International Civil Aviation Organization

EIGHTEENTH MEETING OF THE COMMUNICATIONS/NAVIGATION AND SURVEILLANCE SUG-GROUP (CNS SG/18) OF APANPIRG

Asia and Pacific Regional Sub-Office, Beijing, China
(21 – 25 July 2014)

Agenda Item 7.2: Other Surveillance Related Issues

UPDATE ON ADS-B IMPLEMENTATION

(Presented by United States of America)

SUMMARY

This paper presents an update on U.S. ADS-B implementation activities.

1. INTRODUCTION

This paper provides a summary of activities and status that may be of interest to the ADS-B Study and Implementation Task Force.

1.1 RTCA Special Committee 186

The last meeting of RTCA SC-186 was held on 20 March 2014, held as a joint session with EUROCAE WG-51. The Joint RTCA/EUROCAE Plenary approved two documents for transmittal to the RTCA Program Management Committee and the EUROCAE Council:

(a) the proposed DO-317B/ED-194A (ADS-B-In Application MOPS) and;

(b) the proposed Safety, Performance and interoperability Requirements (SPR) document for Cockpit Display of Traffic Information (CDTI) Assisted Visual Separation (CAVS).

DO-317B/ED-194A includes new ADS-B-In application requirements for Traffic Situation Awareness with Alerts (TSAA) and for CAVS. TSAA is intended for use by general aviation aircraft without Airborne Collision Avoidance System (ACAS) II capability.

The RTCA Program Management Committee approved DO-317B and DO-354 (the CAVS SPR) on 17 Jun 2014.

Currently the joint RTCA/EUROCAE ADS-B committees are work on the development of an SPR and MOPS for Flight-deck-based Interval Management (FIM); this work is expected to complete in early 2015.

A summary of SC-186 activities and products can be found on the internet at: http://www.rtca.org/content.asp?pl=108&sl=33&contentid=88 .

2. FAA IMPLEMENTATION ACTIVITIES AND STATUS

2.1 Regulatory Activities

The FAA has conducted a variety of ADS-B-related regulatory activities and has continued activities planned for the future as ADS-B-In avionics standards continue to evolve.

2.1.1 Advisory Circular (AC) 20-165A

The initial version of this AC, providing installation guidance for ADS-B Out avionics, was released by the FAA at the same time as the U.S. ADS-B Out final rule. This AC provides installation guidance for avionics that meet FAA Technical Standard Order (TSO)-C166b/C154c (DO-260B/DO-282B, also known as "ADS-B Version 2") and was updated as a result of FAA certification experience to AC 20-165A on 7 Nov 2012. The U.S. ADS-B Final Rule, the Version 2 TSOs, and AC 20-165A are referenced in section 4.

2.1.2 AC 90-114, Change 1

The FAA Flight Standards Service indicates that no operational approval is required for aircraft with avionics compliant with AC 20-165A to operate in U.S. airspace defined in Title 14 of the Code of Federal Regulation (14 CFR) § 91.225 (part of the U.S. ADS-B Final Rule). The original AC was published on 8 December 2011 and contained general guidance and operational consideration information regarding ADS-B. AC 90-114, Change 1, which added an appendix providing guidance for obtaining approval for ITP, was published on 21 September 2012 (see section 4).

Future appendices to the AC will provide guidance for additional individual ADS-B-In applications as appropriate.

2.1.3 Technical Standard Order (TSO)-C195a

This TSO was released by the FAA on 29 February 2012. This TSO invokes RTCA DO-317A (identical to EUROCAE ED-194) and covers the following applications:

(a) Enhanced Visual Acquisition (EVAcq)
(b) Basic Airborne (AIRB) [ICAO ASBU B0-ASEP]
(c) Visual Separation on Approach (VSA) [ICAO ASBU B0-ASEP]
(d) Basic Surface (SURF) [ICAO ASBU B1-SURF]
(e) In-Trail Procedures (ITP) [ICAO ASBU B0-OPFL]

See section 4 for TSO-C195a.

TSO-C195b, based on DO-317B (described above), is planned for release by the end of September 2014.

2.1.4 AC 20-172A

This AC was published on 23 Mar 2012 and provides airworthiness guidance for ADS-B-In systems and applications. Revisions were made from AC 20-172 to reflect feedback comments from the industry and to reflect the additional applications (EVAcq and ITP) in TSO-C195a (versus TSO-C195). See section 4.

AC 20-172B, a revision of AC 20-172A to provide guidance for the additional ADS-B-In applications included in TSO-C195b (DO-317B), is planned for release by the end of 2014.

2.2 Surveillance and Broadcast Services Program

The U.S. Federal Aviation Administration (FAA) is delivering Surveillance and Broadcast Services (SBS) as described in this section. SBS services are provided via a set of FAA-specified service volumes in en route airspace, terminal area airspace, and on airport surfaces.

ADS-B: Aircraft with ADS-B Version 2 avionics certified and installed in accordance with FAA Advisory Circular (AC) 20-165A (or an equivalent approved by FAA Aircraft Certification) will receive ATC separation service in the U.S., implementing ICAO ASBU B0-ASUR. See Figure 1 below.

> ***Note**: Specifically-approved aircraft equipped with Version 1 avionics are currently receiving ADS-B-only ATC separation services in Alaska and the Gulf of Mexico.*

The U.S. is supporting two ADS-B links:

- The 978 MHz Universal Access Transceiver (UAT) link per FAA Technical Standard Order (TSO)-C154c [see References];
- The 1090 MHz Extended Squitter (1090ES) link per TSO-C166b [see References].

