1 Purpose and Scope

1.1 Introduction

This document contains Minimum Aviation System Performance Standards (MASPS) for Aircraft Surveillance Applications (ASA). This document is intended to:

- Specify requirements for and describe assumptions for all sub-systems supporting the operational application of ASA, e.g., Automatic Dependent Surveillance - Broadcast (ADS-B), Airborne Surveillance and Separation Assurance Processing (ASSAP), and Cockpit Display of Traffic Information (CDTI).
- Describe in detail specific operational applications of ASA.

These standards specify characteristics that should be useful to designers, installers, manufacturers, service providers and users for systems intended for operational use within the United States National Airspace System (NAS). Where systems are global in nature, the system may have international applications that are taken into consideration.

Compliance with these standards is recommended as one means of assuring that the system and each subsystem will perform its intended function(s) satisfactorily under conditions normally encountered in routine aeronautical operations for the environments intended. This MASPS may be implemented by one or more regulatory documents or advisory documents (e.g., certifications, authorizations, approvals, commissioning, advisory circulars, notices, etc.) and may be implemented in part or in total. Any regulatory application of this document is the sole responsibility of the appropriate governmental agencies.

Chapter 1 of this document describes the Aircraft Surveillance Applications system and provides information needed to understand the rationale for function characteristics and requirements. The ASA sub-functions consist of a surveillance function, a surveillance data processing function, and a display function. This section describes typical applications and operational goals, as envisioned by members of RTCA Special Committee 186, and establishes the basis for the standards stated in Chapters 2 and 3, including the use of Transmit Quality Level (TQL) and ASA Capability Level (ACL). Definitions and assumptions essential to the proper understanding of this document are also provided in this section. Additional definitions are provided in Appendix AA.

Chapter 2 describes minimum system performance requirements for the ASA applications under standard operating and environmental conditions. ASA functional requirements and associated performance requirements are provided. ASA Capability Levels are identified and specified.

Chapter 3 contains the minimum performance standards for each sub-subsystem that is a required element of the minimum system performance specified in Chapter 2, as well as the interface requirements between these sub-functions. Assumptions about expected standards for systems external to ASA are also documented.

Chapter 4 contains the minimum performance standards for each ADS-B IN system application. The applications are grouped into grouped into four broad categories: situational awareness, enhanced situational awareness, spacing applications, and delegated separation applications.

The appendices are as follows:

A: Acronyms and Definitions of Terms
B: Bibliography and References
C: Derivation of Link Quality Requirements for Future Applications
D: Design Trade-Off Considerations
E: Receive Antenna Coverage Constraints
F: Integrity Considerations for ADS-B Applications
G: Latency and Report Time Error Data
H: Derivation of Track Acquisition and Maintenance Requirements
I: Intent Guidance Material for Future ADS-B Intent Broadcast
J: Length/Width and Position Offset Coding
K: Future Air-Referenced Velocity (ARV) Broadcast Conditions
L: Determining the Navigation Accuracy Category for Velocity (NAC_V)
M: Compatibility of ASA MASPS with ADS_B Standards and Fielded Systems
N: MASPS / Link Compliance Matrices
O:
P:
Q:
R:

The word "sub-function" 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 sub-functions, includes computer software, the guidelines contained in [RTCA DO-178B] should be considered even for non-aircraft applications.

1.2 System Overview

Today's airspace system provides separation assurance from traffic in IFR operations via air traffic control and air traffic services (ATC/ATS), which are ground-based. These services utilize ground radar surveillance (primary and secondary surveillance radars), controller radar displays, air route infrastructure, airspace procedures including flight crew see and avoid, and VHF voice communications to assure separation standards are maintained. In the event of failure of this separation assurance system, aircraft equipped with Airborne Collision Avoidance Systems (ACAS), i.e., TCAS, are warned of potential mid-air collisions as a safety back up.

In order to accommodate expected increases in air traffic, a future separation assurance system is evolving using new technologies and automation processing support that is expected to enable the delegation of certain spacing or separation tasks to the flight deck. ASA represents the aircraft-based portion of this future separation assurance system. A wide range of separation assurance applications are expected to be developed over time that will enable enhanced airspace operations. These enhanced operations are intended to provide benefits in terms of increased safety and improved operational efficiencies such as increased system capacity and throughput. Only aircraft-based applications are discussed in this document. Ground-based applications are being developed, but are not within the scope of this document.

