NAV CANADA Surveillance Evolution

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NAV CANADA

WHO WE ARE

Private, non-share capital company | Managing one of the largest regions of airspace in the world

› World's first fully privatized ANS

› Regulated by Transport Canada

18 M
square kilometres of airspace managed by NAV CANADA

More than
100
staffed sites

More than
4,000
employees across the country

45,000+
customer accounts

The facts and figures presented here were accurate as of 2020.

OUR SERVICES
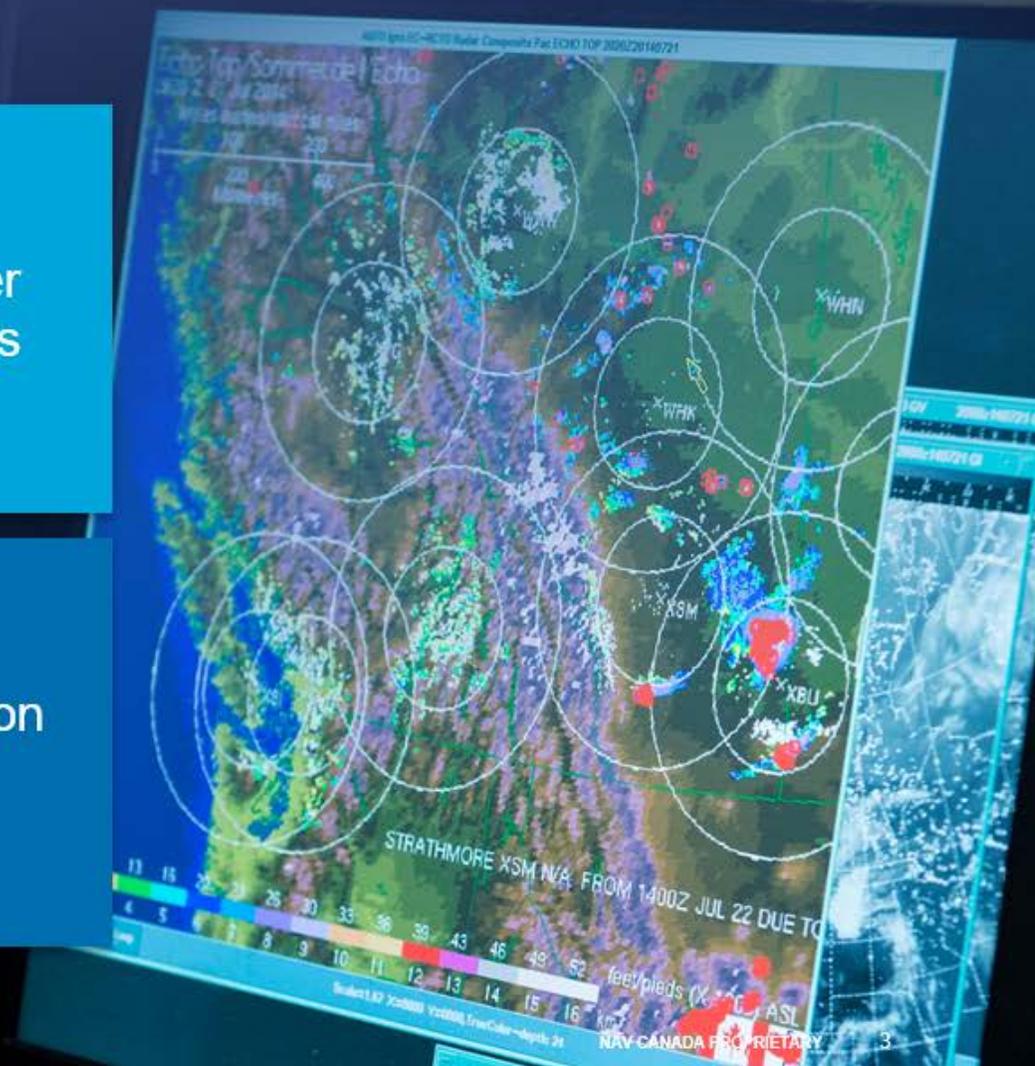
|		
Air traffic control	Flight information	Weather briefings
Aeronautical Information Management	Airport advisory services	Navigation aids

An aircraft's journey

SAFETY EVERY STEP OF THE WAY

As the owner and operator of Canada's civil air navigation system, NAV CANADA tracks and guides aircraft from all over the world safely through Canadian airspace. Our role begins well before takeoff and continues right up to arrival.

