ADS-B Implementation Workshop (ADS-B Workshop)
(Bangkok, Thailand, 14 – 16 August 2024)

Introduction to AIGD

Presented by Hong Kong, China

Agenda

- **Overview of AIGD, Chapter by Chapter**

  https://www.icao.int/APAC/Documents/edocs/

  “CNS” ➔ Search “AIGD”

- **Other sources for ADS-B Implementation Guidance**

Overview of AIGD

1. Introduction
2. Acronyms and Glossary of Terms
3. Reference Documents
4. ADS-B Data
5. ADS-B Implementation
6. Harmonization Framework for ADS-B Implementation
7. System Integrity and Monitoring
8. Reliability and Availability Considerations
9. ADS-B Regulations and Procedures
10. Security Issues Associated with ADS-B

1. Introduction

- The Eleventh ICAO Air Navigation Conference held in 2003 recommended that States recognize ADS-B as an enabler of the global ATM concept bringing substantial safety and capacity benefits; support the cost-effective early implementation of it; and ensuring it is harmonized, compatible and interoperable with operational procedures, data linking and ATM applications.
- The Twelve ICAO Air Navigation Conference held in 2012 endorsed the Aviation System Block Upgrades (ASBU) to provide a framework for global harmonization and interoperability of seamless ATM systems. Among the Block Upgrades, the Block 0 module “Initial Capability for Ground Surveillance” recommends States to implement ADS-B which provides an economical alternative to acquire surveillance capabilities especially for areas where it is technically infeasible or commercially unviable to install radars.
- This ADS-B Implementation and Operations Guidance Document (AIGD) provides guidance material for the planning, implementation and operational application of ADS-B technology in the Asia and Pacific Regions.
- The procedures and requirements for ADS-B operations are detailed in the relevant States’ AIP. **The AIGD is intended to provide key information on ADS-B performance, integration, principles, procedures and collaboration mechanisms**.
- The content is based upon the work to date of the APANPIRG ADS-B Study and Implementation Task Force (SITF), the Surveillance Implementation Coordination Group (SURICG) and various ANC Panels developing provisions for the operational use of ADS-B. Amendment to the guidance material will be required as new/revised SARPs and PANS are published.

4. ADS-B Data

- A guidance material on generation, processing and sharing of ASTERIX Cat. 21 ADS-B messages is provided at Appendix 7 of AIGD
- Note – Latest developments for newer version of ADS-B Version 3 / DO260C (not yet in our AIGD)
- Improvements in
  - Interval Management (IM)
  - Aircraft-derived weather data
  - UAS related fields
  - Support to Commercial Space / Hypersonic Vehicles
  - ACAS Support
  - 1090 MHz frequency conservation
  - Surface Reporting Improvements
  - Autonomous Distress Tracking (ADT)
- Shared in https://www.icao.int/NACC/Documents/Meetings/2023/ADSB/ADS-BImp-P07.pdf

5. ADS-B Implementation

- 5.1 Introduction
  - 5.1.1 Planning
  - 5.1.2 Implementation team to ensure international coordination
  - 5.1.3 System compatibility
  - 5.1.4 Integration
  - 5.1.5 Coverage Predictions

- 5.2 Implementation checklist
  – Sample from Airservices Australia at Appendix 1
  - 5.2.1 Introduction
  - 5.2.2 Activity Sequence
  - 5.2.3 Concept Phase
  - 5.2.4 Design Phase
  - 5.2.5 Implementation Phase

6. Harmonization Framework for ADS-B Implementation

- Template shared from Hong Kong China

7. SYSTEM INTEGRITY AND MONITORING

- 7.1 Introduction
- 7.2 Personnel Licensing and Training
- 7.3 System Performance Criteria for an ATC separation service
- 7.4 ATC system validation
  - 7.4.1 Safety Assessment
  - 7.4.2 System safety assessment
  - 7.4.3 Integration test
  - 7.4.4 ATS Operation Manuals
  - 7.4.5 ATS System Integrity
- 7.5 System Monitoring
  - 7.5.1 Problem Reporting System (PRS)
  - 7.5.2 The monitoring process
  - 7.5.3 Distribution of confidential information
  - 7.5.4 ADS-B problem reports
  - 7.5.5 ADS-B periodic status
  - 7.5.6 Processing of Reports
- 7.6 APANPIRG
- 7.7 Local Data Recording and Analysis
  - 7.7.1 Data recording
  - 7.7.2 Local data collection
  - 7.7.3 Avionics problem identification and correction
- 7.8 & 7.9 ADS-B Problem Report & ADS-B Performance Report Form

