RTCA Special Committee 186, Working Group 3

ADS-B and TIS-B 1090 MHz Extended Squitter Data Link MOPS

Meeting #13

20-22 August 2002
At RTCA, Washington DC

Proposed Changes to Chapter 1

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SUMMARY

In reviewing working paper 1090-WP-13-06, I found places in Chapter 1 where I would propose changes. So here they are. I have indicated the changes in ***boldface italic*** font, (sometimes ***underlined***, too), and included two new Visio diagrams.

(The Visio files for these are attached to the text that I am sending Gary Furr for him to redistribute to the group. The Visio files themselves, however, need not be distributed to the entire working group.)

§1.1, First paragraph

This document contains Minimum Operational Performance Standards (MOPS) for airborne equipment for Automatic Dependent Surveillance-Broadcast (ADS-B) ***and Traffic Information Service – Broadcast (TIS-B)*** utilizing 1090 MHz Mode-S Extended Squitter. The supporting hardware can be a stand-alone ADS-B unit, or alternatively, ADS-B may be incorporated within other on-board equipment.

§1.2.1 Definitions of *ADS-B and TIS-B*

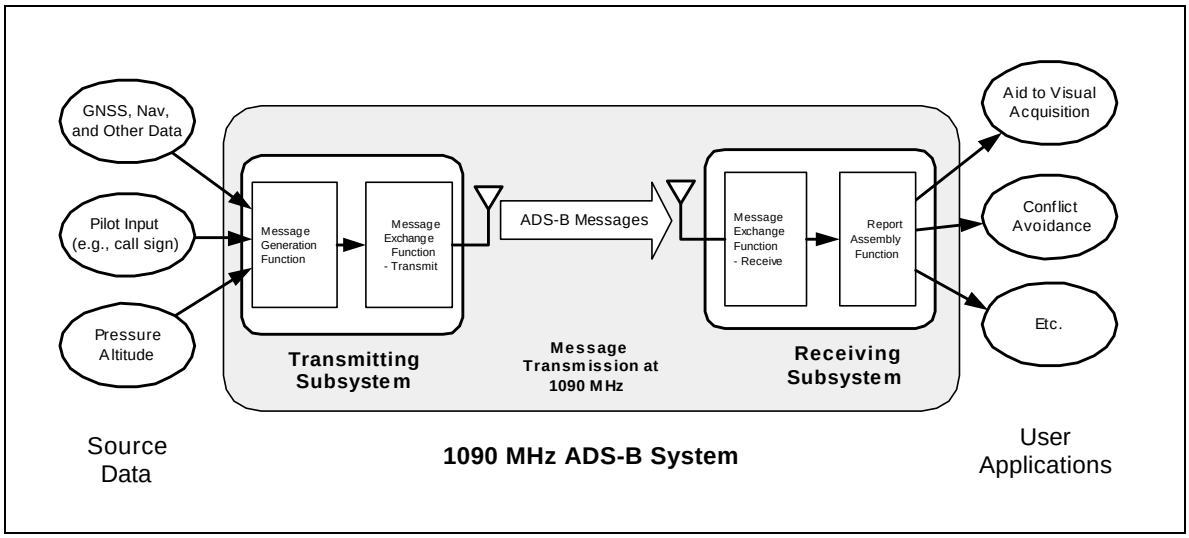
ADS-B ***(Automatic Dependent Surveillance – Broadcast)*** is a system for aircraft or surface vehicles operating within the airport surface movement area that periodically transmit ***their*** state vectors (horizontal and vertical position, horizontal and vertical velocity) and other information. ADS-B is *automatic* because no external stimulus is required; it is *dependent* because it relies on on-board navigation sources and on-board broadcast transmission systems to provide surveillance information to other users. The aircraft or vehicle originating the broadcast may or may not have knowledge of which users are receiving its broadcast; any user, either aircraft or ground-based, within range of this broadcast, may choose to receive and process the ADS-B surveillance information. ADS-B supports improved use of airspace, reduced ceiling/visibility restrictions, improved surface surveillance, and enhanced safety such as conflict management.

TIS-B (Traffic Information Service – Broadcast) is a system in which transmitters on the ground provide aircraft with information about nearby aircraft. The TIS-B information is likely to come from ground-based surveillance sensors such as air traffic control radars or multilateration systems. However, TIS-B information broadcast on a particular radio data link might also be derived from the reception on the ground of ADS-B messages that were transmitted on a different data link. For example, 1090 MHz TIS-B transmitters might broadcast information about nearby aircraft from which equipment on the ground has received ADS-B messages on other data links.