ENROUTE

PRE-FLIGHT

LANDING

APPROACH

TAKEOFF

Staffed sites across Canada
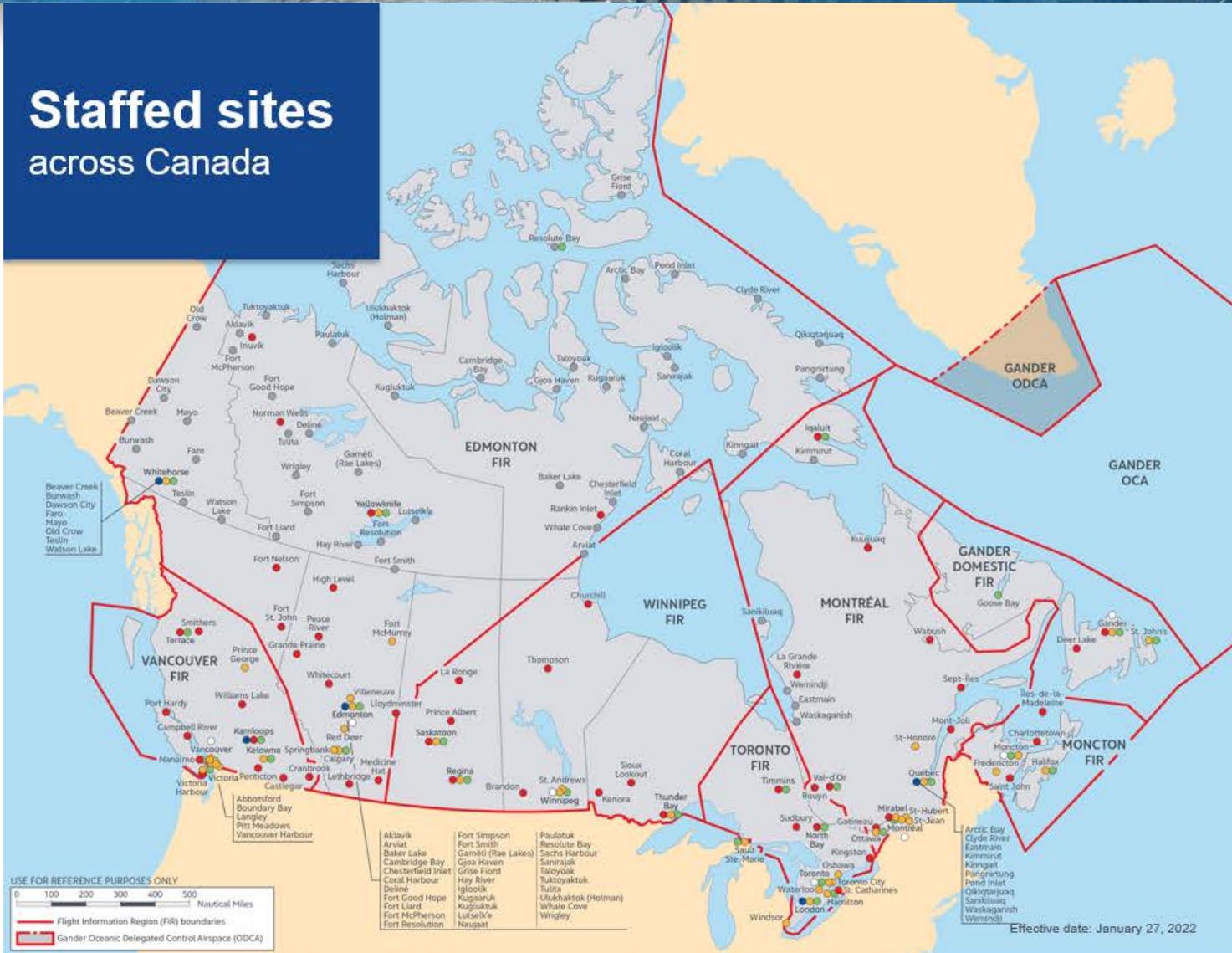
7 Area Control Centres

