



**Fourth GREPECAS–RASG-PA Joint Meeting and
Twenty-second Meeting of the CAR/SAM Regional Planning and Implementation Group
(GREPECAS/22)**

Virtual Phase (Asynchronous, 16 September to 11 October 2024)
In-Person Phase (Lima, Peru, 20 to 22 November 2024)

**Agenda Item 5: CAR/SAM Air Navigation Services (ANS) Implementation
5.2 Communications, Navigation, Surveillance and Spectrum (CNSS)**

ADS-B IMPLEMENTATION IN THE CAR REGION

(Presented by the Secretariat)

EXECUTIVE SUMMARY

This information paper presents a summary of the activities developed by the CAR region to support the implementation of ADS-B in the region and its integration into the development of regional operational objectives.

<i>Strategic Objectives:</i>	<ul style="list-style-type: none"> • Safety • Air Navigation Capacity and Efficiency • Economic Development of Air Transport • Environmental Protection
<i>References:</i>	<ul style="list-style-type: none"> • Twenty-first Meeting of the Caribbean and South American Regions Planning and Implementation Group (GREPECAS/21) https://www.icao.int/NACC/Documents/Meetings/2023/GREPECAS21/00-GREPECAS21-InformeFinal.pdf

1. Introduction

1.1 The CAR region has been continuously working on the national and regional implementation of ADS-B to benefit situational awareness by obtaining surveillance data where current surveillance systems did not provide such data, providing dual coverage data to support the implementation of automated protocols and to benefit the region with surveillance data sharing agreements between States.

1.2 ADS-B is element 1 of block 0 of the ASUR module of the global air navigation plan and an important element of the GANP technological thread. The benefit of the element with its implementation alone is to promote operational safety through improved situational awareness.

1.3 In addition, ADS-B is a key enabler that directly supports the implementation of operational ASBU elements, since without ADS-B, many of the operational elements could not be functional, so at the operational level, ADS-B data supports all operational functions of the different phases of flight.

1.4 ADS-B requires a series of enablers to be put into operation prior to its implementation, these enablers are:

1. Ground infrastructure
2. Aircraft avionics capacity
3. Personnel training
4. National regulation/legislation of the use of ADS-B

1.5 The **Appendix** to this information paper presents the ADS-B implementation sheet.

1.6 The CAR region has States such as Barbados, Mexico, Trinidad and Tobago, the Central American States and COCESNA, which have already completed the implementation of almost all ADS-B enablers and only need national regulation to support them in making this service operational.

1.7 There are other States in CAR such as Cuba and Haiti, which are in the process of implementing the enablers, but their ground infrastructure is already available.

1.8 This service is also supporting the implementation of automated protocols in the region (AIDC and NAM/ICD) because agreements are being generated to share these surveillance data generated by ADS-B with the agreements that already existed to share radar data. This expansion in the agreements to share surveillance data between the CAR States means that different FIRs have double, triple coverage of surveillance data, bringing other benefits, not only operational, but also technical.

2. Discussion

2.1 Following up on the requests made at the GREPECAS/21 meeting, where States and Organizations were asked to develop an action plan for the implementation of ADS-B:

CONCLUSION GREPECAS/21/21		DEVELOPMENT OF AN ACTION PLAN FOR THE ADS-B IMPLEMENTATION	
What: That States/Territories, led by ICAO, a) review the existing Operational Concept for the ADS-B Implementation in the CAR and SAM Regions, including its operational objectives, b) support the development of model regulations for ADS-B; c) integrate all different stakeholders in the process; and d) develop an action plan incorporating activities, accountability, and milestone dates by 30 June 2024.		Expected impact: <input type="checkbox"/> Political / Global <input checked="" type="checkbox"/> Inter-regional <input checked="" type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Operational/Technical	
Why: ADS-B is an enabler to several of the operational improvements foreseen in the GANP ASBUs, current many States have implemented ADS-B infrastructure as a surveillance mean. To obtain the benefits of ADS-B implementation regional agreements and priorities for the CAR and SAM States			
When:	30 June 2024	Status:	<input checked="" type="checkbox"/> Valid / <input type="checkbox"/> Superseded / <input type="checkbox"/> Completed
Who:	<input checked="" type="checkbox"/> States <input checked="" type="checkbox"/> OACI <input checked="" type="checkbox"/> Others: IATA		

2.2 When analysing the status of ADS-B implementation in the CAR/SAM region and taking into account the implementation dates issued by the States as part of the regional analysis, it was concluded that the CAR and SAM regions cannot work together at this time since the level of ADS-B implementation at the moment is different in each region, but it was indicated that as the implementation is carried out in the different States, the benefits of ADS-B can be integrated in both regions.

