International Civil Aviation Organization
North American, Central American and Caribbean Office

WORKING PAPER

ADS-B/LEG — WP/06
09/11/18

Automatic Dependent Surveillance – Broadcast (ADS-B) Implementation and Regulation Meeting for the NAM/CAR/SAM Regions (ADS-B/LEG)

Mexico City, Mexico, 26 to 30 November 2018

Agenda Item 6: ADS-B regulation considerations

Major Considerations When Contemplating ADS-B Regulations

(Presented by the United States)

EXECUTIVE SUMMARY	
This working paper outlines the major topics/concepts that should be considered by any ICAO Member State which is planning to implement ADS-B regulations.	
Action:	Suggested actions are presented in Section 4.
Strategic Objectives:	• Safety • Air Navigation Capacity and Efficiency
References:	• ICAO Doc 4444, PANS-ATM

1. Introduction

1.1 The Federal Aviation Administration's (FAA) current ADS-B Program was launched in 2007. One of the first actions taken by the FAA program manager was to understand what other ICAO Member States were doing or planning. The FAA, NavCanada, AirServices Australia, and EUROCONTROL ADS-B program managers began a series of regular meetings; the primary purpose of these meetings was to coordinate program activities as much as possible given the different objectives and environments of each program. These meetings, along with FAA participation in various ICAO regional ADS-B/Surveillance implementation forums, have given the FAA a broad perspective on the different ways that ADS-B is being used by Air Navigation Service Providers (ANSPs) worldwide.

1.2 This paper outlines the major topics/concepts that should be considered by any ICAO Member State which is planning to implement ADS-B regulations. In this paper, the term "regulations" is interpreted broadly to mean any document or guidance produced by a State that governs use of ADS-B avionics or received ADS-B data in providing ATS surveillance services as defined in ICAO Doc 4444, Procedures for Air Navigation Services - Air Traffic Management (PANS-ATM).

2. Discussion

2.1 From an ANSP perspective, the first step is to determine how use of ADS-B data will fit into the overall Communications, Navigation and Surveillance (CNS) strategy for the ANSP. The overall CNS capability in a given airspace sector determines the quality of available Air Traffic Services. Considerations should include:

a) What is the current and expected future traffic demand in each airspace sector?
b) For each airspace sector, what navigation and communication services are available or could be made available?
c) What surveillance services already exist and how does this impact [b]?
d) How would use of ADS-B data affect the available or future surveillance services?
e) What resources are available, or could be made available in the future, to implement use of ADS-B data?

2.2 ANSP personnel should also be aware of potential uses for ADS-B data to provide ATS surveillance services (as defined in PANS-ATM). In general, for airborne aircraft, ADS-B data can be used for ATS surveillance services or for ATC situational awareness. ATC situational awareness means that the data is not used for separation – it can be used for supplementing procedural separation methods (see PANS-ATM Chapter 5) or for traffic flow management purposes (or both). There are multiple options for using ADS-B data in providing ATS surveillance services:

a) As the principal source of cooperative surveillance (replaces one or more cooperative surveillance radars)
b) To cover airspace “gap” volumes where there was no cooperative surveillance radar coverage (involves mixing of radar and ADS-B data at the boundaries of radar coverage)
c) As the source of cooperative surveillance in airspace that previously had no cooperative surveillance coverage of any kind
d) Part of an integrated Wide Area Multilateration (WAM) system to perform [a] or [c]

2.3 For the airport surface, ADS-B data can be used as the sole source of cooperative surveillance for an airport surface that previously had no cooperative surveillance coverage. Another alternative is to integrate ADS-B data with a surface multilateration system.

