

Collaboration is key to Canada's 5G and Industry 4.0 success

Why we need cooperative
models to deliver 5G networks
for Canada's post-COVID-19
connectivity needs

March 2021



COVID-19 has changed Canada's connectivity needs

COVID-19 has forced businesses and individuals to quickly change their ways of working and living to adapt to newly introduced physical distancing orders. This was made possible by internet connectivity, which allowed Canadian businesses and individuals to quickly adopt new ways of remote working and living. These new ways of working and living had a significant impact on internet usage in Canada. Internet usage increased by 43% during the first lockdown period, as compared to the same time a year earlier.¹

Canada's telecommunications networks, which are among the best in the world with some of the fastest speeds across peer countries like the G7, Australia and South Korea, were able to support this increased internet usage and digital ways of working. Further, along with the timing and quality of the health response, Canada's networks were a key enabler of Canada's economic resilience throughout COVID-19. Excluding energy, mining, oil and gas industries, which have been impacted by both COVID-19 and a broader commodity downturn, Canada's top six industries by GDP have exhibited a recovery to pre-COVID-19 GDP levels between April and July 2020.² It is revealing that industries with the highest share of remote workforces have had the greatest growth in GDP since lockdown.^{2,3}

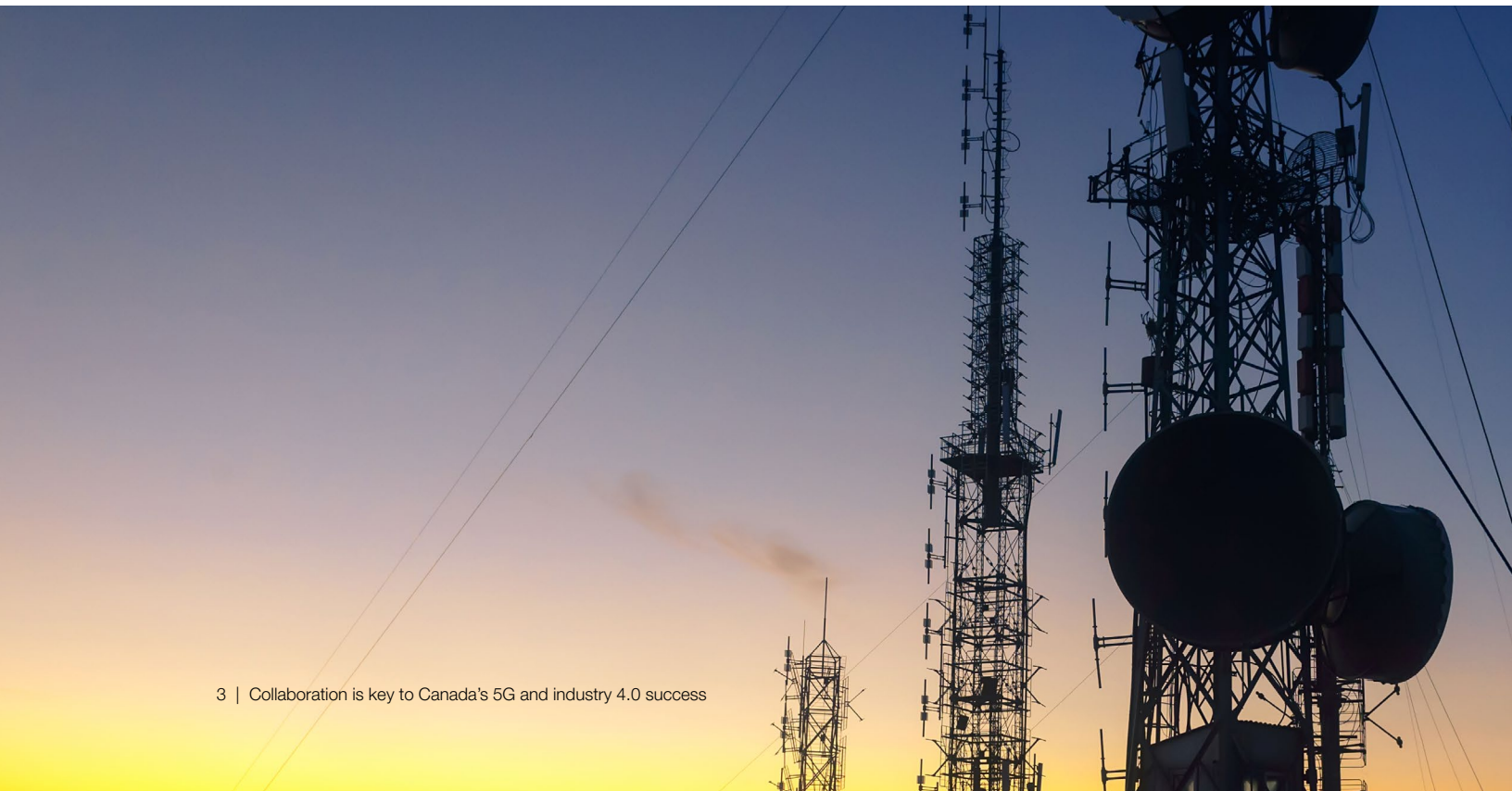
Connectivity has also supported the well-being of Canadians, who are using it to address the challenges of COVID-19 restrictions. A large portion of Canadians have used connectivity to contact family and friends, access education and healthcare, and purchase goods. This has helped Canadians adapt to new living conditions and provided Canadians with an outlet to the rest of the world during COVID-19. Canada's telecommunications operators also supported Canada's COVID-19 response by donating services to businesses and in-need communities, as well as by donating directly to the COVID-19 health response.⁴

