

Surveillance and Broadcast Services

ADS-B Overview and Status to DoD

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Date: May 5, 2009



Federal Aviation
Administration



Agenda

- **Section 1: ADS-B Overview**
 - NextGen
 - ADS-B Overview
 - Strategy
 - Rollout Plans
 - FAA Service Contract
- **Section 2: ADS-B Infrastructure**
- **Section 3: Program Governance and Structure**
- **Section 4: NPRM Status and Rulemaking Overview**
- **Section 5: ADS-B Supported Future Applications**
- **Section 6: Questions and Answers**

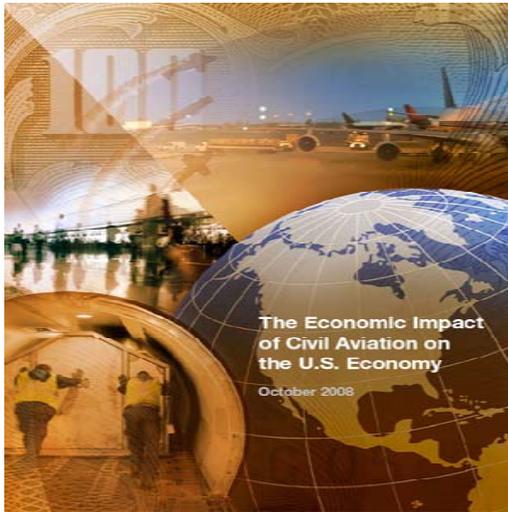


The Current System is not Performing Adequately



- Demand remains high in already congested markets
- Our air traffic system does not utilize current available technologies to:
 - Support aviation's role in the national economy
 - Address aviation's environmental impact

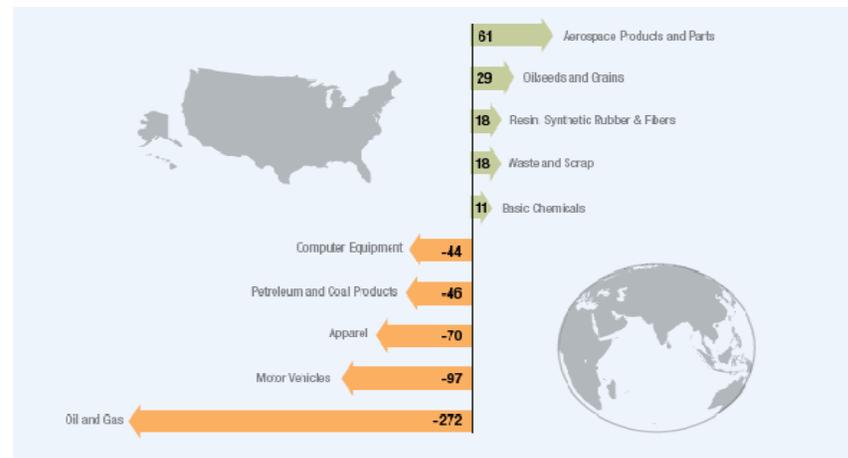
Impact of Aviation on the U.S. Economy



The Aviation Industry contributes to the U.S. Economy and International Trade

Aviation accounts for:

- 11 million aviation-related jobs
- \$1.2 trillion in economic activity
- 5.6 Percent Contribution to Gross Domestic Product
- Adds \$61 Billion to the US Trade Balance



NextGen: Improving Efficiency and Capacity

Today's National Airspace System

- Ground-based Navigation and Surveillance
- Air Traffic Control Communications By Voice
- Disconnected Information Systems
- Air Traffic "Control"
- Fragmented Weather Forecasting
- Airport Operations Limited By Visibility Conditions
- Forensic Safety Systems



NextGen

- Satellite-based Navigation and Surveillance
- Routine Information Sent Digitally
- Information More Readily Accessible
- Air Traffic "Management"
- Forecasts Embedded into Decisions
- Operations Continue Into Lower Visibility Conditions
- Prognostic Safety Systems



The transition to NextGen has already begun.

