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Minimum Aviation System Performance Standards (MASPS) for Traffic Information Service – Broadcast (TIS-B)

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FOREWORD

This report was prepared by RTCA Special Committee 186 (SC-186) for use as a guide in developing Traffic Information Services-Broadcast Performance Standards. It was approved by the RTCA Program Management Committee on October 11, 2007.

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- Developing consensus on the application of pertinent technology to fulfill user and provider requirements, including development of Minimum Operational Performance Standards for electronic systems and equipment that support aviation; and

- Assisting in developing the appropriate technical material upon which positions for the International Civil Aviation Organization and the International Telecommunication Union and other appropriate international organizations can be based.

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1 PURPOSE AND SCOPE

1.1 Introduction

This document contains Minimum Aviation System Performance Standards (MASPS) for Traffic Information Service - Broadcast (TIS-B). These standards specify system characteristics of use to designers, manufacturers, installers, service providers, and users of a TIS-B system. This document specifies requirements intended for global application and also provides guidance for system development throughout the world. The requirements set forth herein reflect consideration of existing capabilities available to support initial applications using TIS-B, as well as the requirements for future systems necessary to support advanced applications. TIS-B as defined within this document supports applications whose Application Capability and Transmit Quality Levels (i.e., sets of surveillance performance parameters sufficient to support application requirements) are defined in the Aircraft Surveillance Applications (ASA) MASPS. These TIS-B MASPS support compatibility between Automatic Dependent Surveillance-Broadcast (ADS-B) and TIS-B. The data link requirements for TIS-B are defined in the Minimum Operational Performance Standards (MOPS) of the candidate data links. The hierarchy of the documents produced by RTCA Special Committee 186 is shown in Figure 1-1.

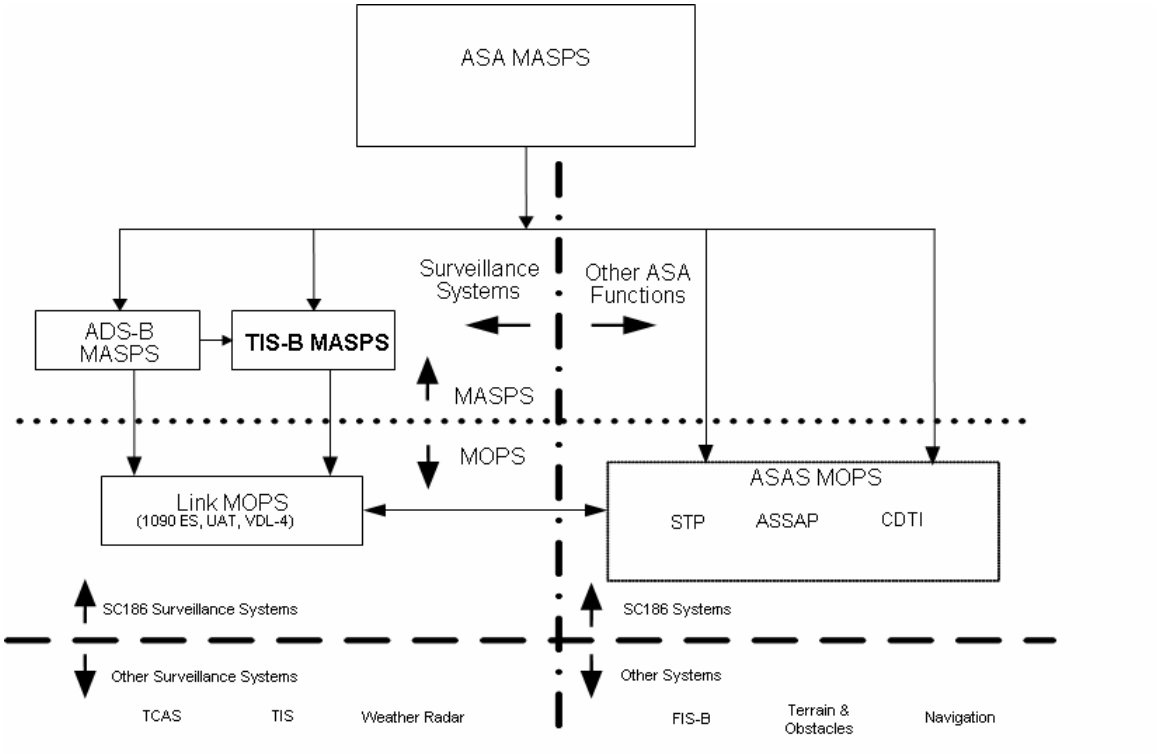


Figure 1-1 SC-186 Document Hierarchy

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Compliance with these standards is recommended as one means of assuring that the TIS-B system and each subsystem will perform its intended function(s) satisfactorily under all conditions normally encountered in routine aeronautical operations for the environments intended. The MASPS may be implemented by one or more regulatory documents and/or advisory documents (e.g., certifications, authorizations, approvals, commissioning, advisory circulars, notices, etc.) and may be implemented in part or in total. A Safety Management System, as required by the implementing authorities, may cover an implementation. Any regulatory use of this document is the sole responsibility of appropriate governmental agencies.

