



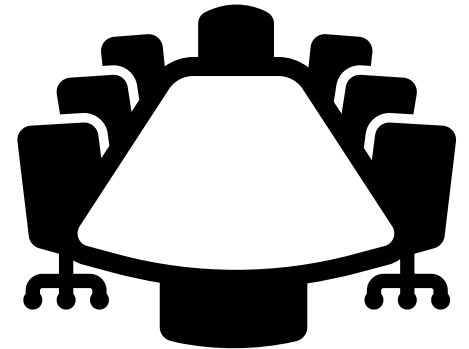
THE CANADIAN POSITIONING, NAVIGATION AND TIMING BOARD (PNTB) UPDATE

CGSIC International Subcommittee
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The Canadian Positioning, Navigation and Timing Board

- MOU recently renewed for another 5 years
- Established in 2011
- Central point of contact for
 - the coordination of civilian and federal PNT issues
 - the exchange of information with foreign governments on civilian PNT matters.
- Our Board is chaired by Natural Resources Canada, and Transport Canada provides vice-chairmanship
- Innovation, Science & Economic Development provides the PNT Office which supports coordination for the PNT Board



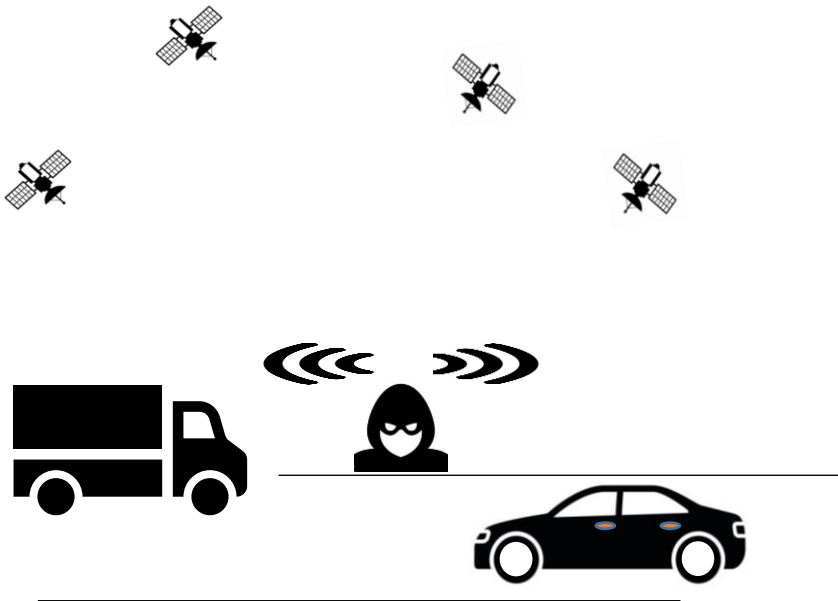
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Update on Completed Efforts



GNSS Jammer Risk Management

Lead: Innovation, Science and Economic Development Canada (ISED)



- ‘Real-world’ testing at Ottawa, Montreal and Vancouver
- Focus:
 - Assessment of the technical capabilities of commercially available jammer detectors
 - Gaining an understanding of jammer detector performance in a controlled laboratory environment and under ‘real-world’ conditions in the field.
 - Development a proof-of-concept cloud-based platform to automate data collection, serve as central repository and to assess the viability of cloud technologies for data analysis

GNSS Jammer Risk Management

Lead: Innovation, Science and Economic Development Canada (ISED)

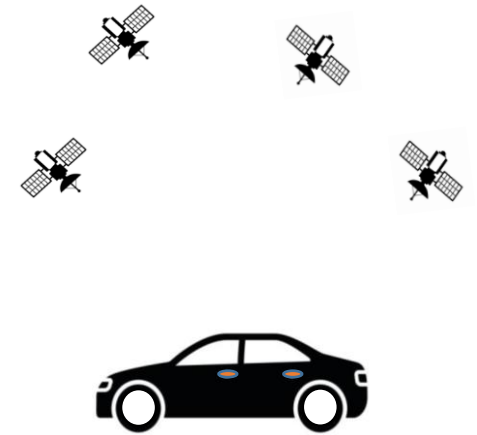
Recommendations

1. Coordinate the development and implementation of a multi-stakeholder public awareness strategy
2. Create a Canadian forum to share information and to raise awareness
3. Establish a community of interest policies to advance infrastructure resilience against jammers
4. Develop procedural guidelines
5. Encourage assessments of vulnerabilities and impacts of jammers
6. Encourage development of jammer-specific PNT contingency plans in corporate business continuity plans
7. Engage a third party to conduct a feasibility study and determine the need and value of an automated platform.