Background: 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



Benefits Summary

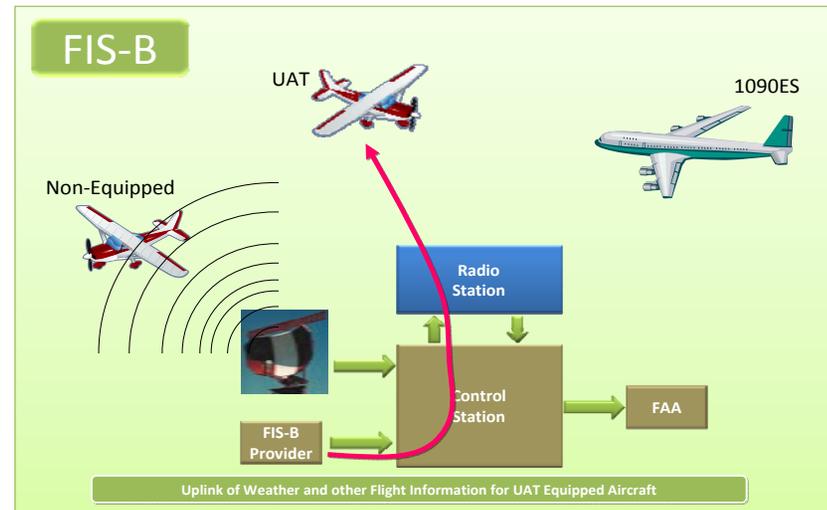
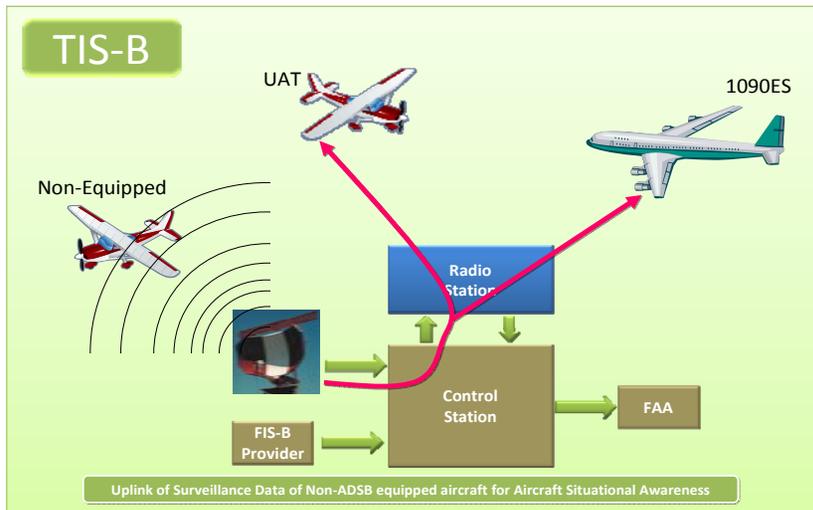
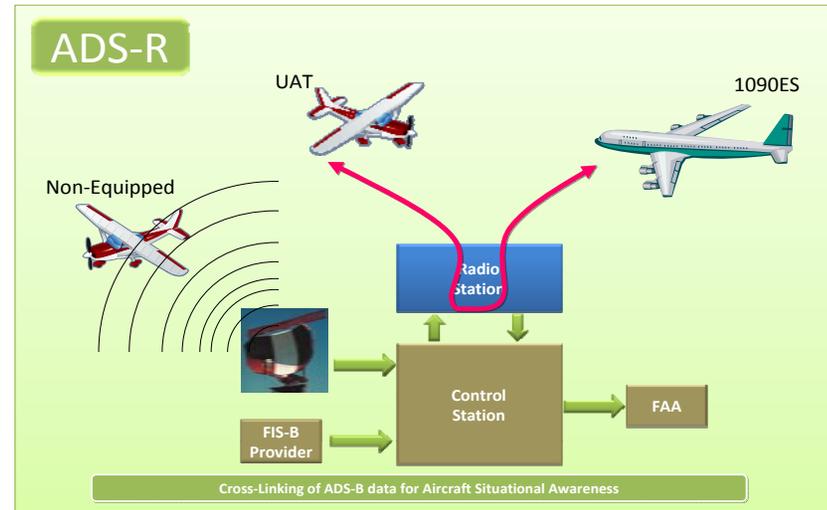
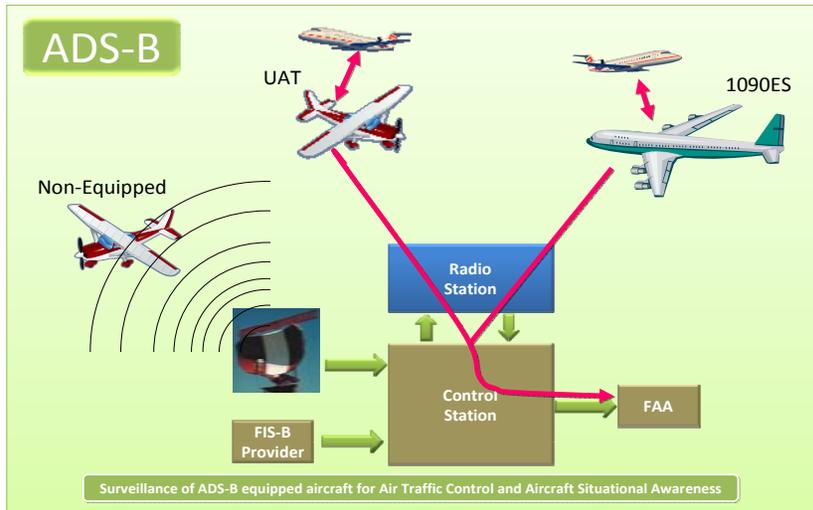
AIR TRANSPORT

