

RTCA Special Committee 186, Working Group 5

ADS-B UAT MOPS

Meeting #11

Terminology Proposed for Use in ADS-B Documents

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SUMMARY

I propose the following terminology for use in SC-186 documents such as the ADS-B MASPS (DO-242A), the 1090 MHz ADS-B MOPS (DO-260A), and the UAT MOPS (DO-*TBD*). I hope that by agreeing on terminology (a) we will avoid heated semantic arguments as we discuss and try to approve these documents, and (b) our customers, the readers of the documents, will find the documents easier to understand.

Proposed ADS-B Terminology

I propose the following terminology for use in SC-186 documents such as the ADS-B MASPS (DO-242A), the 1090 MHz ADS-B MOPS (DO-260A), and the UAT MOPS (DO-*TBD*). I hope that by agreeing on terminology (a) we will avoid heated semantic arguments as we discuss and try to approve these documents, and (b) our customers, the readers of the documents, will find the documents easier to understand.

Note: In this proposal, the section references (e.g., §1.2.1) are to parts of the draft revised ADS-B MASPS (DO-242A).

-- begin proposed definitions --

Automatic Dependent Surveillance – Broadcast (ADS-B). *ADS-B* is defined (§1.2.1) as a function on an aircraft, or a surface vehicle operating within the surface movement area, that periodically broadcasts its state vector (horizontal and vertical position, horizontal and vertical velocity) and other information. ADS-B is *automatic* because no external stimulus is required to elicit a transmission; it is *dependent* because it relies on on-board navigation sources and on-board broadcast transmission systems to provide surveillance information to other users. In addition to *A/Vs*, ADS-B service may be extended to identify obstacles (e.g., an uncharted tower not identified by a current NOTAM). ADS-B is distinguished from ADS as currently employed in some oceanic regions in that ADS-B is a one-way *broadcast* service, in which information is broadcast without the expectation of an acknowledgement or reply.

Aircraft/Vehicle (A/V). For the purpose of this MASPS, the term *aircraft/vehicle (A/V)* is defined (§1.2.1) as meaning either (a) a machine or device capable of atmospheric flight, or (b) a vehicle on the airport surface movement area (i.e., runways and taxiways).

ADS-B report. An *ADS-B report* is defined (Appendix B) as information provided by ADS-B to an external application. *ADS-B reports* are generated by the *report assembly function* in an *ADS-B receiving subsystem* and made available to external applications.

ADS-B message. An *ADS-B message* is defined (Appendix B) as a packet of formatted data that convey information used in the development of ADS-B reports. *ADS-B messages* are generated by the *message generation function* in an *ADS-B transmitting subsystem* and broadcast over the ADS-B propagation medium to the *ADS-B receiving subsystems* at other *ADS-B participants*.

ADS-B transmitting participant. An *ADS-B transmitting participant* is an *A/V* that has on-board systems (e.g., navigation systems, control panels, etc.) that provide information to an *ADS-B transmitting subsystem* on that *A/V*, which broadcasts *ADS-B messages* for use by *ADS-B receiving participants*. The term, *ADS-B transmitting participant*, may refer informally to a provider of *ADS-B messages* that describe *obstacles* whose existence and positions are being provided as a service to *ADS-B receiving participants*.

ADS-B receiving participant. An *ADS-B receiving participant* is an *A/V* or ground system equipped with an *ADS-B receiving subsystem* that provides *ADS-B reports* to applications (that are external to the *ADS-B system*).

ADS-B system. The *ADS-B system* is defined (§) as the set of *ADS-B transmitting subsystems* and the set of *ADS-B receiving subsystems*, together with the *ADS-B broadcast medium*. The *ADS-B transmitting subsystems* are located at or on board the *ADS-B transmitting participants*. The ADS-B receiving subsystems are located at or on

board the *ADS-B receiving participants*. The *ADS-B broadcast medium* carries the ADS-B messages from the transmitting participants to the receiving participants. Figure 1-2 (§1.2.1) illustrates the scope of the ADS-B system. The sources of *state vector* and other transmitted information at a *transmitting ADS-B participant* are deemed not to be part of the ADS-B system. Likewise, the user applications at a *receiving ADS-B participant* are deemed not to be part of the ADS-B system.

State Vector (SV). A *transmitting ADS-B participant's state vector* is defined here as that participant's location and velocity. The state vector, together with other information, is conveyed in *SV messages* from the *ADS-B transmitting subsystem* at that transmitting participant to the *ADS-B receiving subsystems* at receiving participants, and then conveyed in *SV reports* from the *receiving subsystems* to *user applications*.