GNSS PNT Infrastructure Requirements for Automation in the Transportation Sector

Lead: Transport Canada (TC)

- Response to [recommendation from workshop](#) held in June 2019 to discuss PNT infrastructure, associated requirements and Canada's readiness to enable CAV deployments.
- Objectives:
 - a) Define service level requirements (integrity, availability, continuity, accuracy)
 - b) Define target network coverage requirements
 - c) Conduct a standards assessment analysis
 - d) Determine industry stakeholders and technologies available
 - e) Conduct primary and secondary research with identified stakeholders
 - f) Estimate cost of expansion
 - g) Identify how to accelerate the expansion of PNT infrastructure
 - h) Recommend a national model for high accuracy, positioning service infrastructure
- Several recommendations made related to the need for standards development, building out additional infrastructure and resiliency



GNSS PNT Economic Value and Disruptions Cost Study

Lead: PNT Office (ISED)



Objectives:

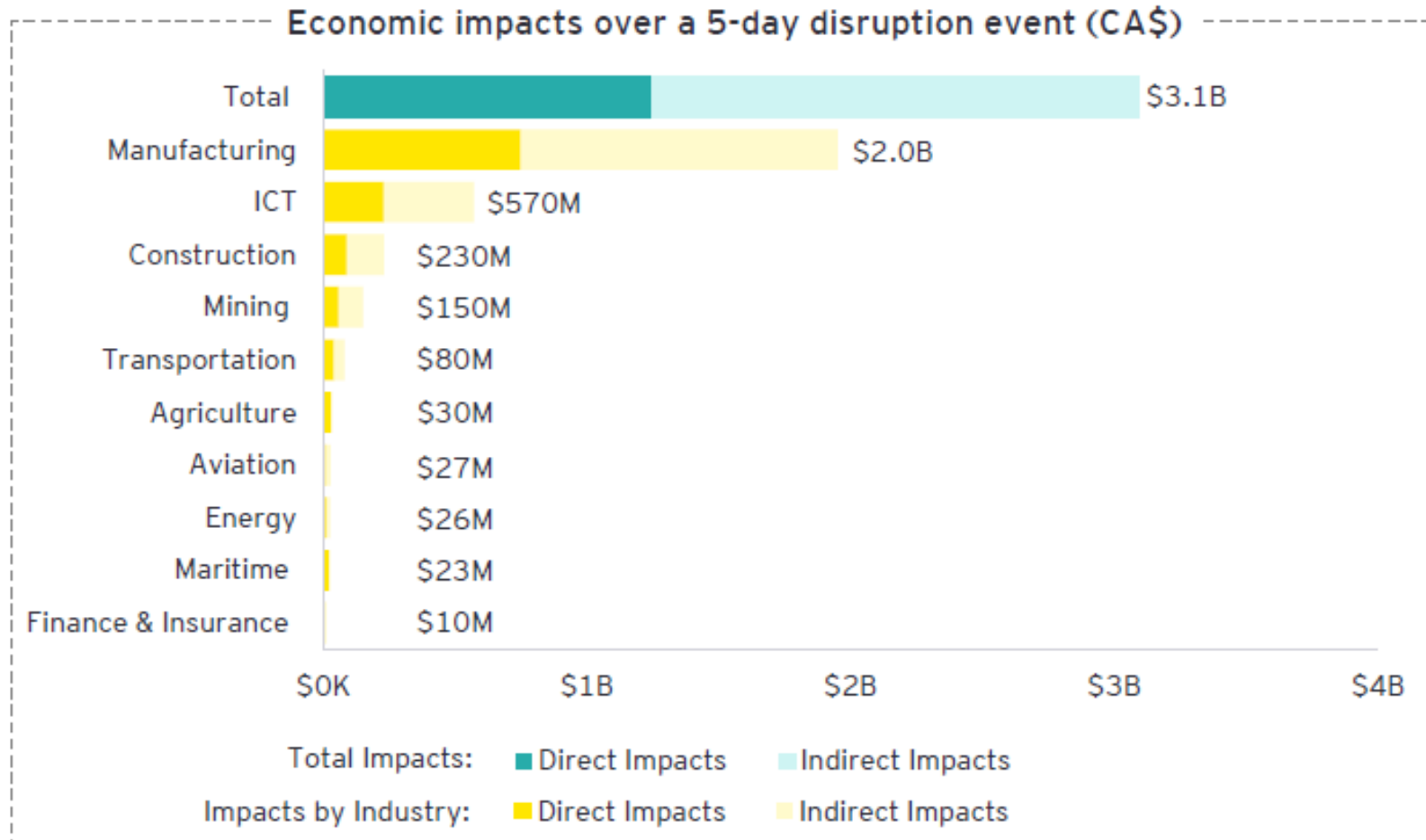
- Determine economic and competitive benefits that a Canadian public investment in precision GNSS-based PNT infrastructure would bring to Canada's key sectors
- Determine the impacts of a sustained GNSS disruption to our economic sectors