- Reduction & more efficient maneuvers in response to URET
- More efficient metering based on improved TMA accuracy
-  • Increased safety on the surface by controllers
-  • More efficient spacing on approach in VMC
-  • Continuation of Visual Approaches in marginal conditions
- Increased ability to allow continuous descent approaches
-  • Increased safety on the surface by pilots
-  • High altitude - Increased capacity in Gulf of Mexico
-  • High altitude - optimal routing in Gulf of Mexico
-  • Increased IFR capacity (Alaska and Gulf of Mexico)

GENERAL AVIATION

-  • Fewer aircraft to aircraft conflicts
- Fewer encounters with hazardous weather
- More efficient routes in adverse weather
-  • Reduction in user costs to obtain weather info
- Fewer aircraft to terrain conflicts
- Fewer aviation accidents in Alaska
-  • Access to lower altitude routes in Alaska
-  • Improved search and rescue services in Alaska
- Increase access to remote villages in Alaska
-  • Increased medevac access to remote villages in Alaska

ADS-B Service Descriptions



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Initial ADS-B Services and Applications

Services:
Surveillance Services (En Route, Terminal, Surface)
Broadcast Services (Traffic / Flight Information)
Applications:
Enhanced Visual Acquisition
Enhanced Visual Approaches
Final Approach and Runway Occupancy Awareness
Airport Surface Situational Awareness
Conflict Detection
Merging and Spacing
Cockpit Display of Traffic Information (CDTI) Assisted Visual Separation (CAVS)



Background – Broadcast Services:

Traffic Information Service – Broadcast / Flight Information Service – 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.



FIS-B transmits graphical National Weather Service products, temporary flight restrictions (TFRs), and special use airspace.



