NAT actions on GNSS RFI

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Overview of North Atlantic Operations

- North Atlantic has 9 States and ANSPs that provide services
    - USA, Canada, UK, Ireland, France, Portugal, Iceland, Denmark, Norway

NAT Strategic Importance

590,000+ movements p.a. … forecast to grow by up to 3.2% p.a. based on ICAO forecasts

c.140 million passengers in 2022. Expected to double by 2040 (IATA)

c.44 billion freight Revenue Tonne Miles per year

14% of Global Aviation GDP, and 7% of global aviation jobs.

c. £41/€48 /$71bn* p.a. of total UK economic impact alone (passenger, freight, ANSP and visitor revenue)

Europe/North America Gateway providing crucial Network Manager Offload Routes

The North Atlantic is the world's busiest Oceanic airspace, making a substantial contribution to economies of the member States and ANSPs

Source: FAA 2017 analysis (*USD$58bn @ £1:$1.41/€1.16/$1.71CAD)

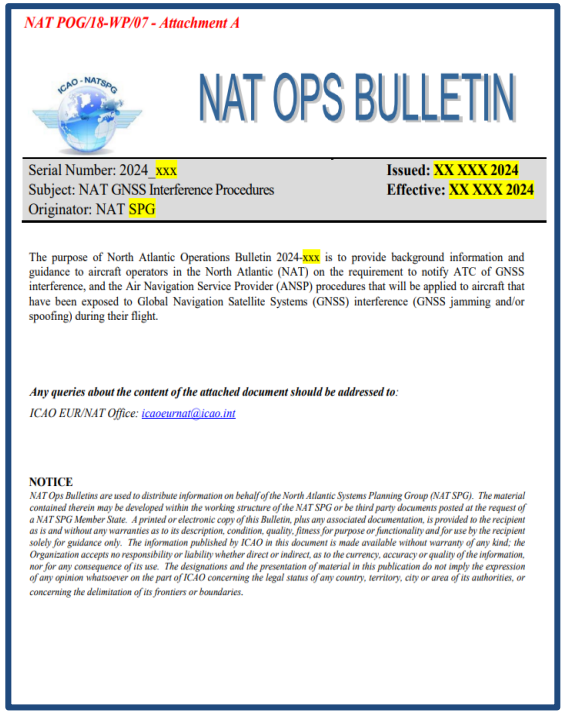
GNSS Interference – Oceanic Impacts & Mitigations

IMPACTS

MITIGATIONS

Mitigation

- **Loss of RNP4 compliance**
  - ***Required for application of reduced separations (e.g. ASEPS/PBCS)***
- **Loss of RNAV10 (RNP10) compliance**
  - ***Required to operate in the NAT HLA (between FL290 – FL410)***
- **Loss or incorrect ADS-B (in & out)**
  - ***Ghosting or loss of ATS Surveillance targets***
- **Loss or incorrect ADS-C reports**
  - ***FOM alerts or incorrect estimates in reports***
- **Loss of CPDLC connection**
  - **Required for application of *reduced separations (e.g. ASEPS)***



