Joint ICAO EUR/NAT and MID Workshop GNSS Radio Frequency Interference (RFI)

Doha, Qatar, 18-20 November 2025)

GNSS RFI Reporting Analysis & Mitigation

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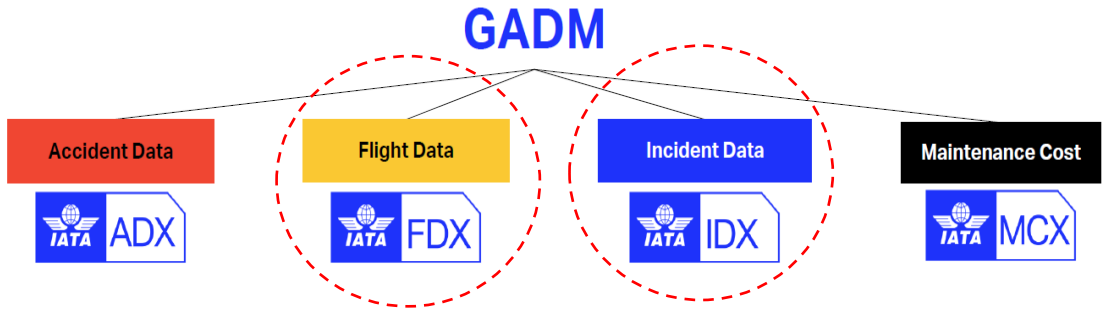
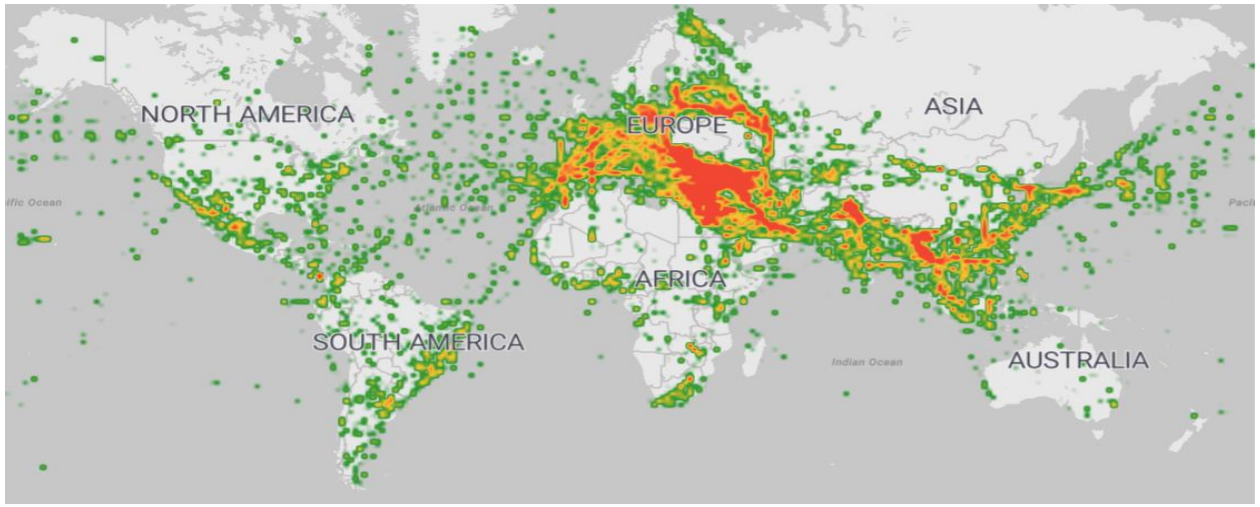
GPS Signal Loss Occurrence Duration

- IATA's Operations, Safety & Security Division
  - Safety & Operational Data and Analytics Programs
- GADM is a unique global aviation safety database with IATA serving as a custodian trusted by the industry to do this.