8. RELIABILITY & AVAILABILITY CONSIDERATIONS

- Reliability and Availability of ADS-B systems should normally be equivalent or better than the reliability and availability of radar systems.
- Appropriate Tier should be selected for the type of ADS-B service intended:

  (a) Tier 1 standards are for a high performance traffic separation service;

  (b) Tier 2 standards are for a traffic situational awareness service with procedural separation; and

  (c) Tier 3 standards are for a traffic advisory service (flight information service)
- 8.1 Reliability Definition
- 8.2 Availability Definition
- 8.3 Recommendations for high reliability/availability ADS-B systems
  - Proper System design
  - Logistics strategy
  - Configuration Management
  - Training & Competency plans
  - Data collection & Review

9. ADS-B REGULATIONS AND PROCEDURES

- 9.1 Introduction
- 9.2 ADS-B Regulations
- 9.3 Factors to be considered when using ADS-B
  - 9.3.1 Use of ADS-B Level data
  - 9.3.2 Position Reporting Performance
  - 9.3.3 GNSS Integrity Prediction Service
  - 9.3.4 Sharing of ADS-B Data
  - 9.3.5 Synergy between GNSS and ADS-B
  - 9.3.6 Use of ADS-B for Airport Surface Movement
  - 9.3.7 1090 Mhz Spectrum and 24-bit Aircraft Address Issue With Unmanned Aircraft Systems (UAS)
  - 9.3.8 Methodologies to Avoid or Reduce 1090 MHz Congestion
- 9.4 Reporting Rates
- 9.5 Separation
  - 9.5.1 General
  - 9.5.2 Identification Methods
  - 9.5.3 ADS-B Separation
  - 9.5.4 Vertical Separation
- 9.6 Air Traffic Control Clearance Monitoring
  - 9.6.1 General
  - 9.6.2 Deviation from ATC clearances

9. ADS-B REGULATIONS AND PROCEDURES

- 9.7 Alerting service
- 9.8 Position Reporting
  - 9.8.1 Pilot position reporting requirements in ADS-B coverage
  - 9.8.2 Meteorological reporting requirement in ADS-B airspace
- 9.9 Phraseology
  - 9.9.1 Phraseology standard
  - 9.9.2 Operations of Mode S Transponder and ADS-B
- 9.10 Flight Planning
  - 9.10.1 ADS-B Flight Planning Requirement – Flight Identity
  - 9.10.2 ADS-B Flight Planning Requirements
  - 9.10.3 Setting Flight Identification (Flight ID) in Cockpits
- 9.11 Procedures to Handle Non-compliant ADS-B Aircraft or Mis-leading ADS-B Transmissions
- 9.12 Emergency Procedures
- 9.13 Procedures to Handle GPS Time and Week Counter Rollover

10. Security Issues Associated with ADS-B

- 10.1 Introduction
- 10.2 Considerations
- 10.3 Measures for Enhancing the Security of ADS-B
  - 10.3.1 Time Difference of Arrival (TDOA) Based Position Verification Method
  - 10.3.2 Appropriate Implementation of a Decoding Method of CPR

Appendices

Appendix 1 – An Example of Commissioning Checklist

Appendix 2 – Guidance Materials on Monitoring and Analysis of ADS-B Avionics Performance

Appendix 3 – A Template for ADS-B Mandate/Regulations for Aircraft Avionics

Appendix 4 – An Example of Advice to Operators Concerning Inconsistency between ADS-B Flight Planning and Surveillance Capability

Appendix 5 – Checklist of Common Items or Parameters for the Monitoring of ADS-B System

Appendix 6 – Baseline ADS-B Service Performance Parameters

Appendix 7 – Guidance Material on Generation, Processing and Sharing of ASTERIX Category 21 ADS-B Messages

Appendix 8 – ICAO Guidance Material on 1 090 Mhz Spectrum Issues and Proper Management of 24-Bit Aircraft Addresses Associated with Unmanned Aircraft

Other Sources for ADS-B Implementation Guidance

- NAM/CAR/SAM Workshop on the Development of the regulation for the implementation of Automatic Dependent Surveillance – Broadcast (ADS-B-Imp)

  ICAO NACC Regional Office, Mexico City, Mexico, 17 to 21 July 2023

- https://www.icao.int/NACC/Pages/meetings-2023-adsb.aspx

Recommendations
from Workshop Report

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.

Recommendations
from Workshop Report

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.

Recommendations
from Workshop Report

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 followup 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, taking into account 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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CIVIL AVIATION DEPARTMENT

Thank you