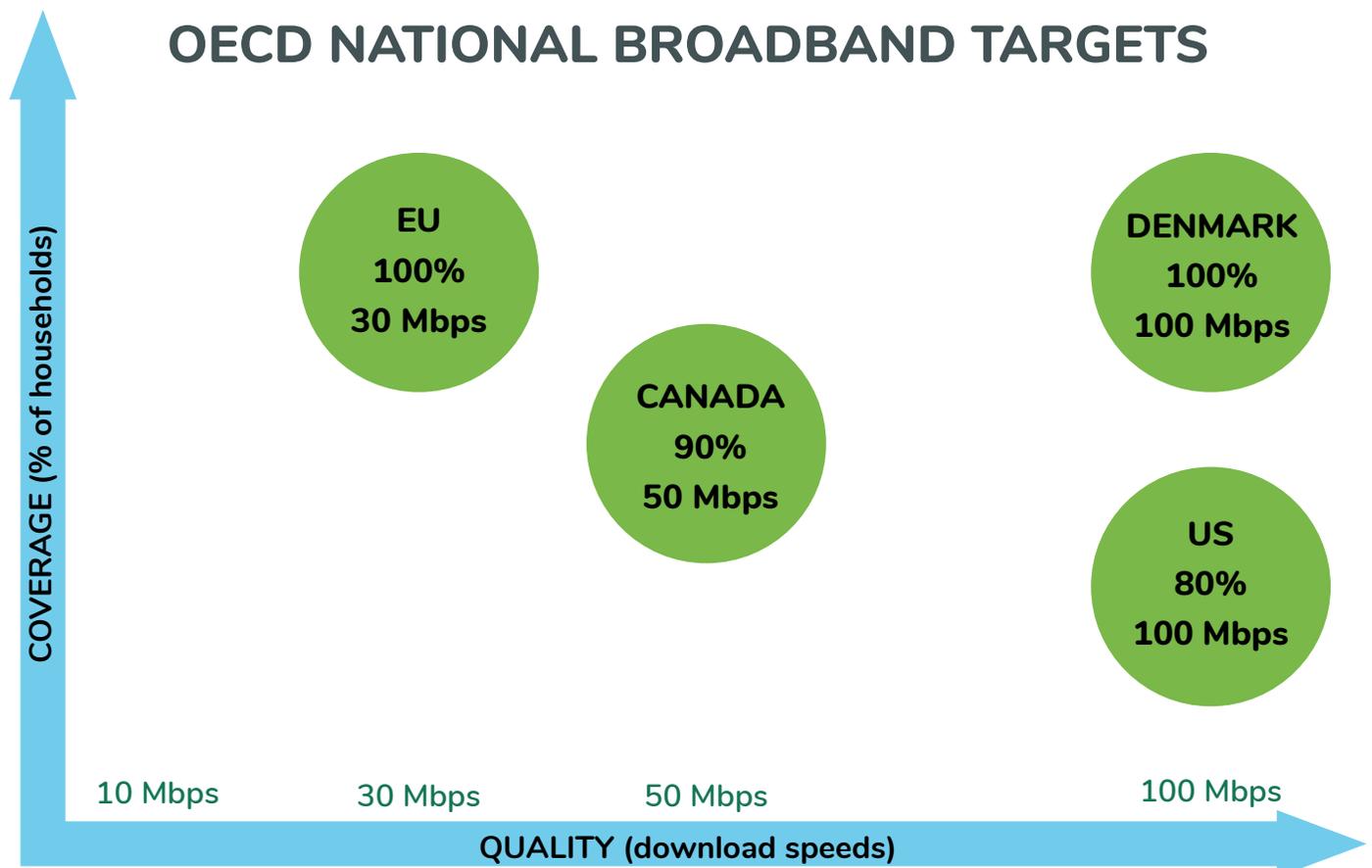
Regulation of Spectrum

Spectrum uses radio waves for wireless communication and is a necessary component of connecting rural and remote Canadians. It is, however, a finite resource.

There is a limited amount of space to produce and send radio waves, and too many radio waves can create interference and slow communications. For this reason, the federal government allocates spectrum as a natural resource.

This is done through spectrum auctions. The federal government auctions spectrum to Internet Service Providers based on geographic area.

Spectrum auctions generate significant amounts of money for the Government of Canada, with the CWTA estimating that since the 1980s the federal government has generated $17 billion in spectrum auctions and fees[3].

Some auctions come with rules such as minimum service requirements. However, in some cases service providers can leave spectrum unused, preventing other providers from accessing it and leaving communities without service.

