

IATA Perspective on GNSS RFI



GNSS RFI - Safety Risk Assessment

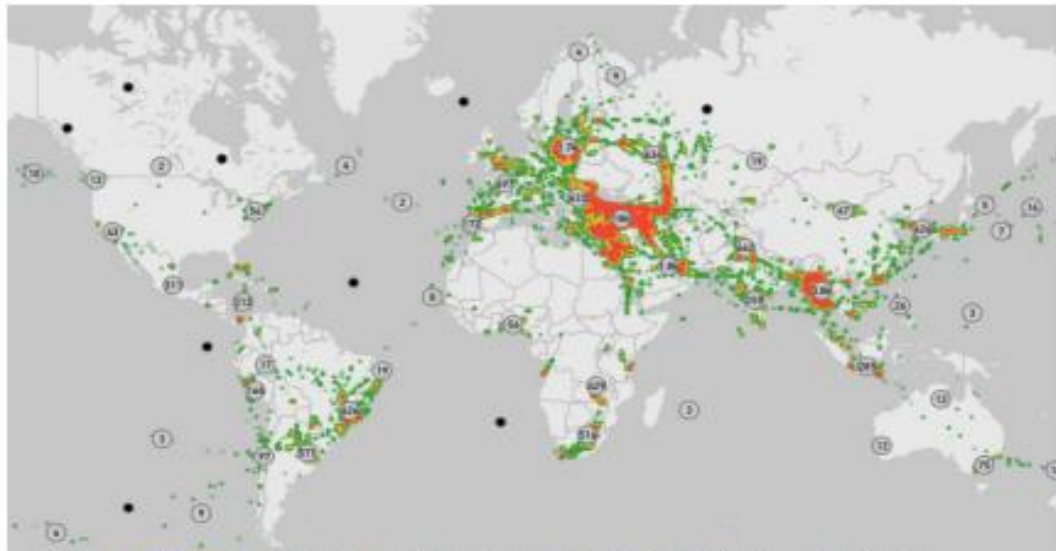


Figure 6 GNSS-RFI Recorded events Jan-Jun 2025 | Current Hotspots.