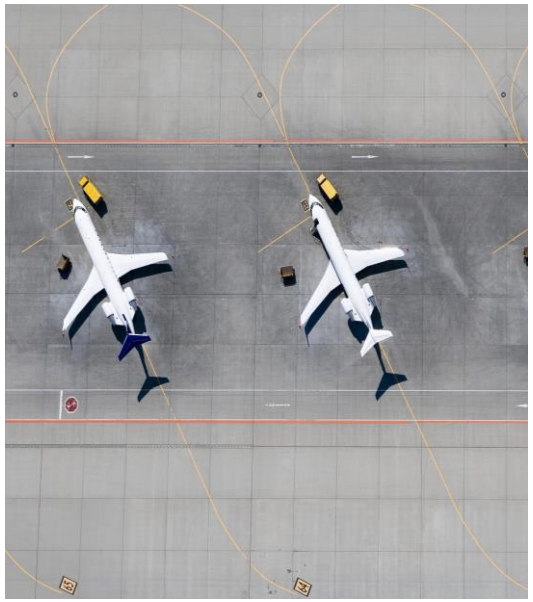
FDX Statistics

More than
220
Airlines and
growing

More than
20 000 000
flights globally

More than
8500
aircraft

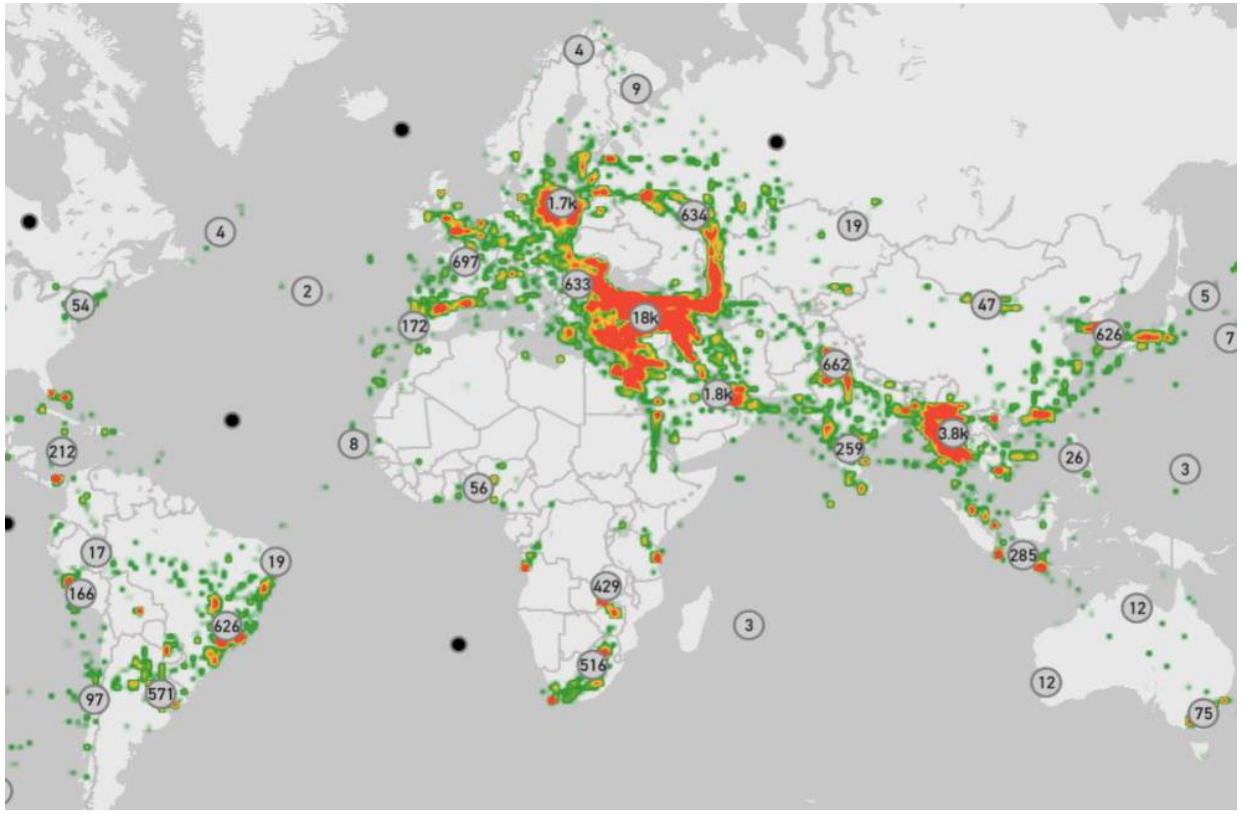
IDX Statistics



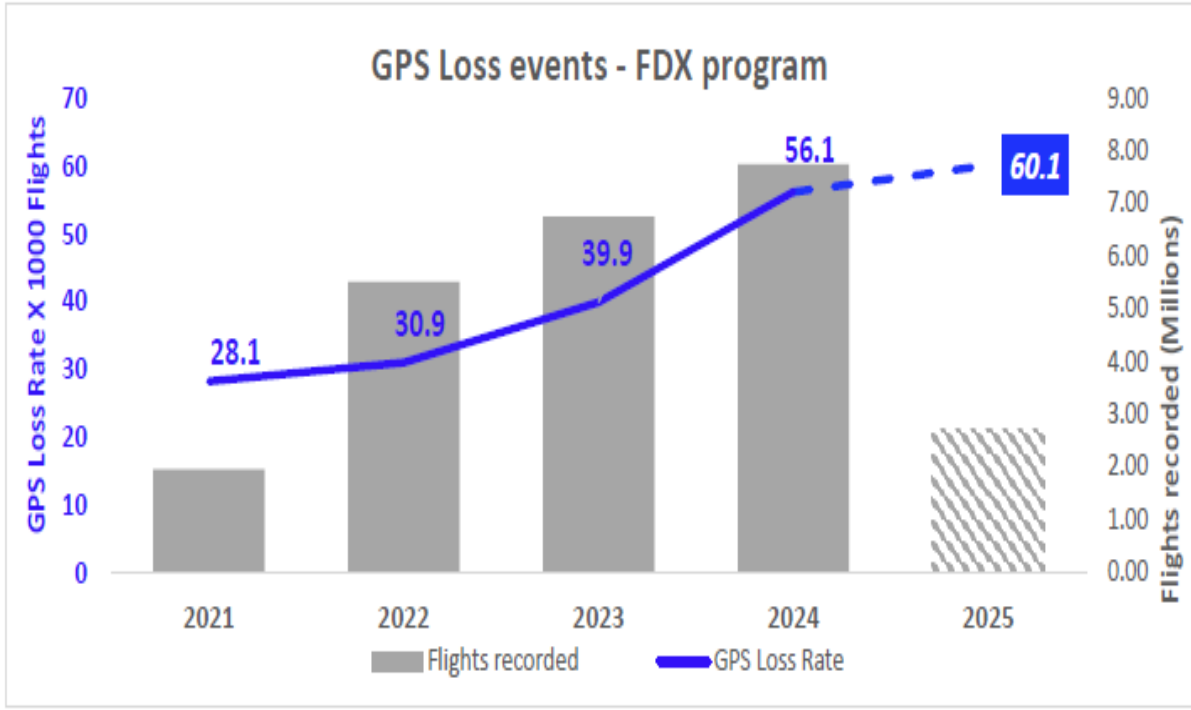
315
Airlines
Participants
and growing

IATA

GNSS RFI - Safety Risk Assessment

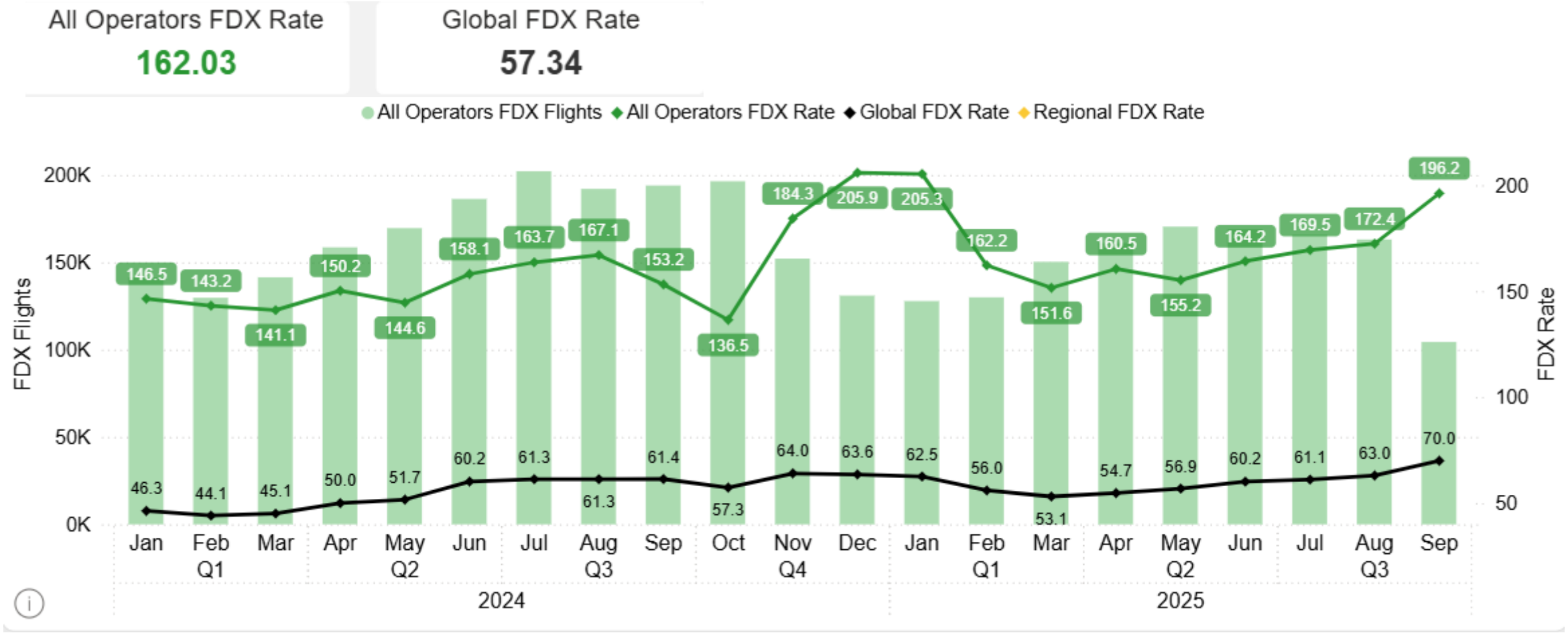


GNSS-RFI Recorded events Jan-Jun 2025 | Current Hotspots



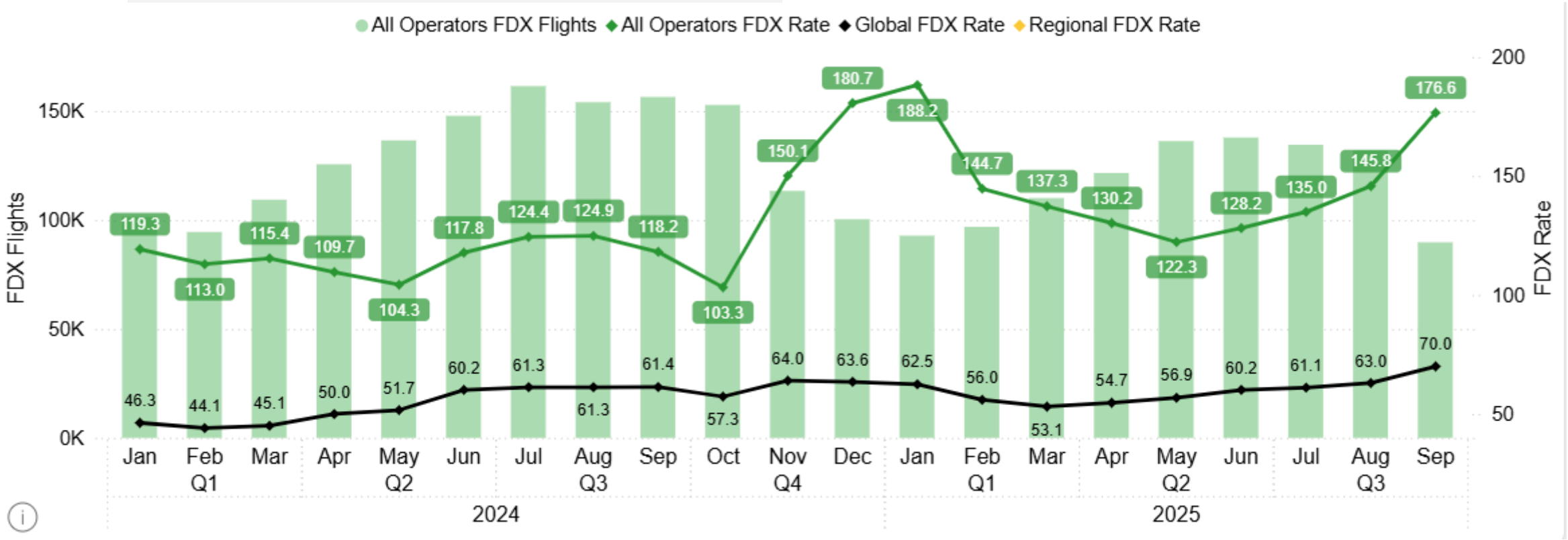
GPS loss events evolution