Airspace definitions are evolving to encompass the concepts of Required Surveillance Performance (RSP) and Actual Surveillance Performance (ASP). ASA will ultimately need to fit within the context of these concepts. It is intended that fundamental concepts defined in this MASPS, specifically Application Capability Level (ACL) and Transmit Quality Level (TQL), will support the future definition of RSP and ASP.

1.2.1 Definition of Aircraft Surveillance Applications

The Aircraft Surveillance Applications (ASA) system comprises a number of flight-deck-based aircraft surveillance and separation assurance capabilities that may directly provide flight crews with surveillance information as well as surveillance-based guidance and alerts. Surveillance information consists of position and other state data about other aircraft, and also, when on or near the airport surface, position and other state data about appropriately equipped surface vehicles or obstacles.

ASA applications are intended to both enhance safety and increase the capacity and efficiency of the air transportation system. Safety will be enhanced by providing improved traffic situational awareness as well as capabilities to assist in conflict prevention, conflict detection, and 4-D conflict resolution, both on the airport surface and while airborne. Capacity and efficiency will be enhanced by delegating certain spacing or separation tasks to the flight crew, for example:

- Allowing aircraft to safely approach closer to each other than is possible using current surveillance systems and operational procedures;
- Improving runway throughput in instrument meteorological conditions (IMC) through use of new cockpit tools; and
- Accommodating more kinds of flight trajectories than ATC currently authorizes.

The individual ASA applications are described in §1.4. It is a goal of these applications to minimize any increase in workload while maximizing increased safety. Particular attention to preventing workload increases is necessary during critical phases of flight, such as final approach and landing.

Some ASA applications are independent of ground systems and air traffic control, while others depend on or interact with services provided by ground systems and air traffic control. This MASPS does not specify requirements for ground systems other than Traffic Information Service – Broadcast (TIS-B), but does state assumptions about the functional and performance capabilities of the services they provide to the extent that these are required by ASA applications. While ADS-B may be used to augment or improve current ATC ground surveillance, these uses are outside the scope of this ASA MASPS.

1.2.1.1 Background Applications

Background applications are those applications that apply to all surveilled traffic of operational interest. These applications may be in use in some or all airspace (or on the ground), but without flight crew input or automated input to select specific traffic. Background applications include Enhanced Visual Acquisition, Conflict Detection, Airborne Conflict Management, Airport Surface Situational Awareness, and Final Approach and Runway Occupancy Awareness.

1.2.1.2 Coupled Applications

Coupled applications are those applications that operate only on specifically-chosen (either by the flight crew or automation) traffic. They generally operate only for a specific flight operation. Coupled applications include Enhanced Visual Approach, Approach Spacing for Instrument Approaches, and Independent Closely Spaced Parallel Approaches. Note that these applications may not necessarily require any cooperation from the traffic, other than that the necessary information to support the application must be provided through ADS-B or TIS-B.

1.2.1.3 Application Assumptions

To achieve the expected gains, this document makes certain assumptions about the how the use of this new technology. These assumptions include, but are not limited to:

A. Flight crews, in appropriately equipped aircraft, will be able to perform functions currently done by ATC, some of which may be at reduced separation standards compared to current separation standards.
B. There is a "variance in the spacing" between aircraft in the arrival stream for approach and landing operations in today's environment that will be reduced with the use of certain ASA applications.
C. Pilots will be willing to accept separation responsibility currently provided by ATC.
D. Pilot and controller workload will not be increased by ASA applications.
E. Most aircraft will eventually be equipped with avionics to perform ASA applications (this is necessary to maximize benefits).
F. ATC will be willing to act as a "monitor" and retain separation responsibility between designated aircraft.
G. ADS-B avionics will be compatible with ATC conflict probing equipment (e.g., User Request Evaluation Tool (URET)).

These assumptions have not yet been fully validated, nor have any new operational procedures been approved.

1.2.1.4 Transmit Quality Level (TQL)

Transmit Quality Level (TQL) is an indication of the quality of transmitted surveillance data. TQL allows the receiver of surveillance information to assess the suitability of the received surveillance data to support a user application. TQL is further described in §3.1.1.