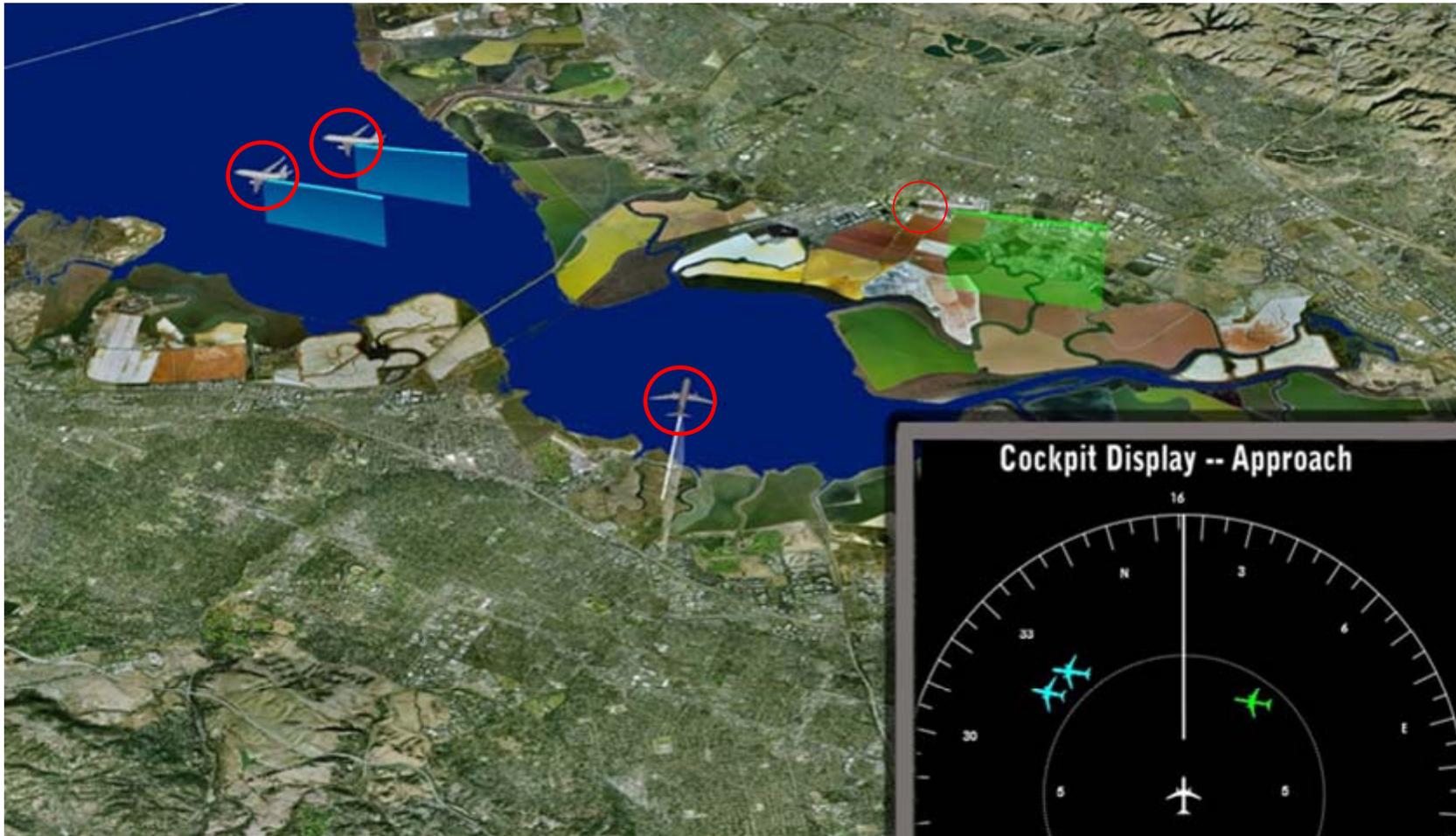
Gulf of Mexico: Current Conditions



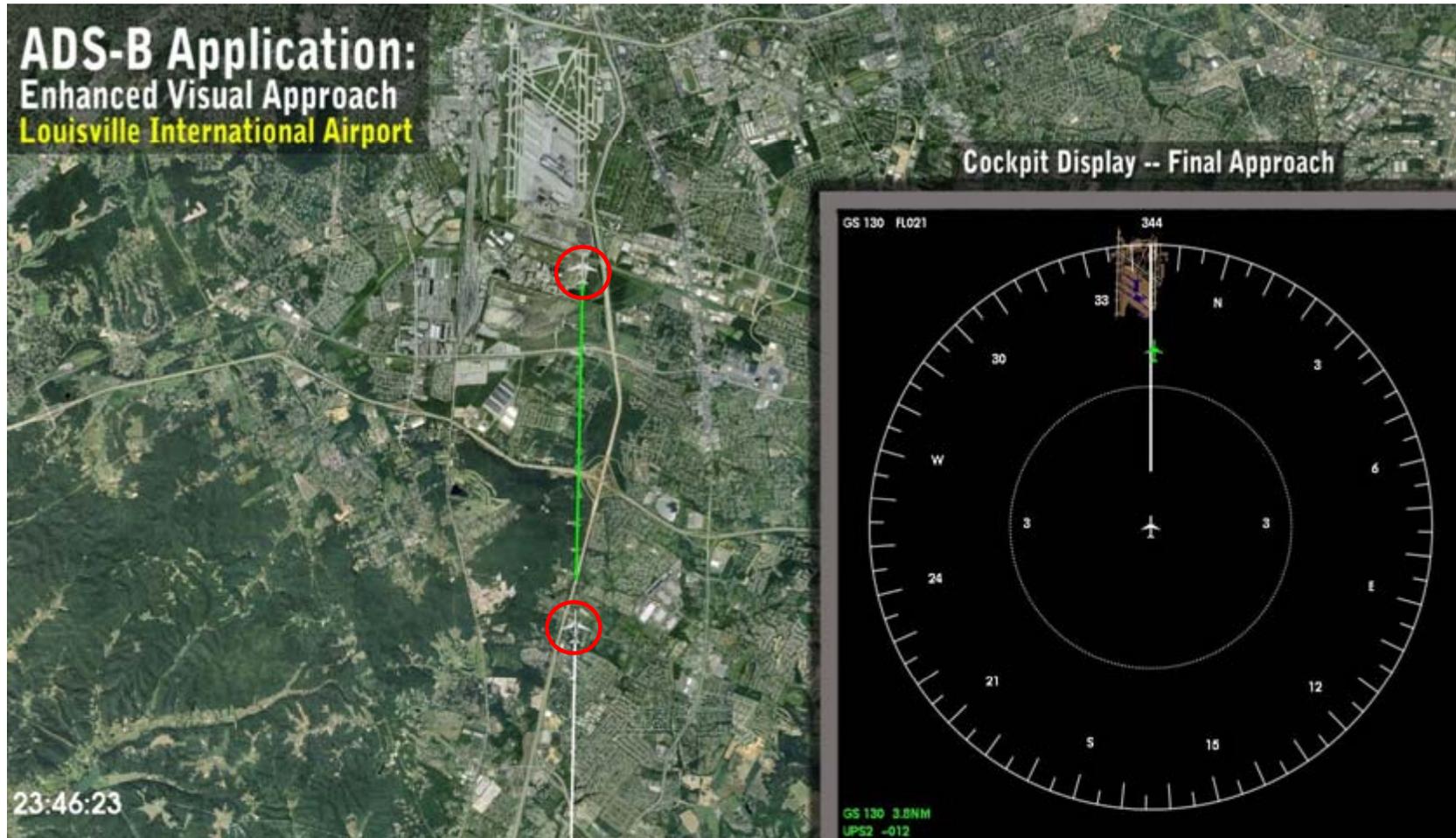