For the purposes of this document, the term *aircraft/vehicle* (A/V) will refer to either 1) a machine or device capable of atmospheric flight, or 2) a vehicle on the airport surface movement area (i.e., runways and taxiways). For simplicity, the word *aircraft* is used to refer to aircraft and vehicles, where appropriate.

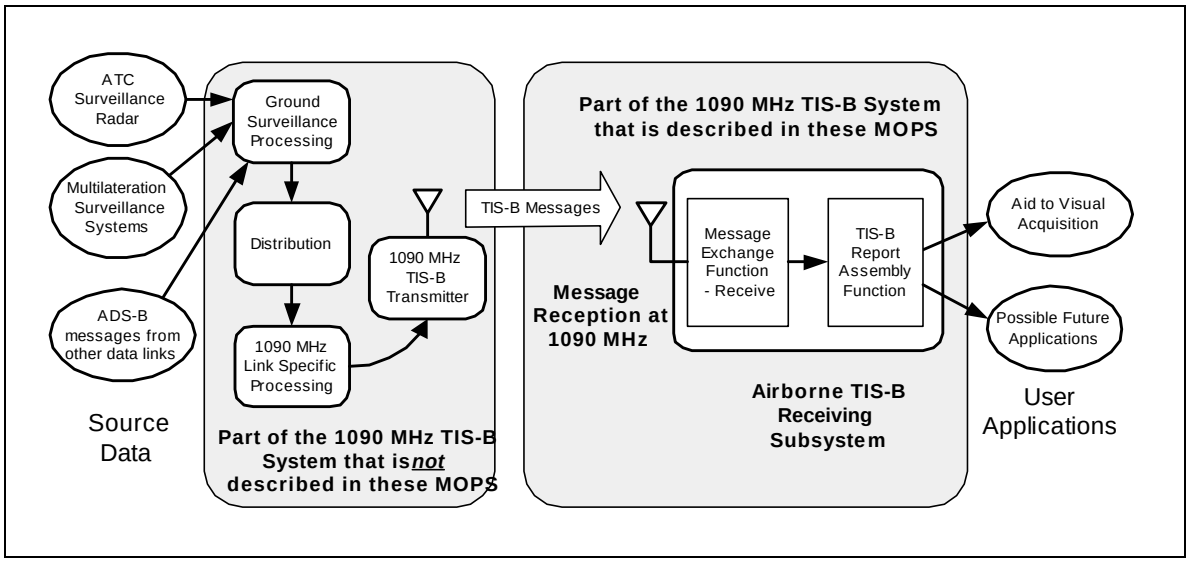
Figure 0-A shows the extent of the 1090 MHz ADS-B system and its major components. This figure is adapted from the ADS-B MASPS, RTCA/DO-242A.

As indicated in the figure, the ADS-B system includes the following components: message generation/transmission by the source A/V, propagation medium, and message reception/report assembling by the user. The ADS-B system does *not* include the sources of the data to be sent by the source subsystem on board the transmitting aircraft. Neither does it include the client applications, which use the information received by the ADS-B user subsystem on board the receiving aircraft. Some ADS-B participants may be able to transmit but not receive. In addition, some ground-based users may be able to receive but not to transmit.



<u>Figure 0-A:</u> The Scope of the 1090 MHz ADS-B System.

<u>Figure 0-B</u> shows the extent of the 1090 MHz TIS-B system and its major components. As indicated in the figure, only the 1090 MHz TIS-B messages and the airborne TIS-B receiving subsystem are described in this MOPS.



<u>Figure 0-B:</u> Scope of the 1090 MHz TIS-B System.

§1.2.2 1090 MHz ADS-B *<u>and TIS-B</u>* System, first paragraph

In the 1090 MHz system that is the topic of this document, the "propagation medium", as shown in ***<u>Figures 0-A and -B</u>***, is the 1090 MHz downlink frequency used by the Secondary Surveillance Radar (SSR) and other systems such as IFF Mode 4. The "ADS-B Messages" transmitted on 1090 MHz are the Mode S extended squitters (airborne position squitter, airborne velocity squitter, surface position squitter, etc.) described in ***§2.2.3.2*** and Appendix A of this document. ***Likewise, the "TIS-B Messages" are the Mode S extended squitters described in §2.2.17 and Appendix A.***

§1.2.3, Avionics Integrity, heading and first paragraph

<<Delete “ADS-B” from the heading, as this now applies to TIS-B, too.>>

The integrity requirements for the total system to support ADS-B ***and TIS-B*** related applications are determined for a particular airborne architecture by conducting a functional hazard assessment and system safety assessment. For each application, the classification (typically expressed in terms of a category such as hazardous/minor, hazardous major, etc.) of unannunciated and unmitigated failure conditions of ADS-B avionics that cause out-of-tolerance error conditions will be derived from these assessments.