1.2.1.5 ASA Capability Level (ACL)

ASA Capability Level (ACL) is an indication of the ASA applications that can be performed, but that are not necessarily in use, on the transmitting aircraft. ACL provides users, including the ground system, with information necessary to identify the application capabilities of the transmitting aircraft and how they may interact. ACL thus allows the receiving aircraft to determine which aircraft are capable of performing coupled applications. ACL is further described in §2.2.

1.2.2 ASA Architecture

Figure 1-2 provides an overview of the ASA system architecture and depicts the interfaces between functional elements for an ASA aircraft participant. The ASA system architecture consists of three major components: subsystems for ASA transmit participants, subsystems for ASA receive participants, and ground systems. The subsystems include surveillance functions (ADS-B, ADS-R, and TIS-B transmit and receive), a surveillance data processing function, Airborne Surveillance and Separation Assurance Processing (ASSAP), and a display function (Cockpit Display of Traffic Information - CDTI). ASA also interfaces with other aircraft systems. Requirements for these functions are developed in Chapter 2 through Chapter 4.

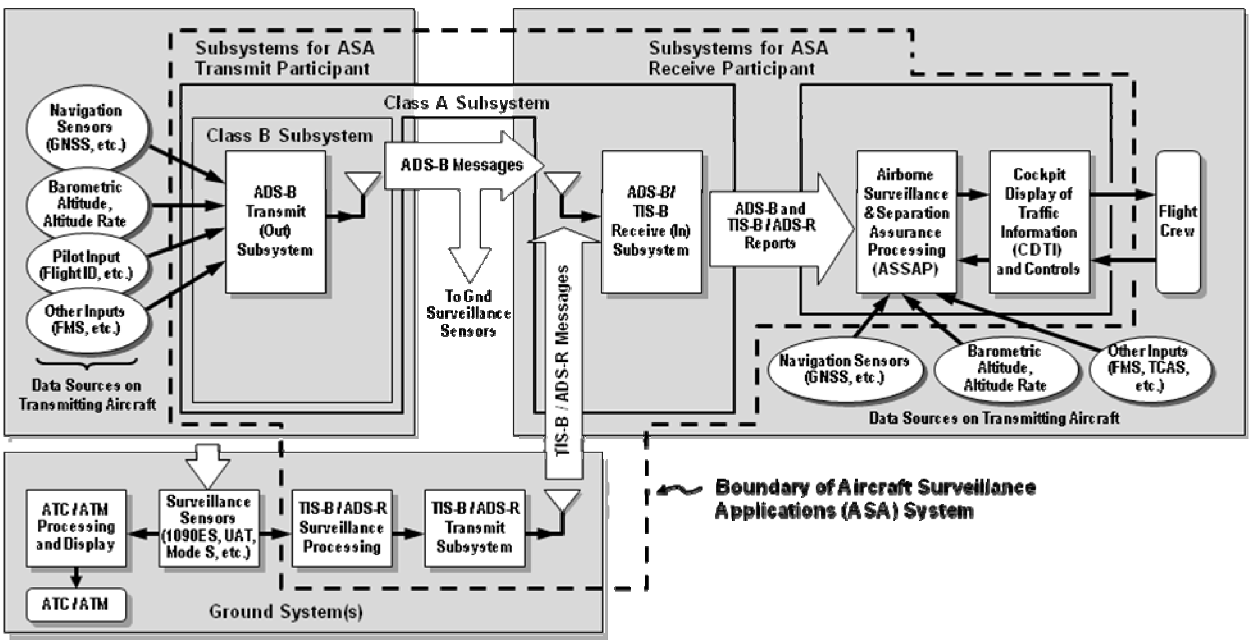

Figure 1-2: Overview of ASA Architecture

Note that there is a clear distinction in the diagram between messages and reports. An ADS-B Message is a block of formatted data that conveys the information elements used in the development of ADS-B reports. Message contents and formats are specific to each of the ADS-B data links. The MASPS does not address message definitions and structures. An ADS-B report contains the information elements assembled by an ADS-B In receiver using messages received from a transmitting airborne and ground participant. These information elements are available for use by applications external to the ADS B system.

1.2.2.1 ASA Transmit Participant Subsystems

1.2.2.2 ASA Receive Participant Subsystems

1.2.2.2.1 Message Reception

ADS-B, ADS-R, and TIS-B messages are received by the ADS-B/TIS-B Receive Subsystem at the receiving ASA Aircraft/Vehicle (A/V). The ADS-B/TIS-B Receive Subsystem processes these messages and provides ADS-B and TIS-B traffic reports to ASSAP.