NAT POG/18-WP/07 - Attachment A

NAT OPS BULLETIN

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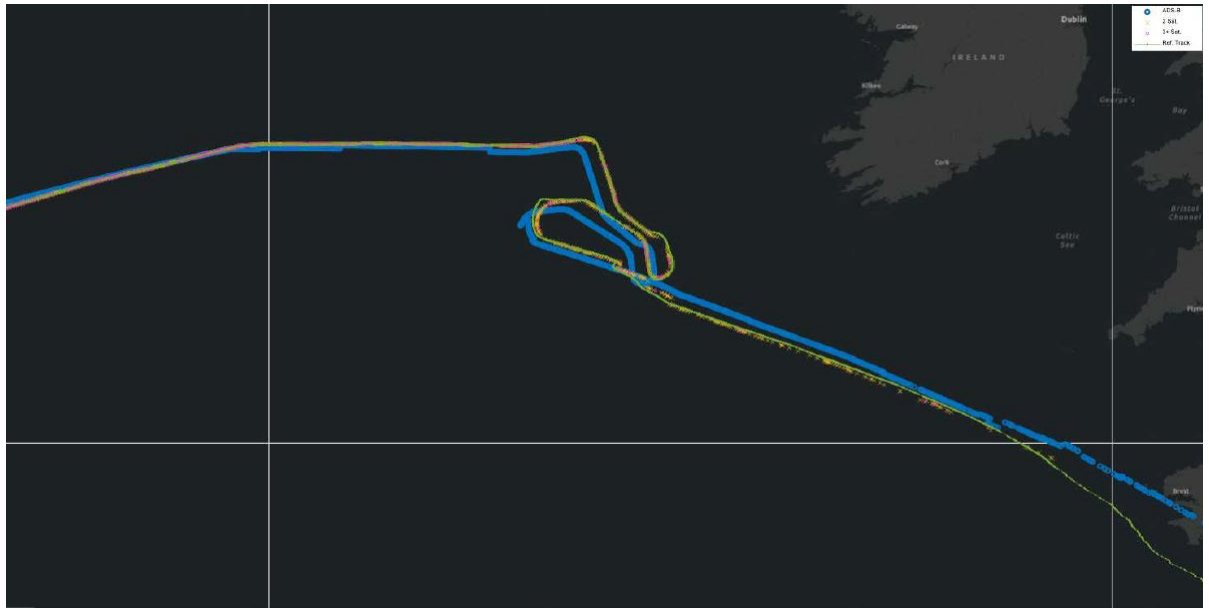
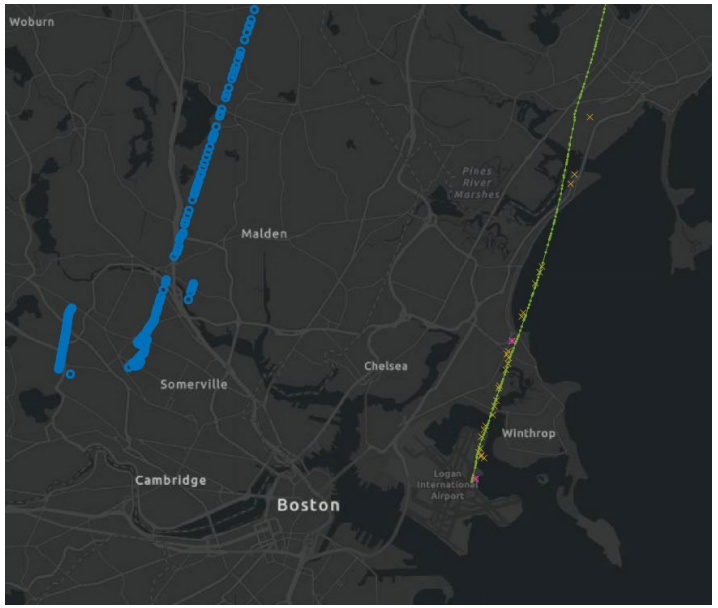
GNSS Interference Progress Update

New emerging risk:

- Aircraft reluctance to report Spoofing/Jamming due to potential for service delivery impact (Ocean specific)

Recent example of aircraft with actual deviation in both Domestic and Oceanic Airspace. See below:

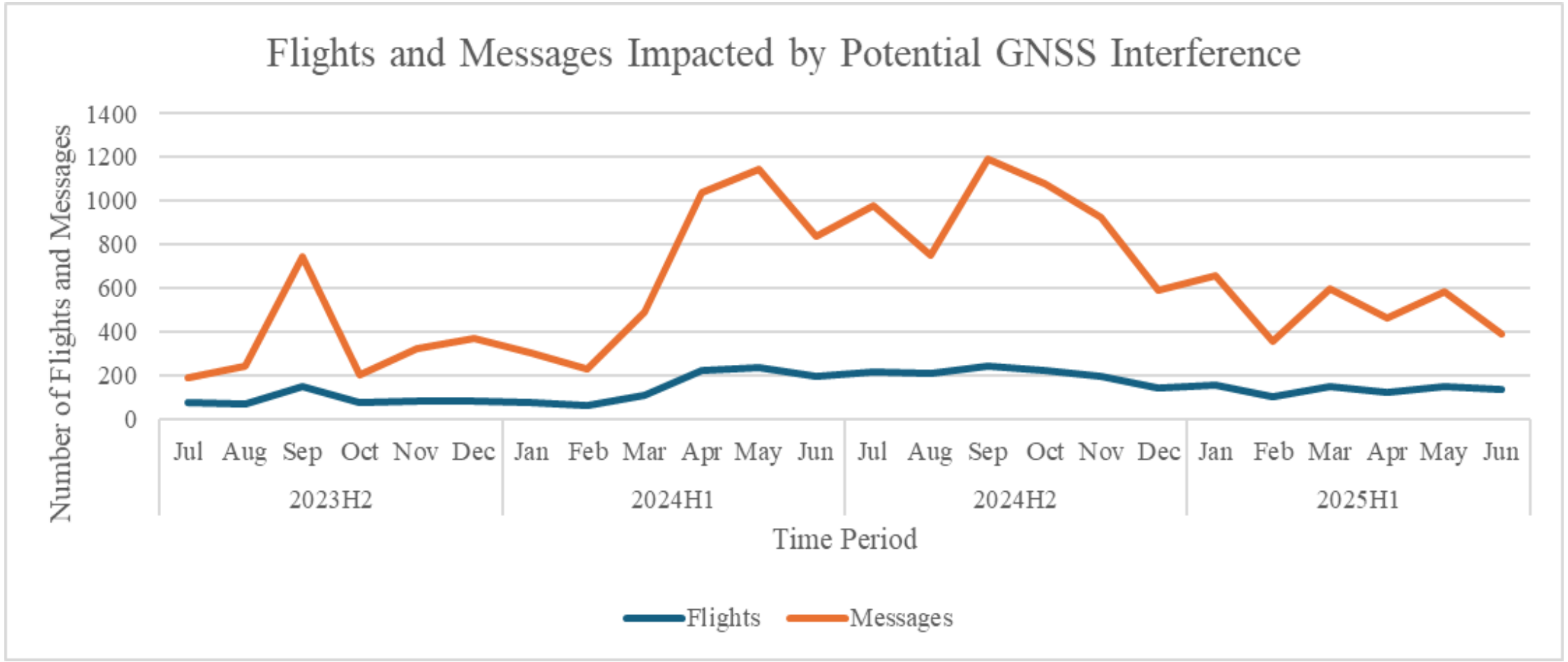




GNSS Interference in Canadian Oceanic Airspace

- Canada reported GNSS RFI effects observed in its oceanic airspace between January and June 2025, using ADS-C FOM (Figure of Merit) values and timestamp anomalies as indicators. A total of 803 unique flights were flagged, with 3,045 impacted messages—an average of 4 flights per day. This represents a 34% reduction from the previous six-month period, though the proportion of affected flights remained consistent at 0.4%.

