



Space based ADS-B Update

SURICG/5 Teleconference

September, 2020



Colored By Altitude

Color Legend	
Red	0 to 2,000 Feet
Orange	2,000 to 5,000 Feet
Yellow	5,000 to 10,000 Feet
Green	10,000 to 18,000 Feet
Light Blue	18,000 to 40,000 Feet
Dark Blue	40,000 Feet & Above

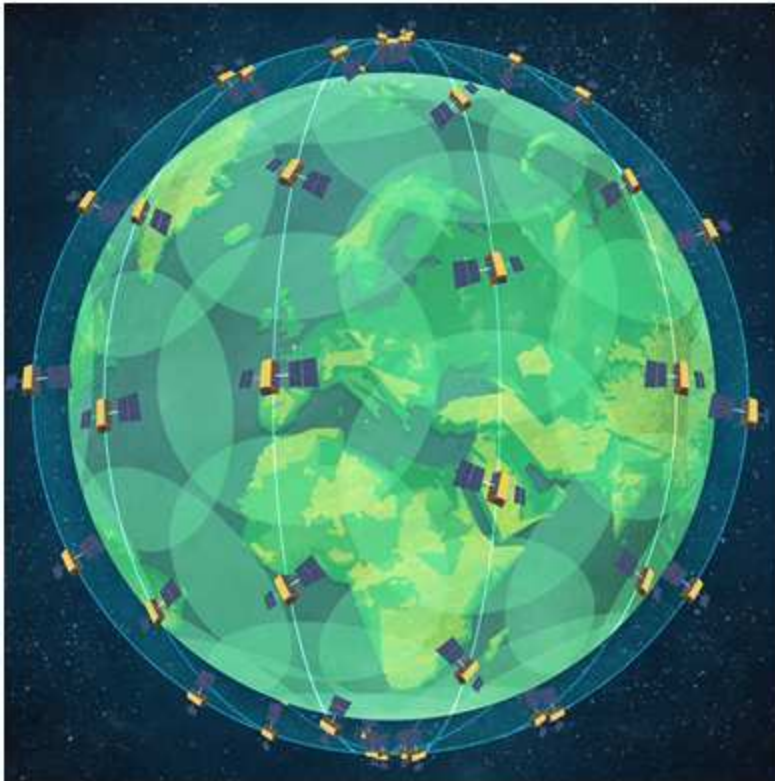


The Aireon satellite based system detects all ADS-B equipped aircraft worldwide for ATC separation purposes at ATC Quality

Aireon Space-Based ADS-B
March to 3 April, 2019

Surveillance as a Service operational since March 2019

<https://aireon.com/live/>



66 Satellites in Low Earth Orbit
(+9 In orbit spares + 6 on ground spares)

Global, Pole-to-Pole Coverage



Integration and validation by Navcanada

- Space based ADS-B was developed using System Engineering principles and processes
- Aireon performed numerous test programs validating the system against the formal requirements
- Navcanada, a launch customer, also integrated and tested/ verified Space based ADS-B operational performance in both Oceanic and Domestic airspace