Going forward, we see COVID-19 having a permanent effect on the demand for connectivity in Canada. The way that Canadian businesses operate and Canadians live their lives has been permanently impacted by six key trends that existed before the pandemic and were accelerated by COVID-19. These trends are:

1. **Shifts in population centres:** Higher levels of remote working and remote learning throughout COVID-19 have given individuals the opportunity to locate to more affordable areas. This is likely to reduce the amount of people moving to large urban centres and increase connectivity needs outside of major cities. It will also increase demand for connected devices, such as remote healthcare technology and connected transit systems that will improve healthcare accessibility and productivity in Canada.
2. **Shift in relationship and entertainment preferences:** Physical distancing measures have led people to increase their use of social media, video streaming and video chat. This is likely to continue post-pandemic and lead to increased connectivity needs across Canada.

3. **Shifts in business operating models:** Office closures and physical distancing measures have made automation and digitization a priority to prevent future disruption risks. We'll likely see an increase in the use of connectivity across Canada to enable devices such as smart assets and tracking in business operations to increase productivity, improve worker safety and support upskilling of the workforce.
4. **Shift to localized supply chains:** Bottlenecks and trade restrictions on medical equipment throughout COVID-19 have made access to local goods a top-of-mind issue. This is likely to increase connectivity needs as we see increased localization of production. This will likely increase the demand for advanced technologies in production, such as smart agriculture and product traceability, increasing job opportunities and improving productivity in Canada.
5. **Shifts in service preferences:** Exposure to virtual services throughout COVID-19, especially in areas such as virtual healthcare and online banking, will likely mean that we'll see these services becoming increasingly popular in the future. This is likely to increase the connectivity needs of Canadians as they access services and increasingly adopt connected devices such as wearable technology to improve quality of healthcare, productivity and support social well-being.
6. **Shifts in consumer purchasing habits:** Closures of retail stores throughout COVID-19 have led to an increase in online shopping. This is likely to persist and increase connectivity needs across Canada as Canadians conduct more of their purchases online and incorporate technologies such as augmented reality into their shopping experience, increasing demand and access to goods across Canada.

COVID-19's impact on these six key trends will likely accelerate the adoption of Industry 4.0 across the economy. Industry 4.0 is the digitization of value chains end-to-end. Examples of this include the use of remote healthcare, connected transit and smart agriculture as part of a larger connected ecosystem. Industry 4.0 will drive productivity, efficiency and flexibility across the economy and will rely on advanced connectivity networks such as 5G, as well as an ecosystem of connected devices and services (the Internet of Things).