1.2.2.2.2 ASSAP

ASSAP is the processing subsystem that accepts surveillance inputs, e.g., ADS-B reports, performs surveillance processing to provide reports and tracks, and performs application-specific separation assurance processing. Surveillance reports, tracks, and any application-specific alerts or guidance are output by ASSAP to the CDTI function. In addition to these interfaces and depending on the actual ASA application, ASSAP may interface to the Flight Management System (FMS) and / or the Flight Control (FC) systems for flight path changes, speed commands, etc. ASSAP also interfaces with:

- The ADS-B transmitter and receiver to support transmission of application-specific messages, etc.,
- Inputs from the own-ship navigation system to obtain state information on own aircraft, and
- TCAS (TCAS I and TCAS II), for combined displays. Also, some applications (e.g., CD and ACM) may suppress alerts in the event that TCAS advisories are present; other applications (e.g., ICSPA) may suppress TCAS advisories on specific targets

1.2.2.2.3 CDTI

The CDTI subsystem includes the actual display media and the necessary controls to interface with the flight crew. Thus, the CDTI consists of a display and a control panel. The control panel may be a dedicated CDTI control panel or it may be incorporated into another control, e.g., a multi- function control display unit (MCDU). Similarly, the CDTI display may also be a stand-alone display (dedicated display) or the CDTI information may be presented on an existing display (e.g., multi-function display).

The TCAS traffic display may be a separate display or TCAS traffic may be integrated with ASA surveillance data and presented in a combined format. If TCAS traffic is integrated with other surveillance data, only one symbol should be displayed to the flight crew for any one aircraft.

Notes:

1. *It is highly desirable that the TCAS traffic display be integrated with the CDTI.*
2. *The flight crew should be instructed, as they are today, that they should not maneuver to avoid a target based solely on displayed TCAS traffic without first visually acquiring the traffic.*

1.2.2.3 Ground Subsystems

1.2.2.3.1 TIS-B

Traffic Information Service Broadcast (TIS-B) messages are processed to include similar surveillance information obtained through ground surveillance systems. TIS-B messages are broadcast by the TIS-B Transmit Subsystem.

1.2.2.3.2 ADS-R

There are currently several non-compatible links used for ADS-B. While not part of the initial standards defined in the TIS-B MASPS [RTCA DO-286], the added capability of re-transmitting ADS-B data received from other ADS-B data links to ensure interoperability (i.e., a "multi-link gateway") is planned for revision A of that document. Automatic Dependent Surveillance – Rebroadcast (ADS-R) messages are crosslink translations from UAT to 1090ES and from 1090ES to UAT provided by the ground surveillance service.

1.2.2.3.3 Air Traffic Control / Air Traffic Management (ATC/ATM)

Ground Interval Management (GIM) description here

1.2.3 Relationship to Other Systems

The concepts of ADS-B and CDTI were largely developed prior to the overall ASA concept. Requirements for ASA consider previously defined ADS-B requirements and CDTI concepts. ASA applications were developed with the idea of using ADS-B and TIS-B surveillance information, and providing that information to the flight crew via a CDTI. It was also realized that some sort of surveillance and application processing would be required to support these applications, which led to the concept of an Airborne Surveillance and Separation Assurance Processing (ASSAP) subsystem. During early development work on Minimum Operational Performance Standards (MOPS) for ADS-B, CDTI and ASSAP, it became clear that the requirements for these systems needed to be based on the requirements of the applications themselves. As such, the need for an overall concept of Aircraft Surveillance Applications (ASA) was realized and resulted in this MASPS. In addition, GPS and other navigation systems were well defined prior to the definition of ADS-B and are also fundamental to ASA.

1.2.3.1 Navigation Data Sources

Surveillance is provided by sharing information among aircraft using Automatic Dependent Surveillance - Broadcast (ADS-B). In ADS-B, each aircraft determines its own position and other state information, and broadcasts this information over a data link. Other aircraft may receive this information, and compare it with their own position to accurately determine relative positioning. Ground systems may also use ADS-B information to augment or replace less accurate radar-based surveillance information, or to provide cost effective surveillance coverage in non-radar airspace.

Because there are aircraft/vehicles (A/Vs) that may not be equipped with ADS-B, TIS-B has been developed to provide the broadcast of non-ADS-B equipped traffic position data. TIS-B may also rebroadcast surveillance information from different ADS-B links.