Image: Courtesy of NavCanada

Customer Service – 24/7/365

Tier 1 – Aireon Service Desk Incident Management

Tier 2 – Systems Engineering/Operations –
Aireon
Harris
Iridium

Tier 3 – Problem Management / Development

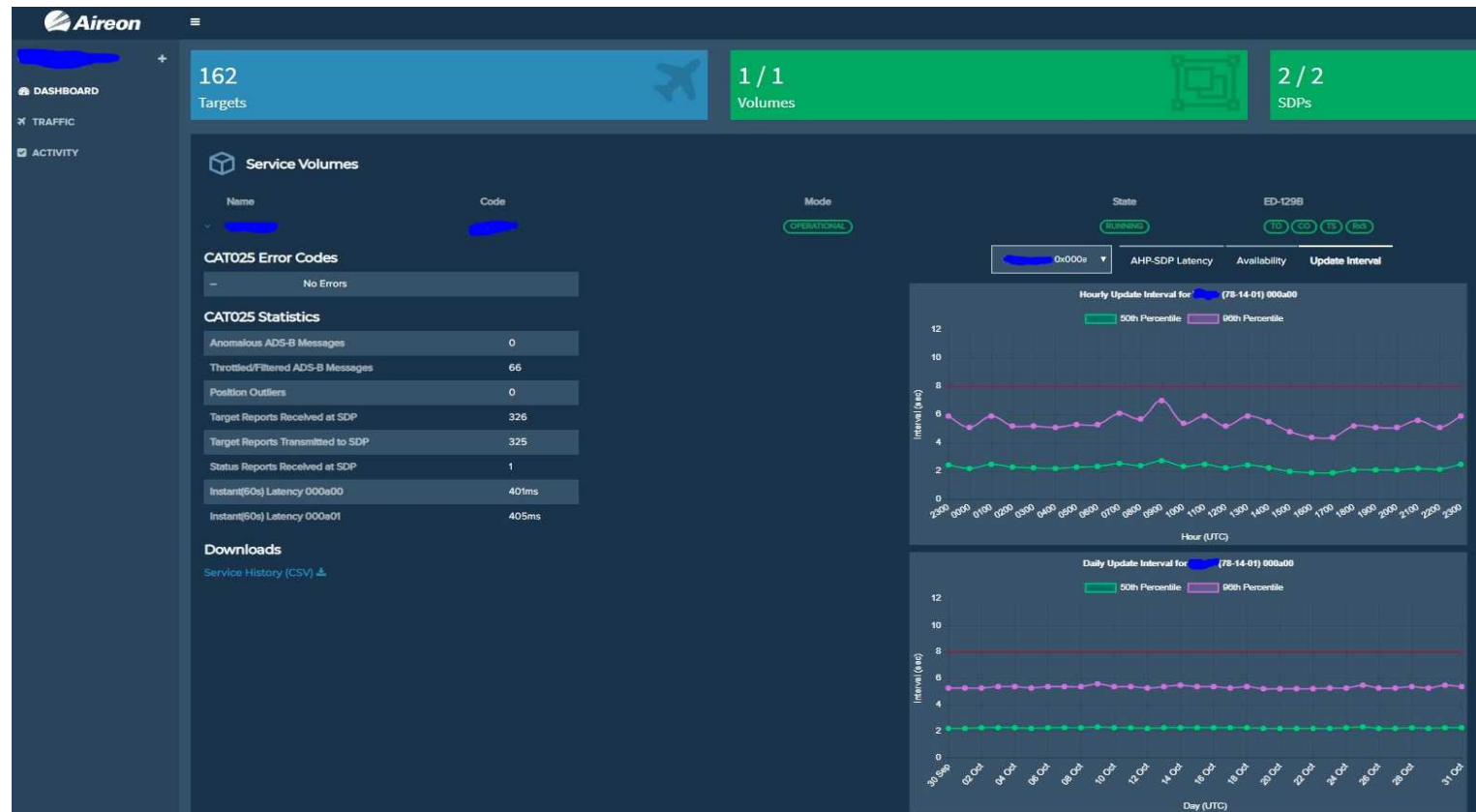
Tier 4 – External Vendors/Third Parties



Aireon Customer Service utilizes a centralized multi-tier approach to allocate support resources - proactively and responsively meeting customer needs