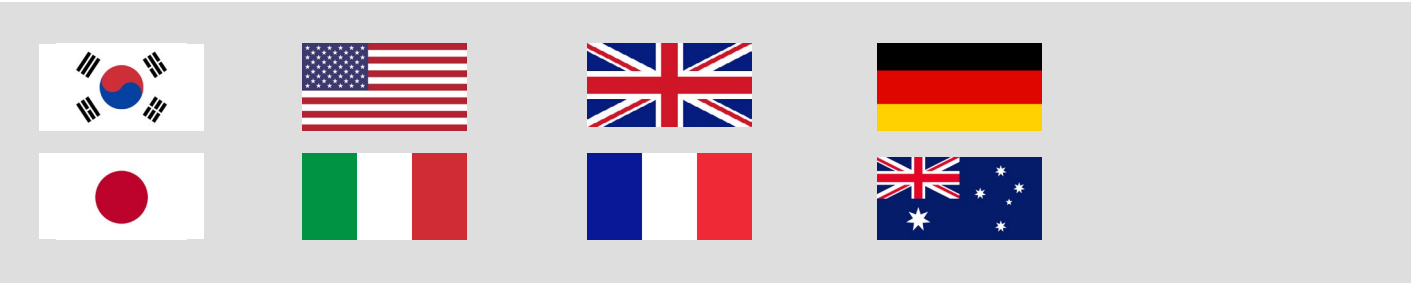


Canada will need to act as an investment catalyst for 5G

A transition to 5G networks will be required to realize the full benefits of Industry 4.0 given their ultra low latency, higher speeds and ability to connect more than one million devices per kilometre. The introduction of 5G networks and the adoption of the Internet of Things in Canada are forecasted to deliver CA\$200 billion in incremental GDP to the Canadian economy between 2020 and 2040.⁵

However, 5G networks are very different from previous generations of network technology (3G, 4G, etc.). Notably, 5G is forecasted to be up to 70% more expensive to build and maintain because it will require the deployment of many small antennas.⁶ Further, the economic benefit of 5G is forecasted to be distributed across all industries in the economy, rather than to the telecommunications operators who will have to fund the network deployment of 5G.⁵ These factors will likely impact the incentives for how quickly, and where, telecommunications operators deploy 5G networks across Canada.

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Because of the importance of 5G for Industry 4.0, and the potential economic and social benefits derived from it, we have seen the governments of the G7, Australia and South Korea take measures across six policy levers to act as an investment catalyst for 5G. This is a departure from many government's historic roles as net receivers, as many governments have traditionally viewed the mobile telecommunications sector as a source of capital from auctioning spectrum and not as a key enabler for mid- to long-term economic success.

Canada has made good progress across a number of the six levers. However, with connectivity needs being accelerated by COVID-19 and the increasing importance of Industry 4.0 adoption, there is an opportunity for Canada to more firmly take the role of an investment catalyst for 5G. To do this, Canada should take learnings from best practices across the six policy levers:

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1. Spectrum timing, allocation and costs: Spectrum is one of the key levers for the deployment of 5G. Spectrum is allocated by the government or regulator through spectrum bands and auctioned off to telecommunications operators. Spectrum bands are the radio frequencies required to transmit connectivity from telecommunications operators to users. Without sufficient spectrum, telecommunications operators cannot provide connectivity to the public. Canada's auction for mid-band 5G spectrum is scheduled for June 2021, which is later than global peers, and the high-band auction date has not been announced.⁷ Mid- and high-band spectrum are essential for the most advanced 5G use-cases. Canada's spectrum costs are also among the highest in the world. This is due to, for example, scarcity created by spectrum reserved for smaller telecommunications operators in the form of set-asides.

Canada should consider accelerating the date of the mid- and high-band spectrum auctions and ensure that spectrum licences are cost-effective. This will increase the amount of capital available for 5G investment by Canada's network operators, who will be required to deploy 5G networks across the country, especially the higher cost mid- and high-band networks that will take significant investment.

2. Network investment incentives: Canadian networks are among the most expensive to build and maintain in the world due to Canada's low population density, high population dispersion, relatively small scale operators and high spectrum costs. Relying only on market forces to dictate 5G network deployment could potentially lead to prioritization of 5G deployment in high-density areas to achieve a return on investment that can potentially recover the high capital expenditures. However, to deliver the full potential of Industry 4.0, 5G networks will need to be more ubiquitous as industrial production and social needs are spread across the country.

Canada can allocate funding to promote 5G deployment in areas that are important to economic success, such as industrial zones and highways. This will ensure that 5G networks can support economic and social benefit broadly across the economy. In addition, Canada can learn from regulation in peer wireless telecommunications markets, such as Europe, where countries that introduced regulated MVNO access to wireless networks have demonstrated lower coverage and adoption rates of network technology (3G, 4G, etc.).⁸ Similar regulation in Canada could potentially reduce carriers' ability to invest and disincentivize them from maintaining their high levels of investment in networks.