Processing is performed by ASSAP, which takes the incoming surveillance information and processes it according to the appropriate ASA application(s) as selected by the flight crew. For example, the ASSAP may predict a violation of the applicable separation minima, and determine appropriate resolution guidance.

Display is accomplished through a Cockpit Display of Traffic Information (CDTI). The CDTI provides the flight crew interface to the ASA system. It displays traffic information as processed by the ASSAP. It provides other necessary information, such as alerts and warnings, and guidance information. The CDTI also provides flight crew inputs to the system, such as display preferences, application selection, and designation of specific targets and parameters for certain applications.

To fill this information gap, the concept of Traffic Information Service Broadcast (TIS-B) was developed. Within their coverage areas, ground surveillance systems can determine the positions of transponder-equipped aircraft and broadcast this position data to ASA-equipped aircraft via TIS-B. Recently developed multilateration surveillance systems planned for the airport surface can provide position accuracies comparable to those from GPS. Away from the vicinity of the airport, ground radar systems will provide less accuracy, but the position information may still be suitable for providing situational awareness with respect to aircraft not equipped with ADS-B position reporting.

1.2.3.2 TCAS

The Traffic-Alert and Collision Avoidance System (TCAS), known internationally as the Airborne Collision Avoidance System (ACAS), provides flight crews with a traffic situation display and with safety alerts. Its success, and the attempt to use it for some additional applications for which it was not intended or well suited, helped promote interest in a more general ASA system to address those applications not directly associated with collision avoidance.

TCAS provides a backup safety system for separation assurance. On aircraft that carry both an ASA and a TCAS, the TCAS collision avoidance function must continue to function correctly when ASA fails. This need does not preclude an avionics architecture that integrates TCAS and ASA functionality in the same equipment, provided the frequency of common mode failures is sufficiently small in the context of providing collision avoidance protection when separation provision has failed. The operational uses of TCAS and ASA, and in particular their flight crew interfaces, will have to be carefully coordinated in order to ensure that all the intended safety and operational benefits are provided.

Note: *If future ASA capabilities are proven to provide increased safety, the interaction between ASA and TCAS may be altered; this will require validation.*

ADS-B surveillance differs from TCAS surveillance in that ADS-B broadcasts position and velocity information while TCAS derives relative position information through an interrogate – reply protocol. ADS-B covers a larger range (potentially 90 to 120 NM), and has greater overall accuracy. Altitude information in both systems is dependent upon on-board equipment. As a last-minute safety system, TCAS only needs to provide surveillance to approximately 15 NM. While TCAS measures range with great accuracy, it is unable to make highly accurate bearing measurements because of the limitations imposed by the available antenna technology that can be installed on aircraft. When GNSS is used as the navigation data source for ADS-B, highly accurate position measurements can generally be provided in all dimensions. This may allow added integrity to vertical height based only on pressure altitude. The relative position between two aircraft is calculated from these position reports, rather than measured, and the accuracy does not depend on the distance between the aircraft. The relative position will also differ from TCAS systems in allowing for relatively compact and inexpensive implementations suitable for categories of aircraft where TCAS is not required and is not economically attractive.

1.2.4 Relationship To Other RTCA / EUROCAE Documents

The diagram in Figure 1-3 shows the relationships between the Aircraft Separation Assurance (ASA) MASPS and other RTCA SC-186 documents, such as the Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Service – Broadcast (TIS-B) MASPS and the various link Minimum Operational Performance Standards (MOPS). Two RTCA link MOPS have been identified: 1090 MHz Extended Squitter ADS-B (1090ES) and Universal Access Transceiver (UAT). The 1090ES MOPS has recently been revised and issued as [RTCA DO-260B], Minimum Operational Performance Standards for 1090 MHz Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Services (TIS-B) [RTCA DO-260B]. The UAT MOPS has been published as [RTCA DO-282B], Minimum Operational Performance Standards for Universal Access Transceiver (UAT) Automatic Dependent Surveillance – Broadcast (ADS-B) [RTCA DO-282B]. EUROCAE Working Group 51 has issued [ED-108], which is a MOPS for VDL Mode 4, which is a third ADS-B link. Additionally, EUROCAE Working Group 51 has released [ED-102A] which is identical to [RTCA DO-260B].

