



*International Civil Aviation Organization*

*MIDANPIRG/23 & RASG-MID/13 Meetings*

*(Cairo, Egypt, 14 – 18 June 2026)*

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**Agenda Item 5.7: CNS**

**DEPLOYMENT OF THE ADS-B GROUND STATION NETWORK AND INTRODUCTION  
OF ADS-B VERSION 3**

*(Presented by Saudi Arabia)*

**SUMMARY**

This paper provides information on the deployment of an Automatic Dependent Surveillance — Broadcast (ADS-B) ground station network as a second layer of ATS surveillance serving Jeddah FIR, including the main lessons learned during implementation. It also summarizes the principal capabilities that will be introduced by ADS-B Version 3, which provides additional features beyond those supported by earlier versions, such as aircraft tracking support, broadcasting of aircraft-based weather data, indication of lost C2 Link state for Remotely Piloted Aircraft Systems (RPAS), and features to support commercial space and hypersonic aircraft operations. The new capabilities are adopted as Amendment 92 to Annex 10, Volume IV, and will become applicable on 26 November 2026. The paper also proposes to instruct CNS SG to update ICAO MID Region Surveillance Plan (Doc 013) and reflect the status of ATS surveillance deployment and evolution covered under ICAO GANP Edition 8.

Action by the meeting is at paragraph 5.

**REFERENCE**

- Annex 10 — Aeronautical Telecommunications, Volume IV
- Doc 9924, Aeronautical Surveillance Manual
- Doc 9871, Technical Provisions for Mode S Services and Extended Squitter
- Doc 9750, Global Air Navigation Plan (GANP), Eighth Edition
- CNS SG/15-IP/05, Implementation of Automatic Dependent Surveillance — Broadcast (ADS-B)
- ICAO State Letter Ref.: AN 7/66.2.1-26/17 dated 13 April 2026

**1. INTRODUCTION**

1.1. Automatic Dependent Surveillance — Broadcast (ADS-B) is a surveillance technology in which an aircraft broadcasts data items including the aircraft position, altitude, velocity, and identification ....etc, typically once per second, on the 1 090 MHz extended squitter data link. Ground stations receive these broadcasts (ADS-B Out), providing an efficient means of ATS surveillance that complements conventional surveillance such as radars.

1.2. This paper presents information on the deployment of an ADS-B ground station network as a second layer of ATS surveillance, together with the lessons learned during implementation, and provides an overview of the capabilities introduced by ADS-B Version 3, which provides additional features beyond those supported by earlier versions, such as aircraft tracking support, broadcasting of aircraft-based weather data, indication of lost C2 Link state for Remotely Piloted Aircraft Systems (RPAS), and features to support commercial space and hypersonic aircraft operations. The new capabilities are adopted as Amendment 92 to Annex 10, Volume IV, and will become applicable on 26 November 2026.

## **2. DEPLOYMENT OF THE ADS-B GROUND STATION NETWORK**

### **2.1. Objectives and architecture**

2.1.1. The deployment of an ADS-B ground station (GS) network is intended to provide en-route redundancy of ATS surveillance coverage where radar surveillance is already available, to enhance the situational awareness of air traffic controllers, and to serve as a gap-filler for surveillance coverage. ADS-B transmissions on the 1 090 MHz extended squitter data link support the provision of ATS surveillance services to equipped aircraft within Jeddah Flight Information Region (FIR).

2.1.2. The ADS-B GS network has been designed to cover the entire Jeddah FIR through the installation of fourteen (16) ADS-B ground stations, plus eight stations co-located with Wide Area Multilateration (WAM) systems to enhance surveillance performance, availability, and reliability. One Local ADS-B station supports the provision of ATS at a remote (digital tower) aerodrome by complementing video surveillance. The dual-surveillance design adds a redundant layer that is particularly valuable in remote areas or areas with a single coverage.

2.1.3. The deployment was accompanied by the successful migration to the Aeronautical Telecommunication Network (ATN) infrastructure and integration with the legacy ATM system. Before introducing the ADS-B service, an Aeronautical Information Publication Supplement is issued to notify airspace users of the enhanced surveillance capabilities, requirements, and operational procedures.

### **2.2. Lessons learned**

2.2.1. The principal lessons learned during the integration of ADS-B ground stations with the legacy ATM system are:

- a) the need to establish continuous GNSS performance monitoring within the intended ADS-B coverage area, to ensure the availability, accuracy, and integrity of Positioning, Navigation, and Timing (PNT).
- b) identification of the future need to upgrade the ATM system to utilize the new generation of ADS-B out Version 3.
- c) the need to conduct periodic validation of ADS-B target data through regular comparison with an independent surveillance source, such as radar or WAM, to confirm system accuracy, availability, and reliability.

