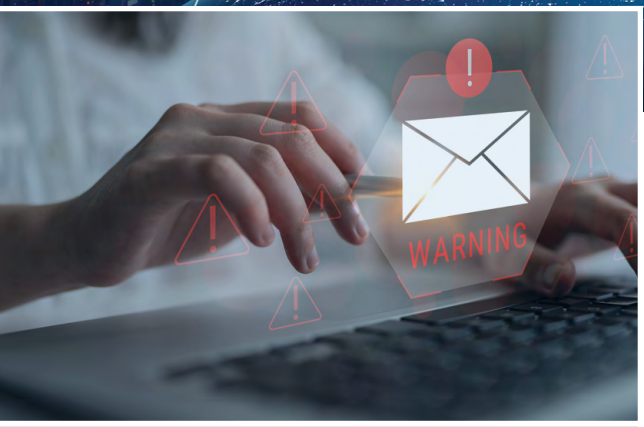
RESEARCH

Securing Canada's Communications Future

Resilience in a connected world





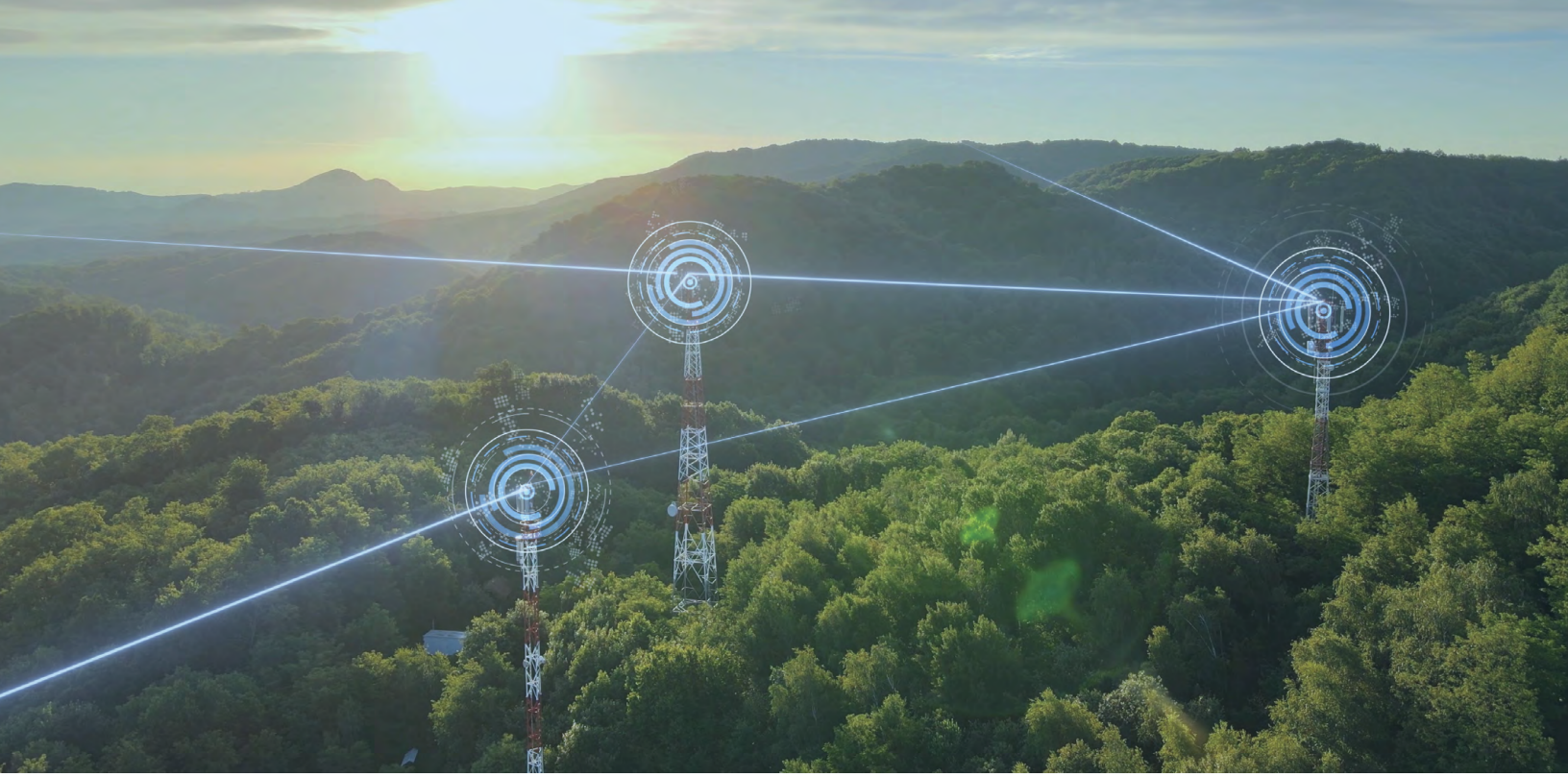
The increasing likelihood of communications outages, and the associated impact severity, requires solutions that consider physical and cyber resilience, effective governance models, and local conditions to secure Canada's communications systems future.