42 Control Towers

54 Flight Service Stations

5 Flight Information Centres

30 Maintenance Centres

51 Community Aerodrome Radio Stations

Effective date: January 27, 2022

NAV CANADA PROPRIETARY   6

SURVEILLANCE EVOLUTION

CURRENT GROUND SURVEILLANCE COVERAGE
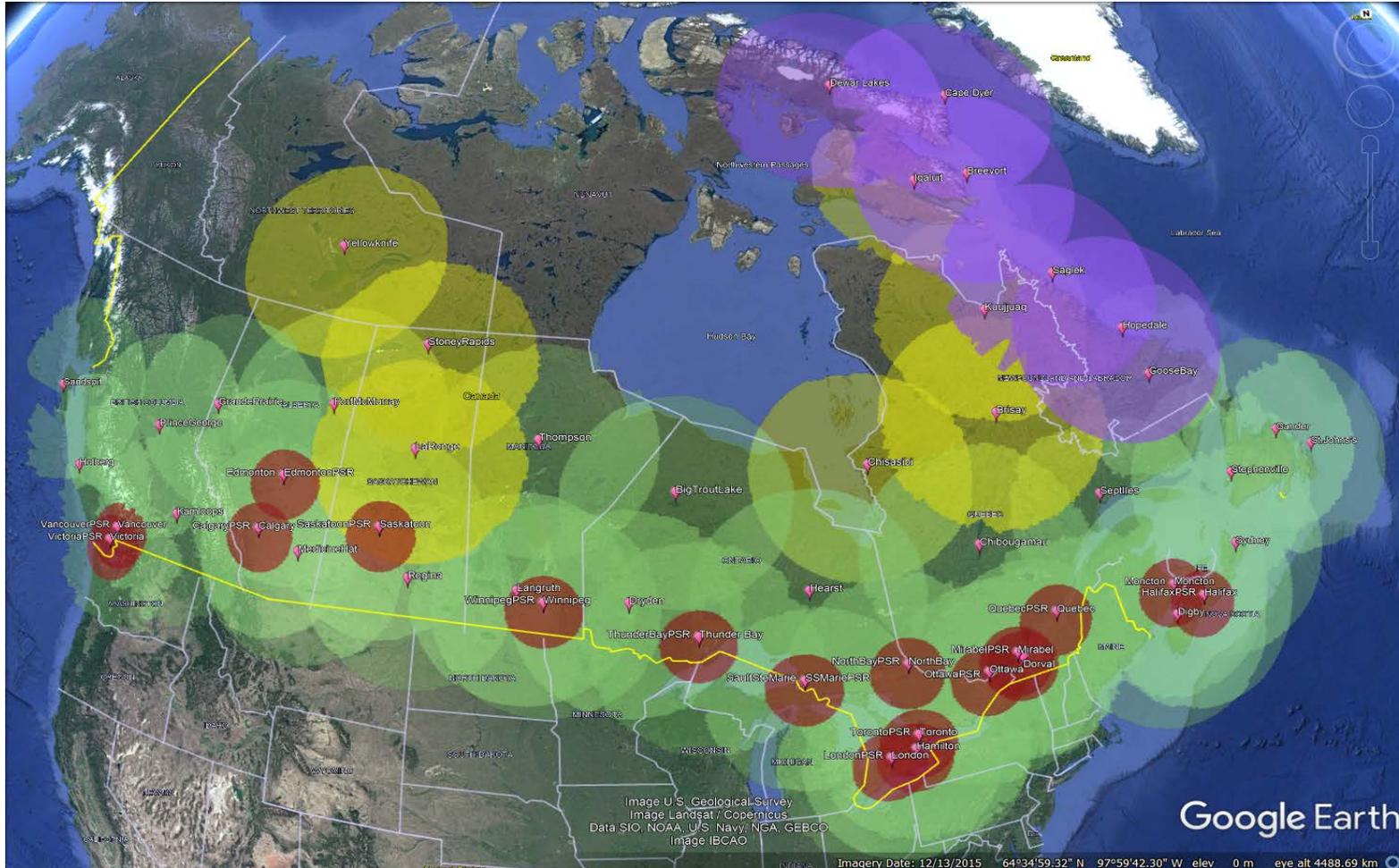
Key:
SSR
SSR (Northern)
PSR
GB ADS-B

2008 – GROUND-BASED ADS-B DEPLOYMENT

› Transport Canada (regulator) provided exemption to Canadian Aviation Regulations to use ADS-B as a surveillance source equivalent to radar for 5NM separation

  › ADS-B performance must comply with ED-129B

› Converted CAT21 to CAT48 to simulate a rotating radar for ease of integration

› Limited to above FL290 with filtering that evolved over time as equipage levels changed

A flight through ADS-B coverage (Greenland, East Coast, Hudson Bay) could traverse 3,300 km of ADS-B surveillance

NAV CANADA PROPRIETARY

MULTILATERATION (MLAT)

Wide Area MLAT (WAM)