The U.S. ADS-B Final Rule [see References] requires aircraft that operate above FL180 to broadcast on the 1090ES link. The FAA is not prescribing the choice of link for aircraft flying below FL180; both links are supported and operators are free to choose whichever link meets their needs. Aircraft broadcasts go to other aircraft and to ground radio stations, where the information is processed and displayed to controllers. Where available, information from FAA radars is combined with ADS-B data to support ATC separation services.

Aircraft with ADS-B-In capability directly receive aircraft broadcasts on the same link around them, limited in range only by line-of-sight or received signal strength. Aircraft broadcasting on one link (example: UAT) are not received by aircraft using only the other link (example: 1090ES) and vice/versa, which justifies the ADS-R service described below.

On 28 May 2010, the U.S. ADS-B Final Rule was published, requiring ADS-B Out equipage in U.S. airspace where a transponder is currently required, with compliance required after 1 Jan 2020. The U.S. ADS-B Final Rule also specifies requirements for broadcast information, including minimum thresholds for position/velocity accuracy and integrity.

ADS-R: ADS-Rebroadcast (ADS-R) is a pilot advisory service that receives data from aircraft on one link and immediately rebroadcasts it on the other link. See Figure 1 below. To conserve spectrum, the service identifies aircraft broadcasting that they are ADS-B-In equipped as "client" aircraft. The traffic broadcasting on the other link within a specified radius and altitude band around each client aircraft are then rebroadcast on the client's link via ADS-R. Note that ADS-R services are only available when both aircraft are within range of any ADS-B ground radio station. Since ADS-B ground stations are sited to cover current radar airspace, this means that there will be regions of airspace (typically at lower altitudes) without ADS-R coverage. Various avionics manufacturers are considering the market opportunities for ADS-B avionics with dual-link receive capability.

TIS-B: Traffic Information Service - Broadcast (TIS-B) is a pilot advisory service for situation awareness, gathering data from U.S. ATC radars, Wide Area Multilateration (WAM) systems such as those used in Alaska/Colorado, and surface multilateration systems like ASDE-X [ICAO ASBU B0-SURF]. See Figure 1 below. This non-ADS-B surveillance information is broadcast as a TIS-B service through ground radio stations to participating aircraft on both links. Like ADS-R, appropriately equipped aircraft are identified as client aircraft and non-ADS-B traffic within a specified radius and altitude band around the client aircraft are selected for TIS-B. Unlike ADS-R, TIS-B messages are structured so that information about multiple aircraft can be packaged into a single TIS-B broadcast.

FIS-B: Flight Information Service - Broadcast (FIS-B) is a pilot advisory service supported by the FAA that is only broadcast on the UAT link. See Figure 1 below. The FIS-B message set contains Airman's Meteorological Information, Aviation Routine Weather Report (METAR) and Unscheduled Specials, Next Generation Radar (NEXRAD) precipitation reflectivity, Pilot Reports (urgent and routine), Significant Meteorological Information, Terminal Area Forecast and unscheduled

Amendments, Winds and Temperatures Aloft, Notices to Airmen (NOTAMs) important to flight safety, and Status of Special Use Airspace.

The FAA is considering additional products for the FIS-B service in the future. Products under consideration include Echo tops, Lightning strikes, Severe Weather Forecast Alerts and Severe Weather Watch Bulletin, Ceilings, Digital Automated Terminal Information Service, Icing (Current/Forecast Potential), Terminal Weather Information for Pilots, and Turbulence.