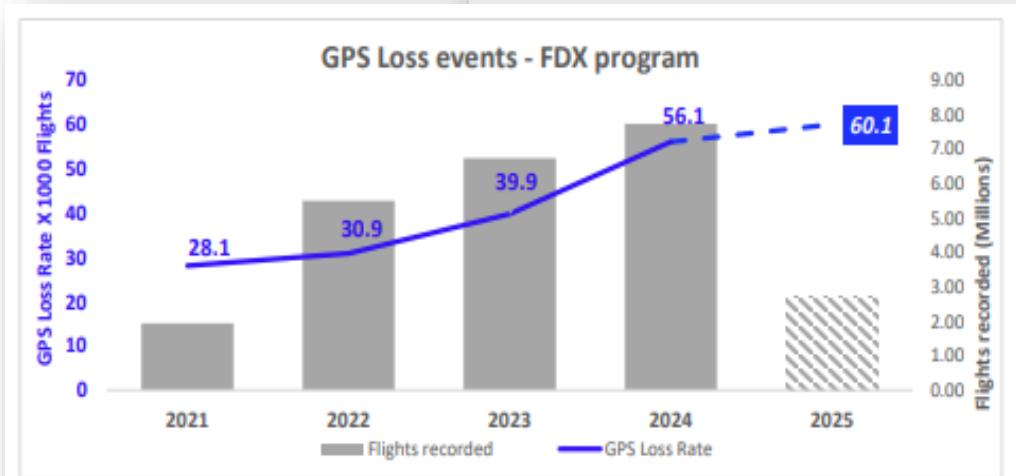


Figure 2 GPS loss events evolution

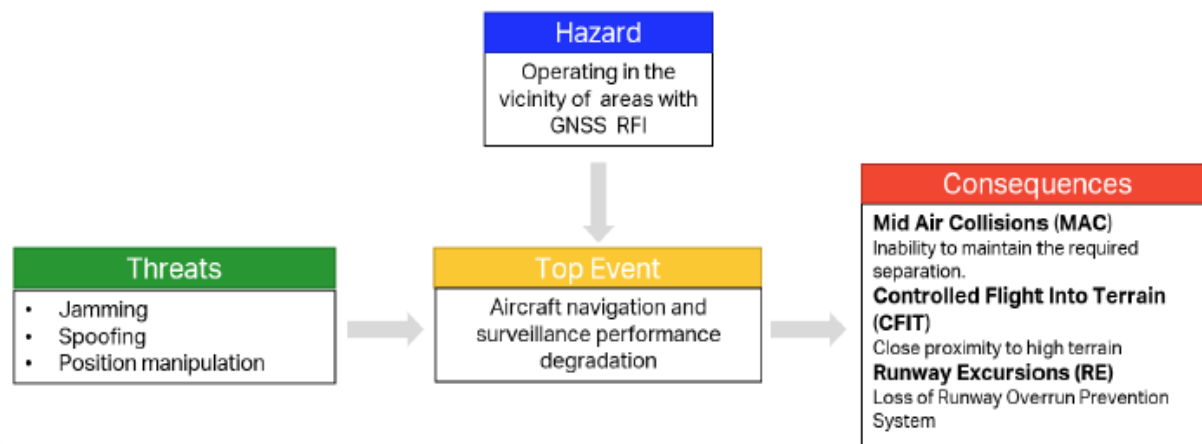
IATA Global GPS RFI SRA 2025 – NACC/SAM Regions

- GNSS-RFI is not limited to the affected flight information (FIR) highlighted by EASA's safety bulletin. IATA FDX indicates it has become a safety risk in other geographical areas.
- **SAM region**
 - FIR Ezeiza SAEF, FIR Resistencia SARR
 - FIR Brasilia SBBS, FIR Recife SBRE
- **Recent Operational Issues**
 - Brasilia TMA
 - Mexico City TMA



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

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

Systems affected / Potential Accident scenarios		CFIT	MAC	RE
Navigation	Downgraded aircraft position computation. GPS (Loss of GPS primary)	X		
	Loss of FLS ³ , GLS ⁴ , SLS ⁵ deviations, and loss of RNP ⁶ and RNAV ⁷ capability	X		
	Abnormal differences between Ground Speed and true Airspeed	X		
Surveillance	Loss of Terrain Awareness Warning System (TAWS) Undue TAWS Alerts false "Pull up" calls (or no calls)	X		
	Terrain display shift on ND	X		
	Loss of ADS-B ⁸ Out Reporting False ADS-B Out Position Reporting		X	
Communication	Loss of Traffic Alert and Collision Avoidance System (TCAS)		X	
	Loss of CPDLC ⁹ and SATCOM ¹⁰		X	
Others	Loss of Runway Overrun Prevention System – (ROPS) or Runway Situation Awareness Tools			X

Safety Issue Hub | GNSS RFI

IATA Unrestricted

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

Version 5 July 2025

1 Global Navigation Satellite System GNSS Radio Frequency Interference Version 5 July 2025

The Safety Issue Hub

The place where you can get access the repository of aviation hazards and safety risks to enable the prioritization and delivery of aviation safety improvement programs, for the benefit of reducing global accidents in aviation.

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Select areas from the list

- Select all
- Flight Operations

Issue	Guidance Material	Last Update
17/04/2025 Over-reliance on satellite navigation The industry's over-reliance on satellite-based navigation systems like GNSS increases the impact of the associated threats linked to GPS jamming and spoofing, which may lead to potential non-desired scenarios such as airspace infringement, mid-air collision, or triggering false TAWS events, increasing controlled flight into terrain (CFIT) risk when the GNSS unit fails. The risk is exacerbated by the proposed withdrawal of ground based navigation aids such as VOR/DME resulting in increased dependence upon satellite-based navigation systems. ITU - UN agencies warn of satellite navigation jamming and spoofing ICAO - Protection of the radio navigation satellite service from harmful interference.		27/05/2025 27/05/2025
29/07/2022 Space Weather / Spectrum Interference Space weather is increasingly affecting commercial aviation as reliance on satellite-based systems grows. It impacts HF voice, datalink (CPDLC), and satellite communications, degrade aircraft systems relying on GNSS and exposes humans to potential harm. NZ CAA - Space Weather (SWX) Information System ICAO - Guidance on Space Weather requirements IATA Safety Risk Assessment IATA - Get more details on this issue FAA - Space Weather Centers and ICAO Space Weather Advisories.		10/12/2024 30/06/2023 31/01/2025 08/08/2024 10/12/2024