GNSS Interference in Canadian Oceanic Airspace



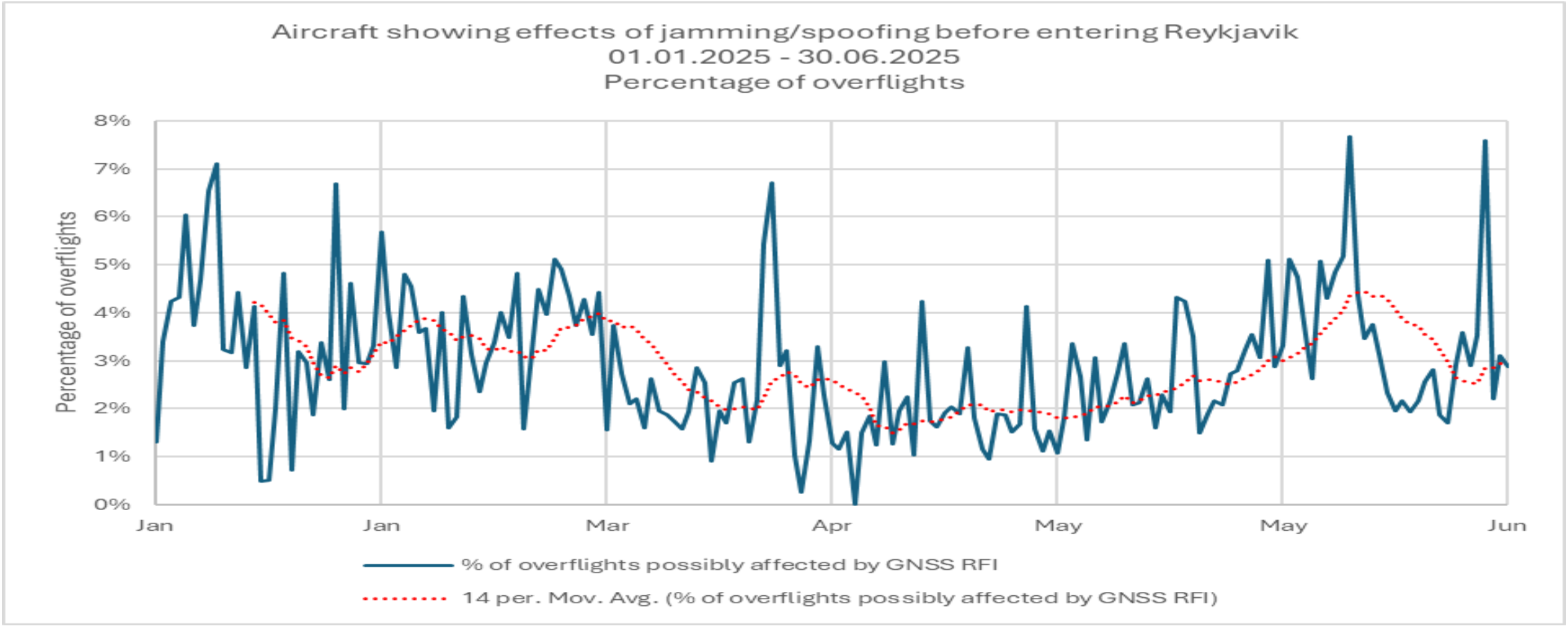
Isavia ANS

GNSS Interference in Reykjavik Airspace

- Iceland reported GNSS RFI effects observed in Reykjavik CTA between 1 January and 30 June 2025. The analysis included ADS-B and ADS-C anomalies, as well as timestamp errors in CPDLC messages—an indicator of GNSS spoofing.

GNSS RFI category	Number of flights
ADS-B	255
ADS-B and Time	2
ADS-B and ADS-C	447
ADS-B, ADS-C and Time	76
ADS-C	488
ADS-C and Time	32
Time	197
Total flights with possible GNSS RFI	1497

GNSS Interference in Reykjavik Airspace



Isavia ANS

GNSS Interference in Shanwick Airspace

The UK advised a six-month analysis (January–June 2025) of GNSS RFI effects in Shanwick OCA using position error reports triggered by degraded Figure of Merit (FOM) values. The methodology focused on FOM levels 1–3, which indicate degraded navigation accuracy consistent with GNSS interference.

FOM Value	Position Accuracy	Comments
1	<30 NM	Consistent with inertial navigation on long flight without updates
2	<15 NM	Consistent with inertial navigation on intermediate length flight without updates
3	<8 NM	Consistent with inertial navigation on short length flight and beyond 50 nautical miles from VOR.

GNSS Interference in Shanwick Airspace

- A total of 302 distinct flights were identified with position errors, generating 1123 error reports. This equates to approximately 1–3 affected flights per day.