Spectrum auctions are not the only system that governments use to determine access to spectrum. Some countries use a system known as a "beauty contest," where service providers request access to spectrum by demonstrating how they plan to use it.

[3] https://www.cwta.ca/facts-figures/

Regulation of Wholesale Rates

In many cases, internet service is provided to customers directly by large telecommunications companies. In other cases, smaller internet service providers (ISPs) purchase access to infrastructure in order to provide service on a smaller scale. These smaller ISPs provide access to many rural and remote communities by developing the "last mile" of service themselves and paying to connect it to the infrastructure (e.g., towers, poles, fibre optic network) of a larger company.

This relationship is known as "wholesale." The wholesale fee can be the difference between having a business case for connecting an area or not.

The CRTC has the power to set a wholesale rate that regulates how ISPs can access each other's infrastructure. In 2015 the federal government began an investigation into regulating the wholesale rate that large ISPs could charge to smaller ISPs.

As a result, the CRTC set a new rate and required large ISPs to repay smaller providers they had overcharged. However, the large ISPs asked for a delay to the changes, and in the end the federal government did not set a wholesale rate. The question of wholesale rates has now reached the Supreme Court of Canada.

Cross-Subsidy

To ensure equal access to internet service across Canada, the government has established various ways to help make the business case more lucrative in rural communities. These include regulatory service standards and a direct subsidy.

One of the most important programs in the Saskatchewan context has been the Universal Voice Subsidy, which provided money for ISPs making service available in high cost areas such as rural communities. This program is currently being phased out and transformed into the Broadband Fund, a change that will impact roughly 100,000 Saskatchewan households and cut $16 million from SaskTel's operations.

Funding

In Canada's Connectivity Strategy, released in 2019, the federal government estimates that $8 billion in infrastructure investments are needed for Canada to reach its universal access targets[4]. Since 2015 the federal government has taken active steps to connect rural Canada by making more money available. Five different programs have come online since 2015 to achieve this goal, resulting in a collective investment of just under $7 billion:

- Connect to Innovate ($500 million, ended 2019)

- Universal Broadband Fund ($1.7 billion)

- Rural and Northern stream of the Investing in Canada Infrastructure Program ($2 billion)

- Canada Infrastructure Bank ($2 billion)

- Broadband Fund ($750 million over five years)

Despite the federal government's significant investment, it remains unclear how effective the funding has been to date, or how much more than the government's estimated $8 billion will be needed to achieve universal access for all Canadians.

[4] Canada's Connectivity Strategy: https://www.ic.gc.ca/eic/site/139. nsf/eng/h_00002.html

It should also be noted that none of the existing funding options support the long-term maintenance of projects, which could pose a significant barrier to providing service to rural and remote communities, which are often not profitable over time.

In addition to this money from the federal government, municipal and provincial governments have also made significant investments into telecommunications during this period. For example, through the Wireless Saskatchewan program the provincial government has invested $107 million in building towers across rural Saskatchewan.

Elsewhere in Canada, Nova Scotia has prioritized building out service with an investment of $193 million to get close to 100% service by the summer of 2022. And the town of Olds, Alberta owns and operates its own "fibre to the premises" utility to ensure their community is connected.