Microsoft Power BI 2 of 6 57%

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DISCUSSION

Unauthorised Drone Procedures for ANSPs - A Good Practice Guide

6 Jun 2025 · Dragos Munteanu

Group

[IATA GNSS RFI SRA](#)

[Safety Issue Hub](#)



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 in GNSS interference incidents, the workshop concluded that a broader set of measures is needed in several key areas: improved information sharing, effective use of infrastructure, and increased preparedness among relevant parties.

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**.

Reported incidents of interference with GNSS signals, known as jamming and spoofing, have increased significantly in the Middle East in recent years. Similar incidents have been reported in other locations, including Europe, where those GNSS interference incidents.

“GNSS disruptions are evolving in terms of both frequency and complexity, demanding a more resilient system. The evolving nature of the threat demands a dynamic and ambitious response. Through collaboration with partners in the European Union and ICAO, we are committed to keeping aviation safe, secure, and navigable.”

“The number of global positioning system (GPS) signal loss events increased significantly in 2024, as reported in the Global Aviation Data Management Flight Data eXchange (GADM FDX). A significant portion of these events are reversing in the near term. IATA and EASA are working together to reinforce existing measures and develop new ones. The next step is for ICAO to move these solutions forward with global alignment. This is a high priority at the ICAO Assembly later this year. To stay ahead of the threat, IATA and EASA are committed to working closely with ICAO, IATA Senior Vice President, Operations, Safety, and Security.

Recommendations

ANSP

- **Promptly notify airlines and airspace users** once GNSS-RFI is detected.
- **Inform flight crews and air traffic controllers** about the impact of GNSS interference and establish effective **contingency procedures and capabilities** as appropriate.
- **Coordinate with the State spectrum regulator** to establish monitoring, notification, and mitigation processes.
- In coordination with airlines and other airspace users, **periodically reassess the national CNS rationalization plan, ensuring a minimum operating network (MON)** for operational resilience.
- Ensure that flights impacted by GNSS-RFI are **instructed (by NOTAM) to inform ATC** so that ANSPs **can plan route realignment** and other mitigations for longer-term RFI issues.
- Implement and maintain **Minimum Safe Altitude Warning (MSAW)** as a ground-based **safety net** to mitigate risks of GNSS-RFI.
- Monitoring ADS-B Quality factor: Ensure the ATM system **monitors ADS-B Out quality indicators** to detect GNSS-RFI.

Recommendations

States

- **Implement appropriate mitigation measures** as contained in the **ICAO GNSS Manual (Doc 9849)** as a matter of high priority and report progress and any difficulties to ICAO.
- Through the planning and implementation of **regional groups (PIRGs)**, regional or global navigation satellite system **reporting mechanisms** are developed, as described in the Global Navigation Satellite System (GNSS) Manual (**Doc 9849**).
- **Review aircraft minimum equipment lists** to ensure compatibility with States implemented **minimum operational networks**.
- While using **GNSS jammers during military exercises and operations**, recognize the impact of harmful **interference to civil flight operations** and exercise caution to the maximum extent possible to protect the safety of flight.
- Establish **appropriate spectrum regulations** to protect GNSS frequencies in line with **ITU Radio Regulations**.
- Consider operational risks associated with **GNSS-RFI during the rationalization of conventional navigation and surveillance infrastructure** and incorporate **inputs from airspace users** while developing a CNS MON.
- Ensure that **contingency procedures** are established in **coordination with air navigation service providers and airspace users** and that **essential conventional navigation infrastructure**, particularly **Instrument Landing System (ILS)**, is retained and fully operational.

What's Next?

THE FORTY-SECOND ICAO ASSEMBLY

A42

SAFE SKIES. SUSTAINABLE FUTURE.