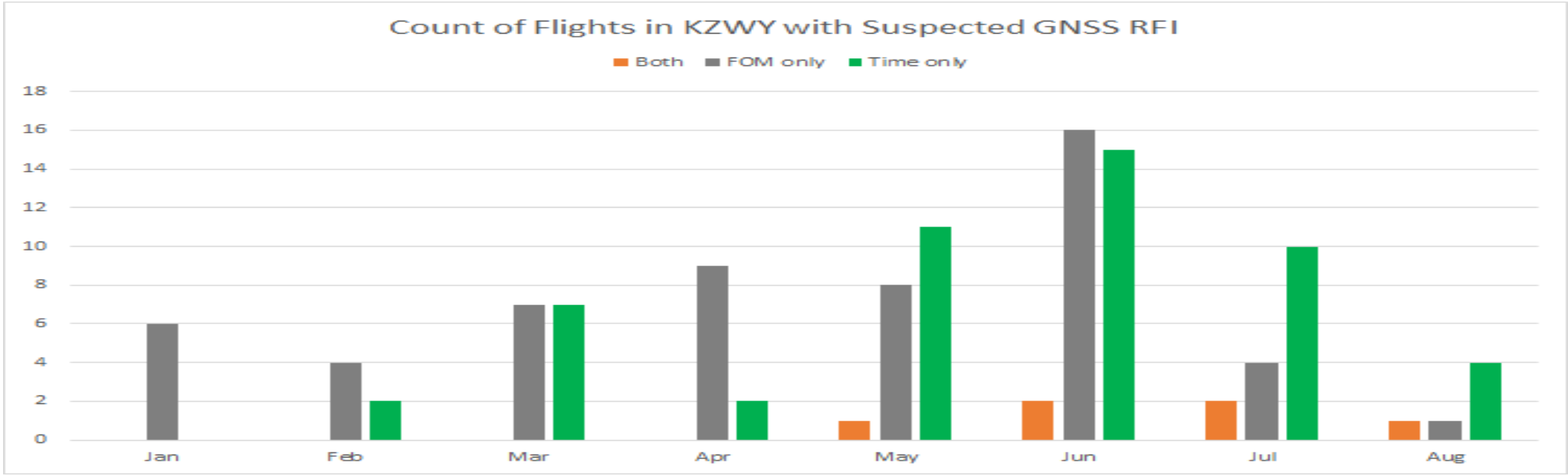
Month (2025)	Number of Distinct Flights with Position Errors	Total Number of Position Errors
January	56	251
February	25	104
March	79	257
April	56	192
May	46	173
June	40	146
Total	302	1123

GNSS Interference in New York Oceanic Airspace

- The United States provided an update on FAA monitoring activities in New York FIR, focusing on ADS-C FOM degradations and CPDLC timestamp anomalies. Weekly analyses began in February 2025, identifying flights with 10 or more ADS-C reports with FOM ≤3 or timestamp discrepancies. The Group recalled the accuracy levels associated with each FOM value, excerpt from RTCA DO-258A, *Interoperability Requirements for ATS Applications Using ARINC 622 Data Communications (FANS 1/A Interop Standard)*:

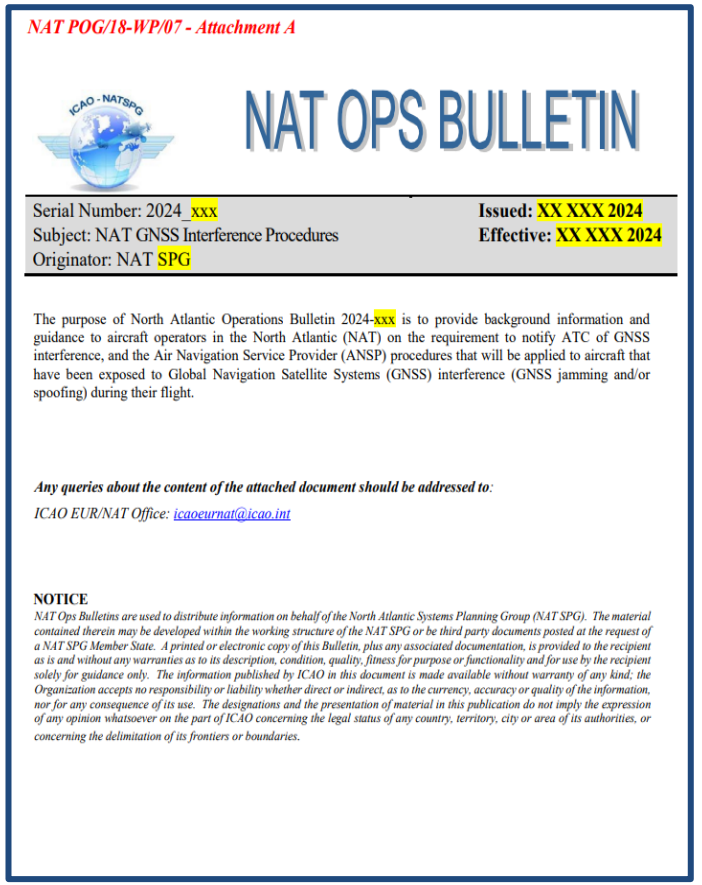
GNSS Interference in New York Oceanic Airspace