Sectors investigated:

- Agriculture
- Construction
- Energy
- Government
- Information and Communications Technology
- Manufacturing
- Mining
- Transportation (Road, Marine, Rail, Air and Drone)

GNSS PNT Economic Value and Disruptions Cost Study

Lead: PNT Office (ISED)



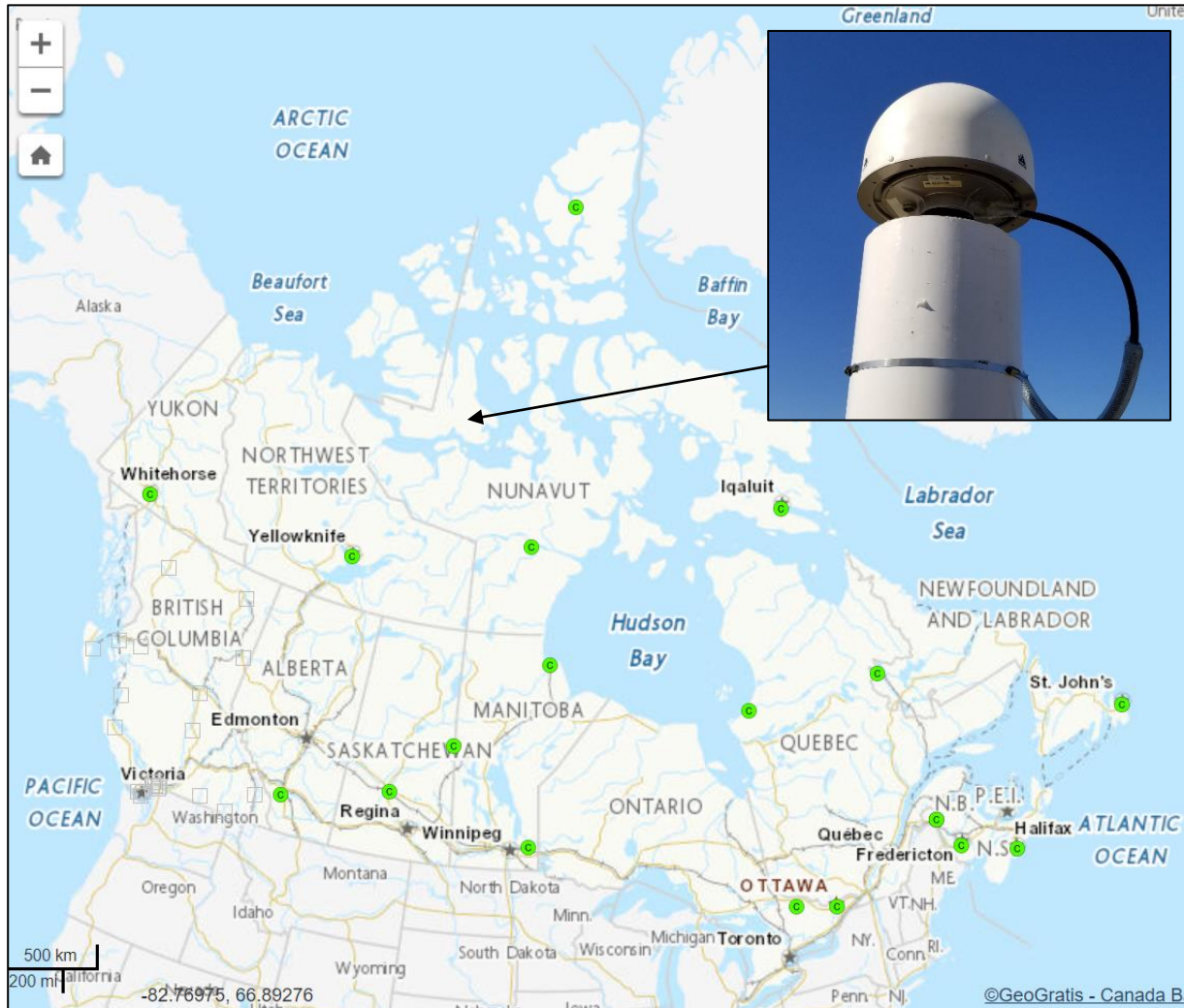
Preliminary Estimates



Update on Current and Future Activities

Geodetic Initiatives

Natural Resources Canada (NRCan) Lead