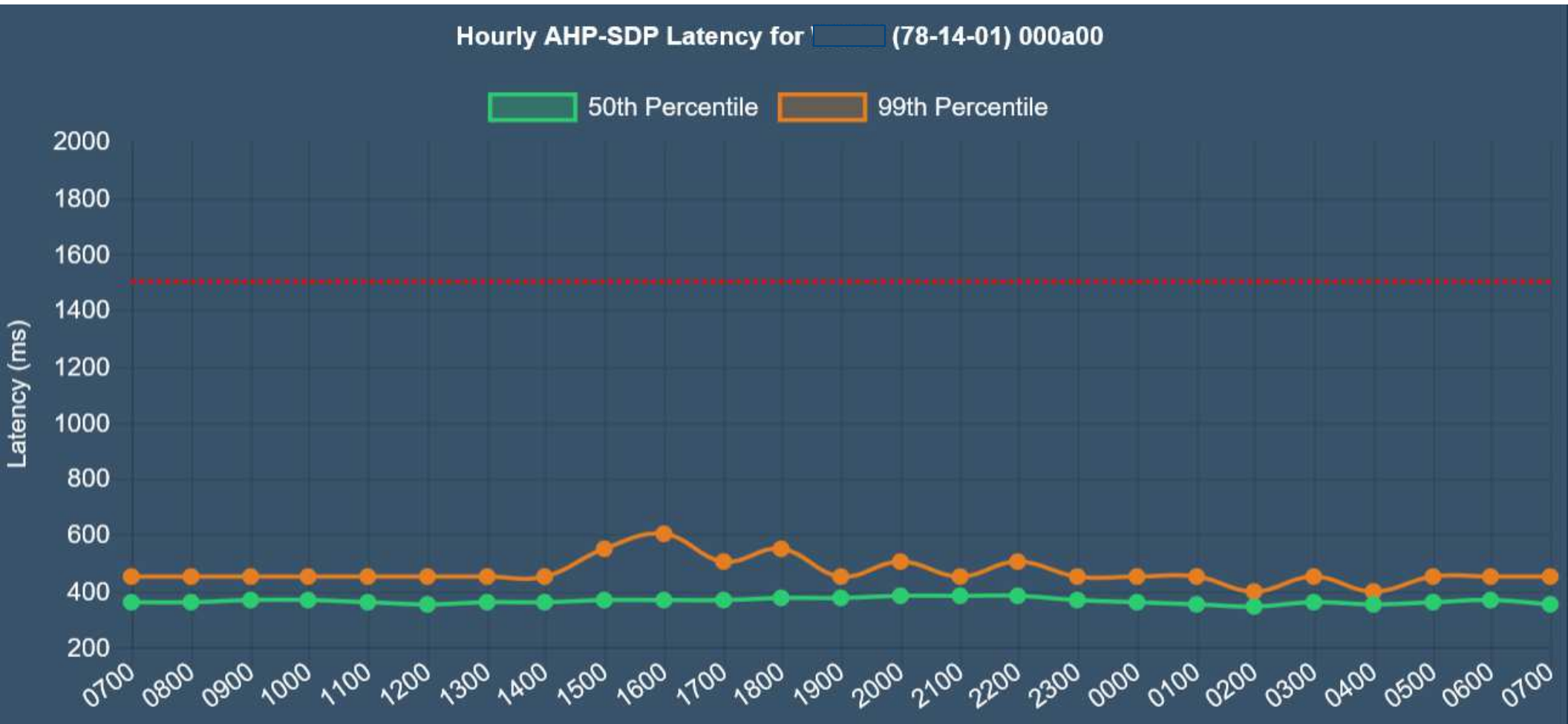
Customers have a dashboard too

- Traffic
- Statistics
- Performance monitor
- Real time graph
 - Latency (<1.5 sec#)
 - Update interval (<8 sec##)
 - Availability ≥ 99.9%