Between January and August 2025, the FAA observed that B789, B788, and A321 aircraft were most affected by timestamp anomalies, while A388, A35K, and A359 showed degraded FOM. Approximately 68% of affected flights were westbound, with nearly half departing from Istanbul, Doha, Abu Dhabi, or Dubai. Eastbound flights also showed anomalies, possibly due to unresolved interference from previous legs.



NAT GNSS Interference Procedures – NAT Ops Bulletin

- SPG/60 raised concerns about GNSS jamming/spoofing affecting flight safety and efficiency.
- Agreed on the need for regionally coordinated efforts under NAT IMG to develop harmonised contingency procedures for GNSS interference.
- POG members noted GNSS interference primarily impacts the ability to apply performance-based separation minima in the NAT.
- POG/18 agreed the NAT Ops Bulletin should focus on flight crew procedures and provide guidance on aligned contingency measures.
- NAT Ops Bulletin published in January 2025.



NAT POG/18-WP/07 - Attachment A

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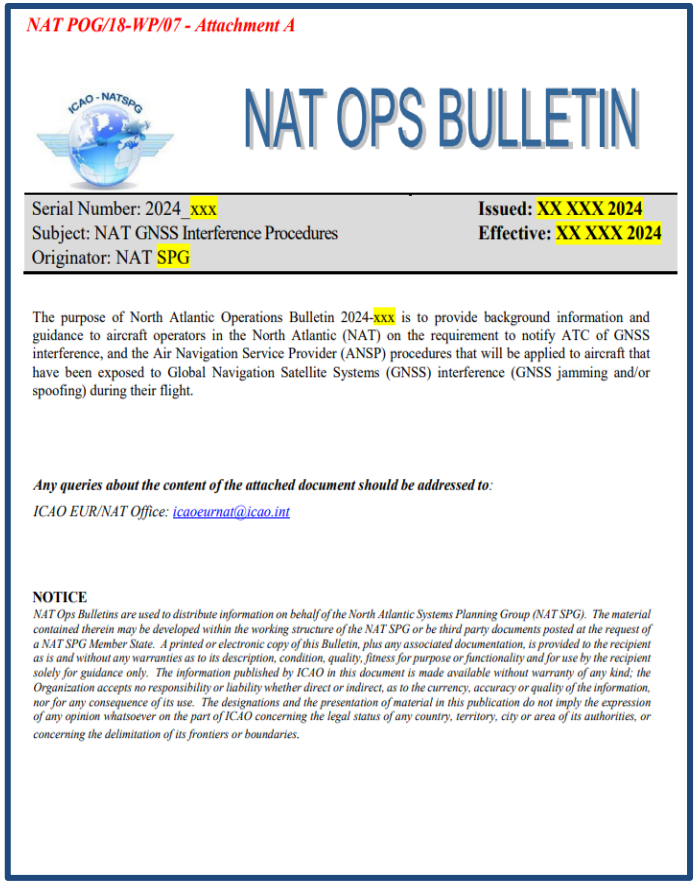
NAT GNSS Interference Procedures – NAT Ops Bulletin

- There are 6 Sections to *NAT GNSS Interference Procedures NAT Ops Bulletin*;
  - Section 1: Definitions
  - Section 2: Purpose of Bulletin
  - Section 3: Background
  - **Section 4: Operator & Flight Crew Procedures**
  - **Section 5: NAT ANSP Procedures**
  - Section 6: Website references (ICAO)



