International Civil Aviation Organization
CAR/SAM Regional Planning and Implementation Group (GREPECAS)

INFORMATION PAPER

**Twenty-first Meeting of the CAR/SAM Regional Planning and Implementation Group
(GREPECAS/21)**
Santo Domingo, Dominican Republic, 15 – 17 November 2023

Agenda Item 3:   **Global and Regional Developments**
                 3.3   **CAR/SAM Air Navigation Services (ANS) Implementation Level**

**Working Session for the roadmap design for the operational and
effective use of ADS-B in the CAR/SAM Regions – Working guide #3**

The implementation of ADS-B (Automatic Dependent Surveillance-Broadcast)

(Presented by the Secretariat)

Summary

There have been discussions on the implementation of ADS-B (Automatic Dependent Surveillance-Broadcast), its effective operational application and the potential phasing out of radar systems in the CAR/SAM Regions. Industry is also concerned on the costs of equipping fleets and the cost benefit of this new technology rather than having a technology that would provide an additional layer of surveillance. Air Navigation equipment manufacturers are including ADS-B technology as a new feature on Secondary Surveillance Radar (SSR) which might be perceived as perpetuation of a technology in lieu of less costly alternatives that could bring costs savings in general helping the region to be more competitive while also providing the same level of situation awareness and safety.

On the other hand, the Global air navigation plan (GANP) strategy on Aviation System Block Upgrade (ASBU) indicates that the technology of ADS-B has the main purpose to support the provision of Air Traffic Services and operational applications at reduced cost and increased surveillance coverage.

It also provides precise position/velocity information in all airspace (accuracy not range-dependent as with radar) and aircraft call sign and precise position/velocity information to nearby aircraft with ADS-B-In receivers. ADS-B can also support State aircraft airspace access, however it should, when possible, leverage benefits from dual-use of State aircraft capabilities to reduce cost and technical impact.

ADS-B provides an aircraft's identification, position, altitude, velocity, and other information to any receiver (airborne or ground) within range. The broadcasted aircraft position/velocity is normally based on the Global Navigation Satellite System (GNSS) and transmitted at least once per second. As stated in the GANP, the ADS-B is ready for implementation at a global level.

According to the concept of operations, baseline of ASBU module ASUR recognizes that aircraft surveillance is accomplished with cooperative known as secondary (interrogation to aircraft) and non-cooperative known as primary (echoes) radar. Secondary radars have problems for covering oceanic and remote airspaces, rough mountainous terrain and have a heavy reliance on mechanical components with large maintenance requirements. In the next upgrade from baseline, known as Block 0, surveillance is provided with new technology (ADS-B OUT and wide area Multilateration (MLAT)) and the next upgrade, known as Block 1, indicates that surveillance will be provided using receivers on spacecraft, allowing improved options for surveillance in oceanic and remote areas.

Currently, the lack of SSR creates a gap if only ADS-B is implemented. Aircrafts equipped with ADS-B would be presented in the air traffic control (ATC) display, while aircrafts lacking equipment, would not appear. In some airspaces, with only no equipped aircrafts, no targets would be visible on the ATC display due to the absence of SSR radar. Developing a CAR/SAM CONOPS (Concept of Operations) and issuing operational regulations to be included in the AIP (Aeronautical Information Publication) together with validation processes for the system might assist on overcoming the implementation challenges. Additionally, for some small aircraft owners/operators the potential benefits of receiving financial assistance for the installation of ADS-B avionics on board aircraft needs to be further analysed with a Cost Benefit Analysis.

During the transition process service providers might need to focus resources on change management procedures so that ATCOs (Air Traffic Controllers) and CNS (Communications, Navigation and Surveillance) personnel have an adequate transition to begin providing separation with this system. In some States, ATCOs required a clear understanding of the entire ADS-B implementation process, as well as detailed operational training, including simulator exercises.

This type of issues is nowadays recurring in the region. It is a challenge that goes beyond the scope of CNS, involves ATCO training, regulation, fleet equipment, and more.

