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ASSEMBLY — 41ST SESSION

TECHNICAL COMMISSION

Agenda Item 33: Other issues to be considered by the Technical Commission

IMPLEMENTATION OF AUTOMATIC DEPENDENT SURVEILLANCE - BROADCAST (ADS-B)

(Presented by Saudi Arabia)

EXECUTIVE SUMMARY	
This paper provides information on automatic dependent surveillance-broadcast (ADS-B) Out equipage mandate in the kingdom of Saudi Arabia with an overview on the planning for the implementation of ADS-B ground surveillance system that will be used to enhance and expand Air Traffic services surveillance within Jeddah FIR.	
Strategic Objectives:	This paper relates to the Safety and Air Navigation Capacity and Efficiency Strategic Objectives.
Financial implications:	Without any financial implications.
References:	Annex 11 — *Air Traffic Services* Annex 10 — *Aeronautical Telecommunications*, Volume IV — *Surveillance and Collision Avoidance Systems* Doc 4444, *Procedures for Air Navigation Services — Air Traffic Management* Doc 9750, *Global Air Navigation Plan* ICAO MID eANP Vol III, Part II, Table ASUR 3-1.

1. INTRODUCTION

1.1 The Automatic Dependent Surveillance-Broadcast (ADS-B) is an advanced surveillance technology that combines an aircraft's positioning source, aircraft avionics, and a ground infrastructure to create an accurate surveillance interface between aircraft and air traffic control (ATC). The use of ADS-B Out will gradually move ATC from a radar-based system to an aircraft location system based on satellite-derived position and speed. Aircraft equipped with ADS-B Out equipment are able to continually broadcast information, such as identification, current position, altitude, and speed, through an onboard transmitter, which can be received by ADS-B ground stations and by other aircraft appropriately equipped.

1.2 The ADS-B on 1090MHz Extended Squitter data link has been identified as an essential radar-like component in enhancing global safety in air traffic services (ATS) and achieving efficiency objectives that bring tangible operational benefits to aviation stakeholders. The ADS-B avionics is recognized as an enabler of the global ATM concept bringing cost-effective substantial safety & capacity benefits.

1.3 At global level, the requirements on ADS-B surveillance accuracy and integrity are defined under Annex 10 — *Aeronautical Telecommunications*, Volume IV — *Surveillance and Collision Avoidance Systems*, Chapters 3 and 4. Moreover, ADS-B has been identified, under the ICAO Global Air Navigation Plan (GANP), as ICAO ABSU ASUR B0-1 element that supports the provision of ATS operational applications at reduced cost and increased surveillance coverage.

1.4 At regional level, the seventeenth meeting of Middle East Air Navigation Planning and Implementation Regional Group (MIDANPIRG/17) agreed to monitor the surveillance capabilities in the MID Region through adding Surveillance Monitoring Matrix to the MID ANP Volume III, Part II and to add ADS-B Mandate column to the matrix (effective date and reference regulation - MID ANP Vol III, Part II, Table ASUR 3-1, Surveillance Implementation Monitoring Table refers). In addition, the MID Region Surveillance Plan (MID Doc 013) encourages MID States to consider emerging dependent Surveillance technologies (ADS-B and MLAT) in their National Surveillance Plans and to use incentive strategy with aircraft operators and airspace users to accelerate ADS-B equipage. The incentive approach might be financial or operational incentive or combined (e.g, Most Capable Best Served principle, waive fees...etc.).

2. ADSB-OUT MANDATE IN SAUDI ARABIA

2.1 The ADS-B Out implementation in the Kingdom of Saudi Arabia is aiming at providing en-route redundancy where radar surveillance is already available. it will be used to support the provision of ATS surveillance services to eligible aircraft within specific areas/portions of Saudi Arabian airspace.

2.2 Currently, the ADS-B Out is used to enhance the situational awareness of air traffic controllers within the Jeddah flight information region (FIR) (South-East ATC sector) single/non-redundant radar areas (Empty Quarter) and will be used as gap-filer for the surveillance coverage within Jeddah FIR.

2.3 In March 2016, the General Authority of Civil Aviation (GACA) in the Kingdom of Saudi Arabia issued GACA Regulation (GACAR) Part 91 – General Operating and flight rules prescribing equipage requirements and performance standards for ADS-B Out equipment on aircraft

operating in Class A and B airspace after 1st January 2020. GACAR Part 91 has defined the minimum broadcast Message Element (ME) and the performance requirements for ADS-B.

2.4 However, based on an assessment of the level of readiness of ADS-B ground infrastructure and ADS-B out aircraft equipage, it was decided to postpone the mandate for the carriage of ADS-B out equipment until 1st January 2023 to allow the aircraft owners, operators and the air navigation services provider in the Kingdom of Saudi Arabia (Saudi Air Navigation Services provider (SANS)) to have additional time and be ready for ADS-B operation by the applicability date.