- Operational at 9 locations

- Telecom is costly

- Remote Unit (RU) site location and leasing is complicated and drives schedule

Surface MLAT with A-SMGCS

- Operational at 4 major airports

- Multipath is a problem

- Continual airport development requires frequent modifications and additional RU deployments
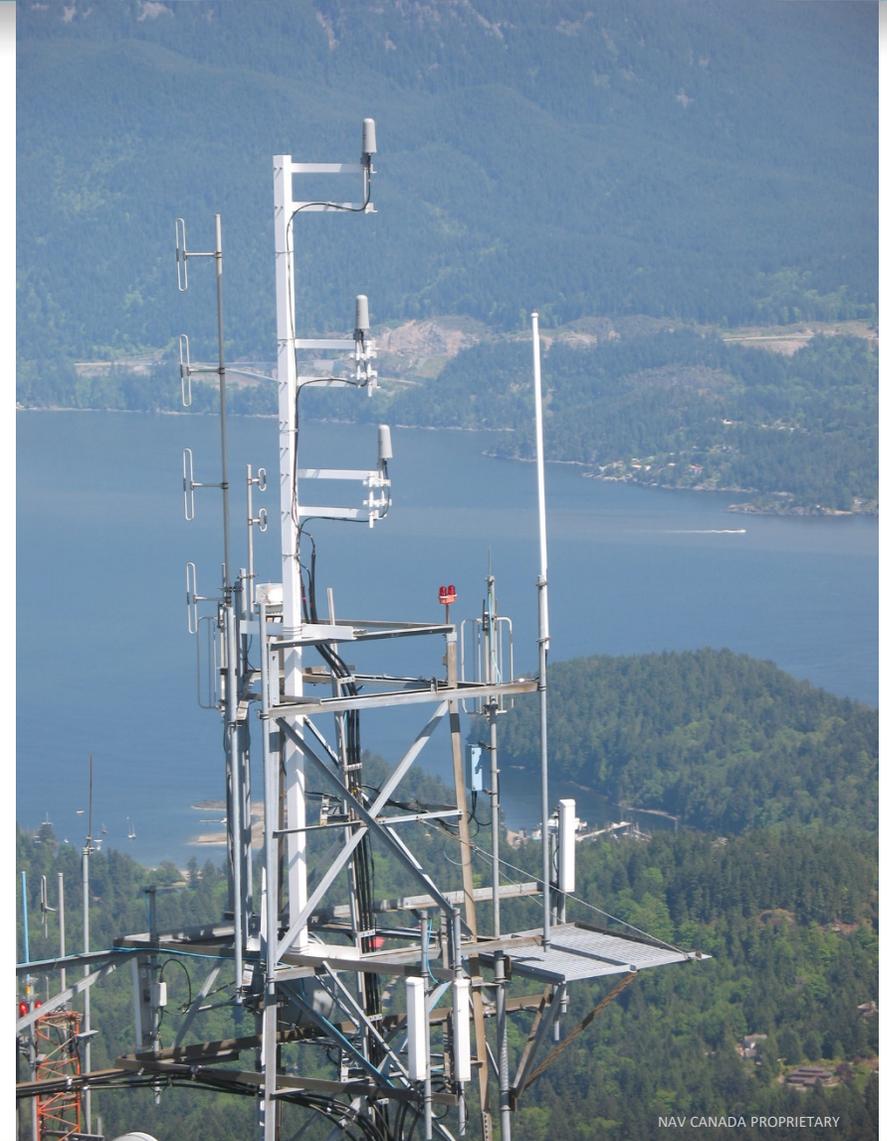
# 2019 – Spaced-based ADS-B available world-wide

Aireon®

A joint venture:

Iridium Communications Inc., NAV CANADA, NATS (UK), ENAV (Italy), Irish Aviation Authority and Naviair (Denmark)

Using ADS-B out via Low Earth Orbiting (LEO) satellites to achieve full global surveillance coverage, Aireon enhances global aircraft safety and increases aircraft efficiency in procedural airspace