2.3 In this regard, the CAR region took as a pilot test to begin the CAR regional implementation process the Central American States, its upper airspace provider COCESNA and Mexico, because the level of implementation of all these States is at 80%, they only need to issue the mandatory date for the implementation of ADS-B, since all the enablers are implemented.

2.4 Mexico issued the Official Mexican Standard NOM-91/2-SCT3-2022, which establishes the specifications for the installation of Automatic dependent surveillance - broadcast (ADS-B) equipment in aircraft and is in force as of 28 August 2024.

2.5 Central America and COCESNA have planned a mandatory implementation of ADS-B in their upper airspace by 1 January 2025, and some Central American States have already issued their regulations for upper airspace.

2.6 All these States have been carrying out measurements of the avionics capacity of commercial aircraft, with all States indicating that the capacity on board commercial aircraft flying in the airspace of the CAR region is above 99%. These statistics have been confirmed by States such as Cuba and the Dominican Republic. Other types of users have been identified and alternative procedures will be implemented so that they can continue flying while they do not yet have the capacity on board.

2.7 The implementation of ADS-B in the Central American and Mexican region has been coordinated with IATA and users are being familiarized with this implementation.

2.8 As part of these meetings between the States and IATA, it was recommended:

- That airlines and States work in a coordinated manner on the implementation of ADS-B in Mexico by November and January 2025 in Central America for operations in upper airspace.
- That States and airlines (users) carry out, with the support of the NACC/WG operational technical groups, a continuous evaluation of the implementation so that as its operation matures, operational improvements are planned through the ASBU elements of the operational thread, where ADS-B is an important enabler.
- That the NACC/WG/SURV/TF Group support States in the implementation process of States that establish ADS-B implementation projects, considering the lessons learned from Central America and Mexico.
- The Secretariat prepare for GREPECAS/22 a progress update as required by GREPECAS Conclusion 21/21

2.9 The results of the mandatory implementation of ADS-B for Central America and Mexico will be evaluated, and support will be provided to the following CAR States in a timely manner in the process.

2.10 Initially, the benefit of implementing ADS-B is operational safety, since it will cover areas in the Caribbean where current radars do not provide coverage, since initially ADS-B will be a backup, with the objective that once all aircraft are equipped, the implementation of separation reduction analysis will begin (initially 10 NM) and that greater benefits will be given to airlines that comply with the equipment. There are examples, such as how it is being done in the South Pacific area, where COCESNA has already implemented satellite ADS-B and airlines are already obtaining operational benefits.

2.11 Finally, the ICAO Office congratulates Central America, Mexico, COCESNA and IATA for the work carried out and the agreements obtained. As well as the FAA for supporting the work carried out by these States and Organizations, we know that this implementation will be of enormous benefit to the region.

APPENDIX A/APÉNDICE A



North American, Central American and Caribbean Office (NACC)
Oficina para Norteamérica, Centroamérica y Caribe (NACC)

ADS-B IMPLEMENTATION ACTION PLAN
PROJECT PLAN DEVELOPMENT

ADS-B IMPLEMENTATION		
Why? the main purpose is that it provides a summary of the essence of the element for the operational elements, and information of the direct relationship of the performance.	What? description of what stakeholders can do with this element that could not be done before. This section is not intended to describe performance enhancement or benefits	How? additional information to improve the understanding of the element.
<ul style="list-style-type: none"> - Define Objective 	<ul style="list-style-type: none"> - Define stakeholders - Integrate all stakeholders in the project - Define action plan - Define benefits 	<ul style="list-style-type: none"> - Case study - Technical evaluation - Risk analysis - Cost benefit analysis - Business and safety case - Schedule - Implementation Strategy - Others
Relationship of the performance (Key performance indicators)		
“What cannot be measured cannot be improved”		
<p>KPI01 Departure punctuality</p> <p>KPI02 Taxi-out additional time</p> <p>KPI03 ATFM slot adherence</p> <p>KPI04 Filed flight plan en-route extension.</p> <p>KPI05 Actual en-route extension</p> <p>KPI06 En-route airspace capacity</p> <p>KPI07 En-route ATFM delay</p> <p>KPI08 Additional time in terminal airspace</p>	<p>KPI09 Airport peak capacity</p> <p>KPI10 Airport peak throughput</p> <p>KPI11 Airport throughput efficiency</p> <p>KPI12 Airport/Terminal ATFM delay</p> <p>KPI13 Taxi-in additional time</p> <p>KPI14 Arrival punctuality</p> <p>KPI15 Flight time variability</p> <p>KPI16 Additional fuel burn</p>	<p>KPI17 Level-off during climb</p> <p>KPI18 Level capping during cruise</p> <p>KPI19 Level-off during descent</p> <p>KPI20 Number of aircraft accidents</p> <p>KPI21 Number of runway incursions</p> <p>KPI22 Number of runway excursions</p> <p>KPI23 Number of airprox/TCAS alert/loss of separation/near midair collisions/midair collisions (MAC)</p>
https://www4.icao.int/ganpportal/ASBU/KPI		