99th percentile ## 96th percentile

Latency : Hourly and daily statistics on customer display



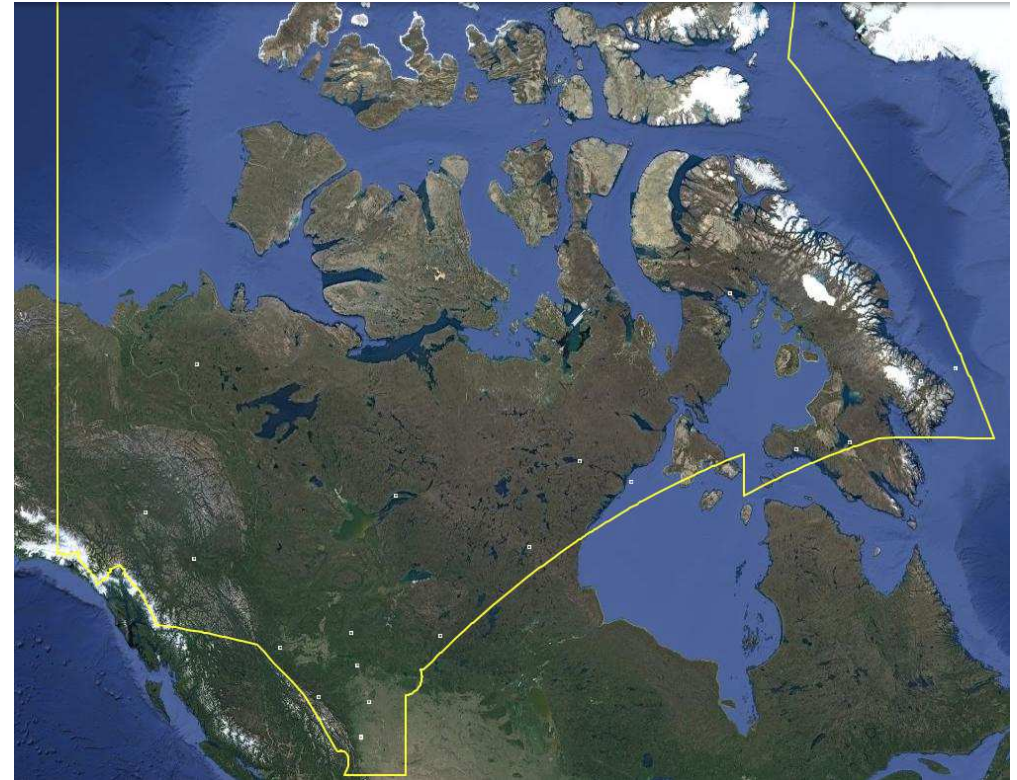
EASA Certification

- Aireon has been approved by the European Aviation Safety Agency (EASA) as an approved *Air Navigation Service Provider* to supply surveillance services
- Ongoing oversight



Nav Canada Space Based ADS-B Operations

- In the North Atlantic **Oceanic**
 - Trial using ASEPS standards
 - 14Nm longitudinal, 19 Nm lateral
 - CPDLC communication
 - see <https://airtrafficmanagement.keypublishing.com/2019/10/25/north-atlantic-space-based-ads-b-trial-reaches-next-milestone/>
- In domestic Enroute
 - Initially Edmonton
 - VHF communication
 - 5 Nm minimum separation
 - Working towards Space based ADS-B in all domestic FIRs
 - Plan : all Class A: 25 February 2021
 - Class B: 27 January 2022



Edmonton FIR

Asia Pacific Customers

- CAAS (Singapore) - Operational
- AAI (India) – Data flowing – training & safety case in progress
- NiuSky Pacific Limited (PNG) – Data flowing – approaching acceptance test
- CAD Hong Kong - Awarded
- DGCA Indonesia - trial – IMT (Local prime) - Awarded



Singapore Acceptance tests

Customers Outside Asia Pacific

☐ Service tests complete

- Navcanada
- NATS (UK)
- Irish Civil Aviation Authority
- Dutch Caribbean
- ASECNA (African states & Madagascar)
- ENAV (Italy)
- ISAVIA (Iceland)
- FAA
- COSESNA (Costa Rica, Honduras, Guatemala, El Salvador and Nicaragua, Belize)
- NaviAir (Denmark)

☐ Contracted

- ATNS (South Africa)
- Nav Portugal

NAVIAIR

NATS

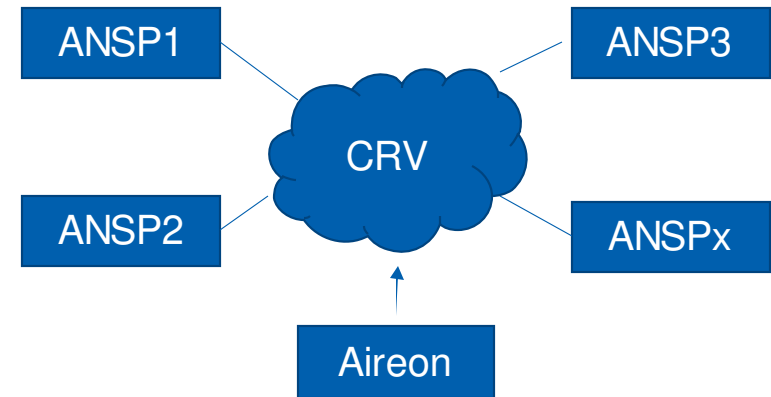
NAV
CANADA



AIREON LLC PROPRIETARY INFORMATION

CRV Approval

- CRV allows ANSPs to exchange data
 - eg AFTN/AMHS, Voice, Surveillance data, AIDC
 - ICAO based, designed for aviation, appropriate security/encryption
 - Avoiding proliferation of point to point networks
- APANPIRG CRV Operations Group approved Aireon to connect to Common Regional Virtual Private network (CRV)
 - To deliver Space based ADS-B
 - Potentially reducing cost for ANSPs



Common aeRegional VPN
Operation Group

Mr Greg Dunstone, FRAeS
Sales Engineer
Aireon LLC, 1750 Tysons Blvd, Suite 1150
McLean, VA, USA 22102

17 June 2020

Dear Mr Dunstone,

Approval for Aireon LLC to connect to the CRV network.

We are happy to inform Aireon that their application "Aireon LLC connection to CRV to support PNG ASLV3.4" to connect to the CRV network as a Service Provider has been approved.

