

The Canadian Positioning, Navigation and Timing Board Update



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The Canadian Positioning, Navigation and Timing Board

- Established in 2011, the Canadian PNT Board serves as a central point of contact for the coordination of civilian and federal PNT issues.
- The PNT Board also acts as a centralized point of contact for the exchange of information with foreign governments and organizations on civilian PNT matters.
- We are currently exploring other approaches to focus on broader engagement outside of the Government of Canada and to address PNT resiliency.

Visit us at: <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10805.html>



Activity Highlights

Update on Recent Initiatives

Maritime Navigation

Lead: Canadian Coast Guard (CCG)

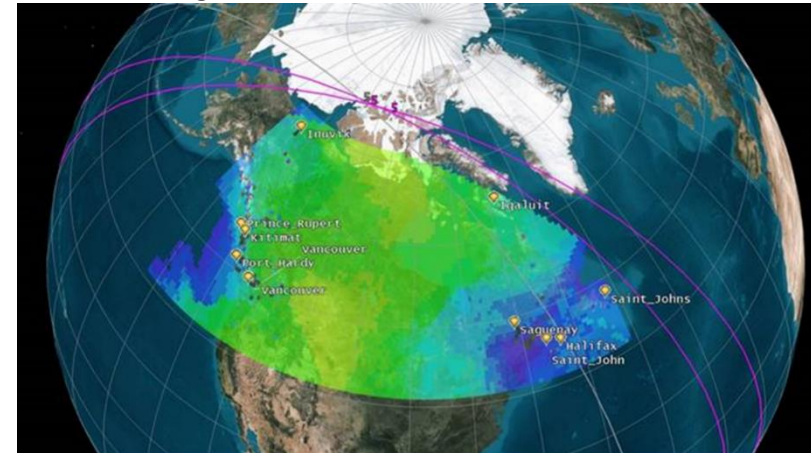
The future of the CCG Differential Global Positioning System (DGPS)

- Due to its age and the needs for replacement, the CCG conducted an options analysis for the future of the CCG DGPS service.
- CCG will be discontinuing the Canadian DGPS by the end of 2022. All 19 sites will be shut down simultaneously.
- Between now and Fall of 2022, CCG will continue to inform stakeholders and communicate in preparation for the shutdown date.

Evaluation of the Wide Area Augmentation System (WAAS)

- An evaluation of WAAS performance in Canadian waters, including the Arctic was completed with 10 test locations. (performed by Serco)
- Testing showed good coverage and accuracy for maritime navigation in Canada, including parts of the Arctic.
- Contributing to International Electrotechnical Commission (IEC TC 80) work for SBAS receiver standards

WAAS Coverage in Canadian Waters; CCG Test Locations



Source: CCG

For more information, see: Johnson, Gregory, Dhungana, Gaurav, Delisle, Jean, "An Evaluation of WAAS 2020+ to Meet Maritime Navigation Requirements in Canadian Waters," Proceedings of the 32nd International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS+ 2019), Miami, Florida, September 2019, pp. 855-875

Maritime Navigation

Lead: Canadian Coast Guard (CCG)

Assessment of maritime PNT solutions for Canada

- The study is considering PNT requirements both south and north of 60 degrees North, including the Arctic.
- Assessment includes alternative solutions independent of GNSS
- The final report will include recommendations on short term and long term strategies.
- CCG continues to work collaboratively with Germany on testing Ranging Mode (R-Mode) in Canada.

Maritime boundaries and Exclusive Economic Zones



Source: Flanders Marine Institute

For more information, see: Huot, Caroline, Châteauvert, André, Delisle, Jean, "Study for a Resilient Position, Navigation and Timing (PNT) Backup Solution in Canada," Proceedings of the 31st International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS+ 2018), Miami, Florida, September 2018, pp. 1806-1816

Threats and Risks

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

Jammer Risk Management

- Although prohibited by Canadian law, the use of and sale (online) of jammers continues to proliferate, creating cases of interference in GNSS bands
- Federal departments and NAV CANADA have partnered to develop a multi-agency Jammer Risk Management Framework with work ongoing in both a technical and policy stream.
- February 2020 workshop with Federal GC helped identify areas of responsibility, power of authorities and initial concepts for the policy stream work.