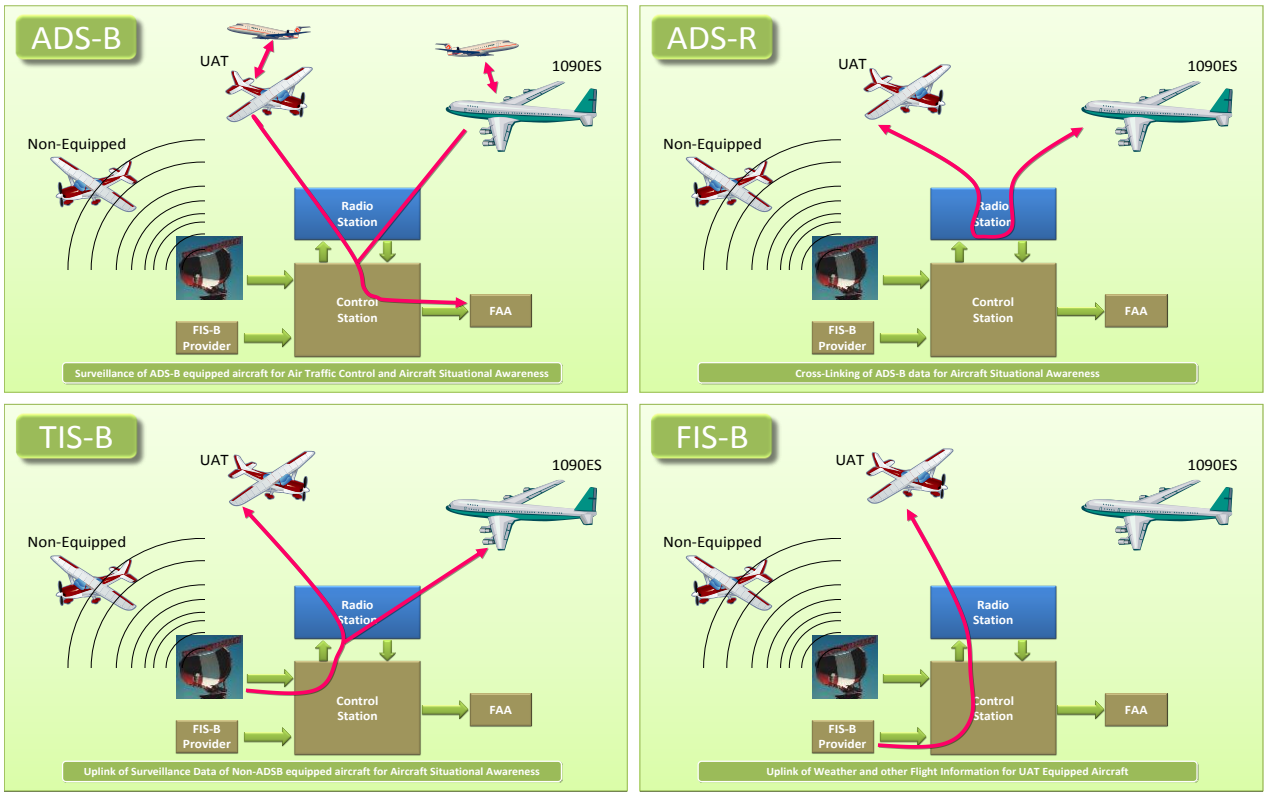


Figure 1

This figure is copyright 2007, ITT Corporation, and used by permission

2.2.1 Service Delivery Approach and Implementation Status

ITT/Exelis [1] is the prime contractor selected by the FAA under a service contract to provide surveillance and broadcast services. The Exelis ground radio infrastructure receives/transmits messages from either ADS-B Version 1 or 2 avionics. The Exelis infrastructure also receives messages from ADS-B Version 0 avionics, but does not transmit TIS-B/ADS-R uplink messages in ADS-B Version 0 format. At a point prior to 2020, ground station transmission of TIS-B/ADS-R/ FIS-B messages in the ADS-B Version 1 format will be discontinued.

As of 31 March 2014, 634 radio sites had been installed by Exelis; these sites cover the "baseline" set of Service Volumes planned by the FAA in 2007. Since 2007, FAA has planned and funded activities to activate additional Service Volumes that will constitute an additional 29 radio sites. See Figure 2 below for a map of the total ("baseline" plus additional) radio sites planned as of 23 June 2014; a map of the currently operational radios can be found at: http://www.faa.gov/nextgen/flashmap

[1] FAA's contract was awarded in 2007 to ITT Corporation, but in 2011, ITT Corporation separated into three independent publicly traded companies. One of these companies is Exelis, and the FAA contract is now performed by this company. All further references in this paper are therefore to "Exelis."

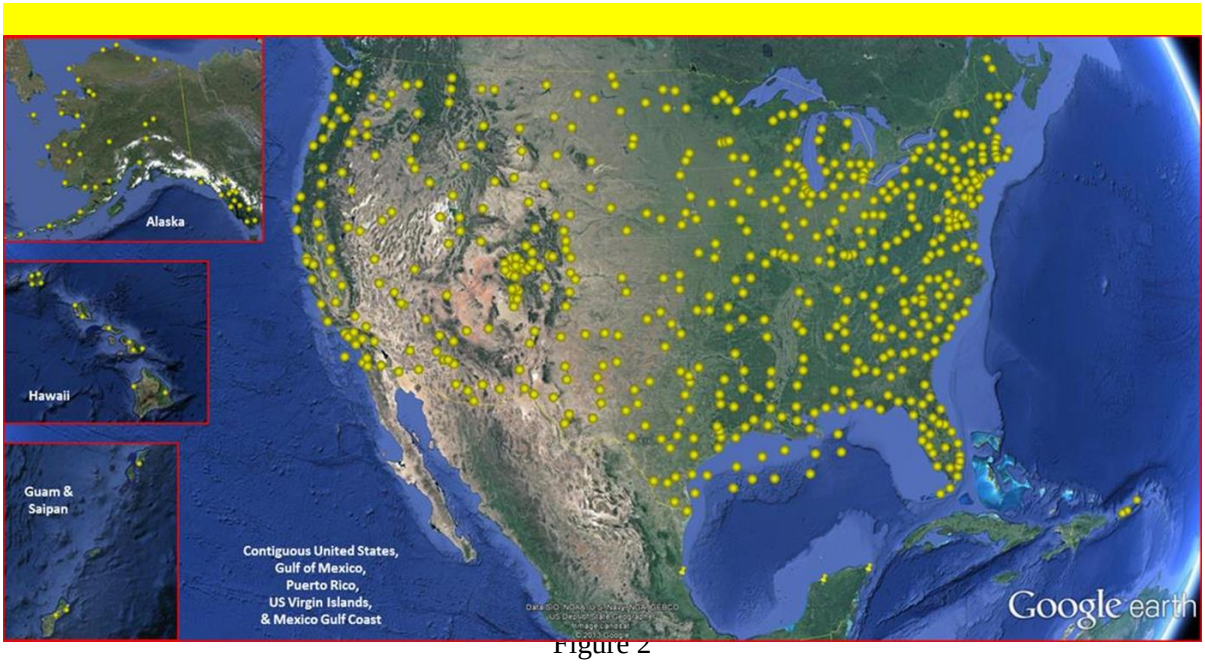


Figure 2

2.2.2 SBS Monitor

The SBS Monitor provides an FAA-developed independent monitor of the status of the Exelis ground infrastructure and provides an assessment of Exelis' performance in delivering services to the FAA. The SBS Monitor performs or will perform the following functions:

1) Contract Technical Performance Monitoring
   These Technical Performance Measures (TPMs) nominally include the latency, availability, and update rate of the SBS services provided by Exelis. The FAA Contracting Officer uses the TPMs to evaluate the quality of the SBS services provided by Exelis.