For some States the question remains if ADS-B is the way forward, technical areas might resist to this technological change and consider radar investment necessary. States face the dilemma of to phase out radar and focus on ADS-B, and need more insight of the initial costs and maintenance requirements for ADS-B.

This type of questions emphasizes the need for coordination, training, regulation, and financial support for the transition.

Furthermore, it is essential to recall the ICAO Doc 9082 which describes the basic principles for calculating cost recovery, through tariffs, for the provision of services and facilities by airports and Air Navigation Service Providers (ANSPs) and focuses on four basic principles of setting rights: non-discrimination, cost-relatedness, transparency and consultation with users. Incorporating these four principles into their laws, regulations or policies would ensure that ANSPs comply with them.

In addition, when analyzing the requirements for the implementation of ADS-B, the issues of military services combined with civilian services should be considered in greater detail and work in close coordination.

Furthermore a workshop on ADS-B implementation was held on 17th thru 21st July 2023, for discussing the development of regulation for ADS-B implementation, recommendations of this workshop are included as **Appendix** to this Information Paper.

**Working Session for the roadmap design for the operational and
effective use of ADS-B in the CAR/SAM Regions Exercise**

Problem Statement:

South American and Caribbean Regions face challenges regarding the implementation of ADS-B and the potential phasing out of radar systems. In some States the discussion on ADS-B implementation reveals the lack of Secondary Surveillance Radar (SSR) in the region, leading to a gap in aircraft visibility on air traffic control (ATC) displays.

The problem statement encompasses the following aspects:

1. Lack of SSR coverage: The lack of SSR coverage in some areas of the CAR/SAM Regions, hampers the effective implementation of ADS-B, in airspaces where non-equipped aircraft operate. This results in a scenario where only the equipped aircrafts appear on the ATC display, while non-equipped aircraft remain invisible.

2. Need for a Concept of Operations (CONOPS) and operational regulations: To address the SSR gap and facilitate ADS-B implementation, a CONOPS might need to be developed.

3. Additionally, operational regulations should be formulated and included in the Aeronautical Information Publication (AIP) to guide the implementation process.

4. Financial support for ADS-B avionics: Considering the financial implications, the question of whether states and Air Navigation Service Providers (ANSPs) should provide financial assistance for equipping aircraft with ADS-B avionics arises. The potential for international aid in this regard is also worth exploring.

5. Resistance to change: The resistance from air traffic control officers (ATCOs) and CNS personnel to the transition from radar systems to ADS-B should be considered. The need to address their concerns and provide a clear understanding of the entire process is crucial for successful implementation.

6. Phasing out radar and focusing on ADS-B: raises the question of whether it would be advisable to phase out radar systems and prioritize the adoption of ADS-B. The associated costs and maintenance requirements for ADS-B implementation also require careful consideration.

Instructions for the Working Session for the roadmap design for the operational and effective use of ADS-B in the CAR/SAM Regions Exercise:

1. **Working Session Objective:**

    -   Design a GREPECAS Project Document to address the challenges of implementing ADS-B and phasing out radar systems in the South American and Caribbean Region.
    -   Encourage collaboration, knowledge sharing, and problem-solving among the participants.
    -   Exercise active listening during the discussions, to understand different points of views.

2. **Working Session Activities:**

    -   Analyse the specific challenges faced in implementing ADS-B and phasing out radar systems in the region.
    -   Identify stakeholders, establish effective communication channels, and define the purpose, objectives, and scope of the Project Document.
    -   Develop a comprehensive project plan, including deliverables, activities, timelines, and project governance to address the challenges and requirements of ADS-B implementation and radar phasing out.
    -   Address the concerns and resistance to change through effective change management strategies.
    -   Determine the financial aspects, including potential sources of funding and international assistance, for ADS-B avionics implementation.
    -   Discuss the potential benefits, costs, and maintenance requirements of phasing out radar systems and focusing on ADS-B.
    -   Participants at the GREPECAS meeting will be divide into groups and assign this task of designing a Project Document that addresses the challenges and considerations discussed.
    -   Each group will nominate a leader to present the results to the meeting and to provide with a Word Document. Facilitate group presentations, feedback, and discussions to foster learning and knowledge exchange.