This connection will enable all CRV member States to consume Air Traffic Control Quality ADS-B surveillance data from Aireon over the CRV.

Aireon must take all reason steps as outlined in their application to ensure that Aireon protects the CRV from the Aireon network.

Please do not hesitate to contact either the Co-Chair (Asia) or Co-Chair (Pacific) if you have any questions.

Yours Sincerely


Terence Palmer
CRV OG co-chair (Asia)


Kelepi Dainaki
CRV OG co-chair (Pacific)



AIREON LLC PROPRIETARY INFORMATION

Aireon Flexibility: Supporting your Application

- **Tier 1 : ATC reduced separation**
 - 5 Nm like radar with VHF
 - ASEPS oceanic with CPDLC
- **Tier 2 : Support procedural ATC**
 - Safety nets
 - Position reports, definite passing, left or reached level
 - Situational awareness
 - Procedural separation standards
- **Tier 3 : Position reports and Flight Service applications**
- **Backup layer of surveillance**
 - Protect against terrestrial surveillance failure
 - Supplement existing surveillance – eg coverage beneath radar coverage
- **Surveillance where there is none today**
 - Oceanic or remote airspace
 - FIR boundary safety
 - At remote ATC towers (with or without reduced separation)
- **Air Traffic Flow Management**
- **SAR**

Aireon Flexibility: Supporting your Environment

- **Communication media options**
 - CRV, MPLS etc
- **Customer configuration**
 - Defined volumes
 - Defined update rate, Site monitor or not
 - Maintenance display or not
- **Testing**
 - On site acceptance testing
 - Remote acceptance testing



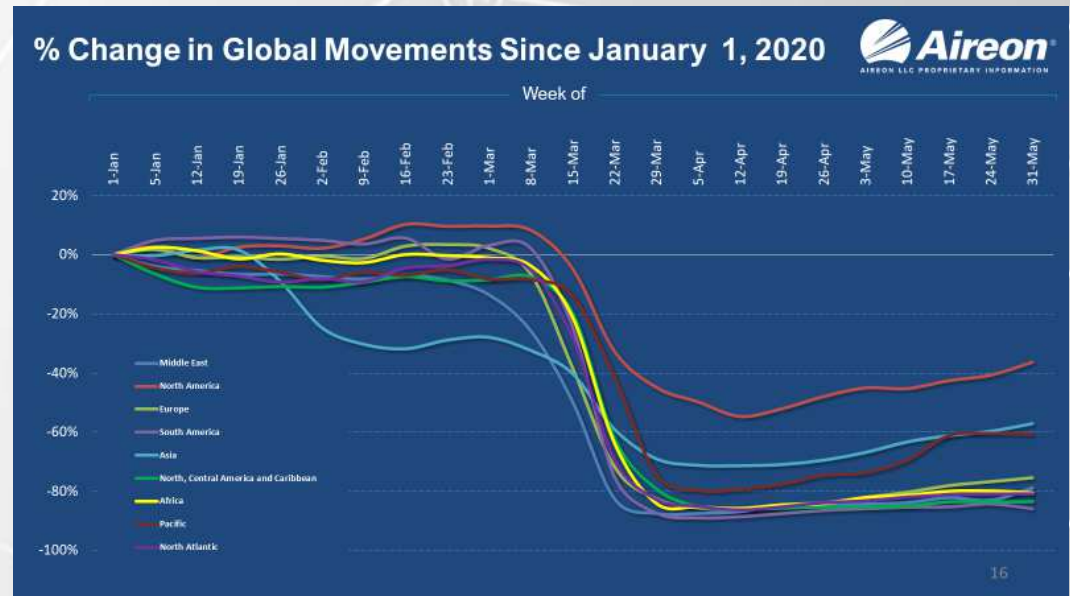
Flexibility: Supporting your Operation

- **With 24/7/365 operational support**
- **ATC system implementation/integration support**
 - We have integrated into most ATC system providers systems
- **Safety case support**
 - We provide our “standardized” safety case document
 - We can assist with your safety case.
 - Like safety case for terrestrial ADS-B