SPACE-BASED ADS-B
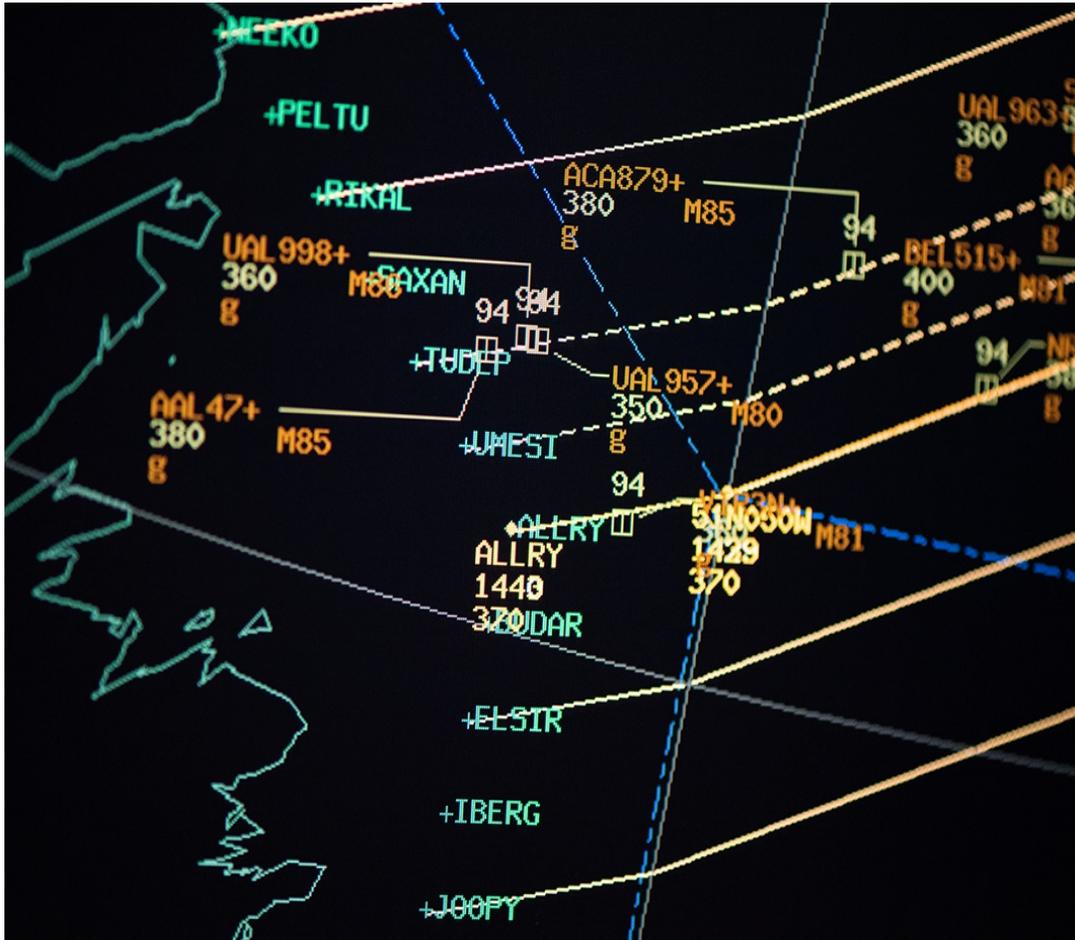
Gander and Shanwick Oceanic Airspace went Live March 2019

- With CPDLC equipage, separation reduced from nominally 80NM to 14NM in-trail and from 60NM to 19NM lateral