TIS-B is a source of surveillance information and does not, by itself, guarantee the viability of the operational applications envisioned in this document. Application-specific requirements, in particular Application Capability and Transmit Quality Levels and any surveillance requirements not included therein, will be provided by the ASA MASPS [DO289, Change 1]. To gain operational benefits from TIS-B or to meet performance requirements, an application may require the inclusion of specific ground system functionality and/or additional systems installed on aircraft along with appropriate operational procedures. Any safety analyses conducted for the ASA applications should consider TIS-B as a surveillance source for those applications.

Section 1 of this document describes the TIS-B system and provides information needed to understand the rationale for system characteristics and requirements. It describes typical applications and operational goals, and establishes the basis for the requirements and standards presented in Sections 2 and 3. Definitions and assumptions essential to proper understanding of this document are also provided in this section.

Section 2 contains the minimum performance requirements for the entire TIS-B system necessary to enable the defined applications.

Section 3 contains the minimum performance standards for each subsystem and function that are necessary to meet the requirements of Section 2.

Section 4 describes procedures to verify system and subsystem performance (e.g., end-to-end performance verification) and subsystem performance that meet the minimum performance requirements.

Supplemental and clarifying material is contained in the appendices to this document.

Appendix A defines acronyms and important terminology used throughout the main body of the document.

Appendix B describes the target detection requirements for all existing surveillance systems within the National Airspace System.

Appendix C contains guidance material for the development of integrity monitoring features for the ground-based elements of TIS-B.

Appendix D lists the membership of Special Committee 186 as well as the list of Working Group 2 members who contributed to this document.

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The word "subsystem" as used in this document includes all components that make up a major independent, necessary and essential functional part of the system so that the system can properly perform its intended function(s). If the system, including any subsystem, includes computer software, the guidelines contained in RTCA Documents [DO178B] and [DO278] should be considered.

Although human factors requirements are not addressed by this document, it should be noted that the characteristics of the surveillance data transmitted by a TIS-B system will affect applications involving airborne surveillance processing and pilot display.

1.2 System Overview

TIS-B is a surveillance service that derives traffic information from one or more ground surveillance sources and broadcasts to ADS-B equipped aircraft or surface vehicles, with the intention of supporting ASA applications. The users of TIS-B include airborne aircraft, aircraft operating on an airport surface, and a select set of airport surface vehicles. For the purpose of this document, the terms aircraft and surface vehicles are synonymous, unless specifically called out otherwise. Furthermore, the terms users, pilots, and operators will be used interchangeably to refer to the operator of any of these vehicles. When referring to TIS-B targets the term aircraft may additionally refer to fixed obstacles.

The TIS-B system physical architecture is expected to include both regional control facilities and ground broadcast stations. TIS-B Control Facilities are where surveillance processing and report generation and distribution are performed for the TIS-B system, such that all targets are registered relative to each other and identified uniquely. TIS-B Control Facilities may be networked together to facilitate data exchange and coordination. Each TIS-B Control Facility may have one or more TIS-B Ground Stations affiliated with it. The Ground Stations may be at remote locations and each will contain, at a minimum, a transmitter for broadcasting the TIS-B messages. The TIS-B Control Facilities and Ground Stations may be part of other surveillance systems, and need not be separate, physical entities. Surveillance data transmitted between TIS-B Control Facilities and Ground Stations are to be secure, unalterable and protected from spoofing.

TIS-B services will be available where there is both adequate surveillance coverage from ground sensors and adequate Radio Frequency (RF) broadcast coverage from TIS-B Ground Stations. Where there is continuous surveillance and RF coverage, seamless TIS-B services can be provided. The level of quality of traffic information provided by TIS-B is dependent on the number and type of ground sensors available as sources for TIS-B and the timeliness of the reported data. Each ASA application will require a minimum level of quality for the TIS-B targets in the airspace where aircraft are performing the application. There are two ways that an aircraft can determine whether TIS-B targets meet the required level. First, individual TIS-B Target Reports (defined in §3.2.1.2.1) contain a quality measure from which the receiving aircraft may determine if an aircraft's report meets the application requirements. Alternatively, a TIS-B site's management information could identify the specific application(s) supported, so that all targets broadcast from that site are understood to qualify for the application(s).

Figure 1-2 shows the boundaries of the TIS-B system as defined in this document, and shows the TIS-B subsystems. Also shown are the input data sources for the TIS-B system, the ground and airborne data link subsystems that may be shared with other

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