State Vector report (SV report). An *SV report* is defined (§3.4.3) as the set of report elements (or "fields") listed in Table 3.4.3. These report elements include a transmitting participant's *state vector* (that is, position and velocity) together with other information such as *the time of applicability (TOA)* of the information in the report, the transmitting participant's address (§2.1.2.2.1) and address qualifier (§2.1.2.2.2), heading if on the surface, and a measure of the integrity of the position information (NIC, §32.1.2.12).

State Vector message (SV message). A *state vector message (SV message)* is defined here as the set of one or more *ADS-B messages* that convey the information in a single *SV report*. For convenience, the singular ("SV message") is taken to include the plural ("SV messages") in the case of the information in a single SV report being conveyed over the broadcast medium in more than one *ADS-B message*. For example, on the 1090 MHz ADS-B data link (see RTCA/DO-260), the SV report is conveyed using both the extended squitter airborne position message and the extended squitter airborne velocity message; we will use the term SV message to include both of those messages.

Mode-Status report (MS report). A *Mode-Status Report (MS report)* is defined (§3.4.4) as the set of report elements (or "fields") listed in Table 3.4.4. The MS report includes fields that are expected to change rather less frequently than the fields in the SV report, so that a transmitting participant need not transmit *MS messages* as frequently as it does *SV messages*.

Mode-Status message (MS message). A *Mode-Status message (MS message)* is defined here as the set of one or more *ADS-B messages* that convey the information in a single *MS report*. For convenience in writing the ADS-B MASPS, the singular ("MS message") is taken to include the plural ("MS messages") in the case in which the information in a single *MS report* being conveyed over the broadcast medium in more than one *ADS-B message*.

Notes:

1. For example, on the UAT data link (for which an RTCA MOPS is currently being developed), the information in a single MS report may be conveyed in more than one ADS-B message. On the UAT data link, transmitting ADS-B participants broadcast most of the MS report elements once every 4 seconds, but those elements that may change more frequently are transmitted once every 2 seconds.
2. As another example, on the 1090 MHz ADS-B data link (described in DO-260A), the information in the MS report is conveyed partly in the extended squitter aircraft ID and category message, and partly in the extended squitter aircraft operational status message. In the DO-242A ADS-B MASPS, these two extended squitter messages could together be considered to be "the MS message."

Air-Referenced Velocity report (ARV report). An *Air-Referenced Velocity report (ARV report)* is defined (§3.4.7) as the set of report elements or fields listed in Table 3.4.7.

Note: The ARV report conveys airspeed and heading, which the original (DO-242) edition of the ADS-B MASPS described (in some places) as being part of the SV report.

Air-Referenced Velocity message (ARV message). An *ARV message* is defined here as the set of one or more ADS-B messages that convey the information in a single ARV report. For convenience in writing the ADS-B MASPS, the singular (“ARV message”) is taken to include the plural (“ARV messages”) for cases in which the information in a single ARV report being conveyed over the broadcast medium in more than one ADS-B message.

Target State report (TS report). A TS report is defined (§3.4.8) as the set if report elements or fields listed in Table 3.4.8. The target state report contains “short term” intent information that describes the target altitude and target heading or track angle towards which a transmitting ADS-B participant is currently being controlled.

Target State message (TS message). A TS message is defined here as the set of one or more ADS-B messages that convey the information in a single TS report.

Trajectory Change report (TC+0 report, TC+n report). A *trajectory change report (TC report)* is defined (§3.4.9) as the set of report elements listed in Table 3.4.9. The information in TC reports would typically come from the active flight plan that is currently being used to define the trajectory which a transmitting ADS-B participant is following (or plans to follow, see §3.4.9 for details).

Trajectory Change message (TC+0 message, TC+n message). A *trajectory change message (TC message)* is defined here as the set of one or more ADS-B messages that carry the information in a single trajectory change report. For convenience in writing the ADS-B MASPS, the singular (“TC+0 message”) is taken to include the plural (“TC+0 messages”) for cases in which the information in a single TC report is transmitted using more than one ADS-B message.

Status Change report (SC report). A *status change report (SC report)* is defined (§3.4.6.2) as the set of report elements listed in Table 3.4.6.2. These report elements are elements that also are part of MS reports and TC reports, but which need to be communicated more quickly than other elements of those reports when changes in their values occur.

Note: Whether the information in a status change report actually qualifies for the term “ADS-B report” is currently a subject of heated debate in the SC-185 working groups. The issue reduces to whether or not one is willing to delegate the report assembly function for MS and TC reports to the user application, rather than performing that function within the ADS-B receiving subsystem.

Status Change message (SC message). A *status change message (SC message)* is defined here as the set of one or more ADS-B messages that carry the information in a single SC report.

--- end proposed definitions ---