2) Avionics Compliance Monitoring
   These aircraft ADS-B reports measure equipage, characterize duplicate/invalid International Civil Aviation Organization (ICAO) address issues, and evaluate compliance with avionics performance requirements defined in 14 CFR §91.227.

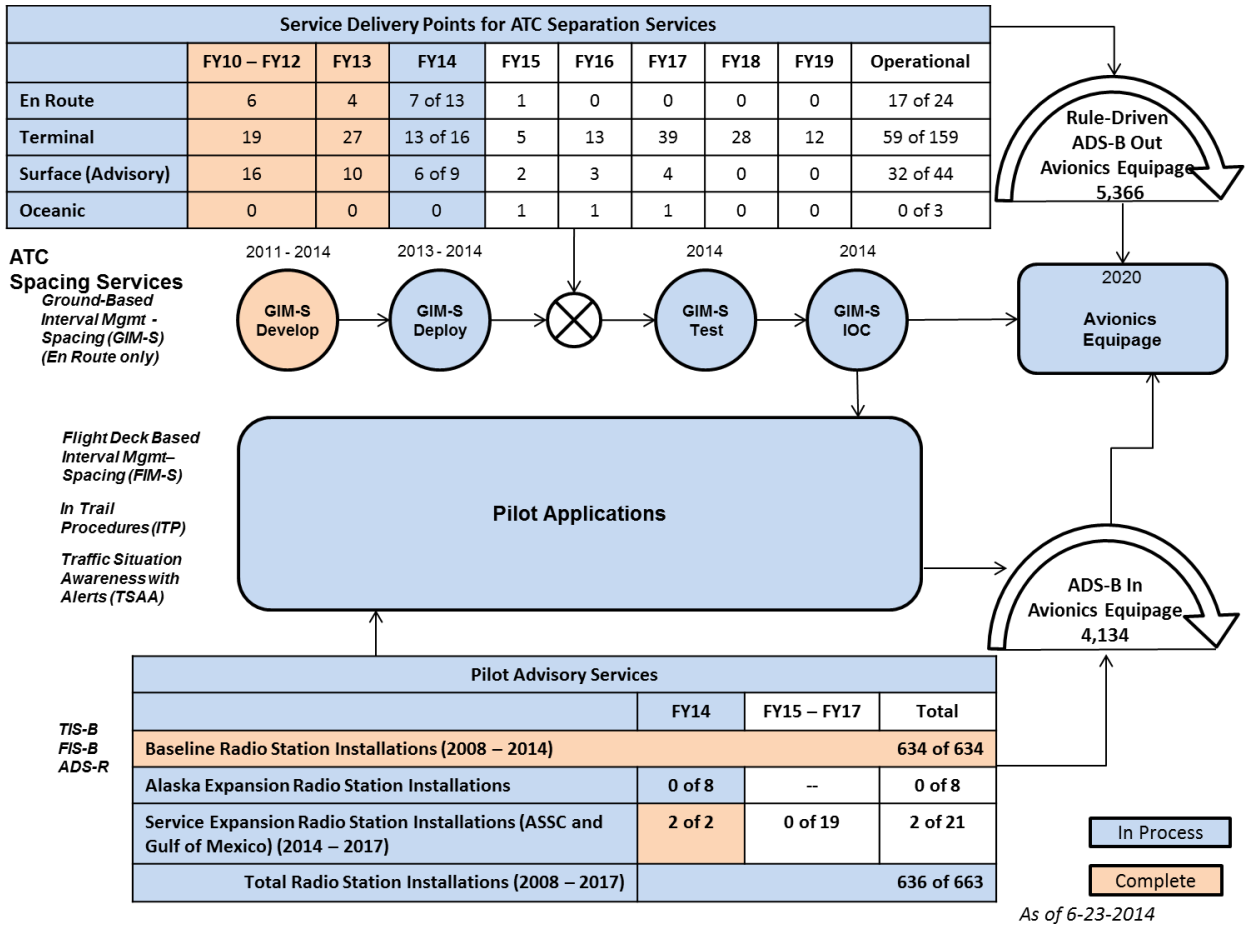
3) Service Status Monitoring
   This function informs personnel at FAA Operations Control Centers, who notify users via NOTAMs about the current status of SBS services throughout the U.S.

2.2.3 FAA ADS-B Development Strategy

The diagram below shows the overall FAA ADS-B development strategy through 2019. ATC Separation Services [ICAO ASBU B0-ASUR] will be rolled out on a facility-by-facility basis. Major en route and terminal facilities will be using ADS-B surveillance by early 2015, but rollout will continue at smaller terminal facilities until 2019, due to the need for automation system modernization at those facilities.

ATC Surface Advisory Services [ICAO ASBU B0-SURF] refer to ADS-B services provided by FAA at those locations where surface surveillance systems exist, which include both the Airport Surface Detection Equipment, Model X (ASDE-X) and the new Airport Surface Surveillance Capability (ASSC) that is currently under development and should be fully deployed by 2017.