## **3. INTRODUCTION OF ADS-B VERSION 3**

### **3.1. General Overview**

3.1.1. The ground stations deployed support ADS-B Version 3, which provides additional capabilities beyond those of earlier versions, including aircraft tracking support, the broadcasting of

aircraft-based weather data, indication of the lost command-and-control (C2) link state for Remotely Piloted Aircraft Systems (RPAS), and features supporting commercial space and hypersonic operations. Version 3 also includes several optional avionics functions. ADS-B version 3 is approved as Amendment 92 to Annex 10, Volume IV, and will become applicable on 26 November 2026. These amendments accommodate emerging technologies and enhance airspace efficiency and safety through improved traffic awareness, while allowing flexibility for manufacturers, operators, and service providers through largely optional equipment and phased implementation for new equipment.

### 3.2. *Key Version 3 capabilities*

3.2.1. The primary advancements in ADS-B Version 3 focus on expanded operational support and more granular technical reporting:

- a) **RPAS support:** Version 3 introduces specific indications for lost C2 link states, including the reservation and immediate recognition of Mode A code 7400 to identify an RPAS that can no longer be actively managed by a remote pilot due to link degradation;
- b) **weather and aircraft parameters:** ADS-B supports, for the first time, the broadcasting of aircraft-based weather data to facilitate air-to-air and air-to-ground weather applications, including new message formats for ADS-B air reports and pilot reports;
- c) **commercial space and hypersonic operations:** Version 3 provides new position and velocity reporting formats to accommodate the extreme altitudes and velocities associated with commercial space and hypersonic aircraft, which were not supported by earlier versions;
- d) **enhanced surveillance monitoring:** Version 3 supports the broadcast of transponder activity, including detected interrogation rates, transmitted reply rates, and Mode S reply-rate-limiting status, allowing ground systems to better manage the radio frequency environment; and
- e) **technical precision improvements:** the update includes improved reporting of geometric altitude, reporting of transponder antenna offset, ACAS coordination capability reporting, and improved emitter category classifications for better target identification.

### 3.3. *Advanced technical features*

3.3.1. ADS-B Version 3 also introduces technical frameworks designed for future-proofing and high-density environments:

- a) **phase overlay:** an optional "supporting" capability that uses 8-phase-shift-keying modulation to transmit three bits of data within a single pulse-position-modulation bit interval, increasing data transmission capacity for the 1 090 MHz extended squitter without increasing radio frequency pollution;
- b) **interference tolerance:** receivers must meet performance requirements under specified interference power levels, to ensure robustness in congested radio frequency environments; and
- c) **improved dead time:** for transponders with this feature, the interval in which the receiver regains sensitivity after a reply is reduced from 125 microseconds to no more than 20 microseconds.

### 3.4. *Safety and efficiency impact*

3.4.1. The implementation of ADS-B Version 3 is expected to have a positive impact on safety by providing improved traffic awareness and enabling the safe integration of emerging technologies, such

as RPAS and space vehicles, into civil airspace. From an efficiency perspective, the more precise altitude and velocity information supports more optimal route selection and more precise aircraft spacing.

#### 4. ICAO MID Region Surveillance Plan

4.1. The ICAO MID Region Surveillance Plan (Doc 013) reviews the available surveillance technologies and highlights their strengths and weaknesses. The plan timelines are divided into three stages: short-term until 2020, mid-term from 2021 to 2025, and long-term beyond 2025. It refers to the Global Air Navigation Plan (GANP) through B0-ASUR, defined the possibility of using lower-cost ground surveillance supported by new technologies such as ADS-B OUT and Wide Area Multilateration (MLAT) systems. However, the plan needs updates to capture the progress made in implementing ATS surveillance in the MID Region, and to align its contents with the evolution of the ASBU framework and updates of the ICAO GANP Edition 8.

4.2. Therefore, the following conclusion is proposed to update the ICAO MID Region Surveillance Plan (Doc 013) and reflect the status of ATS surveillance deployment in the MID region and the evolution of ASUR thread and elements covered under ICAO GANP Edition 8.

***MIDANPIRG DRAFT CONCLUSION 23/XX: UPDATES OF ICAO MID REGION SURVEILLANCE PLAN (DOC 013)***

*That:*

- a) *MID States are invited to share information on their deployment of ATS Surveillance including ADS-B, Multilateration, and the related lessons learned;*
- b) *CNS SG takes the required measures to:*
  - 1) *update the ICAO MID Region Surveillance Plan (Doc 013) and reflect the status of ATS surveillance deployment in the MID region and the evolution of ASUR thread and elements covered under ICAO GANP Edition 8.*
  - 2) *develop guidance material for upgrading ATM systems to process ADS-B data items Version 3 and extract information supporting the ATS surveillance.*
- c) *MID States are encouraged to contribute to updating the ICAO MID Region Surveillance Plan (Doc 013) by providing the information on the ATS Surveillance deployed or planned.*

#### 5. ACTION BY THE MEETING

5.1 The meeting is invited to:

- a) note the information contained in this paper on the deployment of the ADS-B ground station network serving Jeddah FIR; and
- b) discuss and adopt the draft conclusion provided under paragraph 4.2 of this paper.