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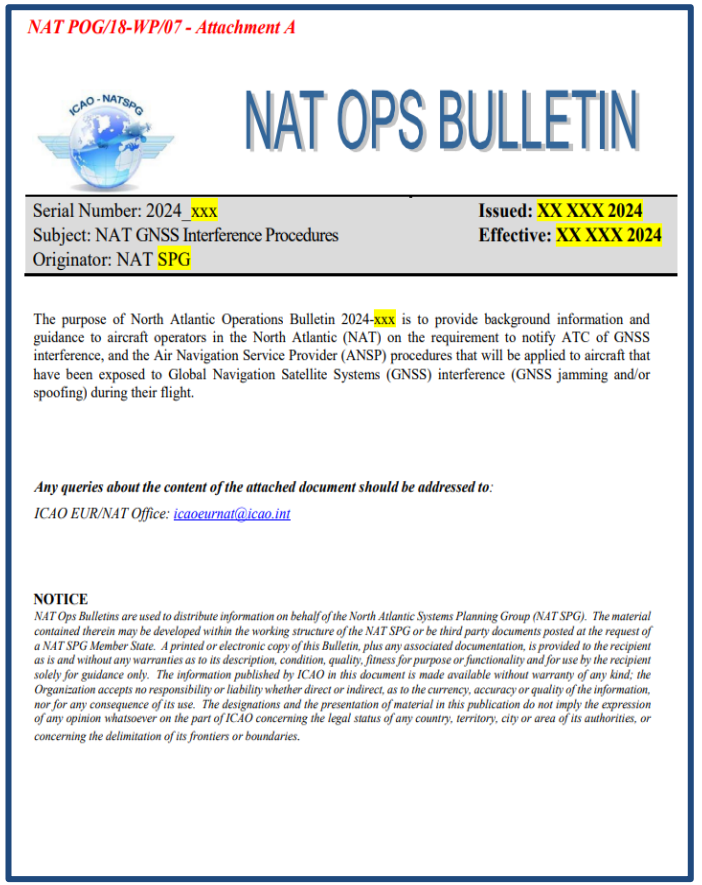
Section 4 – Operator & Flight Crew Procedures

- Flights that experience GNSS interference enroute to the NAT Region shall notify ATC in the RCL.
- Notification in RCL via ACARS or Voice confirming navigation status and detail of ongoing loss/impacts. For example:

"REMARKS/ GNSS INTERFERENCE RNP10 ONLY"
or
"REMARKS/ GNSS INTERFERENCE NO CPDLC"

- Section highlights that early notification minimises impact on the cleared profile, while late notification increases workload for ATC and may result in tactical adjustments to profile.



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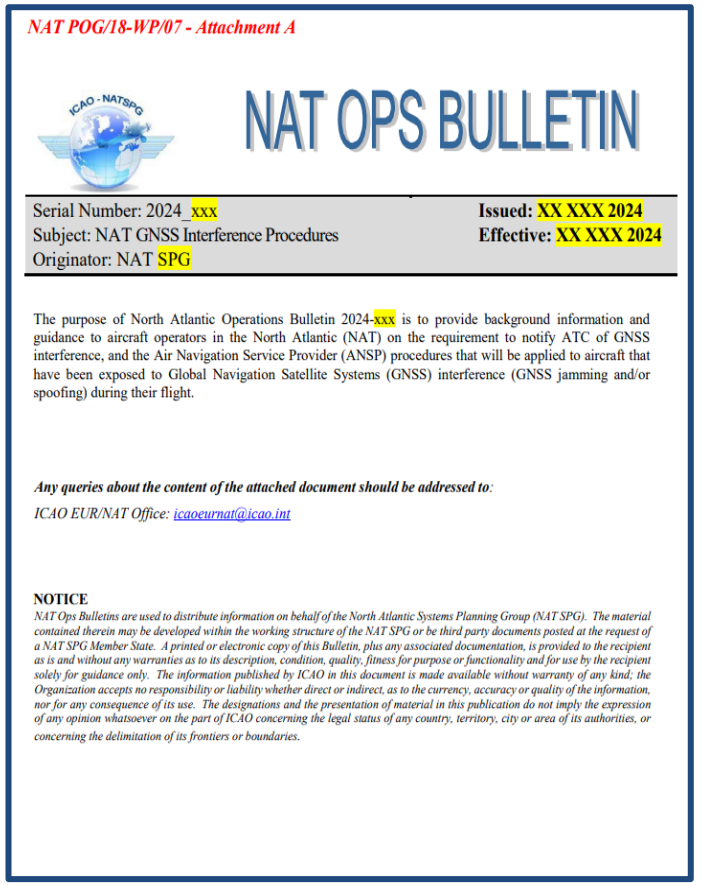
Section 5 – NAT ANSP Procedures