- Less reliant on North Atlantic Tracks

- Able to provide optimum flight profiles to more aircraft

- Monitoring flights in real time with SB ADS-B has allowed for earlier alerts of unexpected aircraft deviations, resulting in historic safety improvements in the NAT, as measured through collision risk estimate
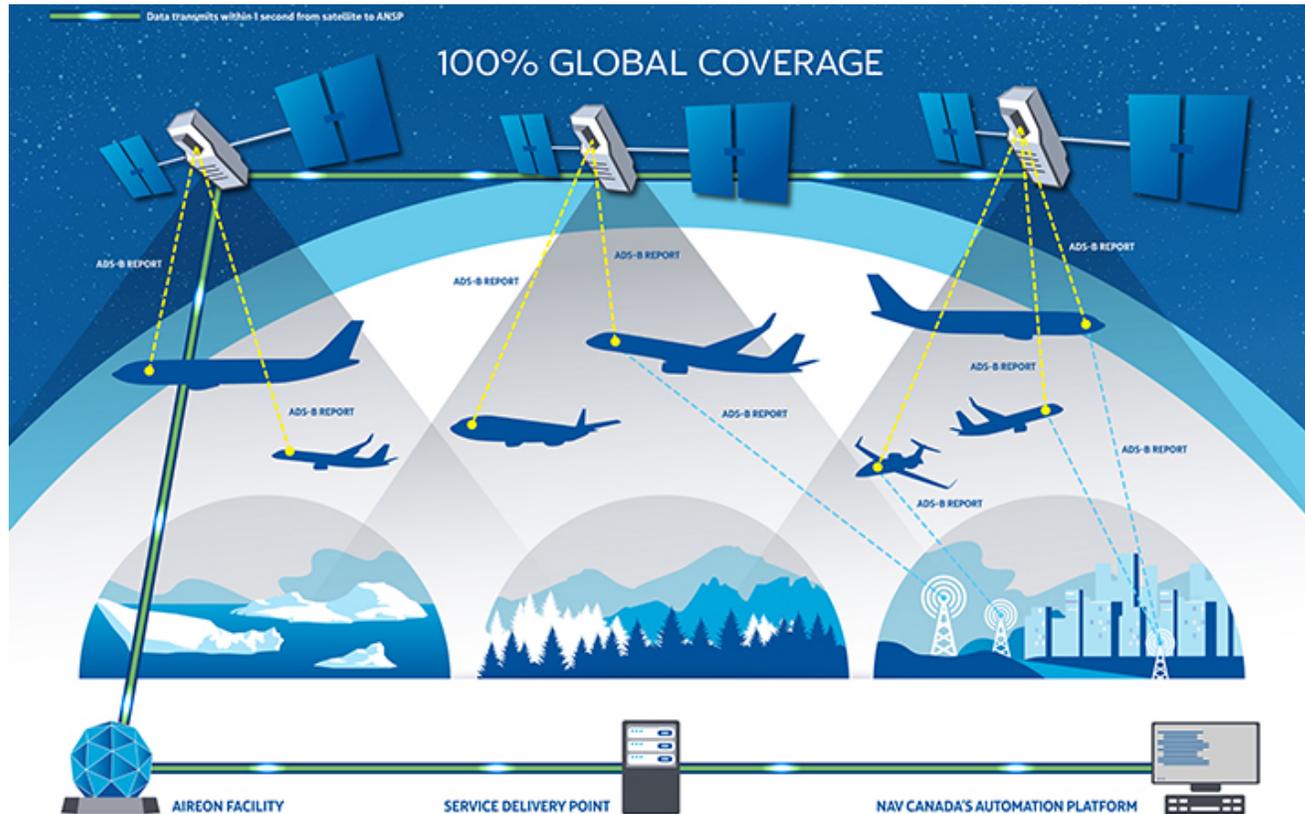
SPACE-BASED ADS-B

Domestic Airspace

Space-based ADS-B is used in all Flight Information Regions:

- Initially deployed for use at FL290 and above

- Phasing in service for enroute airspace below FL290 through 2022

AIREON INTEGRATION CHALLENGES

ATM Systems

- Introduction of ASTERIX CAT21 ADS-B data format
- Increased and variable position update rate
- Integration of Lat/Long with Range/Azimuth

Certification, Monitoring and Analysis

- Service volume sizes
- Identification of non-compliant aircraft
- Developed new tools to evaluate data

EXTERNAL CHALLENGES

Aircraft Equipage

- Majority of large commercial carriers equipped, however some installation variations observed

- Smaller carriers equipage much less and more varied

- NAV CANADA is implementing ADS-B service for equipped aircraft prior to the full mandate

RF Congestion

- Overuse of 1090 MHz in high density traffic areas can impact SB ADS-B position update rate
  - Seen in areas near the northeast US
 - Ground Based ADS-B is being deployed in these areas

OPERATOR KNOWLEDGE

Air Traffic Controllers

- ATCO training is essential
- there are important differences between radar and ADS-B
- Adaptation within the Flight Data Processor may vary

