Surveillance and Broadcast Services

ADS-B Program Overview

Presented to: ADS-B Technology Forum
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Agenda

• Overview
• Strategy
• Infrastructure and Implementation Status
• Applications
# ADS-B Services and Applications

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(1) Merging and Spacing and Cockpit Display of Traffic Information (CDTI) Assisted Visual Separation (CAVS) are a part of the Enhanced Visual Approaches Application

(2) Also known as Airborne Situational Awareness and Alerting (ATSA AIRB) or Conflict Detection (CD)
ATC Separation Services: Automatic Dependent Surveillance - Broadcast (ADS-B)

• **Automatic**
  – Periodically transmits information with no pilot or operator input required

• **Dependent**
  – Position and velocity vector are derived from the Global Positioning System (GPS)

• **Surveillance** -
  – A method of determining position of aircraft, vehicles, or other asset

• **Broadcast**
  – Transmitted information available to anyone with the appropriate receiving equipment
Cockpit Services

Traffic Information Services – Broadcast TIS-B is a service which provides ADS-B equipped aircraft with position reports from secondary surveillance radar on non-ADS-B equipped aircraft.

Flight Information Services – Broadcast (FIS-B) transmits graphical National Weather Service products, pilot reports, and special use airspace.
Surveillance Broadcast Services

Surveillance and Broadcast Services

Federal Aviation Administration
Strategy
Ground Infrastructure

Deploy Ground Infrastructure 2/2008 – 12/2009
Critical Services ISD 9/2010

Avionics Equipage

RPR Phase II 10/2007
Final Rule 5/2010
Avionics Equipage Begins 7/2010

Separation Standards Approval 4/2010

Surveillance and Broadcast Services

RPR = Rulemaking Project Record; NPRM = Notice of Proposed Rulemaking; ISD = In-Service Decision
SBSS Architecture Overview

Radio Station Segment
- Radio Station
  - Radio Station Layout Provides RF Coverage Over a Set of Service Volumes

Network Segment (MPLS VPN)
- Radio Station
  - Radio Station

Control Segment
- ESA Control Station
  - Data Center/Ashburn, VA
- WSA Control Station
  - Data Center/Redwood City, CA
- CSA Control Station
  - Data Center/Dallas, TX
- Regional CS
  - ZAN SDP/AK

Network Segment (MPLS VPN)
- ADS-B Reports
  - Service Status Reports
- FAA ATC Automation SDPs
- FAA Monitor SDP
- FAA ATIS-B Data SDP

Legend:
- Radio
- Network
- Control
- FAA
- Weather

Surveillance and Broadcast Services

Federal Aviation Administration
Implementation Status: 2008-2010

- 320 Segment 1 sites (several Rocky Mountain and Alaskan sites awaiting Spring)
- 307 Segment 1 radio sites constructed (281 in CONUS; 26 in Alaska)
- 296 Segment 1 radio sites reporting on the network (271 in CONUS; 25 in Alaska)
- 205 radio sites have achieved Initial Operating Capability (IOC) [Miami Center (ZMA), Gulf of Mexico, Louisville (SDF), Philadelphia (PHL), Juneau (JNU), Boston Center (ZBW), New York Center (ZNY), Jacksonville Center (ZJX), Cleveland Center (ZOB), Atlanta Center (ZTL), Washington Center (ZDC), Chicago Center (ZAU), Seattle Center (ZSE), Albuquerque Center (ZAB) and Minneapolis Center (ZMP)]
ADS-B - General Aviation Airports

- Segment 1 – 49 (blue)
- Segment 2 (so far) – 15 (red)
2011 – 126 SV’s through Acceptance

•+82 (avg 1.6 SV’s / week)

White = 2008-2010
Blue = 2011
Green = 2012
Yellow = 2013
2012 – 194 SV’s through Acceptance

•+68 (avg 1.3 SV’s / week )
2013 – 295 SV’s through Acceptance

Surveillance and Broadcast Services

Federal Aviation Administration
Key Sites

- **Essential (Advisory) Services**
  - Miami Area In Service Decision – November 2008