3. Rural network subsidies: Rural networks are significantly more expensive than urban networks due to low population density. Recognizing the importance of connectivity during COVID-19, the federal government increased the funding of the Universal Broadband Fund by 75% in November 2020.⁹ Rural connectivity will be an important factor in the adoption of Industry 4.0 as key industries in Canada such as agriculture, energy, mining, oil and gas are primarily located in rural areas.

Global peers such as Japan have acknowledged the importance of rural connectivity and offered low-cost 5G spectrum licences with stipulations that all prefectures receive 5G services within two years of issuing.¹⁰ The US has allocated US\$9 billion to deploying 5G networks in rural areas in an effort to narrow the Digital Divide and boost agricultural productivity.¹¹ Canada can bolster its support for rural connectivity throughout

the 5G era by modifying the current rural connectivity programs to provide incentives for specific 5G targets rather than just high-speed connectivity. This will allow for a narrowing of the Digital Divide by providing rural communities with access to the most advanced technologies.

4. Regulatory standards: 5G networks are different from previous generations as they require a large amount of small antennas. Deployment of these small antennas can be difficult as the approval process can create roadblocks. Global peers have taken varied approaches to supporting network operators' access to infrastructure. The US has streamlined the process for approval by introducing a 90-day shot clock for municipalities to approve infrastructure access requests.¹¹ South Korea has revised regulations to provide operators with access to local government-owned areas and facilities management agencies to install 5G equipment.¹²

Canada can learn from peers by streamlining the approvals for 5G network deployment. Similar to the US, Canada can introduce a shot clock and/or notification regime to reduce any costs related to 5G approval delays. Canada should also have a regulatory framework that allows for voluntary sharing of private infrastructure between operators. This will provide operators with clarity in the planning process and allow for streamlined deployment of 5G infrastructure across Canada.

5. Research and innovation funding (technology development): Research and innovation in the development of 5G technology will support the adoption of Industry 4.0 and economic growth in Canada through local production. The UK has established a nationally coordinated program for 5G investment, which includes 5G trials and testbeds that pilot 5G technology across multiple industrial use-cases in small- and large-scale environments to measure social and economic benefits of 5G.¹³ Canada has made progress in this area, including through the CA\$400 million ENCQOR 5G testbed, established by the Ontario and Quebec provincial governments.¹⁴

Canada can consider establishing large-scale government-industry 5G testbeds to facilitate research and development of 5G technology while measuring potential economic and social benefits of its use. Canada can also create direct funding programs specifically for 5G research and innovation projects in addition to its current broader technological advancement programs. These initiatives will ensure that Canada is able to realize the full economic and social potential of 5G technology, while supporting local innovation.

6. Vertical industry application funding (technology adoption): Around 90% of the benefits associated with 5G technology are forecasted to be realized by businesses adopting Industry 4.0 and other advanced technologies.¹⁵ Global peers have recognized this and targeted funding to incentivize 5G use-case adoption in industries critical to mid- to long-term economic success. South Korea has created legislation mandating adoption of 5G in immersive content, autonomous vehicles, smart manufacturing, smart cities and digital healthcare.¹⁶ Italy has invested €60 million through the Bari-Matera plan on 10 specific 5G application areas including Industry 4.0, virtual reality and smart cities.¹⁷

Canada can take a similar approach by working with network operators and industry to introduce tax incentives, subsidies or grants to incentivize the adoption of 5G use-cases in key industries such as manufacturing, agriculture, healthcare, energy, mining, oil and gas. Canada can also expand scope and funding of current innovation programs to include specific 5G adoption targets, such as in the Digital Superclusters program, which promotes advancement and use of technology in multiple industries.

Conclusion

COVID-19 has accelerated multiple social and economic trends that will increase the demand for connectivity in Canada and increase the need to adopt Industry 4.0. There is now a window of opportunity for the government, the telecommunications sector, and broader industry to cooperate on Canada's 5G network deployment as a key enabler for meeting Canada's post-COVID-19 connectivity needs and its adoption of Industry 4.0. Canada can take learnings from global peers who are acting as an investment catalyst for 5G deployment through their action across six key policy levers. Canada's action across these levers will help secure the mid to long term success of the Canadian economy and support Canadians' social well-being through keeping pace with global peers and providing the most advanced technologies to Canadians.

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