GNSS RFI En- route - Europe & MENA



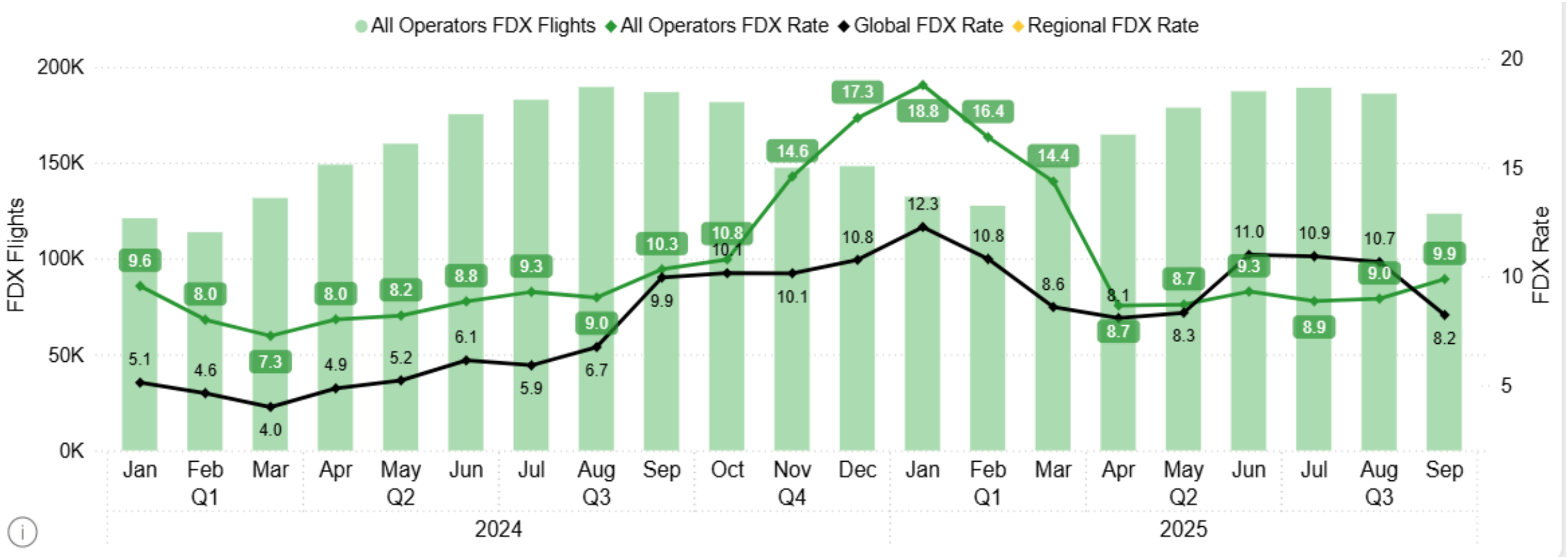
GNSS RFI En-route - Europe

All Operators FDX Rate	Global FDX Rate
130.34	57.34



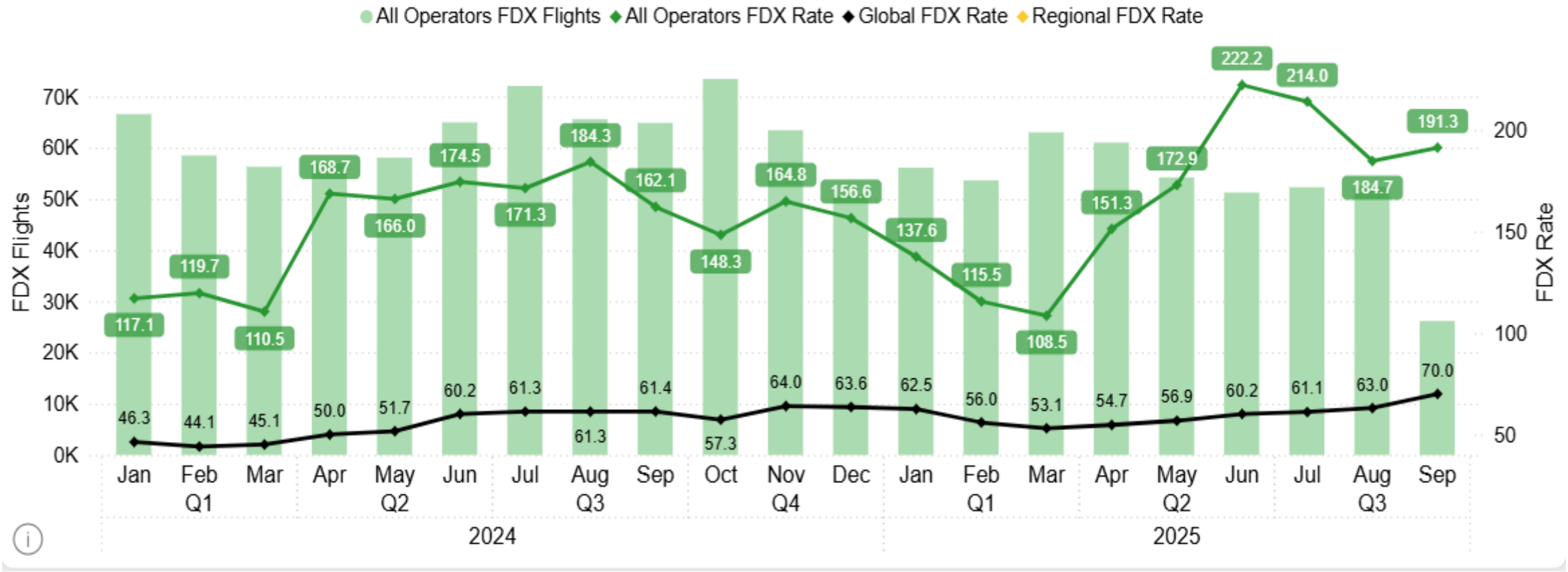
GNSS RFI Takeoff & Climb Europe

All Operators FDX Rate	Global FDX Rate
10.55	8.26



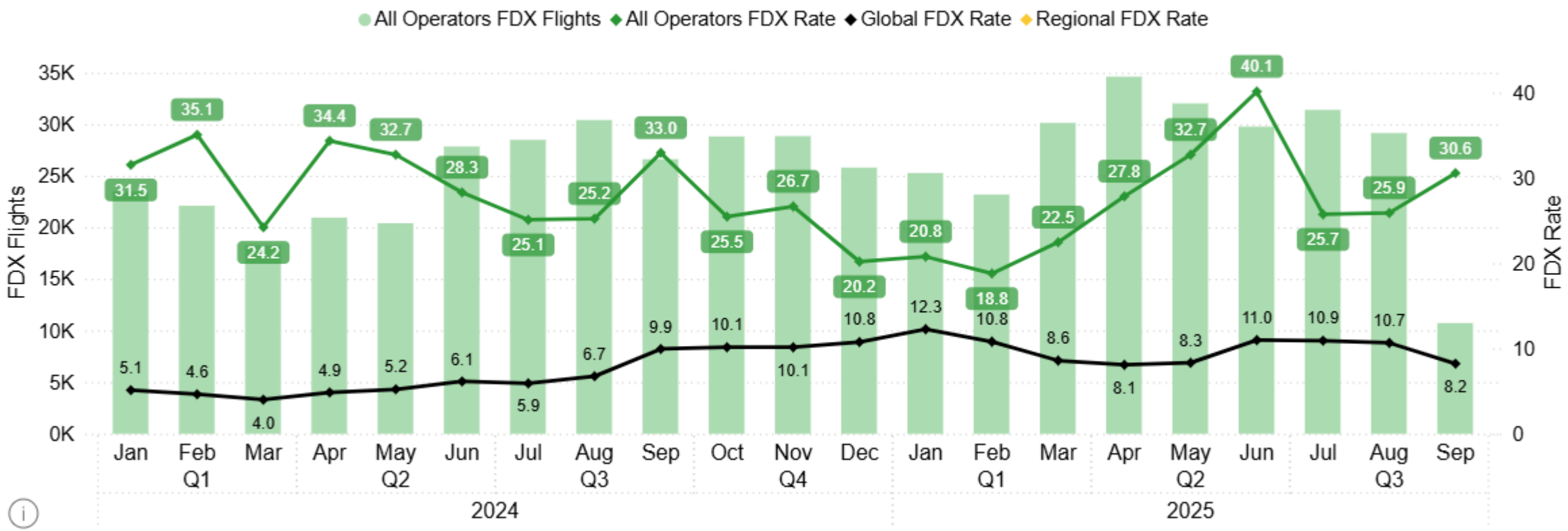
GNSS RFI En- route MENA

All Operators FDX Rate	Global FDX Rate
157.57	57.34

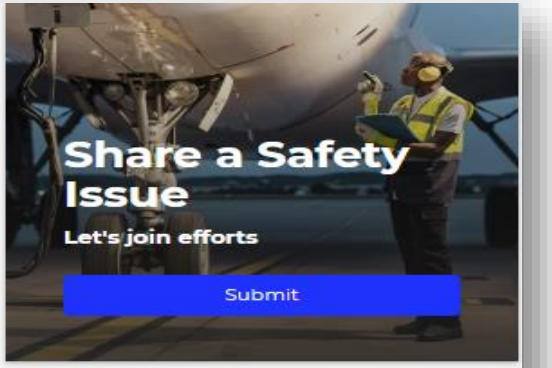


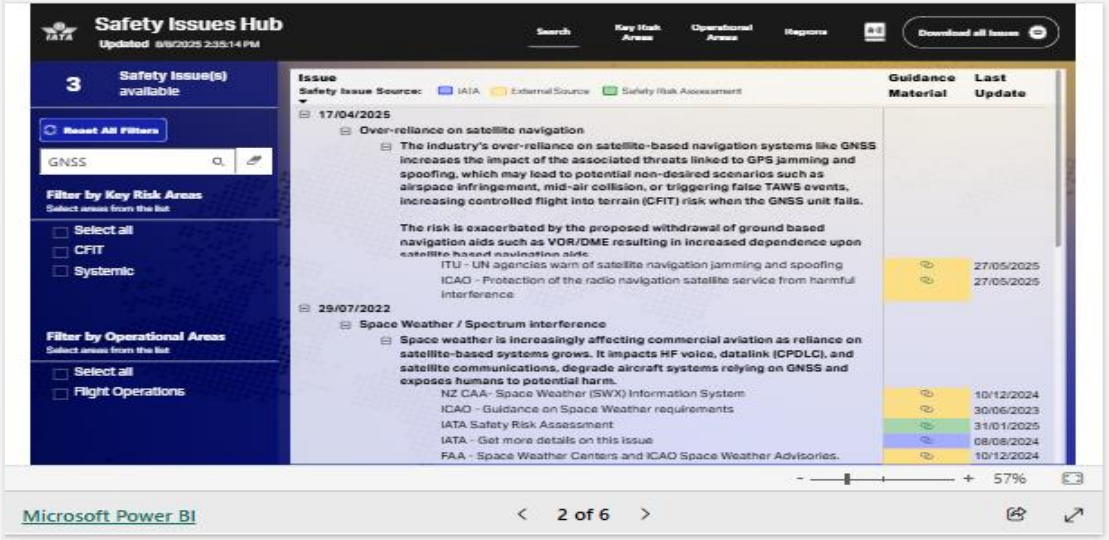