2.4 States considering the use of ADS-B data to provide ATS surveillance services or to provide airport surface surveillance must also consider two additional questions to assist in determining the strategy and appropriate regulations for ADS-B:

a) What is the expected risk of GNSS signal jamming (a.k.a., GNSS denial of service)?
b) What is the expected risk of ADS-B signal spoofing (a.k.a., false target attacks)?

c) These risks need to be considered by the State, and mitigated if needed. Mitigations for GNSS signal jamming can include retention of other surveillance systems (radars, etc.) to provide "backup" services. One mitigation for ADS-B signal spoofing is use of another cooperative surveillance system to "validate" received ADS-B position reports; the U.S. uses such an approach. However, providing mitigations for these risks can increase the costs of providing ATS surveillance services, so a careful risk analysis is important.

2.5 Regulations governing ADS-B avionics can be developed via three methods:

a) a State defines their own equipment and operational requirements (FAA examples: Technical Standard Orders (TSOs), Advisory Circulars (ACs), Policy Memos)
b) a State copies equipment and operations requirements from another State
c) a State directly references another State's requirements documentation

Only the State's regulatory authority can determine the appropriate approach.

In the U.S., equipment and operational requirements for ADS-B 1090ES avionics are defined in Title 14 Code of Federal Regulations (14 CFR) 91.225, 14 CFR 91.227, FAA TSO-C166b, FAA AC 20-165B, and FAA AC 90-114A, Change 1. Copies of these regulations can be obtained at https://rgl.faa.gov. EASA has issued ETSO-C166b and CS-ACNS to define the EU equipment and operational requirements; see https://www.easa.europa.eu/document-library.

2.6 Regulations governing the use of ADS-B by the ANSP can vary considerably. In all cases, basic regulations must be established formalizing how ADS-B data can be used in providing ATS surveillance services, including what separation minima (if any) are permitted and what ADS-B quality indicator values are required (see ADS-B/LEG — WP/07). Such regulations may or may not be available to the public, but must be available to ANSP personnel. In the FAA, operational procedures for ANSP personnel are generally contained in FAA Orders; for example, FAA Order 7110.65 (latest version), entitled "Air Traffic Control", prescribes air traffic control procedures and phraseology for use by personnel providing air traffic control services. Additionally, FAA requirements for ADS-B quality indicator values are encoded in management-approved Safety & Risk Management documentation and enforced via parameter settings in FAA's various ATC automation systems.

2.7 Depending on the use of ADS-B data in providing ATS surveillance services, airspace regulations may be desired. Such regulations can range from:

- a notice informing operators that aircraft equipped with ADS-B will receive priority in allocating cruise altitudes in an airspace region; to
- establishing upper altitude airspace corridors where only ADS-B-equipped aircraft are permitted to fly; to
- an airspace mandate similar to that established by the U.S. (see 14 CFR 91.225 and 14 CFR 91.227)

In most cases, stakeholders will demand that airspace regulations are projected to be cost beneficial – i.e., that benefits will exceed implementation costs over some "lifecycle" period of time. For example, U.S. law requires that the "public good" benefits of any proposed regulation exceed all of the costs to implement said regulation over some reasonable period of time.

2.8 Prior to deciding on any ADS-B regulations, it is critical that a State's regulatory authority engage in dialog with stakeholders. Which stakeholders to consult will depend on the regulations being considered. Stakeholders can include the ANSP, aircraft owners/operators, industry (manufacturers of ANSP systems or related components as well as manufacturers of aircraft or aircraft components), airport owner/operators, and the public (citizens of the State). Stakeholders will want to know:

- What regulations are proposed?
- How much would it cost?
- How long would it take?
- What are the benefits?
- What are the risks?

The primary concern for each Stakeholder is: "What does it mean to me?"

Each State needs to evaluate how to conduct Stakeholder consultations in accordance with the laws of their State. Based on the experience of several States that have already implemented regulations regarding ADS-B, it is strongly recommended that States engage in Stakeholder consultations above and beyond the minimum legal requirements. Understanding and addressing Stakeholder concerns quickly can result in an efficient implementation of any State's ADS-B regulations.

3. Conclusion

3.1 This paper outlined the major topics/concepts that should be considered by any ICAO State which is planning to implement ADS-B regulations.

4. Suggested actions

4.1 States are invited to:

a) Fully consider this information when determining what ADS-B regulations are necessary.

— END —