The pilot applications and pilot advisory services are available to aircraft equipped with ADS-B-In capability. Pilot Advisory Services (ADS-R, TIS-B, and FIS-B) are activated as each ADS-B ground station is installed, tested, and declared operational.



2.2.4 Air Traffic Control Separation Services

Since late 2009, the FAA has been delivering ATC separation services to aircraft equipped with ADS-B Version 1 avionics (TSO-C154b/TSO-C166a) and aircraft equipped with ADS-B Version 2 avionics (TSO-C154c/TSO-C166b), as these aircraft are outfitted with certified avionics. Between 2009 and 2011, the following key-sites achieved IOC:

- Louisville Terminal Radar Approach Control (TRACON);
- Houston Air Route Traffic Control Center (ZHU) Gulf of Mexico airspace;
- Philadelphia TRACON;
- airspace in the vicinity of Juneau, Alaska.

For both TRACONs, ATC separation services have been provided using fused radar and ADS-B.

Based on this operational experience, FAA made an In-Service Decision (ISD) for SBS on 22 September 2010, indicating that the use of ADS-B and WAM are operationally suitable as surveillance sources for ATC Separation Services in the United States. As with any complex system, there were a set of issues raised during the testing and evaluation phase that are being addressed. These issues, documented in ISD Action Plans, are being resolved, as needed, to enable activation of ADS-B for ATC Separation Services in the initial production sites.

The initial terminal production sites were Houston TRACON for the Standard Terminal Automation Replacement System (STARS) and New York TRACON for the Common Automated Radar Terminal System (CARTS). The activities that were completed for CARTS and STARS include updating the software baselines to support ATC terminal separation for ADS-B-only targets (for aircraft equipped with Version 2 avionics). End-to-end system testing was conducted to validate the separation standards analyses for ADS-B-to-ADS-B and ADS-B-to-radar separation services.

The initial En Route Automation Modernization (ERAM) production site was ZHU. ZHU is implementing ADS-B data integration with ERAM in phases. The first phase provided ADS-B data to ERAM via a "virtual radar" interface as was used previously by the ZHU En Route Host system to provide separation services in the Gulf of Mexico airspace. In the second phase, ERAM was provided with ADS-B data to enable ATC separation services using a fused ADS-B and radar picture at ZHU. This ERAM software release is now being deployed to additional Air Route Traffic Control Centers (ARTCCs) as shown above.

By 2015, the FAA will begin integrating ADS-B surveillance data in the Advanced Technologies and Oceanic Procedures (ATOP) automation platform to support ATC separation services in oceanic airspace for which the U.S. is responsible. By 2017, the ATOP conflict probe and other functions will be modified to support In-Trail Procedures (ITP) – ITP is described in section 2.2.6.1.

2.2.5 Pilot Advisory Services

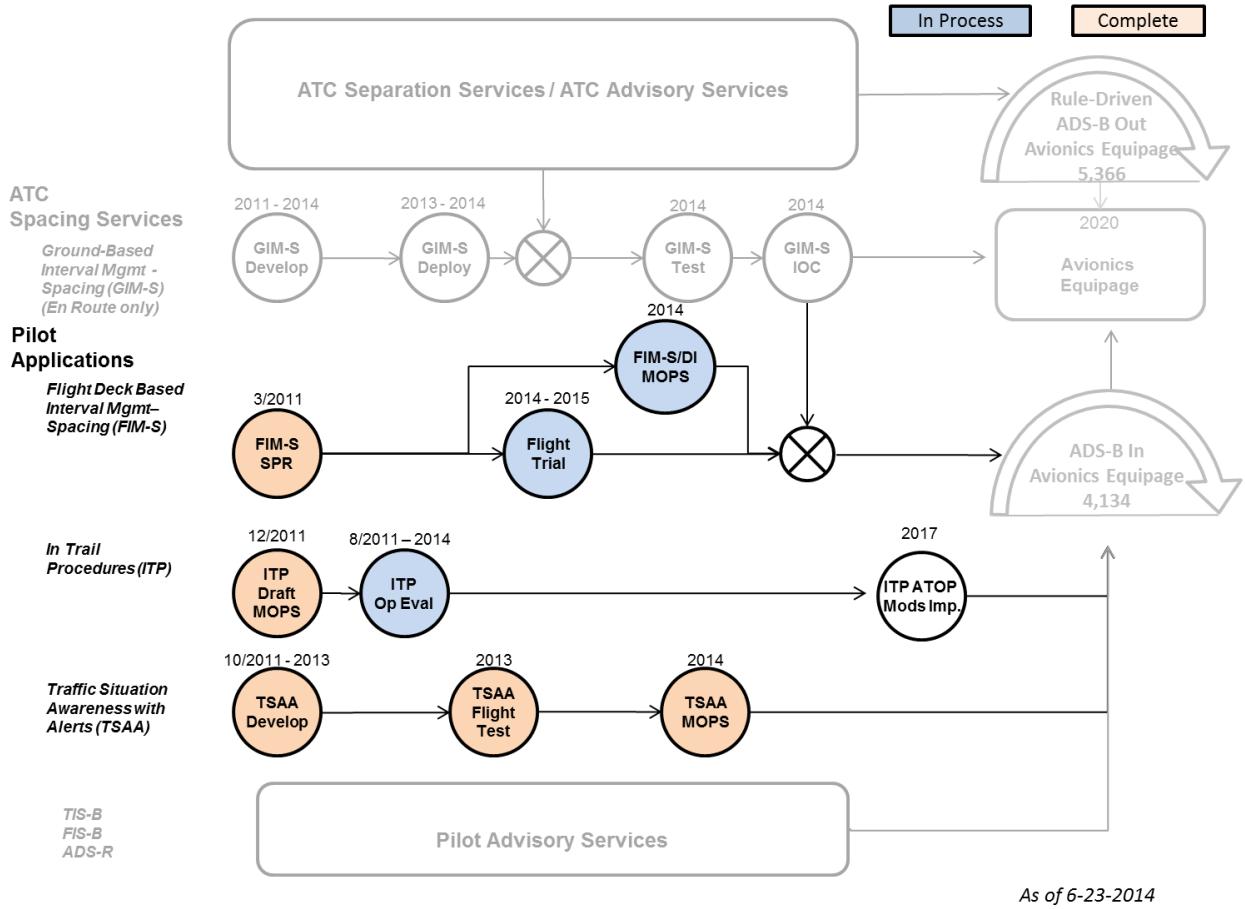
The continued deployment of Pilot Advisory Services (broadcast of TIS-B/ADS-R and FIS-B) continues. The number of Service Volumes in which Pilot Advisory Services are operational was 306 (99% of the total 310) as of the end of May 2014; they are too numerous to list here.