Customized Commercial Proposals

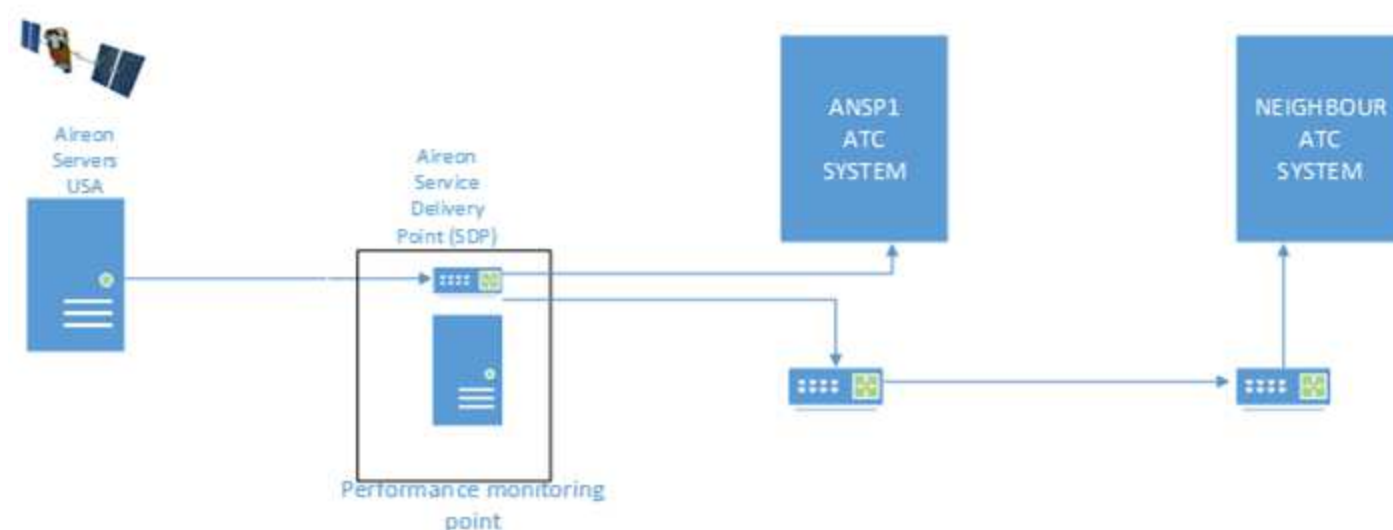
- **Fixed per month**
 - If traffic climbs you don't pay more
 - Good for fixed budgets
- **Or Fixed per Flight hour**
 - If traffic drops – you pay less
- **Price depends on use case**
 - Tier 1 : ATC separation
 - Tier 2 : Support procedural ATC
 - Tier 3 : Flight service
 - Supplement existing surveillance
 - Coverage beneath radar coverage
 - Surveillance where there is none
 - FIR boundary safety
 - Remote towers



Can I share Aireon data with my neighbour?

Aireon position

- Aireon needs to be paid for the service.
- To protect Intellectual property & provide security Aireon needs to be in contract with data recipients
- The incremental cost of a direct service is moderate especially if CRV is used
- Neighbour has no guarantee of service quality

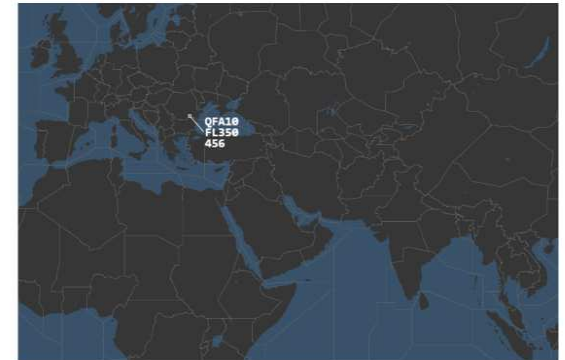


BUT Aireon is always willing to discuss further with individual ANSPs

Air Traffic Flow Management

- Space based ADS-B can detect departure and improve estimates for aircraft reaching defined points or boundaries
- Eurocontrol will integrate it into the Enhanced Tactical Flow Management System (ETFMS)
 - <https://www.eurocontrol.int/press-release/aireon-eurocontrol-agreement-enhance-atfm>
- Typically Aireon curate the surveillance data within Aireon's Azure Cloud environment
 - Delivers to the ANSP (ATFM or SWIM environment) via the internet
 - Tailors the data to meet customer need
 - eg: Add estimates, schedule data
 - eg: machine learning from historical data (what the adjacent FIRs typical do...)
 - Typically 1/ minute or changed with “distance to run”

**Singapore could receive data on QF10
London to Singapore whilst over Europe !**



Capabilities available from 2021 to include traffic visualization and hosted tools



Thank you!



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