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ADS-B 1090ES MOPS Maintenance

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Proposal to Add a “Receive-Only” Equipment Class

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Summary
This Working Paper addresses the proposal to add a “Receive-Only” Equipment Class and was initiated during WG-5 Meeting #26 during discussion of the matter by FAA AIR-130.

2.1.11 **Equipage Class Definitions**

ADS-B equipment is categorized into aircraft system equipage classes as defined in Table 3-1 of RTCA DO-242A (ADS-B MASPS). For 1090 MHz ADS-B equipment, those definitions are repeated in these MOPS in Table 2-1.

The Class “A” Aircraft/Vehicle Classes (A0, A1, A2, and A3) are as defined in RTCA DO-242A. Class A equipment is interactive, transmit and receive equipment, used for both aircraft and vehicles. The ADS-B MASPS “A1” equipment has been further divided into two classes, based on antenna diversity. For A1 installations using a single antenna, the “A1 Single” class is created, and abbreviated throughout this document as “A1S.” A1 installations with diversity antennas are abbreviated throughout this document as “A1.” The only equipment difference between classes A1 and A1S is antenna diversity.

The ADS-B MASPS “B0” class (broadcast-only aircraft) is defined as having transmitter characteristics and payload capability identical to the 1090 MHz A0 interactive aircraft class. The ADS-B MASPS “B1” class (broadcast-only aircraft) is defined as having transmitter characteristics and payload capability identical to the 1090 MHz A1 interactive aircraft class. The ADS-B MASPS “B1” equipment has been further divided into two classes, based on antenna diversity. For B1 installations using a single antenna, the “B1 Single” class is created, and abbreviated throughout this document as “B1S.” B1 installations with diversity antennas are abbreviated throughout this document as “B1.” The only equipment difference between classes B1 and B1S is antenna diversity.

The characteristics of the 1090 MHz “B2” class (broadcast-only ground vehicle) are defined in Table 2-1.

The characteristics of the 1090 MHz “B3” class (broadcast-only fixed or moveable obstacle) are defined in Table 2-1. The payload capability supports the surface position, height of highest point, and identification (including Emitter Category) of the obstacle, so that both State Vector and Mode Status reports must be supported. Moveable obstacles require a position source. A moveable obstacle is one that can change its position, but only slowly, such that its horizontal velocity may be ignored.

Class “R” is a receive-only aircraft/vehicle class also defined in Table 2-1. The subclasses (R0, R1, R1S, R2 and R3) of receive-only equipment shall meet all of the receive requirements of its corresponding “A” subclass.

Requirements for Class ‘C’ ground-based receive-only equipment are not addressed in this document.

2.1.12

Equipage Class Categories

ADS-B equipment is categorized into aircraft system equipage classes as specified in the ADS-B MASPS (RTCA DO-242A) and as summarized in Table 2-1. These class categories are based on both the aircraft's on-board transmitter and receiver capabilities. The system classes are then broken down into subsystem equipment classes that are based on the individual unit specifications (refer to §2.1.12.1 and §2.1.12.2). Table 2-2 lists the different types of ADS-B Messages in the 1090 MHz ADS-B system.

Table 2-1: ADS-B Aircraft System Classes

Class	Subsystem	Features
Interactive Aircraft/Vehicle Participant Systems (Class A)		
A0	Minimum Interactive Aircraft/Vehicle	Lower transmit power and less sensitive receive than Class A1.
A1S/A1	Basic Interactive Aircraft	Standard transmit power and more sensitive receiver. Class A1 implements Antenna Diversity (Note)
A2	Enhanced Interactive Aircraft	Standard transmit power and more sensitive receiver. Interface with avionics source required for aircraft trajectory intent data. Antenna Diversity (Note)
A3	Extended Interactive Aircraft	More sensitive receiver. Interface with avionics source required for aircraft trajectory intent data. Antenna Diversity (Note)
Broadcast-Only Participant Systems (Class B)		
B0	Aircraft Broadcast Only	Transmit power may be matched to coverage needs. Nav data input required.
B1S/B1	Aircraft Broadcast Only	Transmit power may be matched to coverage needs. Nav data input required. Class B1 implements Antenna Diversity (Note)
B2	Ground Vehicle Broadcast Only	Transmit power matched to surface coverage needs. High accuracy Nav data input required.
B3	Fixed Obstacle	Fixed coordinates. No Nav data input required. Collocation with obstacle not required with appropriate broadcast coverage.
Ground Receive Systems (Class C)		
C1	ATS En Route and Terminal Area Operations	Requires ATS certification and interface to ATS sensor fusion system.
C2	ATS Parallel Runway and Surface Operation	Requires ATS certification and interface to ATS sensor fusion system.
C3	Flight Following Surveillance	Does not require ATS interface. Certification requirements determined by user application.
Airborne Receive-Only Systems (Class R)		
R0	Minimum Receive-Only Aircraft	Less sensitive receive than Class R1.
R1/R1S	Basic Receive-Only Aircraft	Standard transmit power and more sensitive receiver. Class R1 implements Antenna Diversity (Note)
R2	Enhanced Receive-Only Aircraft	Standard transmit power and more sensitive receiver. Interface with avionics source required for aircraft trajectory intent data. Antenna Diversity (Note)
R3	Extended Receive-Only Aircraft	More sensitive receiver. Interface with avionics source required for aircraft trajectory intent data. Antenna Diversity (Note)

Note: See §3.3.1 for Antenna Diversity.

Table 2-6A: ADS-B Class R Receive-Only Equipment To Report Coverage

Receiver Class	Minimum Trigger Threshold Level (MTL)	Reception Technique	MASPS Requirement [RTCA DO-242A Table 3-3(a)]	Minimum Report Required
R0 (Minimum)	-72 dBm	Standard	SV MS	ADS-B State Vector Report (\$Error! Reference source not found.) AND ADS-B Mode Status Report (\$Error! Reference source not found.)
R1S/R1 (Basic)	-79 dBm	Enhanced (\$Error! Reference source not found.)	SV MS ARV	ADS-B State Vector Report (\$Error! Reference source not found.) AND ADS-B Mode Status Report (\$Error! Reference source not found.) AND ADS-B Air Referenced Velocity Report (ARV) (\$Error! Reference source not found.)
R2 (Enhanced)	-79 dBm	Enhanced (\$Error! Reference source not found.)	SV MS TS ARV TC+0	ADS-B State Vector Report (\$Error! Reference source not found.) AND ADS-B Mode Status Report (\$Error! Reference source not found.) AND ADS-B Target State Report (\$Error! Reference source not found.) AND ADS-B ARV Report (\$Error! Reference source not found.) AND Reserved for ADS-B Trajectory Change Reports
R3 (Extended)	-84 dBm	Enhanced (\$Error! Reference source not found.)	SV MS TS ARV TC+n	ADS-B State Vector Report (\$Error! Reference source not found.) AND ADS-B Mode Status Report (\$Error! Reference source not found.) AND ADS-B Target State Report (\$Error! Reference source not found.) AND ADS-B ARV Report (\$Error! Reference source not found.) AND Reserved for ADS-B Trajectory Change Reports