The latest updated information on operational Service Volumes can be found on the FAA website as described previously.

2.2.6 Pilot Applications

The FAA is developing a number of pilot applications that are expected to provide benefits to operators who choose to equip their aircraft with appropriate ADS-B-In avionics which provide the capability to receive, process, and display ADS-B and TIS-B data from surrounding aircraft. In addition to providing benefits directly to customers who equip, these applications will help accelerate the understanding and acceptance of ADS-B and provide a path to future applications.

The FAA is currently investing in flight testing/trials for two applications: Oceanic In-Trail Procedures (ITP) and a pre-cursor of Flight-deck Interval Management (FIM) known as Merging & Spacing. The FAA has substantially completed its investment in developing the TSAA application as described in section 2.2.6.3. The figure below shows the plans for these applications as part of the FAA ADS-B Strategy.



2.2.6.1 Oceanic In-Trail Procedures (ITP) [ICAO ASBU B0-OPFL]

The objective of ITP is to increase the efficiency of long-haul flights in non-surveillance airspace while maintaining or enhancing the current level of safety. The concept takes advantage of ADS-B-In and a cockpit display of traffic information. In addition to increasing flight crew awareness of surrounding traffic, the ITP capability will enable climbs or descents in situations where the aircraft is currently blocked by traffic due to procedural separation standards. There is an expectation that once flight crews gain experience with the onboard ITP system and procedures, they will reduce their discretionary fuel reserves, further reducing fuel burn (and carbon emissions) and potentially allowing more payload for cargo.

The FAA and United Airlines are conducting initial operational evaluations of ADS-B ITP using 12 United B747-400 aircraft. On 24 Jun 2011, a Supplemental Type Certificate (STC) was granted by FAA for the ITP system installation on the B747-400 model operated by United Airlines. On the same day, the FAA Air Traffic Organization received approval from its safety regulator to offer ADS-B ITP services to properly equipped aircraft in the Oakland Oceanic Flight Information Region (FIR). Oakland Center controllers were trained the week of 25 – 29 Jul 2011. FAA En Route and Oceanic Safety and Operations Support authorized Oakland Center to initiate the operation evaluation on 15 August 2011; this has since been extended to 30 Sep 2014. United Airlines received Operational Approval from FAA Flight Standards to commence ITP operations on 15 Aug 2011. FAA is currently modifying the Advanced Technologies & Oceanic Procedures (ATOP) ATC automation system to provide direct controller support for ADS-B ITP, including conflict probe changes; this work should be completed by 2016.

FAA has worked with the Air Navigation Service Providers (ANSPs) in New Zealand and Fiji to expand the ITP operational evaluation to the Nadi FIR and Auckland Oceanic FIR and this occurred in late 2013. FAA has also held discussions with the Japan Civil Aviation Bureau about the potential for offering ITP services in Fukuoka FIR at some point in the future. FAA also participated extensively in the development of the ICAO amendments for ITP (modifications to Annex 10, PANS-ATM and PANS-OPS) and the accompanying ICAO Circular 325. ICAO issued State Letter AN 7/1.1.49-14/21 on 26 March 2014 which announced the adoption of Amendment 89 to Annex 10. ICAO issued State Letter AN 11/19-14/37 on 23 June 2014 which announced the adoption of Amendments 6 and 6 to PANS-OPS, Volumes I and II. ICAO issued State Letter AN 13/2.1-14/48 on 30 June 2014 which announced the adoption of an amendment to PANS-ATM for ADS-B ITP. All of these amendments have an applicability date of 13 November 2014.

All FAA certification and flight standards guidance material for ITP are published in TSO-C195a, AC 20-172A, and AC 90-114, Change 1. See section 4 for the references to these documents.

2.2.6.2 Interval Management (IM) [ICAO ASBU B0-RSEQ and B1-ASEP]

Interval Management (IM) introduces a new method for flight crews and ATC to achieve a desired spacing between aircraft in all phases of flight. The initial applications of these operations will take place for arriving aircraft in en route airspace to a terminal area metering fix consistent with today's instrument flight rules (IFR) procedures and criteria. Later implementations of these operations include the possibility of having the flight crew execute (supported by aircraft avionics) an interval management clearance issued by ATC using a new separation standard with reduced separation minima.