GNSS RFI Takeoff & Climb MENA

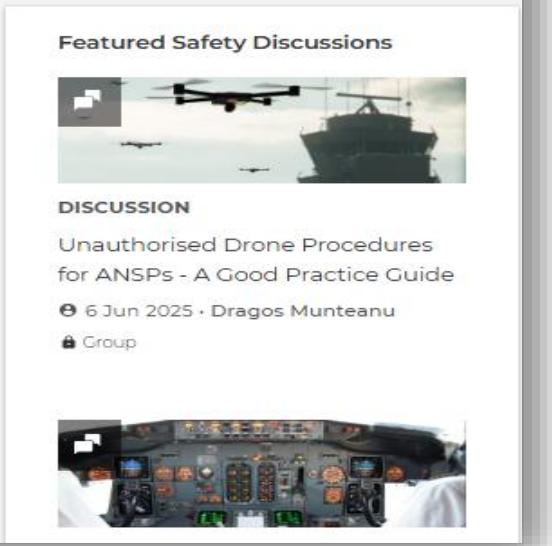
All Operators FDX Rate	Global FDX Rate
27.82	8.26



Safety Issue Hub | GNSS RFI





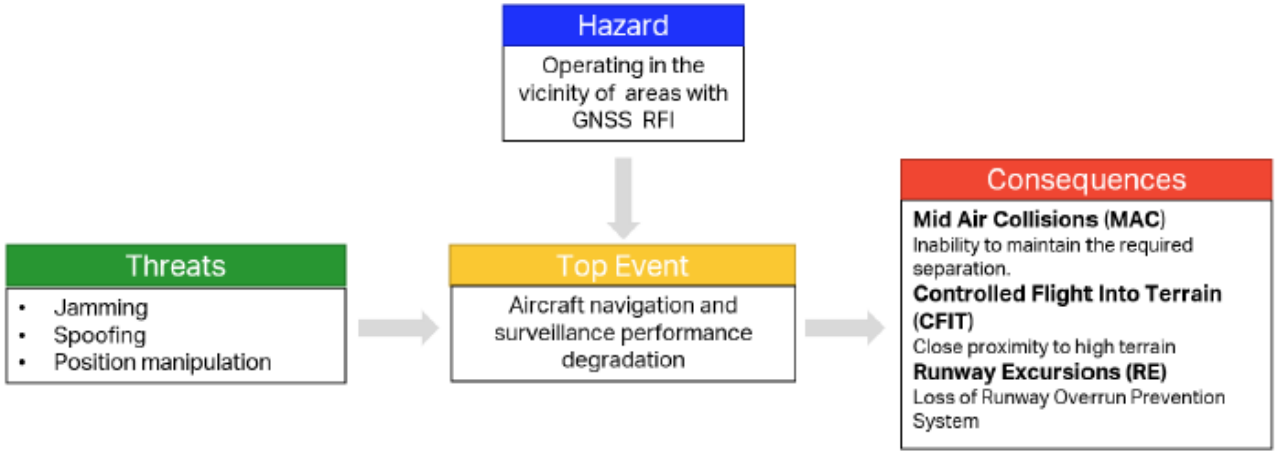


[IATA GNSS RFI SRA]

[Safety Issue Hub]

IATA

GNSS RFI - Safety Risk Assessment



Preventive Controls from the Operator's Perspective
Flight planning | Checking NOTAMS related to known or expected GNSS RFI.
Flight Planning | Checking the availability of non-GNSS-based routes, procedures, and approaches (ILS, VOR, and DME).
