Twenty Fourth Meeting of the
Informal South Pacific ATS Co-ordinating Group (ISPACG/24)

Brisbane, Australia, 11-12 March 2010

Agenda Item 4: Review Open Action Items

FEDERAL AVIATION ADMINISTRATION SURVEILLANCE AND BROADCAST SERVICES UPDATE

Presented by the Federal Aviation Administration

SUMMARY

The purpose of this information paper is to summarize the status of the Federal Aviation Administration's Surveillance and Broadcast Services Program.

1. INTRODUCTION

1.1 The U.S. Federal Aviation Administration (FAA) created the Surveillance and Broadcast Services (SBS) Program in September 2005 to develop a multi-segment, lifecycle-managed, and performance-based strategy that aligns with the Next Generation Air Transportation System (NextGen) and generates value for the U.S. national airspace system (NAS). The SBS Program Office is overseeing and directing the acquisition of a number of surveillance and broadcast services, in specified volumes, on a NAS-wide basis.

1.2 At the 23rd. meeting of the Informal South Pacific Air Traffic Services Co-ordinating Group (ISPACG/23), the United States provided an information paper, (IP-11), reviewing the status of the FAA's program plan and activities for the deployment of Automatic Dependent Surveillance-Broadcast (ADS-B) technology across the U. S. National Airspace System (NAS). The presentation provided an overview of the work undertaken by the SBS Program Office to establish separation standards for the use of ADS-B in a mixed radar environment within the NAS. The preliminary analysis demonstrated that the combination of ADS-B avionics, which are compliant with the FAA Final Program Requirements, the ground infrastructure as specified in the ADS-B service specification, and the automation assumptions made by the FAA program office, can meet the current performance baseline for use in non-radar and radar environments.

1.3 The purpose of this paper is to briefly summarize the current status and plans of the SBS Program.

2. DISCUSSION

2.1 On 9 September 2005, the FAA officially committed to establishing ADS-B as the basis for air traffic control in the U.S. Moving to ADS-B will allow the agency to eventually decommission approximately half of the current infrastructure of secondary surveillance radars in favor of a system that uses precise location data from satellites and provides greater benefits to everyone who uses the NAS. A reduced network of secondary radars will be maintained at high-density airports to ensure a back-up in case of a GPS outage. The FAA is following a dual-track strategy of building a ground infrastructure and pursuing a rulemaking to mandate avionics equipage in designated airspace. A rule is necessary since ADS-B is being used for air traffic control when aircraft are equipped to broadcast their locations out to ground stations and other equipped aircraft. In 2007, the FAA proposed a rule that would mandate "ADS-B Out" avionics to fly in certain designated airspace - generally the same busy airspace where transponders are required today. The proposed rule would give operators ten (10) years to equip.

2.2 The ADS-B rulemaking is proceeding as expeditiously as possible. Public comments were received by March 2008, and in September 2008, a committee of stakeholders endorsed the compliance mandate and recommended ways the FAA could more closely align the rule with stakeholder interests. The FAA rulemaking council approved the Rulemaking Project Record at the end of January 2009, clearing the way for a final draft in May 2009. An economic analysis was completed in August 2009. This was followed by internal FAA review and the Department of Transportation review. The final rule is now being reviewed by the Office of Management and Budget (OMB), with a target publication date of April 2010.

2.3 The FAA plans to deploy ADS-B surveillance services for the 50 United States and the territories of Puerto Rico and Guam. The FAA-specified system provides services on two ADS-B frequencies – one on 1090 MHz (Mode S Extended Squitter) and one on 978 MHz (Universal Access Transceiver – UAT). ITT Corporation was selected in August 2007 as the vendor for the national deployment of almost 800 ground stations. Under the terms of its contract, ITT must have the system ready for commissioning by 2010, and enough stations in place by 2013 to provide ADS-B coverage everywhere there is radar today. As the ADS-B radio infrastructure expands, ITT, Corp. will likely use the system's capabilities to offer commercial services to private pilots and airlines.