IM operations consist of a ground capability called Ground Interval Management - Spacing (GIM-S) to schedule/manage the arrival traffic flow, and a flight deck capability (FIM-S) to allow the aircraft to efficiently manage the interval assigned by air traffic control. The FAA is implementing the requirements for the capabilities in GIM-S via two FAA automation programs: Time-Based Flow Management (TBFM) and ERAM.

The FAA has several airlines interested in supporting operational data collection and benefits measurement as the initial FIM-S capabilities are established. The FAA supported the efforts of a joint RTCA/EUROCAE working group to develop the Safety, Performance and interoperability Requirements (SPR) document for FIM-S (also known as ASPA-IM), which resulted in RTCA DO-328.

RTCA SC-186 and EUROCAE WG-51 are working on the Minimum Operational Performance Standards (MOPS) for FIM-S avionics as described in section 1.1.

2.2.6.3 Traffic Situation Awareness with Alerts

Traffic Situation Awareness with Alerts (TSAA) is aimed at improving a pilot's identification of conflicting traffic by providing onboard alerts for aircraft without Traffic Alert and Collision Avoidance System (TCAS) equipment. Such traffic may or may not have been pointed out by air traffic control. This alert identifies conflicting traffic, but does not provide any resolution maneuver advice. TSAA will be tailored to operate without excessive nuisance alerts when operated in the VFR traffic pattern at small general aviation airports, where most general aviation collision accidents occur.

The FAA contracted with the Massachusetts Institute of Technology (MIT) (and Avidyne as MIT's subcontractor) to develop this application. The FAA engaged the Aircraft Owners and Pilots Association, the General Aviation Manufacturers Association, and Helicopter Association International stakeholders to participate with the FAA in periodic reviews of the MIT/Avidyne work. The joint RTCA/EUROCAE committee (SC-186/WG-51) agreed the Operational Services and Environment Definition (OSED) was "mature" enough to perform safety and performance analyses in October 2011. Piloted simulations to evaluate alerting algorithms and human factors considerations for a TSAA system were completed in early 2013. Subsequent flight tests of a prototype system were completed in mid-2013. This project worked via RTCA SC-186 and EUROCAE WG-51 to complete the Safety, Performance and interoperability Requirements (SPR) document, which was published by RTCA as DO-348 in March 2014 (the same material will be published by EUROCAE later this year). TSAA avionics standards are included in DO-317B/ED-194A as described in section 1.1.

2.2.7 ADS-B on Airport Surface Vehicles

The FAA is promoting ADS-B for use with vehicles on airport surfaces to improve runway safety. Any vehicle (e.g., a tug, fuel truck, snowplow, or rescue-and-firefighting vehicle) can be equipped to transmit location information to controllers, pilots, vehicle drivers, or airport operators. In the U.S., ADS-B transmissions will only be permitted from airport ground vehicles that are in the airport movement area (and subject to air traffic control).

While not mandating vehicle ADS-B, the FAA is encouraging airport operators to equip appropriate vehicles. In addition to significant improvements in runway safety, airport managers could use ADS-B information to track assets more efficiently. This would be especially useful with rescue vehicles in case of an accident.

The FAA has issued AC 150/5220-26 for Airport Ground Vehicle ADS-B Out Squitter Equipment as referenced in section 4. The AC helps airport managers understand how to determine which vehicle transponders meet FAA performance requirements, inform the FAA of the airport's intent to proceed with vehicle ADS-B, request unique ICAO identifying numbers for vehicles to be equipped, and request a transmit license.

The FAA has been evaluating the first vehicle ADS-B Out squitter unit for compliance to the FAA Vehicle Squitter Performance Specification. The first unit utilizes the UAT ADS-B link, which is the preferred Vehicle Squitter Unit link as stated in the FAA Advisory Circular. Extensive operational testing and evaluations were performed through April 2012, which provided data to update performance requirements and ensure interoperability with ASDE-X. The successful unit from FreeFlight Systems was added to the Advisory Circular as a Qualified Product in September 2012.

The FAA has made the ADS-B Vehicle Squitters eligible for Airport Improvement Plan (AIP) Funding. That will allow eligible airport authorities choosing to procure qualified Vehicle Squitter Units to use AIP funds to do so.

2.2.8 Using ADS-B to Enhance ATC Separation Services

As a means of encouraging early ADS-B-Out equipage, the FAA is exploring opportunities to use ADS-B surveillance coverage to improve airspace access, enable more direct routings and more fuel-efficient altitudes, and circumvent constrained airspace. Currently, the focus is on offshore/oceanic airspace near the coasts of the U.S. mainland and Alaska. However, other opportunities exist in the Caribbean as well as at low altitudes in Alaska and the mountainous regions of the western U.S. What all of these regions have in common is either a lack of radar coverage or relatively unreliable radar coverage.

The FAA has agreements with JetBlue and United Airlines to explore the benefits of ADS-B surveillance in offshore airspace along the U.S. east coast and in the Gulf of Mexico. JetBlue has equipped 35 A320 aircraft with Version 2 ADS-B avionics, and United is working with Boeing and Rockwell Collins to equip at least 110 737NG aircraft with Version 2 ADS-B avionics.