CANADA'S CONNECTIVITY FUNDING PROGRAMS

Connect to Innovate
$500 million

Broadband Fund
$750 million

Universal
Broadband
Fund
$1.7 billion

TOTAL NEEDED:
$8 billion

Canada
Infrastructure Bank
$2 billion

Rural and
Northern stream
$2 billion
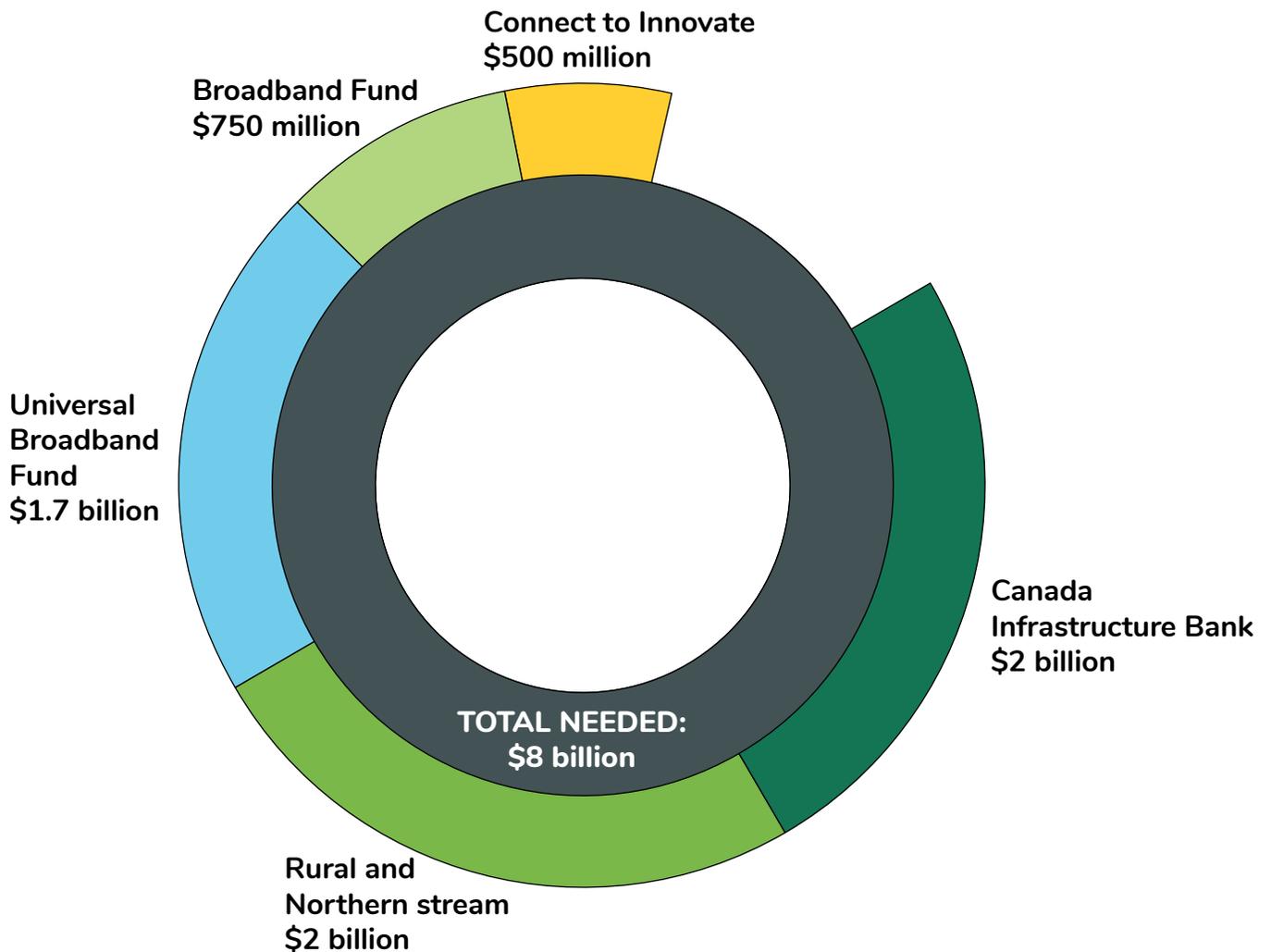
NEXT STEPS

Through its initial research phase, the Rural Connectivity Task Force has learned about several dimensions of the digital divide, including:

- The economic and social impacts on rural communities.

- How different types of infrastructure and technologies interact, and how that impacts internet speeds.

- How federal and provincial policy decisions shape the amount and quality of service we can expect in rural Saskatchewan.

Between now and January 2021, the Task Force will continue its research by meeting with key stakeholders, including internet service providers and regulators. Once these meetings are completed, the Task Force will develop its recommendations and release them as part of a final report.

APAS has also partnered with the Canadian Internet Registration Authority (CIRA) to develop an **Internet Speed Test** for Saskatchewan. The Internet Speed Test allows users to calculate the speed of their internet and will enable APAS to establish a baseline for service levels across the province. **To take the speed test, visit apas.ca/speedtest.**

GET INVOLVED

How can you take action and support the work of the APAS Rural Connectivity Task Force?

1. **Take the Internet Speed Test** (as many times as you like!) and let your internet service provider know if you're not getting the service you're paying for. Take the test at **apas.ca/speedtest**.

2. **Encourage friends, family, and neighbours to take the Internet Speed Test.**

3. **Subscribe to the APAS newsletter and follow APAS on social media** to stay up to date with this and other APAS projects.

4. **If your RM doesn't currently participate in APAS, join for only $2,021 in 2021**. We'll put your membership fee directly towards the work of the Rural Connectivity Task Force.

For more information about the Rural Connectivity Task Force, visit apas.ca/connectivity.