2.5 As consequence, GACAR Part 91 ADS-B Out equipage requirements were amended to set the new effective date of ADS-B Out equipage mandate in Saudi Arabia airspace to 1st January 2023 and expand the applicability mandate to airspace Classes C, D and E. Therefore, all aircraft intending to operate in Classes A, B, C, D, or E airspace must be equipped with a serviceable 1090 MHz ES ADS-B Out equipment by 1st January 2023. The amendment of GACAR Part 91 can be reached through the following link: https://gaca.gov.sa/web/en-gb/page/new-regulations.

2.6 As the percentage of ADS-B equipped aircraft is critical for the decision-making process for ADS-B deployment and its use for the provision of ATS surveillance within Jeddah FIR and considering the impact of COVID-19 on the implementation of programs and plans related to updating and installation of new facilities by airspace users and air navigation service provider (SANS), the mandate will be reassessed and may be revised during Q4-2022 based on the level of ADS-B equipage of registered fleet at national and regional levels and the progress made by (SANS) in the deployment of ADS-B ground infrastructure.

3. ADS-B AVIONICS EQUIPAGE CERTIFICATION AND OPERATIONAL APPROVAL

3.1 The amendments of GACAR Part 91 § 91.135 (d), § 91.239 (b) and § 91.477 prescribe the ADS-B Out equipage and use requirements. These requirements state that Saudi Arabian registered Aircraft and foreign Civil Aircraft must be equipped with a serviceable 1090 MHz ES ADS-B equipment that has been certified in accordance with EASA CS-ACNS.D.ADSB, or FAA AC 20-165A – Airworthiness Approval of ADS-B. The amendment of GACAR Part 91 § 91.303 identifies airspace classes A, B. C, D and E where ADS-B Out equipage is mandatory for civil flights.

3.2 The Appendix C Section VII. to GACAR Part 91 prescribes the ADS-B Out equipment performance and installation requirements with the list of data items that must be broadcasted by ADS-B Out equipment. The data items include aircraft's identification, position, velocity, and other information.

3.3 The ADS-B capabilities should be filled in item 10 as part of the description of aircraft equipment and capabilities related to communication, navigation and surveillance in accordance with the *Procedures for Air Navigation Services — Air Traffic Management* (Doc 4444, PANS-ATM), Appendix 2.

4. OVERVIEW OF ADS-B OUT IMPLEMENTATION WITHIN JEDDAH FIR

4.1 Under the implementation of ADS-B as mandated in GACAR Part 91, the air navigation services provider in the Kingdom of Saudi Arabia (Saudi Air Navigation Services (SANS)) adopted an implementation plan to install and use ADS-B Ground surveillance system during the last quarter of 2020. This plan was impacted by restrictions imposed by COVID-19 pandemic and was reviewed with re-activation of deployment activities during the second quarter of 2022.

4.2 The ADS-B Ground surveillance system to be deployed in Saudi Arabia will mainly include:

a) fifteen ADS-B Ground stations distributed to provide en-route redundancy where Radar surveillance is already available, to complement the radar network coverage and to expand air traffic control (ATC) surveillance services within Jeddah FIR. The primary function of the ADS-B Ground Station is to receive 1090 MHz RF input on the Air Interface, extract data from the 1090 MHz ES messages, assemble the data as ADS-B Reports and send these reports over the Ground Interface through secure IP-based network; and

b) surveillance data Processing and distribution (SDPD) which is multi-sensor tracking system. This system processes surveillance reports originating from different surveillance sources (radar and ADS-B Ground Stations) and fuses the associated reports into a unique system track. The system tracks are assembled into messages and these messages are sent over the Ground Interface to be displayed and presented on the situation data display (SDD) at ATC positions.

4.3 The air navigation services provider in the Kingdom of Saudi Arabia (SANS) started already collection and analysis of flight plan (FPLs) data to identify the level of ADS-B equipage for the fleet operating from/to Jeddah FIR and transiting through it.

5. CONCLUSION

5.1 The ADS-B Out can provide air traffic controllers with real-time position/velocity information in all airspace that is more accurate than the information provided by radar systems (range dependent). With more accurate information, ATC will be able to separate safely aircraft with improved accuracy and timing leading to an increase of efficiency, and capacity that allows accommodation of traffic growth. Therefore, ADS-B Out equipage requirements and performance standards for fleet operating can support the improvements in air traffic management.

5.2 The implementation of ADS-B out at national and regional should consider the level of ADS-B equipped fleet considered as the most critical information for the decision-making in mandating ADS-B and its use for the provision of ATS surveillance.

5.3 The Assembly is invited to take note of the information provided in this paper and encourage States and Regions to exchange information on the implementation of ADS-B and lessons learned in the provision of ATS surveillance service.

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