As stated in §1.2.4, the development of the applications was based upon existing concepts and published standards for CDTI, ADS-B, and TIS-B. However, as the concepts were matured, and the analysis completed, it was realized that some performance requirements in addition to those in current standards (e.g., RTCA DO-242A) would be beneficial for the initial five ASA applications and might be required in future applications. While this MASPS introduces requirements on ADS-B systems beyond those currently specified, the five initial applications defined in this version of this MASPS are expected to operate while interfacing with either [RTCA DO-242] or [RTCA DO-242A] compliant systems. It is a goal of this MASPS, and it is strongly urged that it be a goal of subsequent subsidiary requirements documents, to maintain backward compatibility of existing systems as new requirements are generated (see Appendix AE for more discussion of the compatibility of this MASPS with the above referenced documents).

The Airborne Surveillance and Separation Assurance Processing (ASSAP) and the Cockpit Display of Traffic Information (CDTI) functions are closely related items and are planned to be written as a joint MOPS, which will be termed the "Airborne Separation Assurance System (ASAS) MOPS (see [ASAS Circular]).

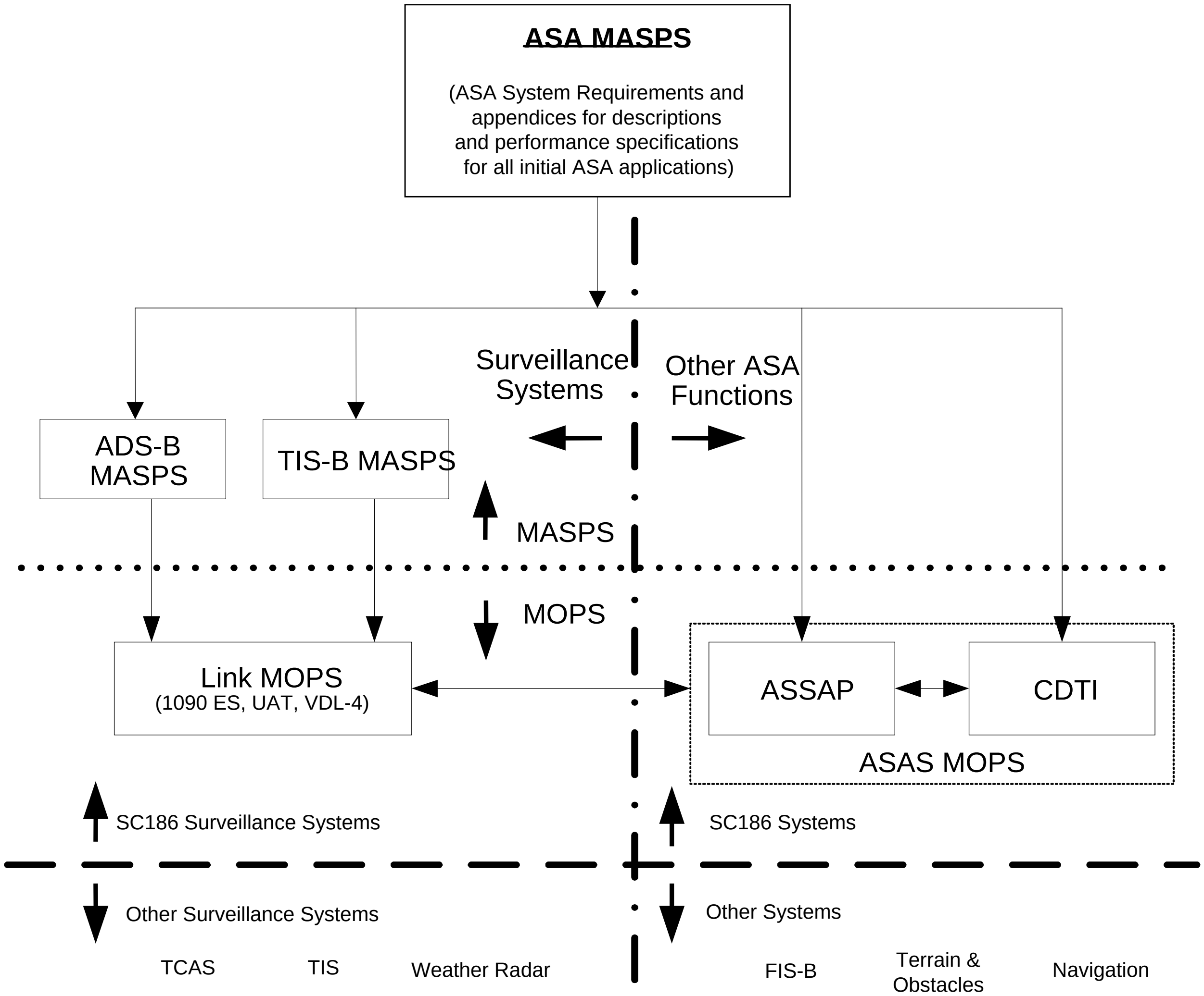

Figure 1-3: Relationship Between ASA MASPS And Other RTCA Documents

Note: *The VDL-4 link MOPS is a EUROCAE document, not an RTCA document.*

Figure 1-3 also shows the functions under the auspices of RTCA SC-186 and those systems outside the scope of RTCA SC-186. This MASPS document makes requirements allocations to the functions under the auspices of RTCA SC-186 and makes assumptions on the systems outside the scope of RTCA SC-186.

Surveillance Systems that are outside of the scope of RTCA SC-186 are the Traffic Alert and Collision Avoidance System (TCAS), Traffic Information Service (TIS), weather radar, and Flight Information Services – Broadcast (FIS-B). Terrain systems, e.g., Terrain Awareness and Warning System (TAWS) and Navigation systems, e.g., GPS, are also outside the scope of RTCA SC-186.

1.3 Operational Applications

The situational awareness and separation assurance capabilities of ASA are provided by applications. Numerous applications have been proposed, and it is expected that additional applications will be developed and standardized in future versions of this MASPS. This document specifies detailed requirements for an initial set of applications. The following applications are described in Section 4:

- Enhanced Visual Acquisition (EVAcq)
- Conflict Detection (CD)
- Airport Surface Situational Awareness (ASSA)
- Final Approach and Runway Occupancy Awareness (FAROA)
- Enhanced Visual Approach (EVApp)
- In Trail Procedure (ITP)

Preliminary requirements are also proposed for three future applications, although these applications are not yet defined in full detail. Preliminary analyses have been performed to determine the likely requirements necessary to support the following applications:

- Airborne Conflict Management (ACM)
- Interval Management (IM)
- Approach Spacing for Instrument Approaches (ASIA)
- Independent Closely Spaced Independent Parallel Approaches (ICSPA)