Gulf of Mexico: ADS-B Enabled



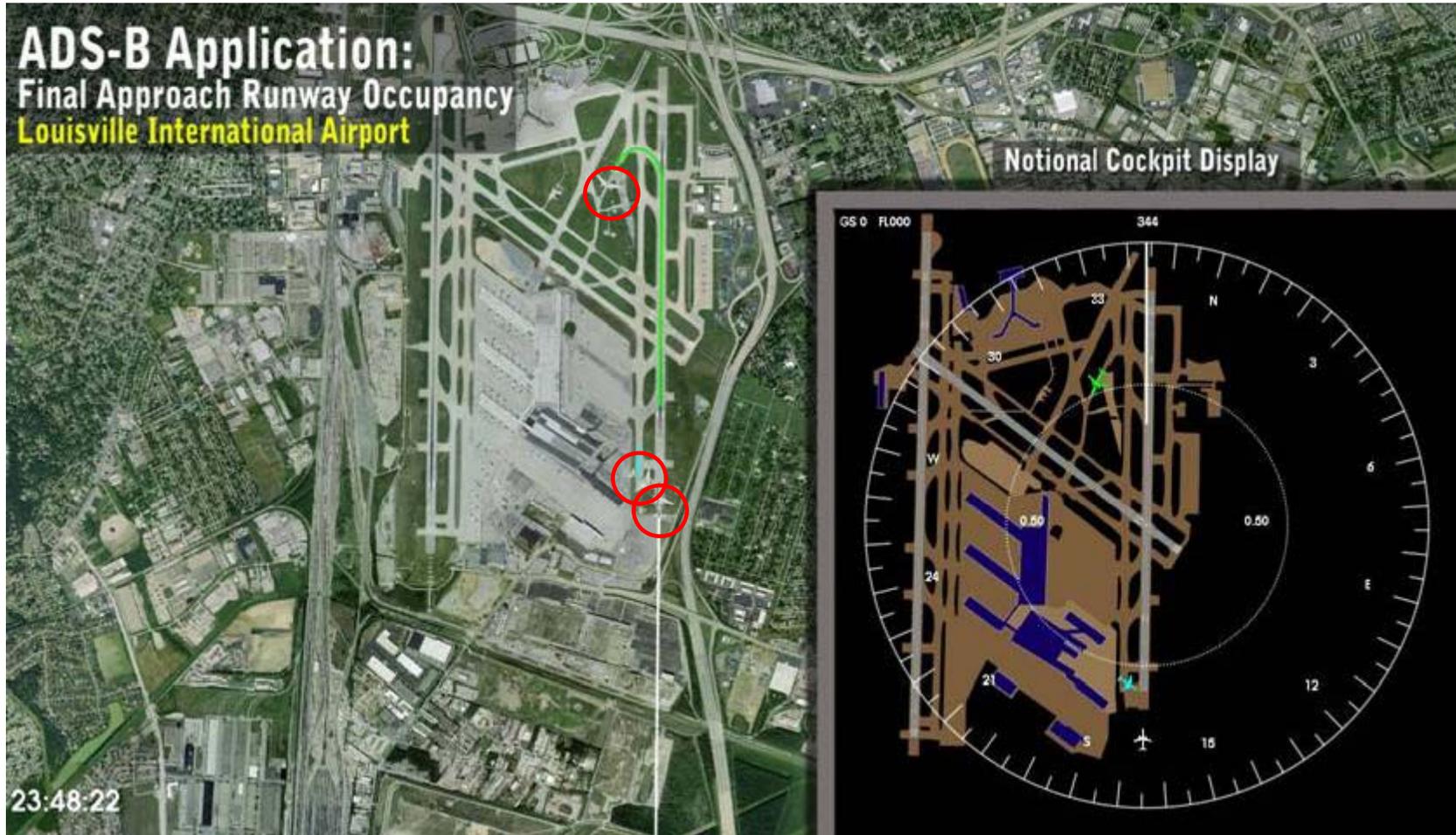
ADS-B In: Program Baseline - Enhanced Visual Acquisition