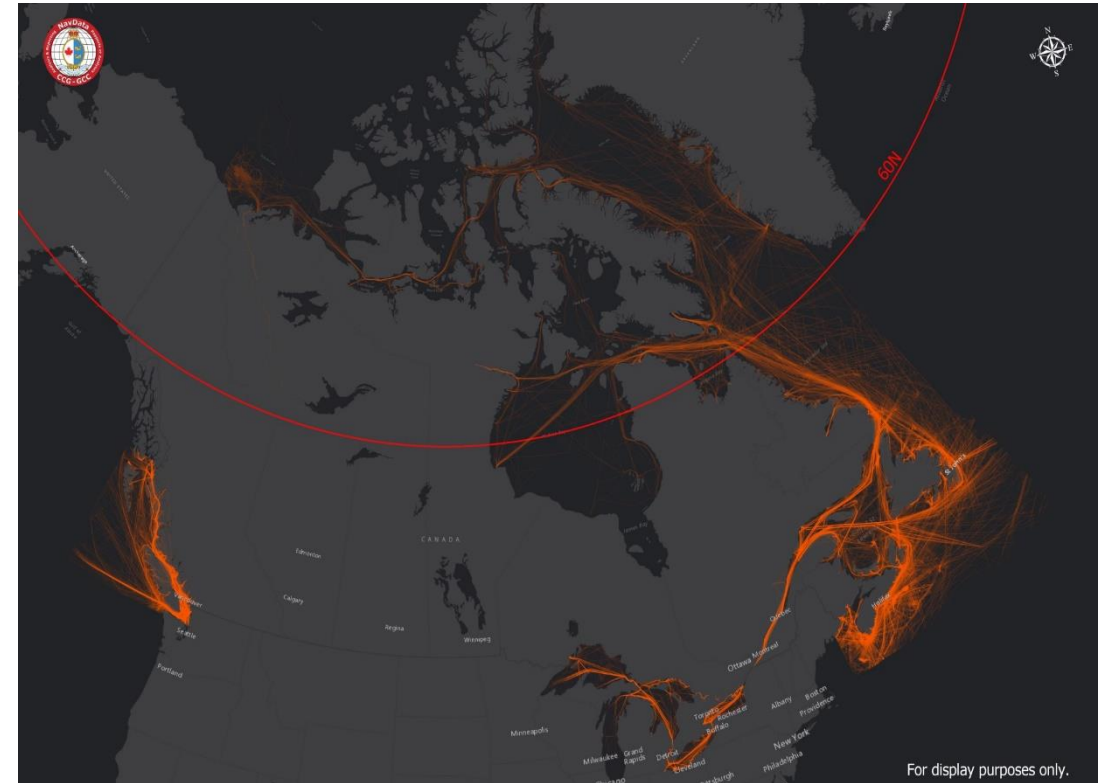
Canadian Active Control System

- Construction of 22 or more new real-time Active Control Stations (2022-2025)
- Scientific, economic and societal benefits
 - Geophysical modelling
 - Space weather monitoring
 - Ionospheric modelling for real-time PPP
 - Informal agreement with European agencies (E-GVAP) to analyze the water vapour data available for climate modelling