The term "preliminary analysis" as used in this MASPS refers to a top level assessment and analysis of an application. Preliminary analyses were performed to derive key requirements (e.g., Transmit Quality Level, ASA Capability Level, required surveillance performance, etc.) of these anticipated future applications to allow manufacturers to anticipate these requirements in their equipment designs, potentially avoiding costly redesigns as new applications become available.

The three future applications were selected due to the expectation that each imposes stringent requirements that may define some limiting ASA performance requirements that will be needed to support other future applications. Specifically, ASIA was selected for preliminary analysis in order to determine requirements for a spacing application that can be conducted in IMC. ACM was analyzed since it addresses conflict prediction, detection and resolution of aircraft-to-aircraft trajectories that may result in loss of separation using relatively long look ahead times, e.g., 2 to 5 minutes. ICSPA was selected since it represents a relatively high-integrity application for a pair-wise airborne separation assurance operation involving close separations in IMC.

Other potential future applications are in various stages of development. Descriptions of these applications can be found elsewhere: [FAA, 2000], [RTCA, 1998], and [RTCA, 2000].

From an operational perspective, ASA applications may be considered in terms of their allocated separation assurance responsibilities. The following categories of applications were defined in the Principle of Operations for the use of ASAS document [PO-ASAS]:

- Airborne Traffic Situational Awareness applications: These applications are aimed at enhancing the flight crews' knowledge of the surrounding traffic situation both in the air and on the airport surface, and thus improving the flight crew's decision process for the safe and efficient management of their flight. No changes in separation tasks or responsibility are required for these applications.
- Airborne Spacing applications: These applications require flight crews to achieve and maintain a given spacing with designated aircraft, as specified in a new ATC instruction. Although the flight crews are given new tasks, separation provision is still the controller's responsibility and applicable separation minima are unchanged.
- Airborne Separation applications: In these applications, the controller delegates separation responsibility and transfers the corresponding separation tasks to the flight crew, who ensures that the applicable airborne separation minima are met. The separation responsibility delegated to the flight crew is limited to designated aircraft, specified by a new clearance, and is limited in time, space, and scope. Except in these specific circumstances, separation provision is still the controller's responsibility. These applications will require the definition of airborne separation standards.
- Airborne Self-separation applications: These applications require flight crews to separate their flight from all surrounding traffic, in accordance with the applicable airborne separation minima and rules of flight.