ADS-B In: Program Baseline - Enhanced Visual Approaches



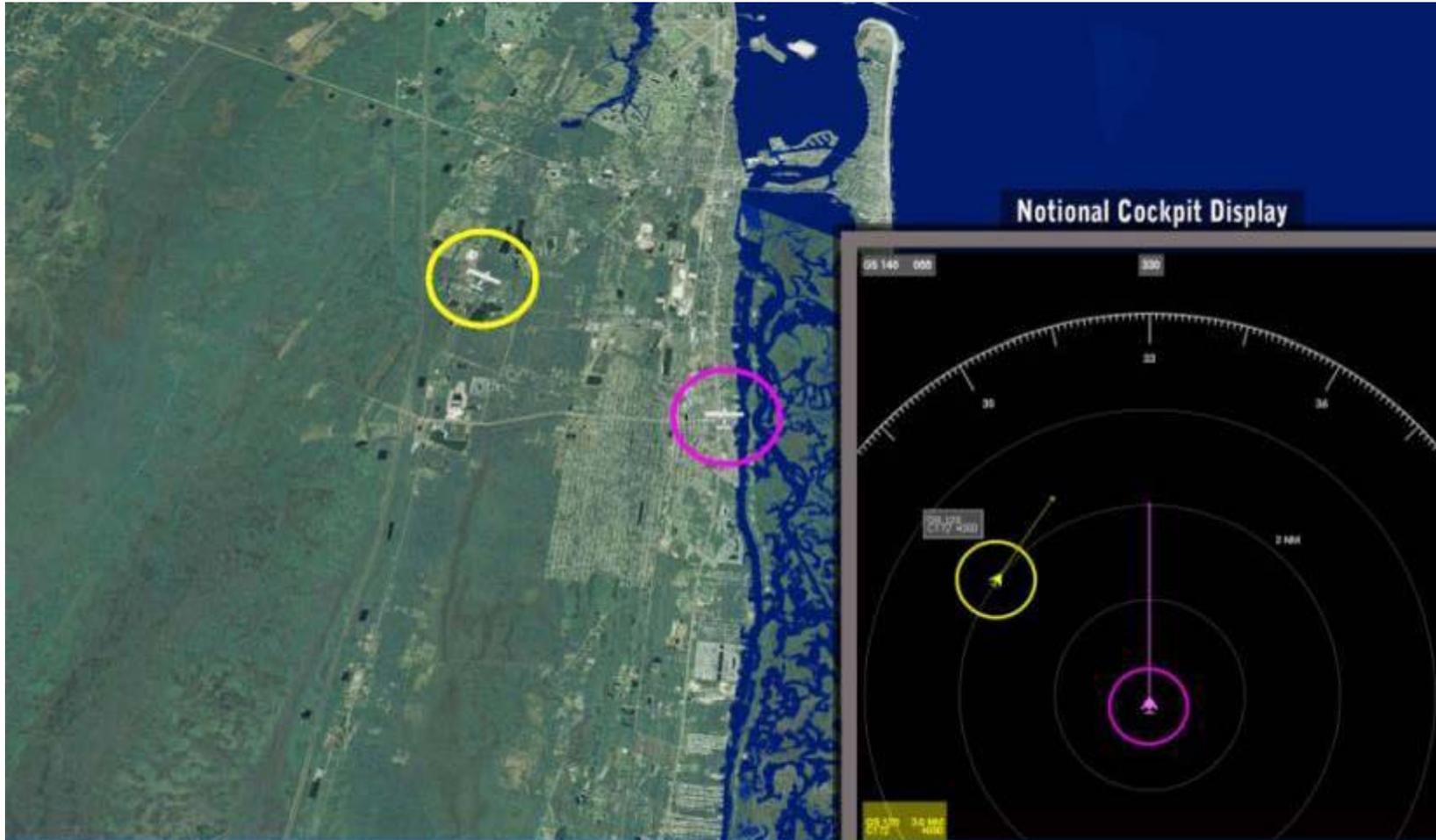
ADS-B In: Program Baseline - Final Approach and Runway Occupancy