- **Critical (Separation) Services**
  - Louisville Initial Operating Capability (IOC) – November 2009
    - Terminal Automation (Common ARTS)
  - Gulf of Mexico IOC – December 2009
    - Enroute Automation (HOST)
  - Philadelphia IOC – March 2010
    - Terminal Automation (STARS)
  - Juneau IOC – April 2010
    - Enroute Automation (MicroEnrouteARTS)
  - In Service Decision – September 2010
2011 Critical (Separation) Services Sites

- **NY TRACON (N90),** Planned IOC – Spring 2011
  - Terminal Automation (Common ARTS)
  - Supports JFK, LaGuardia, Newark, Islip & Newburgh/Stewart

- **Houston TRACON (I90),** Planned IOC – Summer 2011
  - Terminal Automation (STARS)
  - Supports Houston Intercontinental, Houston Hobby & Beaumont

- **Houston ARTCC (ZHU),** Planned IOC – Spring 2011
  - Enroute Automation (ERAM)
  - Supports Houston Center, Gulf of Mexico
Challenges

• **Limited rule-compliant equipage**
  – Current pre-rule (DO-260A and DO-282A) don’t meet requirements for ADS-B-Only 3NM separation and only by exception for 5NM separation.
  – Only test aircraft currently equipped with rule compliant avionics (260B). Ultimately, rule compliant avionics will be required for ADS-B only separation in non-radar airspace.
Air Interface

- **Air Interface Control Document (ICD)**
  - Describes the services provided by the Surveillance and Broadcast Services System (SBSS) over the Air Interface to ADS-B Equipped aircraft.
  - Detailed design of the Air Interface to help ensure that vendor offerings of ADS-B avionics are fully compatible with the SBSS, and that they may be designed to take full advantage of the offered services

- **Document being vetted through RTCA.**
- **Final document to be available in Spring 2011**
- **ITT to provide access to sample data for avionics manufacturers.**
In-Trail Procedures (ITP) Application Overview

Purpose: Provide operational benefits in non-surveillance airspace by enabling “in-trail” climbs/descents at reduced separation distances

Goal: Employ ITP in oceanic air carrier operations (revenue service) by 2011

Objectives: Validate operational performance and economic benefits of ITP
Develop and validate ADS-B ITP MOPS material

Partners: United Airlines, Honeywell, Goodrich, Airservices Australia, Airways Corp NZ
Traffic Situation Awareness with Alerts (TSAA) Application Overview

**Purpose:** Enhance safety in the National Airspace System by providing alerts to General Aviation pilots of conflicting airborne traffic.

**Goals:**
- Reduce the risk of airborne aircraft-to-aircraft encounters
- Expand ADS-B benefits for General Aviation

**Objective:** Validated MOPS

**Partners:** MIT/Avidyne

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**Timeline:**
- ConOps and Stakeholder Buy-in: April 2011
- Mature OSED: November 2011
- Simulations Complete: August 2012
- Flight Tests Complete: December 2012
- MOPS Approved: May 2013

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Surveillance and Broadcast Services

Federal Aviation Administration
• SURF-IA Application Overview

Purpose: Reduce runway incursion rate by providing enhanced situational awareness and direct alerting to pilots

Goal: To promote early equipage by increasing safety benefits to aircraft operators
To provide acceptable response to NTSB Most Wanted List

Give immediate warnings of probable collisions/incursions directly to cockpit flight crews

Objectives:
- Develop validated MOPS material for SURF-IA
- Increase ADS-B aircraft equipage
- Enable industry to design and install runway incursion warning capability systems

Partners: Honeywell, ACSS/US Airways, RTCA Stakeholders

Key Activities:
- Demonstrate SURF-IA at PHL, PAE, SEA - Complete
- Development of SPR – Complete
- Equip 20 US Airways Airbus A330s - Pending

Key Outcomes:
- SPR PMC Approval – Dec 8th (DO-323)
- Resolve Line of Sight and Drop-out Issues

Completed
In Process
Not Yet Started

- SURF-IA Vendor Agreements Established October 2008
- SURF-IA Critical Design Review June 2009
- SURF-IA Demo ACSS Honeywell Reports May 2010
- SURF-IA SPR Development & Approval December 2010
- SURF-IA MOPS Material Development Pending resolution of ARC recommendations 2011
Questions / Comments

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