3. **Working Session Deliverables:**

    -   Comprehensive Draft Project Document templates tailored for ADS-B implementation and radar phasing out in the South American and Caribbean Region.
    -   Group presentations showcasing the application Project Management methodology in addressing the challenges.
    -   **Working Session** materials, including slides, handouts, and reference materials.

4. **Expected Outcomes:**

    -   Well-designed Project Document that addresses the challenges of ADS-B implementation and radar phasing out.
    -   Improved project management capabilities within the South American and Caribbean aviation Specialists

Note: The job card serves as an outline for the Working Session exercise. The facilitator should adapt and customize the activities and content to meet the specific needs and objectives of the participants. The problem statement from the exchange of messages provides the context and challenges that the Working Session aims to address.

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APPENDIX

Workshop on ADS-B implementation (Mexico City, 17th to 21st July 2023)

Design of the ADS-B Implementation Project

- **Recommendation 1**: The implementation of ADS-B is a project, which as such must have specific development objectives and goals. Considering that ADS-B supports the provision of Air Traffic Services and operational applications, it is necessary that these objectives are clear to all project participants.

- **Recommendation 2**: In the State, a multidisciplinary group shall be created that integrates the technical, operational, safety, and other administrative, financial, and legislative requirements from the beginning of the project.

- **Recommendation 3**: The integration in the project of all the interested parties; in this regard, it is important that an analysis of who and why should be integrated into the project be carried out. The stakeholders may vary from State to State and therefore an analysis by the State is necessary to include everyone within the implementation project.

- **Recommendation 4**: Establishment of a clear leadership for the development of the project, also indicating the role and responsibilities of each one of those involved in the development of the implementation.

- **Recommendation 5**: Create a project development roadmap, indicating the clear involvement of each of the participants, as well as their roles and responsibilities and the development schedule. Technical criteria to consider.

- **Recommendation 6**: Carry out an ADS-B coverage analysis that allows the identification of the scope of the implementation on the ground to fulfil the objectives of the project.

- **Recommendation 7**: Integrate the analysis of other technical requirements for the operation of ADS-B stations, such as communications, energy, security, cybersecurity, maintenance logistics, among others that may vary according to the implementation, implementation site, and terrain characteristics.

- **Recommendation 8**: For the definition of the technical/operational criteria, the integration requirements between the different ground systems, technical characteristics, integration protocols, verification, validation, and certification criteria of the data must be taken into account before its processing in the ATC Control Centre and criteria for monitoring the data during its presentation at the control positions, to ensure the quality of the information. Avionics criteria

- **Recommendation 9**: Having statistics of the avionics version of the commercial and general fleet, and including the military part is important to define the implementation requirements. In the different presentations provided by the States, a clear and high percentage of aircraft capable of version 2 (DO260B) was identified. In this sense, the States should benefit from this advantage and direct their implementation and the development of the legislation using as a minimum requirement that the aircraft be equipped with this version. Other important factors to consider.

- **Recommendation 10**: The ADS-B implementation process must integrate a clear identification of the implementation benefits and accompany them with a measurement process that ensures measurement data before and after the ADS-B implementation.

- **Recommendation 11**: Other information must also be integrated into the ADS-B implementation process, such as risk analysis, feasibility analysis, benefit analysis, safety analysis, financial and human resources, among others, that provide information that is integrated into the project, to ensure its success. A follow-up mechanism for the implementation of the project must also be implemented to allow the activities to be adjusted according to the development of the project.

- **Recommendation 12**: Finally, the development of legislation is a process that must be carried out from the beginning of the development of the project, considering all the factors listed above, incorporating the different interested parties, and establishing correct communication mechanisms that allow the establishment of clear regulations for all.

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