Flight Planning | Consider limitations caused by inoperative radio navigation systems to operate in GNSS RFI-affected areas.
En route | Enforce action ECAM/EICAS and FCOM or supplemental procedures for loss of GNSS.
Post-flight | Technical report in the maintenance logbook in case any cockpit effects related to GNSS RFI are experienced.
Post-flight | Establish maintenance/operations feedback after troubleshooting GNSS RFI reports.
Post-flight | Report any suspected GNSS RFI events to relevant regional and international organizations (e.g., IATA, ANSPs,).
Post-flight | When RFI is identified, aircraft data should be sent to OEMs for further investigation.

Table 3 GNSS RFI Preventive controls

Operators / Recovery controls
En route – Enforce abnormal/emergency procedures as appropriate.
En route – Establish/enforce procedures regarding cross-checking position using other available navigation systems (radio navaids, e.g., VOR, DME), INS, and visual references.
En route - Establish/enforce procedures for location cross-check with air traffic control (ATC) before attempting troubleshooting.
En route - Establish/enforce procedures to revert to available alternate navigation systems (VOR, DME, INS) radar vectors from ATC.
En route - Establish/enforce requirements to notify ATC about GNSS RFI, and if cockpit annunciation of ADS-B OUT failure is available, add that information to communications with ATC.
Approach - Enforce procedures to conduct conventional arrival/approach procedures.