Canada's communications networks form the invisible infrastructure that makes modern life possible.

As the fourth utility, these systems support the internet, mobile networks, GPS, and other essential connectivity for key sectors such as emergency services, education, finance, healthcare, and transportation. These systems are publicly vital yet largely privately operated, and are facing escalating climate and cybersecurity risks alongside the complexities of a more interconnected and globally integrated communications landscape.

The next decade will see increased dependence on these systems, as many of our work activities, social interactions, and vehicles are already highly digital and connected. This increased dependence, coupled with the proliferation of next-generation technologies, will further intensify the need for reliable connections, accelerate the exploitation of resources and environmental impacts, and create new opportunities and incentives for cyberattacks.

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Future uncertainties

Over the next 5-10 years, Canada's communications systems face numerous challenges, driven by issues including:

Increasing threats: Average temperature rises in Canada have outpaced global climate change, particularly in the Arctic. This has contributed to a tenfold increase in the cost of recovery following natural disasters over the past 50 years. At the same time, instances of willful sabotage, such as vandalism, copper theft, and coordinated cyberattacks, have become more common.

Private-public partnerships: Communications technologies are a public necessity, but these services are largely operated by private companies, with more than 85% of the market owned by a small number of large organizations. Future upgrades will require capital, but investment has declined, with annual private spending in communications infrastructure falling by $600M (6%) since 2019.



System sovereignty: Canadians increasingly rely on foreign-owned infrastructure, such as the satellite internet market, which has doubled since 2018 and is projected to double again by 2030. This trend, among others, raises questions about system sovereignty and security given that systems such as GPS have been blocked during international conflicts. Legislation such as federal Bill C-8, recently introduced in Parliament, identifies communications technology sovereignty as a key priority.

Potential research topics

To help secure Canada's critical communications systems, we will need to look across disciplines to understand and identify how Canada can address the myriad risks threatening connectivity and continuity for government, citizens, and businesses alike. This research initiative seeks to bring together researchers to explore solutions and generate actionable insights on issues such as (but not limited to):

Environmental Factors

Environmental events such as extreme weather, rising sea levels, thawing permafrost, and solar flares represent a regular threat to communications systems. Potential questions may include:

- How can infrastructure be designed or reinforced to remain operational during climate-affected natural disasters such as wildfires, floods, extreme winds, and intense storms?
- What monitoring tools or early-warning systems can improve preparedness for upcoming natural disasters?
- How can systems be adapted to withstand potential space weather disturbances?

Innovative Technological Approaches

Emerging technologies can help strengthen weather resilience, cybersecurity, and redundancy in systems. Potential questions may include:

- What technologies (e.g., low-earth orbit (LEO) satellites, decentralization, next-generation networks) can help make communications systems more resilient to cyberattacks and system failures?
- How can Canada optimize or balance wired vs. wireless systems to improve reliability for essential services, such as emergency services and 911?

Management and Economics

Management of communications systems requires a balance between public interest and private ownership. All interests should be balanced to support long-term resilience, safety, and economic viability. Potential questions may include:

- What policies or regulatory frameworks could help establish guidance for system backups, such as redundancy requirements and emergency power supplies?
- What economic models could help equitably allocate costs and incentives for various resilience measures among governments, providers, and consumers?

Equitable Access

All Canadians require consistent access, including those in communities facing persistent connectivity barriers. Potential questions may include:

- How can system resilience be supported for those in rural, remote, northern, and Indigenous communities?
- What accessibility requirements or inclusive design principles should be embedded into resilience planning to support user needs?

Canadian Context

While groups such as the World Bank have published guides on communications resilience, Canada faces unique issues that may require a contextual analysis. Potential questions may include:

- How should unique factors, such as a large geography, distributed population hubs, and traditional land rights, be considered for the design and implementation of communication resilience strategies in Canada?
- How could Canadian system sovereignty be promoted as dependence on foreign-owned infrastructure continues to grow?





About the CSA Explore Research Program

Explore is CSA Group's interdisciplinary, forward-looking research program, designed to respond to complex, emerging issues that transcend traditional boundaries. The CSA Explore Research Program convenes and supports experts from multiple disciplines to address systemic challenges on specific topics of relevance over the next decade and beyond. Individual research projects help advance discovery from the lens of their own disciplines. Together, their insights guide CSA's proactive response to future needs.

To learn more about the program and how to apply, please see: https://www.csagroup.org/standards/csa-research-centre/csa-explore-research-program/

The application deadline is June 1, 2026.

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