Canadian Risk Assessment and Risk Mitigation Assessment

- This project sought to:
 - Understand Canadian civilian Critical Infrastructure Sector risks associated with GNSS-based PNT information
 - Recommend actions to improve PNT resiliency
 - Strengthen relationships with Canadian Critical Infrastructure sectors
- Some initial ideas are emerging:
 - Canadian GNSS and PNT key stakeholders benefit when brought together to share knowledge and advance PNT resiliency initiatives.
 - Improving awareness of PNT threats and vulnerabilities is key to ongoing management of PNT risks.
 - A multi-layered approach to address PNT resiliency will likely be needed.

Connected and Automated Vehicles (CAV)

Lead: Transport Canada (TC)

- There is a need to characterize how PNT can enable higher levels of automation across various modes of transportation.
- A workshop with key PNT and CAV stakeholders was held in June 2019 to discuss PNT infrastructure, associated requirements and Canada's readiness to enable CAV deployments.

For more information, see:

<https://tcdocs.ingeniumcanada.org/sites/default/files/2019-10/Report-Sunil%20Bisnath-PNT-Workshop-for-CAVS.PDF>

- In late fall 2020, TC launched a project/study: “Next Generation Positioning, Navigation and Timing Infrastructure Requirements for Automation in the Transportation System: An Overview”. A workshop will be held in late Fall 2021 to share and discuss findings and recommendations.

For more information, see:

<https://buyandsell.gc.ca/procurement-data/tender-notice/PW-20-00932768>

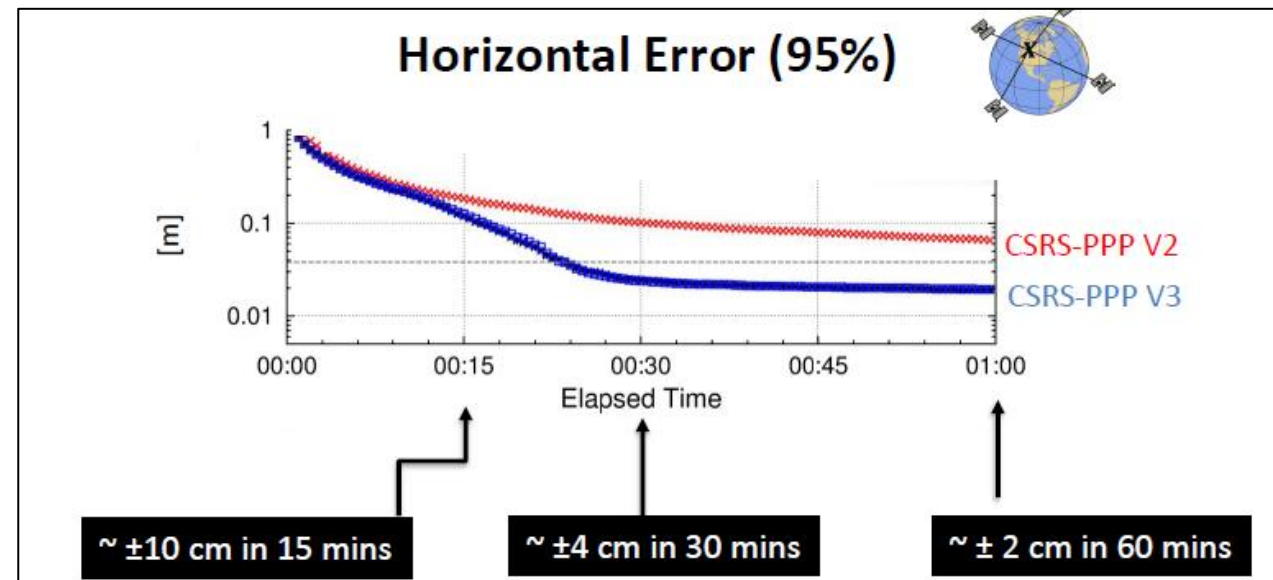
- Other PNT related initiatives include:
 - Automated Shuttle System testing
 - Cooperative Truck Platooning System testing and research
 - Connected Vehicles (V2V/V2X/V2I) research including signal resiliency and performance