Table 5 GNSS RFI recovery controls


IATA
Global Navigation Satellite System
GNSS Radio Frequency Interference
Safety Risk Assessment

Recommendations

Airlines

- Develop or update the risk model using the appropriate assessment technique to evaluate the operator's exposure to GNSS-RFI hazards across the operational network.
- Establish Safety Performance Indicators (SPI) related to GNSS-RFI consequences on aircraft navigation and communication performance degradation, focusing on navigation display alerts in line with OEM technical information that can be tracked using the operator's flight data monitoring program.
- Encourage flight crews to submit GNSS-RFI-related safety reports.
- Establish a mechanism to report confirmed RFI events to ANSPs, national authorities, and IATA.
- Ensure the safety reporting program captures all required details.
- Integrate a periodic evaluation of the exposure to threats identified in the GNSS-RFI risk model into risk management activities.
- Ensure that the preventive controls listed in Table 3 are documented, implemented, and trained as required.
- Ensure that the recovery controls listed in Table 5 are documented, implemented, and trained as required.
- Consider circulating aircrew notices, special crew briefings and supplementary procedures to enhance crew awareness of cockpit effects and required actions before, during and after GPS interference.
- Stay in contact with aircraft and equipment manufacturers to receive guidance on operating aircraft and systems during jamming or spoofing and integrate their recommendations into standard procedures.
- Consider using simulator training sessions to explore RFI-related CRM and crew mitigation.

GNSS Spoofing – Effects

IDX DATA - Analysis

Clock Shifting

During this period, the aircraft typically experiences the following:

- Reversion to other navigation modes e.g. inertial systems or ground navigation aids;
- Loss of ADS-B reporting, and, consequently, loss of CPDLC;
- ADS-C reporting incorrect timestamps;
- CPDLC reporting incorrect timestamps or being unable to log on due to incorrect year;
- FMC/FMS time prediction being erroneous or lost.

In the event the aircraft system does not recover, then the MMR can be reset on the ground and the actual date/time recovered before the next flight.

EGPWS

There are two scenarios:

- **Active GPS signal interference with EGPWS activations:** the aircraft is actively receiving an incorrect signal, and the EGPWC is using this to output a spurious alert. This can occur on both cruise and arrival or, more rarely, on departure.
- **No active GPS signal interference with EGPWS activations:** the aircraft has passed through an area of GPS signal interference, and some aircraft systems have not recovered, most likely an MMR or the EGPWC. Then the aircraft experiences an EGPWS activation on arrival, even though the GPS signal is accurate.

EASA-IATA Workshop

EASA and IATA Publish Comprehensive Plan to Mitigate the Risks of GNSS Interference

Cologne — The International Air Transport Association (IATA) and the European Union Aviation Safety Agency (EASA) have published a comprehensive plan to mitigate the risks stemming from global navigation satellite system (GNSS) interference. The plan was part of the conclusions of a jointly-hosted workshop on the topic of GNSS interference.

Given the continued rise i
concluded that a broader
areas: improved informat
effective use of infrastruc
preparedness among rele

Reported incidents of interference with GNSS signals, known as jamming a
Middle East in recent years. Similar incidents have been reported in other lo
those GNSS interference incidents.

"GNSS disruptions are evolving in terms of both frequency and complexity.
resilience. The evolving nature of the threat demands a dynamic and ambiti
Director. "Through collaboration with partners in the European Union and IA
(ICAO), we are committed to keeping aviation safe, secure, and navigable."

"The number of global positioning system (GPS) signal loss events increase
the Global Aviation Data Management Flight Data eXchange (GADM FDX). A
reversing in the near term. IATA and EASA are working together to reinforce
The next step is for ICAO to move these solutions forward with global alignr
high priority at the ICAO Assembly later this year. To stay ahead of the threa
IATA Senior Vice President, Operations, Safety, and Security.

The workshop concluded that four workstreams are critical:

1. Enhanced Reporting and Monitoring

- Agree on standard radio calls for reporting GNSS interference and **standardized notice to airmen (NOTAM) coding, i.e. Q codes.**
- Define and implement **monitoring and warning procedures**, including real-time airspace monitoring.
- Ensure **dissemination** of information without delays to relevant parties for formal reporting.

2. Prevention and Mitigation

- **Tighten controls (including export and licensing restrictions)** on jamming devices.
- Support the **development of technical solutions to:**
  - **reduce false terrain warnings**;
  - **improve situational interference** with portable spoofing detectors; and
  - ensure rapid and reliable GPS equipment recovery after signal loss or interference.

3. Infrastructure and Airspace Management

- **Maintain a backup for GNSS** with a minimum operational network of traditional navigation aids.
- **Better utilize military air traffic management (ATM) capabilities**, including tactical air navigation networks and real-time airspace GNSS incident monitoring.
- **Enhance procedures** for airspace **contingency and reversion planning** so aircraft can navigate safely even if interference occurs.

4. Coordination and Preparedness

- **Improve civil-military coordination,** including the sharing of GNSS radio frequency interference (RFI) event data.
- **Prepare for evolving-threat capabilities**, also for **drones**.

Thank you.