International Civil Aviation Organization

The Fifth Meeting of the South Asia, Indian Ocean and Southeast Asia ATM Coordination Group (SAIOSEACG/5)

Bangkok, Thailand, 13 – 16 January 2026

Agenda Item 4: Implementation of CNS-ATM Systems

GNSS RADIO FREQUENCY INTERFERENCE (RFI)

(Presented by International Air Transport Association (IATA))

SUMMARY

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.

1. INTRODUCTION

1.1 Modern commercial aviation relies heavily on GNSS-based services for numerous safety-critical operations. These include precision approach procedures enabled by performance-based navigation that enhance safety and reduce delays. GNSS also enables optimized enroute navigation for fuel efficiency, and improved air traffic management. Global Positioning System (GPS) data is deeply integrated into aircraft systems such as Flight Management Systems (FMS), Automatic Flight Control Systems (AFCS), and data link communication systems. Additionally, surveillance systems like ADS-B Out rely on accurate GPS positioning to enhance situational awareness for ATM. The heavy reliance on GNSS complicates contingency planning and execution when subjected to radio frequency interference (RFI).

1.2 The increasing frequency and geographic spread of GNSS RFI, particularly in regions experiencing geopolitical instability, has introduced a significant threat to the reliability and integrity of satellite-based services. Despite global efforts to monitor and report such events, GNSS interference incidents are no longer isolated or rare. Instead, they represent a persistent and growing risk to aviation safety and efficiency.

1.3 Various ICAO expert groups dedicate significant time and resources to addressing this issue. Over the longer term, the development of standards related to alternative positioning, navigation, and timing (APNT) and spectrum resilience may address some aspects of GNSS RFI. However, commercial aviation seeks urgent resolution of “day of operation” RFI impacts, which can involve re-routes, denied entry to certain airspace, and reversion to minimum operational network (MON) all of which directly affect flight efficiency and safety.

2. DISCUSSION

2.1 The increasing density of radio frequency emitters globally, coupled with the miniaturization and widespread availability of electronic jamming devices, exacerbates the RFI problem. Airlines are observing a rise in GNSS interference events, ranging from temporary signal

degradation to complete loss of functionality, requiring immediate and often disruptive operational responses.

2.2 A loss of positional accuracy undermines the ability to maintain precise flight paths and safe separation between aircraft, increasing the risk of mid-air collisions or controlled flight into terrain (CFIT), particularly in complex or congested airspace. Precision approaches may be degraded, forcing aircraft to rely on less accurate alternatives that may not always be available, leading to go-arounds or diversions. Additionally, disruptions to air traffic management systems and critical onboard systems that depend on GNSS data can result in cascading failures and reduced situational awareness.

2.3 GNSS RFI events increase the complexity of flight operations. Pilots must quickly adapt to degraded navigation capabilities, coordinate with air traffic control, and implement alternative procedures, all while managing heightened workload during critical flight phases. Air traffic controllers, in turn, must handle increased traffic complexity with reduced automation support, often requiring greater separation between aircraft. Airline operations centres must also respond in real time, adjusting flight plans, fuel loads, and crew assignments while ensuring compliance with regulatory requirements when GNSS navigation is compromised.

2.4 Effectively addressing GNSS RFI requires a coordinated, multi-faceted approach involving ICAO member states, regulatory authorities, industry stakeholders, and equipment manufacturers.

2.5 This meeting is invited to endorse the multifaceted approach and support ICAO in accelerating work under its program to achieve those actions.

2.6 Effective ICAO / State Coordination: Military RFI

2.6.1 Military entities are currently the most significant originators of deliberate, debilitating GNSS RFI impacting civil aviation. Despite prior requests from ICAO, some states persist in jamming and spoofing international civil aviation.

2.7 Enhanced Monitoring and Reporting: Non-military RFI

2.7.1 Standardized Incident Reporting: Development and implementation of a robust, standardized global reporting mechanism for GNSS RFI events, including details on location, duration, characteristics, and impact on operations. This data is crucial for trend analysis, source identification, and risk assessment.

2.7.2 A current positive activity is the initiation of the *Procedures for GNSS and Data Link Disruption Ad Hoc Group* to collect data on GNSS and data link disruption in APAC region, and develop the procedures for GNSS and data link disruption that include (but not limited to) the need for reporting process by airspace users to ATS units and sharing of information between stakeholders.

2.7.3 Improved Detection Capabilities: Encouraging and supporting the development and deployment of advanced RFI detection and localization systems, terrestrial, airborne and space based.

2.8 Source Identification and Mitigation:

2.8.1 International Cooperation: Strengthening cross-border cooperation and information sharing between states to identify and mitigate RFI sources, particularly those with a broad geographical impact.

2.8.2 Regulatory Enforcement: Urging member states to rigorously enforce national regulations concerning the sale, possession, and use of GNSS jamming devices, and prosecuting offenders to the full extent of the law.

2.8.3 Public Awareness Campaigns: Educating the public on the dangers and illegality of GNSS jamming devices.

2.9 Aircraft and Avionic Resilience:

2.9.1 Development of Robust Receivers: Encouraging avionics manufacturers to proactively develop and deploy more resilient GNSS receivers with enhanced anti-jamming and anti-spoofing capabilities, including advanced filtering techniques, adaptive nulling, and multi-constellation/multi-frequency reception. The removal of Controlled Radiation Pattern Antennas from some restricted sales lists provides an initial opportunity to have a timely impact on reducing GNSS RFI.

2.9.2 Certification Standards: Updating and harmonizing ICAO PBN and equipment certification standards to account for the evolving RFI threat, ensuring that new aircraft and avionics are adequately resilient.

2.9.3 Enhanced Integrity Monitoring: Promoting the use and further development of airborne and ground-based integrity monitoring systems (e.g., RAIM, ABAS, GBAS) to provide timely alerts of GNSS signal degradation.

2.10 Operational Procedures and Training:

2.10.1 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.

2.10.2 Pilot Training: Ensuring comprehensive training for flight crews on recognizing, managing, and reporting GNSS RFI events, and on transitioning to alternative navigation methods.

2.10.3 ATC Training: Providing air traffic controllers with the necessary training and tools to manage air traffic effectively during GNSS degraded events.

2.11 Research and Development: Alternative / Complementary PNT Technologies: Supporting research and encouraging investment in complementary PNT technologies to augment and back up GNSS.

2.12 Address cybersecurity aspects of GNSS: developing cyber hardening strategy, including encryption and authentication of timing and navigation data, to protect against malicious attacks, including spoofing.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) Acknowledge the paramount significance of GNSS in airline operations and the escalating threat posed by RFI.

b) 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

c) Urge member states to prioritize and expedite national and international initiatives to address GNSS RFI.

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