Pilots

- Many pilots were unaware of how to enter ADS-B Flight ID
- In some aircraft Flight ID cannot be changed while in flight
- NAV CANADA's ATM systems use Flight ID to correlate surveillance track with the filed flight plan
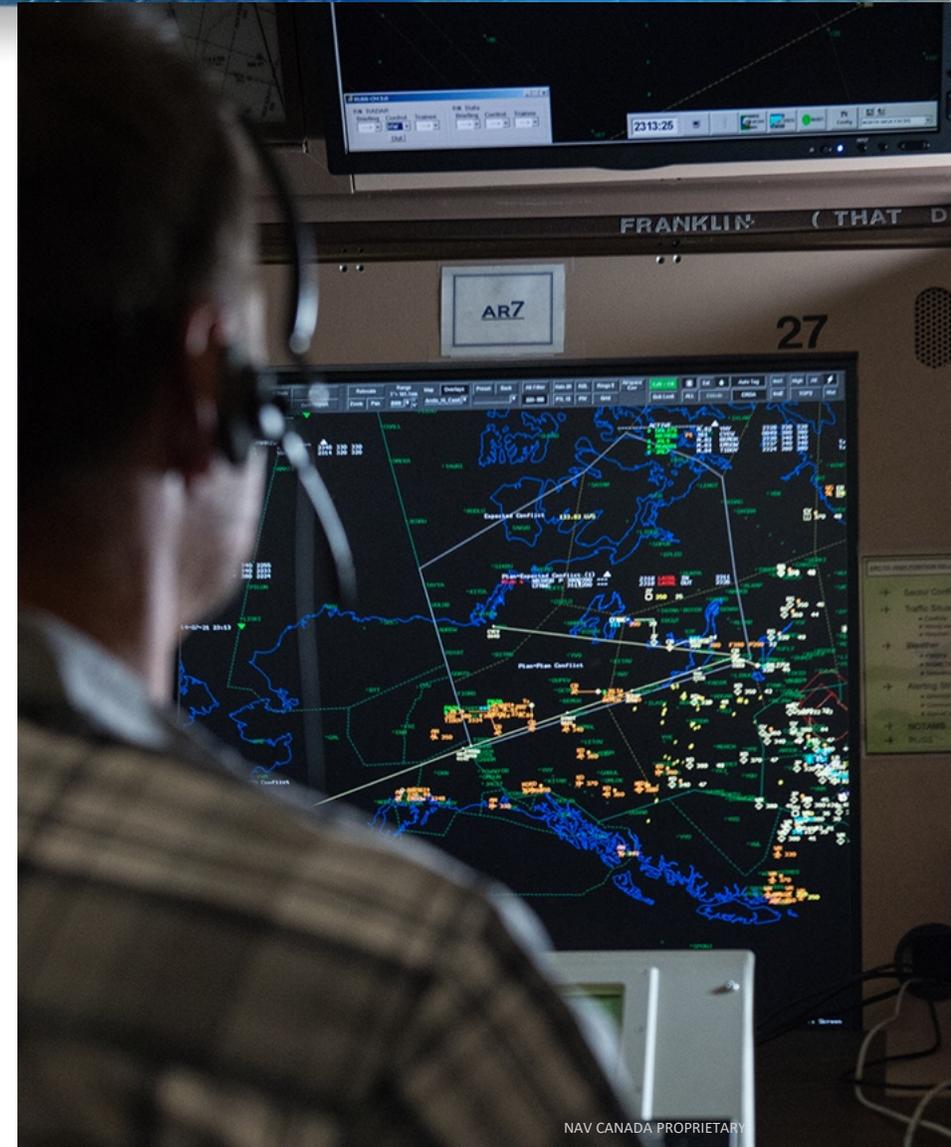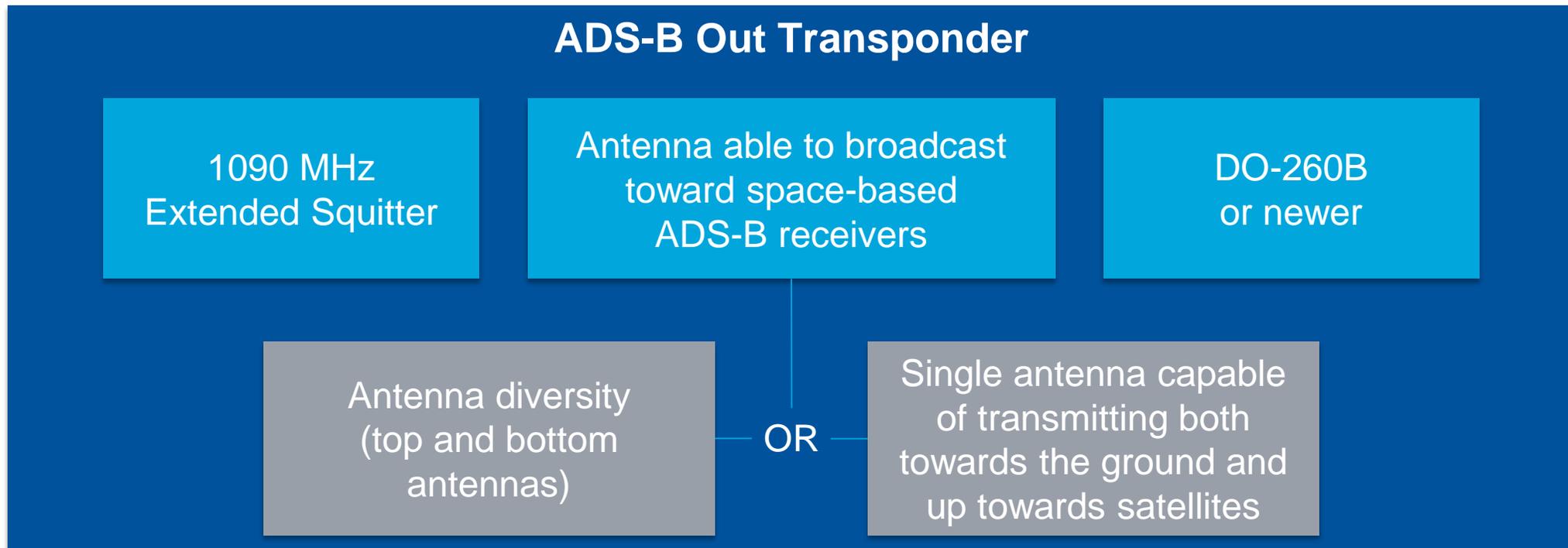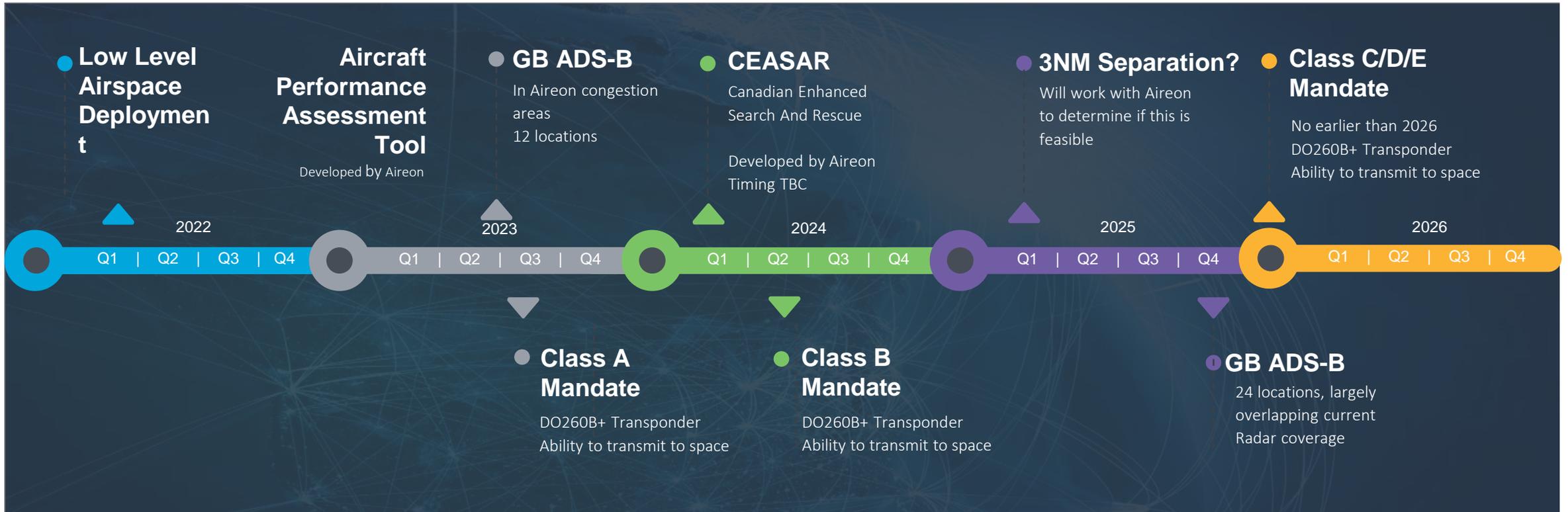
ADS-B OUT REQUIREMENTS MANDATE

In order to take advantage of space-based ADS and demonstrate compliance with the mandate, aircraft will need appropriate equipment

ADS-B Out Transponder

1090 MHz Extended Squitter	Antenna able to broadcast toward space-based ADS-B receivers	DO-260B or newer

Antenna diversity (top and bottom antennas) **OR** Single antenna capable of transmitting both towards the ground and up towards satellites

MEETING CURRENT AND FUTURE NEEDS

- Extending the benefits of space-based ADS-B surveillance into Canada's domestic airspace enhances safety and efficiency

- It also expands surveillance to remote and terrain-blocked areas previously not covered by surveillance

- The greatest benefits for ATS surveillance are achieved if all aircraft are appropriately equipped

THANK YOU