2.4 The ground infrastructure will allow the FAA to provide both surveillance for air traffic control separation services and broadcast services to properly equipped aircraft. ADS-B ground stations will receive ADS-B signals from aircraft within line-of-sight and broadcast "essential" information to properly equipped aircraft. These "essential service" broadcasts to equipped aircraft will consist of radar-derived position reports for non-ADS-B equipped aircraft within a certain radius and altitude of each equipped aircraft (known as Traffic Information Service-Broadcast, or TIS-B) and graphical weather information and flight information, such as temporary flight restrictions

(known as Flight Information Service-Broadcast, or FIS-B). Note that while TIS-B is available on both ADS-B links, FIS-B is available on the UAT link only

2.5 Based on key-site testing of ITT's ground stations in South Florida, the FAA declared ADS-B traffic and weather broadcast services ready for operational use in November 2008. This in-service decision, that commissioned ADS-B essential services (TIS-B and FIS-B) into the NAS, allows pilots flying in equipped aircraft the ability to see live traffic. UAT users can also receive free, real-time graphical weather displays from the National Weather Service, along with critical flight information, such as temporary flight restrictions and special-use airspace. The in-service decision cleared the way for the vendor to install ground stations and transmit broadcasts for operational use across the nation, starting on the East and West coasts and portions of the Midwest, with 340 ground stations scheduled to be operational by 2010.

2.6 The ADS-B ground system has reached Initial Operating Capability (IOC) at two of the four key sites; Louisville, Kentucky and the Gulf of Mexico (Houston Center). Philadelphia, Pennsylvania is on track to reach IOC at the end of February 2010, followed by Juneau, Alaska in April 2010. The commissioning, or In Service Decision, for surveillance services is planned for September 2010.

2.7 The FAA worked with industry through the ADS-B Aviation Rulemaking Committee (ARC) to accelerate early equipage of ADS-B. Specifically, two of the October 2007 ARC recommendations focus on benefits / equipage:

- Recommendation #9: Leverage the benefits of ADS-B information to motivate equipage by establishing agreements with specific operators.
- Recommendation #10: Continue to establish agreements with local and state governments to leverage the benefits of ADS-B

2.8 Since that time, the FAA has held meetings with a number of customers to discuss potential partnerships. The FAA currently has partnerships with AOPA, Auburn University, United, US Airways, NetJets, Honeywell, ACSS, Alaska Aviation Community, and HAI. There are agreements under discussion with Continental Airlines and Delta Airlines.

2.9 The FAA is formulating plans to enable the use of ADS-B for three nautical mile en-route separation services. The proposed work would be to evaluate the safety of applying 3-nautical mile lateral separation between two aircraft when in airspace controlled by an Air Route Traffic Control Center.

3. ADS-B IN

3.1 The Aviation Rulemaking Committee recommended that the FAA should, in partnership with industry, define a strategy for ADS–B In by 2012, ensuring the strategy is compatible with ADS-B Out avionics. The committee further recommended that the FAA define how to proceed with ADS-B In beyond the voluntary equipage concept in the notice of proposed rulemaking. In response to this

request, the FAA plans to charter a new Aviation Rulemaking Committee in summer 2010 to focus on ADS-B In.

3.2 In response to this recommendation, the SBS Program is developing a number of airborne ADS-B applications that will provide benefits to operators who choose to equip their aircraft with appropriate avionics, including ADS-B In, which provides the capability to receive, process, and display ADS-B data from surrounding aircraft. In addition to providing benefits to customers who equip, these applications will help accelerate the understanding and acceptance of airborne ADS-B and provide a path to future applications. While the FAA is evaluating a number of airborne applications, the program is currently investing in three applications: Surface Indications and Alerting, In-Trail Procedures, and Interval Management.

3.3 Surface Indications and Alerting (SURF-1A)

3.3.1 The United States Congress added funding for ADS-B in fiscal year 2008 conference report in which it appropriated $9.3 million “specifically to expedite air-to-air capabilities.” The FAA determined that expediting surface conflict detection and cockpit alerting would motivate airlines to equip earlier for ADS-B to obtain the significant safety benefits.

3.3.2 The FAA awarded the contracts for this effort in November 2008, to Honeywell and Aviation Communications and Surveillance Systems (ACSS). Honeywell was awarded $3 million to develop requirements and standards, and perform human factors analyses. Honeywell’s demonstration tests took place at Seattle-Tacoma Airport and at Snohomish County Paine Field. The demonstration used a Cessna Sovereign and a Beechcraft King Air, flown by Honeywell test pilots.

3.3.3 ACSS was awarded $6.3 million to create standards, perform flight demonstrations, and develop prototypes. ACSS partnered with US Airways, which is equipping 20 Airbus 330s with cockpit displays. The ACSS demonstration testing at the Philadelphia International Airport involved an ACSS Beechcraft King Air, flown by an ACSS test pilot and a US Airways A330, operated by US Airways fleet pilots. The A330 remained on the airport surface during the demonstration testing.

