International Civil Aviation Organization

MIDANPIRG Communication, Navigation and Surveillance Sub-Group

Fourteenth Meeting (CNS SG/14)
(Abu Dhabi, UAE, 19 – 23 October 2025)

Agenda Item 3: CNS Planning and Implementation Framework in the MID Region

MITIGATING GNSS AND ADS-B VULNERABILITIES THROUGH REGIONAL RADAR SHARING AND SURVEILLANCE DATA GOVERNANCE

(Presented by UAE)

Summary

This paper highlights the increasing reliance on Automatic Dependent Surveillance – Broadcast (ADS-B) as a primary surveillance source and the associated cybersecurity vulnerabilities identified globally.
It encourages and advocates for radar data sharing among MID States as an effective means to enhance the resilience, redundancy, and data integrity of regional surveillance systems. By leveraging multi-sensor fusion (radar, ADS-B, WAM) and implementing secure radar data exchange frameworks, the region can mitigate risks of spoofing, jamming, or unauthorized ADS-B data manipulation.

The paper recommends formalizing a MID-region Radar Sharing Agreement under a secure Service-Oriented Architecture (SOA) framework aligned with ICAO's Global Air Navigation Plan (GANP)

Action by the meeting is at paragraph 4.

REFERENCES

- ICAO Global Air Navigation Plan (GANP), 8th Edition (Doc 9750)
- ICAO Assembly 42nd Session – Working Paper A42-WP/479 (ADS-B Cybersecurity)
- ICAO Assembly 42nd Session – A42-WP/108 and A42-WP/204 (C-PNT and CNS Resilience)
- EUROCONTROL "Guidelines for the Shared Use of Radar Sensor Data (SUR.ET1.ST05.3000-GUI-01-00)"
- ICAO MID Region Air Navigation Plan (MID ANP, Vol. I, Part IV – CNS)

1. INTRODUCTION

1.1 The Middle East continues to witness rapid growth in air traffic, leading to increased reliance on digital surveillance technologies such as ADS-B and WAM.

1.2 While these technologies provide operational and cost benefits, they also introduce cyber vulnerabilities that can affect surveillance data authenticity, integrity, and availability.

1.3 Recent ICAO deliberations (A42-WP/479) recognized spoofing and unauthorized broadcast injection as critical risks to ADS-B and urged Member States to adopt multi-sensor and redundant surveillance architectures.

1.4 Conventional Radar systems, unaffected by GNSS interference or spoofed positional data, remain a trusted, independent surveillance layer. Sharing radar data across FIR boundaries not only enhances coverage but also creates redundant validation channels to verify states surveillance infrastructure information in real time.

2. DISCUSSION

2.1 The reliance on ADS-B as a primary surveillance source continues to grow across the MID Region, providing extended coverage and operational efficiency, particularly in remote or oceanic areas. However, as noted during the CNS/13 meeting and reflected in MIDANPIRG/22-WP/49, ADS-B also introduces new vulnerabilities due to its dependence on GNSS and the unencrypted nature of its data transmissions. Spoofing, jamming, and data manipulation events have the potential to compromise situational awareness and aircraft tracking integrity. Excessive dependence on ADS-B without cross-verification from independent sensors exposes the system to false target injections, ghost tracks, or the loss of track continuity during GNSS disruption. The ICAO 42nd Assembly and subsequent MIDANPIRG conclusions have therefore emphasized the importance of multi-sensor surveillance integration and robust cybersecurity governance to ensure operational resilience.

2.2 In this regard, radar data sharing among MID States provides a practical and technically proven means of enhancing surveillance integrity and continuity. Correlating radar with ADS-B data allows for real-time verification of track validity and early identification of anomalies. Shared radar coverage ensures that even in the event of an ADS-B or GNSS outage, aircraft remain visible to adjacent States, thereby sustaining regional safety and efficiency. As reflected in Appendix C of MIDANPIRG/22-WP/49, the ICAO MID Office has already developed the Proposed MID Region Guidelines on the Agreement about the Shared Use of Radar Sensor Data, adapted from EUROCONTROL's template. These guidelines establish a harmonized foundation for bilateral or multilateral radar-sharing arrangements, taking into account the operational, legal, and cybersecurity requirements specific to the Middle East.

2.3 The regional framework outlined in MIDANPIRG/22-WP/49 emphasizes that such cooperation should be governed by formal agreements defining ownership, usage restrictions, and data protection measures. In line with these provisions, the UAE proposes that future radar-sharing implementations be embedded within secure Service Level Agreements (SLAs) based on service-oriented architecture (SOA) principles, allowing modular, scalable, and encrypted data exchange. Participating States should ensure that data transmission channels are protected by encryption, mutual authentication, and strict access controls, consistent with ICAO's CNS Resilience Framework and national cybersecurity standards.

2.4 By leveraging the guidelines presented in MIDANPIRG/22-WP/49, the MID Region can advance toward a unified Surveillance Data Governance Framework that enables interoperability, defines roles and responsibilities, and ensures compliance with both operational and cybersecurity requirements. Establishing redundant regional validation nodes hosted by participating States would further enhance continuity by providing multi-sensor fusion and integrity verification, thereby strengthening confidence in the surveillance picture shared across the region. This coordinated approach aligns with the objectives of Performance Improvement Area 2 (PIA2) of the Global Air Navigation Plan (GANP) and directly supports the region's efforts to achieve seamless, safe, and cyber-resilient air traffic management operations.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper highlighting ADS-B and GNSS vulnerabilities and the role of radar data sharing in enhancing surveillance resilience;

b) endorse the concept of developing a MID Region Radar Sharing Agreement based on the framework presented in MIDANPIRG/22-WP/49 Appendix C, aligned with EUROCONTROL's guidelines;

c) encourage MID States to engage in bilateral or multilateral discussions to establish secure radar data exchange channels, using Service-Oriented Architecture (SOA) principles and ensuring encryption, authentication, and access control;

d) support ICAO MID Office in developing a Regional Surveillance Data Governance Framework defining ownership, use limitations, and data protection responsibilities; and

e) recommend the inclusion of radar data sharing and multi-sensor integration initiatives under the MID CNS Implementation Plan to strengthen surveillance and cybersecurity resilience across the region.

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