FAA is analyzing ADS-B surveillance coverage in current procedural airspace managed by the U.S. Alternatives include space-based ADS-B (orbiting satellites listen to aircraft ADS-B broadcasts and relay this information to an ATC facility) as well as potential installation of ADS-B radio stations in countries willing to collaborate with the U.S. to cover the airspace of interest. The technical and cost benefits of space-based ADS-B are currently being studied.

2.2.9 Avionics Upgrades to ADS-B Version 2 Avionics

The FAA is working with partners who were early adopters of ADS-B to upgrade those avionics (Version 1, DO-260A/DO-282A) to the avionics standards (Version 2, DO-260B/DO-282B) required by the U.S. ADS-B Final Rule. Specifically, these partners are UPS, US Airways, operators in Alaska equipped with avionics under the FAA Capstone Program, and several helicopter operators in the Gulf of Mexico. Currently, the FAA is funding the upgrade from Version 1 to Version 2 transponders for the UPS fleet and the US Airways A330 fleet. As part of this effort, ACSS was one of the first applicants to exercise the provisions of AC 20-165, achieving an STC for an installation on UPS 767 and 747 aircraft in January 2012, for JetBlue A320 aircraft in July 2012, for US Airways A330 aircraft in August 2012 and for UPS A300 and MD-11 aircraft in January 2013. FAA is currently engaging with Gulf of Mexico helicopter operators to assist them in upgrading their ADS-B Version 1 avionics to Version 2, so that they can comply with AC 20-165A and the U.S. ADS-B Final Rule. FreeFlight Systems achieved an STC for an installation on an Agusta Westland 139 helicopter in June 2012; Rockwell Collins achieved an STC for installations on multiple Sikorsky helicopter models in March and April 2014. Separately, FAA awarded a contract to FreeFlight Systems in April 2013 to upgrade U.S. operators with Capstone ADS-B Version 1 avionics to U.S.-rule-compliant Version 2 ADS-B systems; over 95% of these operators are in Alaska.

2.3 TCAS/ACAS-X Program [ICAO ASBU B2-ACAS]

Recognizing the limitations of the TCAS II design, the Federal Aviation Administration's (FAA's) Traffic Alert and Collision Avoidance (TCAS) Program Office (PO) has funded the development of an advanced Airborne Collision Avoidance System (ACAS), called ACAS-X, since 2009. ACAS-X has the flexibility to reduce unnecessary alerts, support use of alternative surveillance sources, enable future Next Generation Air Transportation System (NextGen) airspace procedures (including several proposed ADS-B-In applications), and potentially provide a collision avoidance capability for new user classes.

Initial evaluations of the new ACAS-X logic have been conducted using the same Monte Carlo safety simulations employed in recent TCAS II v7.1 safety studies. These studies indicate that compared to existing TCAS II, the new logic significantly reduces the probability of a Near Mid-Air Collision (NMAC), while also significantly reducing the number of alerts and Resolution Advisory (RA) reversals (~50% respectively).

ACAS-X has reached a state of sufficient maturity that industry and international participation in development activities will facilitate acceleration of fielding a future collision avoidance capability. Standards development work within RTCA SC-147 and EUROCAE WG-75 began in late 2013 and should be completed by the 2018 timeframe. Following operational evaluation aboard participating partner aircraft operators, the first certified units could be in service as early as 2020.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matters as appropriate.

– – – – – – – – – – – – –

4. REFERENCES

U.S. ADS-B Final Rule
http://www.regulations.gov/#!documentDetail;D=FAA-2007-29305-0289

FAA TSO-C154c (UAT Link)
http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgTSO.nsf/0/e5a37977fbdb786b8625768200579728/$FILE/TSO-154c.pdf

FAA TSO-C166b (1090ES Link)
http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgTSO.nsf/0/e70544d62a001f87862576820057970f/$FILE/TSO-166b.pdf

FAA AC 20-165A (ADS-B-Out Installation Guidance)
http://www.faa.gov/documentLibrary/media/Advisory_Circular/AC%2020-165A.pdf

FAA AC 90-114, Change 1 (ADS-B Operations)
http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/69fd8e2a5b3cb95b86257a850056c48d/$FILE/AC%2090-114%20CHG%201.pdf

FAA TSO-C195a (Aircraft Surveillance Applications)
http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgTSO.nsf/0/a742d5047d73c258862579b3005501d2/$FILE/TSO-C195a.pdf

FAA AC 20-172A (ADS-B-In Installation Guidance)
http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/a577ca07065f4a26862579cd007889e0/$FILE/AC%2020-172A.pdf

Airport Surface Surveillance Capability Market Survey
http://faaco.faa.gov/attachments/Airport_Surface_Surveillance_System_Market_Survey_020110.doc

Report from the ADS-B Aviation Rulemaking Committee to the FAA, 26-Sep-2008
http://www.faa.gov/nextgen/portfolio/trans_support_progs/adsb/media/arcReport2008.pdf

Report from the ADS-B-In Aviation Rulemaking Committee to the FAA, 30-Sep-2011
http://www.faa.gov/nextgen/portfolio/trans_support_progs/adsb/media/ADSB%20In%20ARC%20Report%20with%20transmittal%20letter.pdf

FAA AC 150/5220-26 (Airport Ground Vehicle ADS-B Out Squitter Equipment)
http://www.faa.gov/documentLibrary/media/Advisory_Circular/150_5220_26_consolidated.pdf

“Final Report on 1090 MHz Spectrum Congestion in 2035 and Performance of Systems Operating in the Band,” Version 1.0, available on request from FAA.