Geodetic Standards & Services

Lead: Natural Resources Canada (NRCan)

- Modernization is ongoing to meet today's economic and scientific requirements.
- The Canadian Geodetic Survey is working closely with the United States National Geodetic Survey to modernize its reference frame in parallel (NATRF).
- Budget 2021 facilitates the addition of active GNSS stations.
- NRCan's PPP services are used extensively by users all over the world.
- PPP services (absolute) have been enhanced to resolve ambiguities resulting in quicker convergence & higher accuracy.

NRCan's PPP service performance



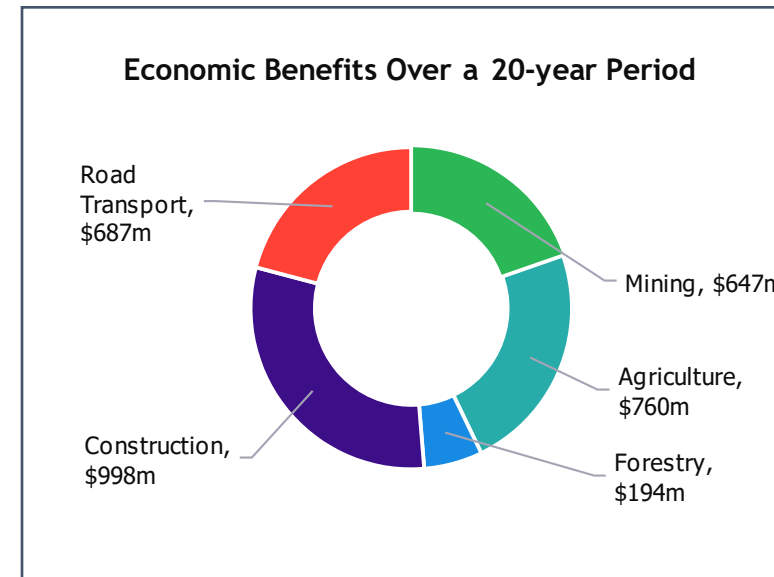
Source: NRCan

Opportunities

- A study contracted by Natural Resources Canada looked at the economic valuation of advanced precision GNSS services.



Source: NRCan



Source: Study contracted by NRCan

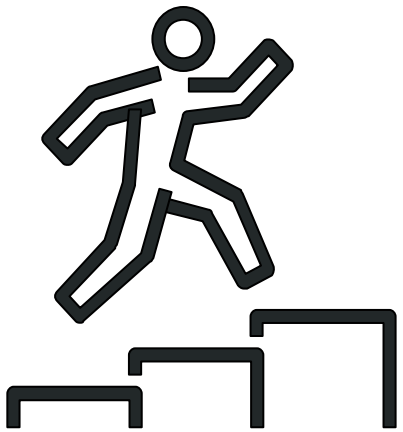
- Another study contracted by Natural Resources Canada is looking at the global competitiveness of advanced precision GNSS services.

International Activities

- Bi-lateral and multi-lateral dialogues have taken place to exchange information on areas of mutual interest and focus on cross-government issues.
- United States: Civil GNSS meeting held virtually in early September 2021 with a focus on PNT Resiliency.

Conclusion

- The Canadian PNT Board will continue to foster a coordinated approach and a platform to share information.
- We continue to see the PNT landscape evolving, affecting PNT use in Canada.
- We will need to be strategic in managing the PNT dependencies, investments and risks.



Thank You

For more information, please contact the Canadian PNT Office

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