ADS-B In: Program Baseline - Airport Surface Situational Awareness



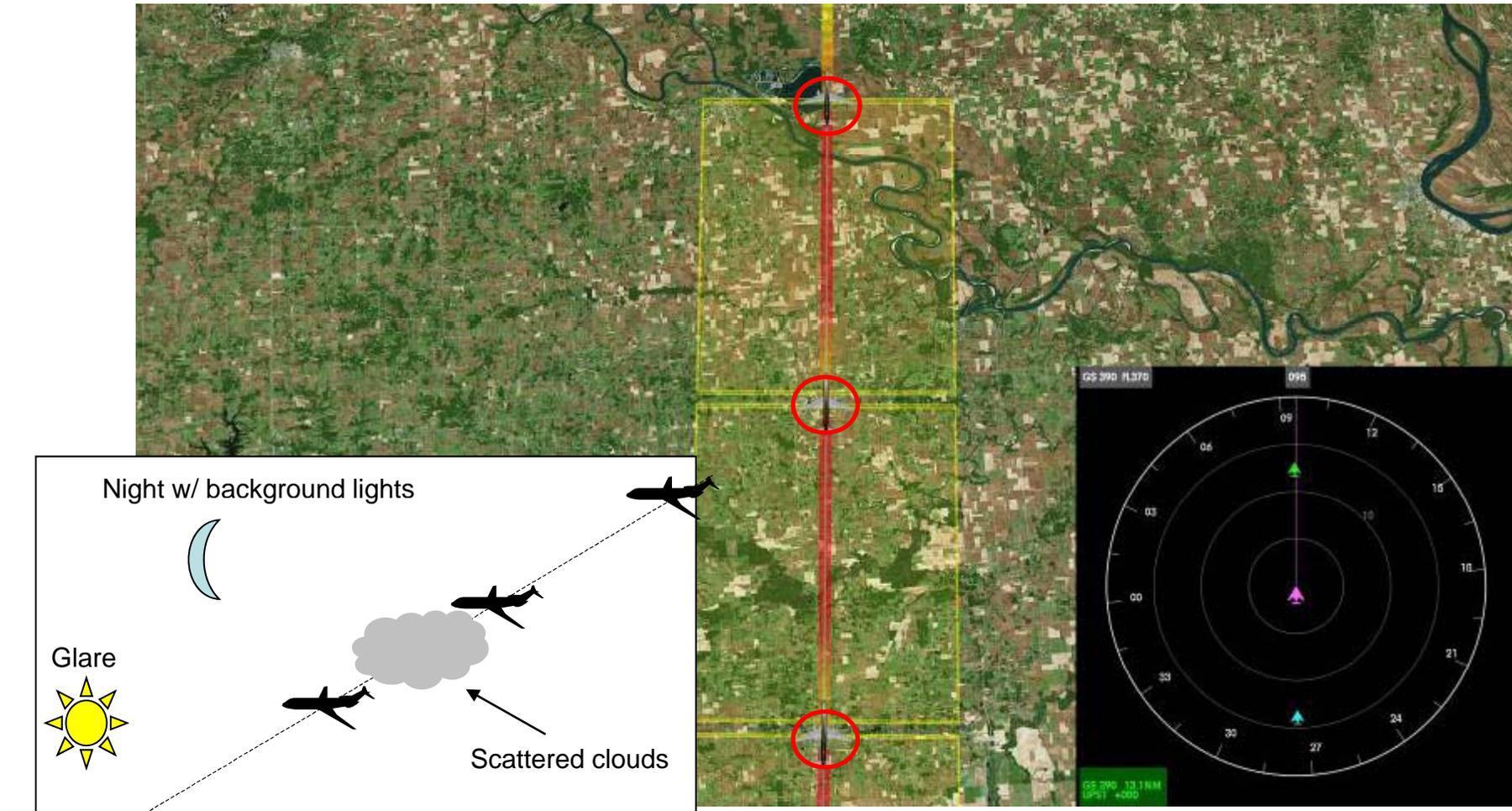
ADS-B In: Program Baseline - Conflict Detection