3.3.4 In June 2009, the FAA conducted a critical design review of the draft analysis material from ACSS and Honeywell to support development of a Safety, Performance and Interoperability Requirements (SPR) document within RTCA Special Committee 186 (SC-186) for advanced ADS-B capabilities in surface indications and alerts. These important new capabilities will make use of ADS-B in the cockpit to directly alert pilots of potential runway traffic hazards.

3.3.5 The FAA expects to receive final reports from ACSS and Honeywell on their respective demonstration testing by the end of February. These reports will be made public after they are reviewed and accepted by the FAA.

3.3.6 The FAA is supporting continued development of the SURF-IA SPR in RTCA SC-186, with a goal of completing the SPR and receiving RTCA approval of this document by the summer of 2010. Subsequently, FAA plans to support development of SURF-IA MOPS material within RTCA SC-186, with a goal of completing this work by March 2011.

3.4 In Trail Procedure

3.4.1 The objective of ITP is to increase the efficiency of long-haul flights while maintaining the current level of safety. The concept takes advantage of ADS-B In to display traffic on an Electronic Flight Bag (EFB). In addition to increasing flight crew awareness of the traffic, ITP displays will offer the capability of climbing or descending through altitudes currently blocked by traffic due to procedural separation standards. After flight crews gain experience with the ITP display and the capability of the ITP to optimize altitude, we expect they will be comfortable with reducing the amount of contingency fuel carried, thereby reducing fuel burn and carbon emissions.

3.4.2 The SBS Program Office has signed an agreement with United Airlines to further advance this concept. The goal of this agreement is to conduct operational flight evaluations of ADS-B ITP on United B747-400 aircraft on routes between the U.S. west coast and Australia beginning in calendar year 2011, using certified avionics equipment.

3.5 Interval Management (IM)

3.5.1 The initial implementation of IM introduces a new method for flight crews, air traffic control, and airline operation centers to achieve a desired spacing between paired aircraft in all phases of flight. The initial applications of these operations will take place in the en route phase of flight down to the runway threshold in a manner consistent with today's IFR procedures and criteria. Later, more mature implementations of these operations include the possibility of delegating separation responsibility (for the interval management function only) to the flight deck. These IM operations are supported by capabilities both on the ground and on the flight deck.

3.5.2 The SBS Program office is coordinating the requirements for the capabilities in Ground Interval Management (GIM) with existing and future FAA automation platforms. The SBS Program is in the final stages of completing an Alternatives Analysis to determine the best implementation solution(s) to meet these requirements. The SBS Program is finalizing an agreement with an FAA program called Time-Based Flow Management (TBFM) to implement GIM requirements for extended metering.

3.5.3 The SBS Program is working with several partners to continue the implementation of capabilities on the flight deck required by Flight-Deck Interval Management (FIM). The goal of these relationships is to continue gathering data and validating concepts as the initial FIM capabilities are established. Discussions are ongoing.

4. WIDE AREA MULTILATERATION (WAM)

4.1 Under the FAA's SBS program is the implementation of WAM in the ski areas of Colorado and Juneau Alaska. The rugged terrain in both areas makes it impossible for air traffic controllers to maintain radar surveillance over aircraft in certain areas. Limitations to aircraft operations are compounded by bad weather, which causes flight delays and cancellations. WAM provides surveillance through a network of small sensors deployed in remote areas. The sensors send out signals that are received and sent back by aircraft transponders. This data is transmitted to screens viewed by air traffic controllers for separation of aircraft. The system reached Initial Operating Capability (IOC) at Denver Center in September 2009 servicing Yampa Valley-Hayden, Craig-Moffat, Steamboat Springs and Garfield County Regional-Rifle Airports. The system at Anchorage Center servicing Juneau Alaska reached IOC in January 2010.

4.2 The system improves safety, efficiency and capacity by allowing controllers to see aircraft that are outside radar coverage. It saves time and money that would otherwise be lost due to flight delays and cancellations or diversions to other airports.

4.3 The improved surveillance also translates into more efficient flight paths, saving time and fuel burn. WAM will serve as a backup to ADS-B in the event of a GPS outage in high value airspace. It will also serve as an additional source for traffic broadcasts to aircraft equipped with proper avionics. The FAA will be expanding the WAM within the state of Colorado to serve Durango, Gunnison, Telluride, and Montrose airports.

5. ACTION BY THE MEETING

5.1 The meeting is invited to consider the content and to comment on this Information Paper.