ADS-B ENABLES

1. Infrastructure

Ground system infrastructure: The type of infrastructure to be implemented can depend on different factors (e.g., Terrain, operational requirements, coverage requirements, avionics compatibility, etc.)

Element	Technical Needs	Standards and technical information to incorporate in the analysis
ADS-B ground stations receive information from aircraft and transmit it to one or more service	<ul style="list-style-type: none"> - Technical requirements - Evaluation terrain - Communication needs (main and back-up needs) - Energy needs - Security - Maintenance logistics - Others according to implementation 	<ul style="list-style-type: none"> - ICAO Annex 10 Volume IV Chapters 2,3 and 5 - ICAO Doc 9871 Technical Provisions for Mode S Services and Extended Squitter - RTCA/EUROCAE MOPS: DO-260/ED-102, DO-260A, or DO-260B/ED-102A EUROCAE ED-129, ED-129A or ED-129B - ICAO Doc 9924 Aeronautical Surveillance Manual
Service Delivery Point(s) for ADS-B information	<ul style="list-style-type: none"> - Technical requirements - ATC integration protocols - Surveillance system purpose and scope - Definition of parameters contributing to quality of services - Components of an aeronautical surveillance system - Definition of parameters contributing to quality of services. - Monitoring system. - Surveillance data evaluation - ATC alarms 	<ul style="list-style-type: none"> - ICAO Doc 9924 Aeronautical Surveillance Manual. - ICAO Doc 4444 PANS ATM
Human Machine Interface (HMI) of the Air Traffic Controller Working Position (ATCo CWP)	<ul style="list-style-type: none"> - Integrate technical language. - Integrate in the HMI operational requirements. - Integrate HMI for technical needs. 	<ul style="list-style-type: none"> - ICAO Doc 9924 Aeronautical Surveillance Manual. - ICAO Doc 4444 PANS ATM
2. Aircraft Avionics		
SSR Mode S transponder with extended squitter version 0, version 1 and version 2.	Three versions of ADS-B: <ul style="list-style-type: none"> - Version 0 = DO-260/ED-102 - Version 1 = DO-260A - Version 2 = DO-260B/ED-102A 	<ul style="list-style-type: none"> - ICAO Annex 10 Volume IV Chapter 2,3 and 5 - ICAO Doc 9871 Technical Provisions for Mode S Services and Extended Squitter - RTCA/EUROCAE MOPS: DO-260/ED-102, DO-260A, or DO-260B/ED-102A - ICAO Doc 9924 Aeronautical Surveillance Manual
Basic Aviation GNSS receiver with RAIM *Receiver autonomous integrity monitoring (RAIM)	Position source. Basic Aviation GNSS receiver with RAIM. Receiver Autonomous Integrity Monitoring (RAIM) provides integrity monitoring of GPS for aviation applications. In order for a GPS receiver to perform RAIM or fault detection (FD) function, a minimum of five visible satellites with satisfactory geometry must be visible to it	<ul style="list-style-type: none"> - Technical performance requirements of either [E]TSO-C129, or [E]TSO-C196, or [E]TSO-C145/-C146. (Note that the US/Europe and equivalent ADS-B mandates require more – see FAA AC 20-165 or EASA CS-ACNS)

<p>Training requirements implementation</p>	<p>ADS-B</p> <ul style="list-style-type: none"> - Technical training - Operative training - Inspector training - Aircraft certification training - Other according with the different stakeholders and project scope. - Training basic on operational procedures - Others 	<p>ICAO Doc 8071 Manual on Testing of Radio Navigation Aids.</p> <ul style="list-style-type: none"> - Volume I - Testing of Ground-based Radio Navigation Systems - Volume II - Testing of Satellite-based Radio Navigation Systems - Volume III - Testing of Surveillance Radar Systems
<p>Legislation/regulation</p>	<ul style="list-style-type: none"> - CNS implementation Strategy - Rules - Technical information (data) - Operational procedures - Aircraft requirements 	

— END/FIN —