Maritime Navigation

Lead: Canadian Coast Guard (CCG)

- Developing and Testing of MF R-Mode technology as a potential backup solution to GNSS in Canada
- Pursuing collaboration on the development of MF R-Mode with Germany.
- Initial tests in 2022-23 -RANGING
 - Static & Dynamic Ranging performance measurements
 - Clock holdover performance
 - Signal sensitivity & characteristic, ground electric property measure, relative receiver comparison
- Next tests in coming years - POSITIONING
 - Static & Dynamic positioning performance

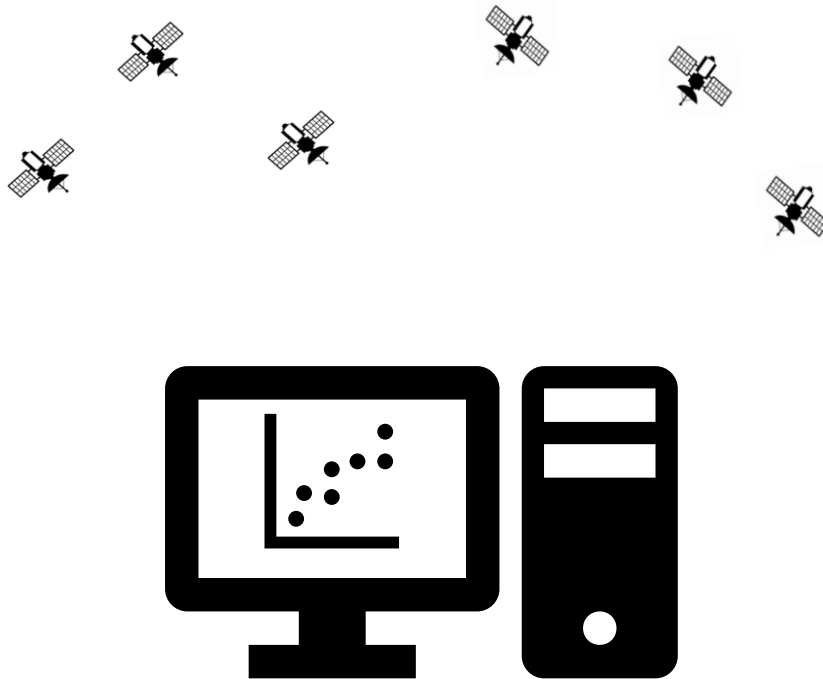


Typical Navigation traffic over a 3- month period

Source: Canadian Coast Guard

GNSS Disruptions Monitoring and Alerting Feasibility Study

Lead: PNT Office (ISED)

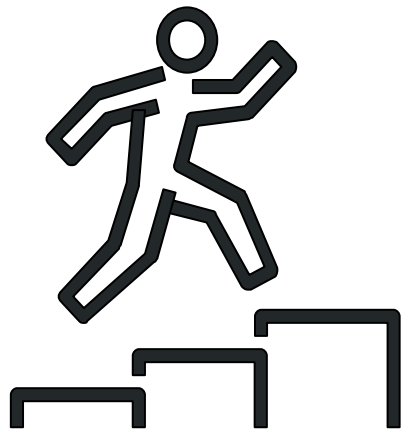


Objectives

- Assess the need and feasibility of building a national monitoring and alerting system for GNSS disruptions
- Determine GNSS monitoring, detection and alerting system requirements
- Recommend investment and deployment options, including the required infrastructure and reporting framework.
- [Request for Proposals](#)

Conclusion

- The Canadian PNT Board continues to foster a coordinated approach to advancing Canadian PNT interests
- Completed and current studies will inform a future direction for PNT efforts



Thank You

For more information, please contact the Canadian PNT Office



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For more information on the Canadian PNT Board, please visit our [website](#):