23 SEPTEMBER - 3 OCTOBER 2025 | MONTRÉAL, CANADA



International Civil Aviation Organization

WORKING PAPER

A42-WP/335¹
TE/135
29/7/25

ASSEMBLY — 42ND SESSION

TECHNICAL COMMISSION

Agenda Item 24: Aviation Safety and Air Navigation Priority Initiatives

GNSS RADIO FREQUENCY INTERFERENCE (RFI)

(Presented by International Air Transport Association (IATA) and International Business Aircraft Council (IBAC) and International Federation of Air Traffic Controllers' Associations (IFATCA))

EXECUTIVE SUMMARY

The Global Navigation Satellite System (GNSS) serves as a fundamental pillar of modern air transport operations. It provides the positioning, navigation, and timing (PNT) necessary for all phases of flight. From precision approaches to efficient en-route navigation and air traffic management (ATM) automation, GNSS underpins safety, efficiency, and environmental sustainability. The escalating prevalence and sophistication of deliberate radio frequency interference (RFI) pose a worsening threat to the integrity and accessibility of GNSS for civil aviation applications.

Although International Telecommunication Union (ITU) resolutions aim to restrict deliberate State-level GNSS interference to within national borders, adversaries in various conflict zones are actively engaged in jamming and spoofing activities that adversely affect global air traffic operations. This paper underscores the operational consequences of GNSS RFI and urges ICAO member states and industry stakeholders to promptly implement effective measures to mitigate this immediate, critical, safety and economic risk.

Action: The Assembly is invited to:

- acknowledge the paramount significance of GNSS in airline operations and the escalating threat posed by RFI;
- endorse the proposed multi-faceted approach set out in section 3.2 of this paper, for mitigating GNSS RFI, encompassing enhanced monitoring, source identification, avionics fortification, operational protocols, and research and development endeavours; and
- urge Member States to prioritize and expedite national and international initiatives to address GNSS RFI.

5. Operational procedures and training:

- contingency planning:** Developing and regularly reviewing robust contingency procedures for GNSS outages, including clearly defined alternative navigation strategies and communication protocols for pilots and ATC.
- pilot training:** Ensuring comprehensive training for flight crews on recognizing, managing, and reporting GNSS RFI events, and on transitioning to alternative navigation methods.
- ATC training:** Providing air traffic controllers with the necessary training and tools to manage air traffic effectively during GNSS degraded events.

6. Research and development: alternative/complementary PNT technologies: Supporting research and encouraging investment in complementary PNT technologies to augment and back up GNSS.

https://www.icao.int/sites/default/files/Meetings/a42/Documents/WP/wp_335_en.pdf

IATA POSITION

Some of Airline Comments

ILS/DME continues to operate	DME network as back-up	Support IATA's views on URATS
NDBs No need / Progressively decommissioned	VOR/DME should only be retained to provide contingency	States prepare contingency plans

No appetite to de-commission nav aids (other than NDBs) in the current and foreseeable operational environment.

Today's in-service NDBs must be prepared for retirement.

- NDBs are not supported and should be removed from airline user charges.
- States and ANSPs are encouraged to consult with airlines to rationalize navigation infrastructure and remove unnecessary NDBs and VORs.
- TACAN is a military NAVAID; it is not supported for civil implementation.



Minimal Operating Networks (MON)

Assume GPS is **not** available. List the ground-based navigation aids you consider unneeded and suitable for de-commissioning. (Include both terminal area and enroute nav aids as appropriate.)

Please list 10 nav aids located in the region where your airline's HQ is located that your airline no longer requires. If you choose to list additional nav aids on a global basis, that is also acceptable.

PLEASE LIST INDIVIDUAL NAV AIDS BY NAME OR OFFICIAL DESIGNATION ON NAV CHARTS

This survey is for research purposes. Responses will be aggregated, and individual airline contributions kept confidential to IATA. The data collected will be used to identify airline MON preferences. Thank you for your participation.

There are 7 questions in this survey.

If, due to a known Microsoft Forms bug all 7 are not visible and responsive to your inputs, please contact ocarrollk@iata.org (Submissions can also be made via email attachment(s) e.g., EXCEL file.)

Thank you!