Individual applications are assigned to the most critical category envisioned for their use. However, individual applications may also span the less critical categories.

The following sections provide an overview of how each of the eight ASA applications defined in this MASPS fits within these application groupings. Chapter 2 defines these applications in more functional detail and includes end-to-end ASA requirements needed to support these applications.

1.3.1 Situational Awareness Application

Airborne Traffic Situational Awareness applications: These applications are aimed at enhancing the flight crews' knowledge of the surrounding traffic situation both in the air and on the airport surface, and thus improving the flight crew's decision process for the safe and efficient management of their flight. No changes in separation tasks or responsibility are required for these applications.

1.3.1.1 Airborne – AIRB

The enhanced traffic situational awareness during flight operations (AIRB), or Enhanced Visual Acquisition (EVAcq), application represents the most basic of ASA applications, and use of the CDTI. The CDTI provides relative range, altitude and bearing data for participating aircraft, which will assist the flight crew in their aircraft visual search task. AIRB is considered a background application.

1.3.1.2 Approach – VSA

The enhanced visual separation on approach (VSA), or Enhanced Visual Approach (EVApp), application is an extension of the current visual approach procedure. In this application, the CDTI is used by the flight crew to detect and track the preceding aircraft more effectively. VSA is considered to be a coupled application, as it applies only to the preceding aircraft.

1.3.1.3 Surface – SURF

The objective of the surface situational awareness (SURF), or Airport Surface Situational Awareness (ASSA), application is to provide the flight crew with own-ship positional and traffic situational awareness information relative to an airport map. This information may be used to support determination of their position, and subsequently determine the appropriate taxi route while also observing other traffic along that route. The flight crew may use the display as a supplemental aid to their out-the-window visual scan and taxi task. The flight crew must not use the display as the primary means of information for taxiing (i.e., blind taxiing). SURF considered to be a background application.

1.3.2 Enhanced Situational Awareness Applications

These applications are aimed at enhancing the flight crews' knowledge of the surrounding traffic situation both in the air and on the airport surface, and thus improving the flight crew's decision process for the safe and efficient management of their flight. Enhancements over the basic situational awareness applications is the provision of cueing to the pilot through indications and alerts. No changes in separation tasks or responsibility are required for these applications.

1.3.2.1 Oceanic – ITP

In-Trail Procedures in Oceanic Air Space

1.3.2.2 Approach – CAVS

CDTI Assisted Visual Separation

1.3.2.3 Surface - SURF IA

Surface situational awareness with indications and alerts

1.3.3 Spacing Applications

These applications require flight crews to achieve and maintain a given spacing with designated aircraft, as specified in a new ATC instruction. Although the flight crews are given new tasks, separation provision is still the controller's responsibility and applicable separation minima are unchanged.

1.3.3.1 Enroute / Terminal - FIM-S

Flight deck interval management, spacing

1.3.3.2 Advanced

1.3.4 Delegated Separation Applications

In these applications, the controller delegates separation responsibility and transfers the corresponding separation tasks to the flight crew, who ensures that the applicable airborne separation minima are met. The separation responsibility delegated to the flight crew is limited to designated aircraft, specified by a new clearance, and is limited in time, space, and scope. Except in these specific circumstances, separation provision is still the controller's responsibility.

1.3.4.1 Enroute / Terminal - FIM-DS

Flight deck based interval management, delegated separation

1.3.4.2 Enroute / Terminal – ICSPA

Independent Closely Spaced Parallel Approaches

1.3.4.3 Enroute – DS-C/P

Delegated separation, paired closely spaced parallel approaches

1.3.4.4 Enroute – DSWRM

Delegated separation, wake risk management

1.3.5 Self Separation Applications

These applications require flight crews to separate their flight from all surrounding traffic, in accordance with the applicable airborne separation minima and rules of flight.

1.3.5.1 Flow Corridors

Separation responsibility transferred to aircraft for more than one flight in a track structure

1.3.5.2 Self Separation

Aircraft no longer fly defined trajectories, instead maneuver without conflict.