



**Agenda Item 6:**

**Other business**

**INTERFERENCE IN THE GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS)**

(Prepared by Secretariat)

**SUMMARY**

This information paper presents the details of the ICAO Communication “E 3/5-24/54”, referring to deliberate interference and signal simulation activities directed against the Global Navigation Satellite System (GNSS), critical for the operational safety of flights.

**References:**

- Communication E 3/5-24/54 from ICAO to States
- Recommendations of the ICAO EUR/MID Symposium on Radionavigation (6 - 8 February 2024)

1. **Background**

1.1 Since 2003, the International Civil Aviation Organization (ICAO) has been actively developing recommendations and guidance regarding radio frequency interference (RFI) in GNSS.

1.2 Among these actions, it is worth recalling ICAO Assembly Resolution A41-8, Appendix C: Resilience of ICAO CNS/ATM Systems and Services, which is the most recent ICAO policy on GNSS resilience and also the Recommendations of the ICAO EUR/MID Symposium on Radionavigation (6 - 8 February 2024 in Antalya - Turkey), generating a list of recommendations relating to the continued efforts of stakeholders to ensure safety, reliability and resilience of air navigation.

2. **Analysis**

2.1 Operational safety, as a fundamental basis for the development of all navigation support systems, in its various aspects together with the availability and reliability of these resources have contributed to the sustainable development of growing and safe aviation. That is why the State administrations together with all the parties involved should become familiar with this situation to make the most pertinent decisions that the case demands.

3. **Suggested actions**

3.1 All those present are requested to:

- a) Take note of the information presented in this IP
- b) Disseminate information to all those involved and interested parties
- c) Keep in mind the recommended measures attached as Appendix A.

## Appendix A

ATTACHMENT to State letter E 3/5-24/54  
**ICAO EUR/MID Radio Navigation Symposium**  
**Antalya, Turkey (6 to 8 February 2024)**

### RECOMMENDATIONS

*Recognizing with concern the impact of global navigation satellite system (GNSS) Radio Frequency Interference (RFI) on aviation safety, capacity, efficiency and security, the Symposium recalled and underlined Resolution A1-8, Appendix C: Ensuring the resilience of ICAO CNS/ATM systems and services and agreed on the need to take necessary actions to ensure continued safe, reliable, and resilient air navigation.*

The Symposium recommended:

- **All Stakeholders** to be aware of the potential safety and capacity impacts of GNSS interference, jamming, and spoofing.
- **Civil Aviation Authorities (CAAs)** to ensure that air navigation service providers (ANSPs) deploy and maintain adequate distance measuring equipment (DME) infrastructure and DME based Performance-Based Navigation (PBN) procedures and enable aircraft operators use of multi-DME and multi-DME/inertial reference system (IRS) complementary solutions as appropriate to maintain PBN operations during GNSS local or regional interference, jamming or spoofing.
- **CAAs** to ensure that air navigation services providers (ANSPs) implement and maintain necessary minimum operational networks (MON), or greater, of navigation aids and radar infrastructures (including very high frequency omnidirectional radio range (VOR), instrument landing system (ILS) Cat I/II/III and DME) to ensure the necessary levels of resilience for navigation when core constellations, satellite-based augmentation system (SBAS) or ground-based augmentation system (GBAS) are unusable.
- **ANSPs** to develop contingency procedures (technical and operational) for GNSS radio frequency interference (RFI) events, to minimize any operational impact and ensure continuous safe operation of air traffic. The contingency procedure may require the provision of reliable surveillance coverage that is resilient to GNSS interference.
- **ANSPs** to implement/maintain a GNSS-independent time source for synchronization of relevant Communications, Navigation and Surveillance/Air Traffic Management (CNS/ATM) infrastructure.
- **CAAs/ANSPs** to facilitate or deploy as appropriate real-time monitoring and detection solutions for GNSS RFI situational awareness for all stakeholders, while recognizing that only the aircraft operator is responsible for determining their ability to navigate.
- **ANSPs** to issue notice to airmen (NOTAMs) on GNSS RFI events in a timely manner; to establish coordination arrangements with neighboring flight information regions (FIRs) on how to best to share their navigation infrastructures in the event of GNSS RFI and any resulting air traffic diversion.
- **CAAs/ANSPs** to improve civil-military coordination to address interference risks associated with GNSS testing and conflict zones, to ensure the uninterrupted and reliable operation of navigation systems in diverse applications.

- **National Military Authorities** to coordinate with National Spectrum Regulators, CAAs and ANSPs, to the extent possible, ahead of any necessary GNSS RFI activity. This will enable ANSPs to mitigate any safety impact on civil aviation.
- **CAAs** to foster collaboration with their National Spectrum Regulators regarding GNSS RFI.
- **National Spectrum Regulators** to locate and determine the source of reported GNSS RFI and attempt to resolve it, as appropriate. The GNSS RFI resolution may require coordination with other authorities at national or regional levels.
- **National Spectrum Regulators** to report frequent unresolved GNSS RFI incidents to the Radiocommunication Bureau of the International Telecommunication Union (ITU), describing GNSS RFI impact as experienced within their national borders, or as reported by their registered aircraft.
- **Aircraft Operators** to develop a procedure requesting crew to notify air traffic control (ATC) whenever GNSS RFI events are experienced and notify respective aircraft and avionic original equipment manufacturers (OEMs) and State of Aircraft design's CAA through normal safety channels when safety effects are encountered.
- **Aircraft Operators** to develop procedures and training based upon information received from aircraft and avionics OEM and State of aircraft design's CAA.
- **Aircraft Operators** to place additional emphasis on flight crews closely monitoring aircraft equipment performance for any discrepancies or anomalies, promptly informing ATC of any apparent GNSS degradation, and being prepared to operate without GNSS navigation systems.
- **Original Equipment Manufacturers (OEMs)** to improve their equipment and provide further guidance and information on the effects and mitigations of GNSS RFI (including interference, jamming and spoofing) from the perspective of aircraft equipment.
- **OEMs** to ensure that aircraft equipment quickly recovers and resumes GNSS navigation once not impacted anymore by a GNSS RFI event.
- **ICAO Navigation Systems Panel (NSP)** to develop recommendations on how to share information on GNSS RFI (NOTAM or other measures).
- **All stakeholders** to collaborate towards developing simple and automated common reporting of GNSS RFI.
- **All stakeholders** to continue to evolve solutions, while leveraging the ICAO NSP as a common focal point.
- **ICAO** to continue raising awareness and supporting States, as required.