- Flights that do not meet at least RNAV 10 (RNP 10) may be cleared to **avoid NAT HLA** (FL290-410).
- Aircraft losing RNP 4 enroute but retaining RNP 10 (RNAV 10) will be cleared on most suitable profile within the NAT HLA, subject to impact on other traffic and **outside PBCS tracks**.
- Aircraft experiencing FANS failure enroute will be cleared on most suitable profile **within** the NAT Datalink Mandated airspace (FL290-410) subject to other traffic.
- Aircraft experiencing ADS-B failure will be cleared on most suitable profile **within** the NAT HLA subject to other traffic.



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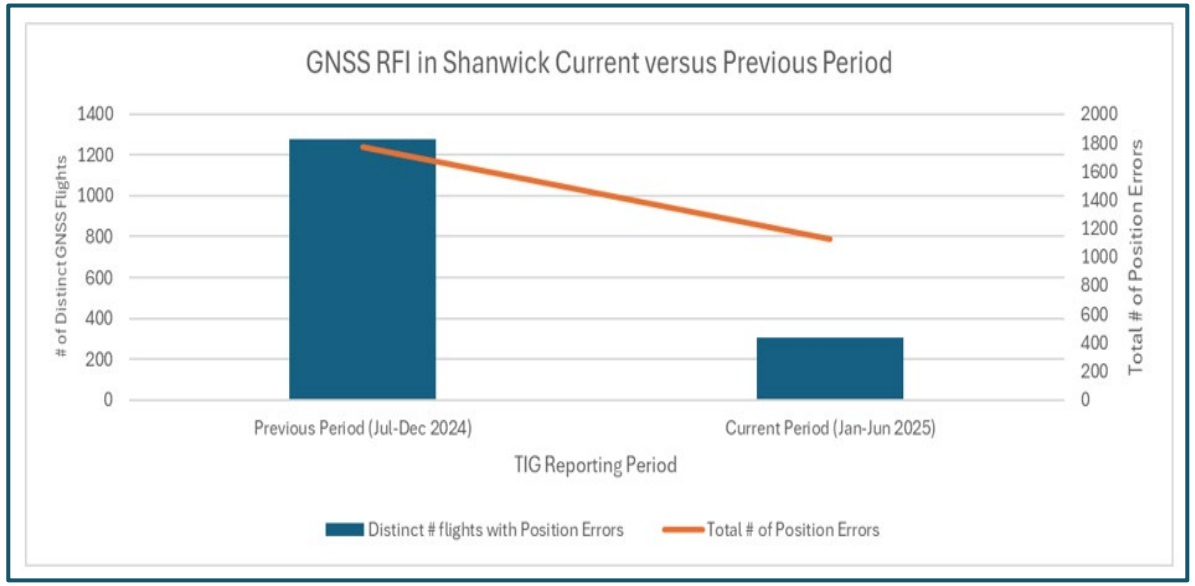
Key messages to airlines on GNSS spoofing

- GPS Spoofing continues to affect both our Oceanic and Domestic Operation
- Between 10-50 aircraft per day impacted prior to entering Shanwick
- Defensive controlling measures in place
- Impacts vary from not meeting RNP values (with associated increased separation standards) to GPWS alerts and aircraft navigational issues
- Operators reminded to inform ATC about navigational degradation associated with GPS Spoofing
- Informing Shanwick/BIRD about GPS Spoofing and RNP values early will maximise opportunity for optimised profiles
- Airline workshop planned Dec/Jan TBD
- Number of pro-active defensive controlling measures under review based on latest data



QUESTIONS?

Presented by

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