ADS-B In: Program Baseline - Merging and Spacing

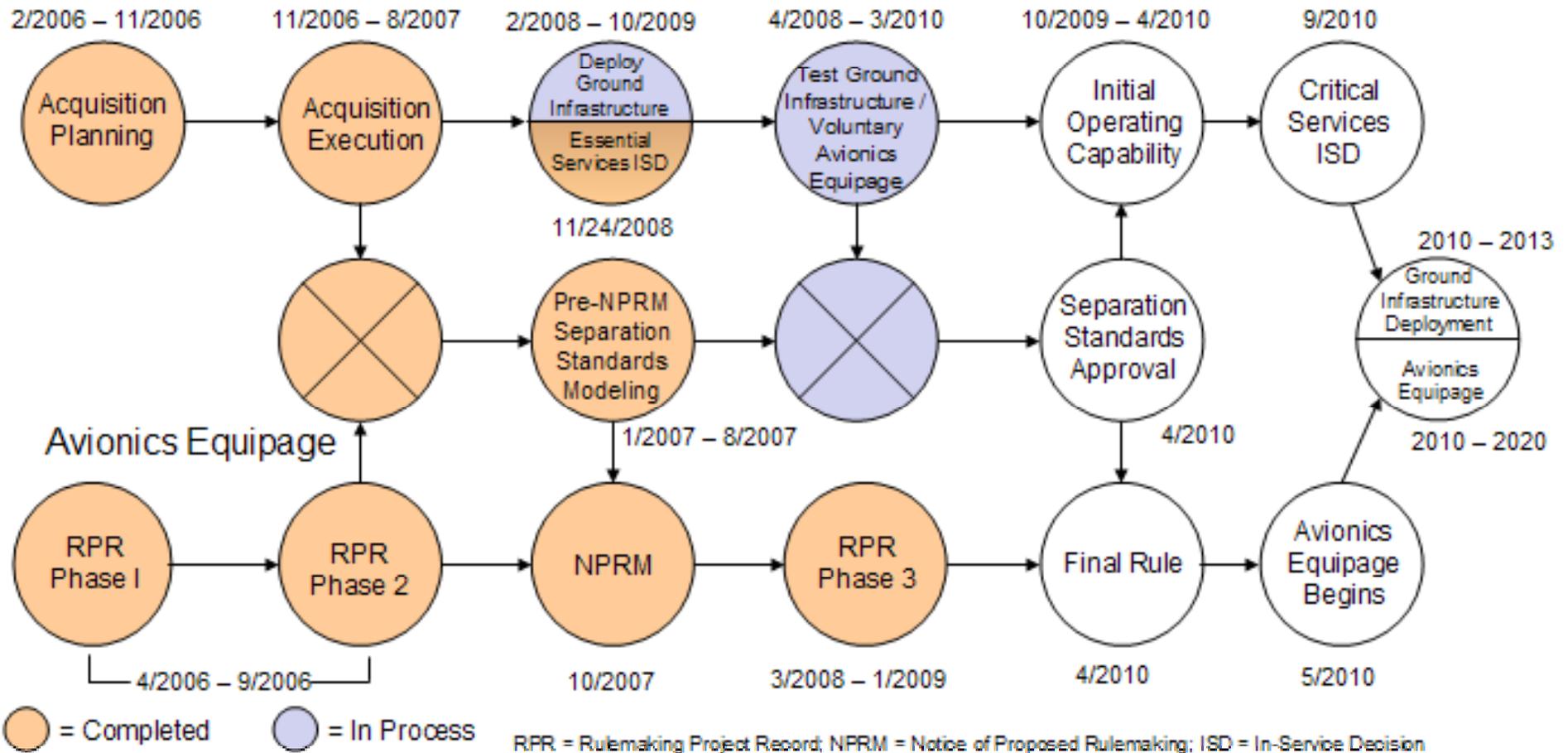


ADS-B In: Program Baseline - Cockpit Display of Traffic Information (CDTI) Assisted Visual Separation (CAVS)

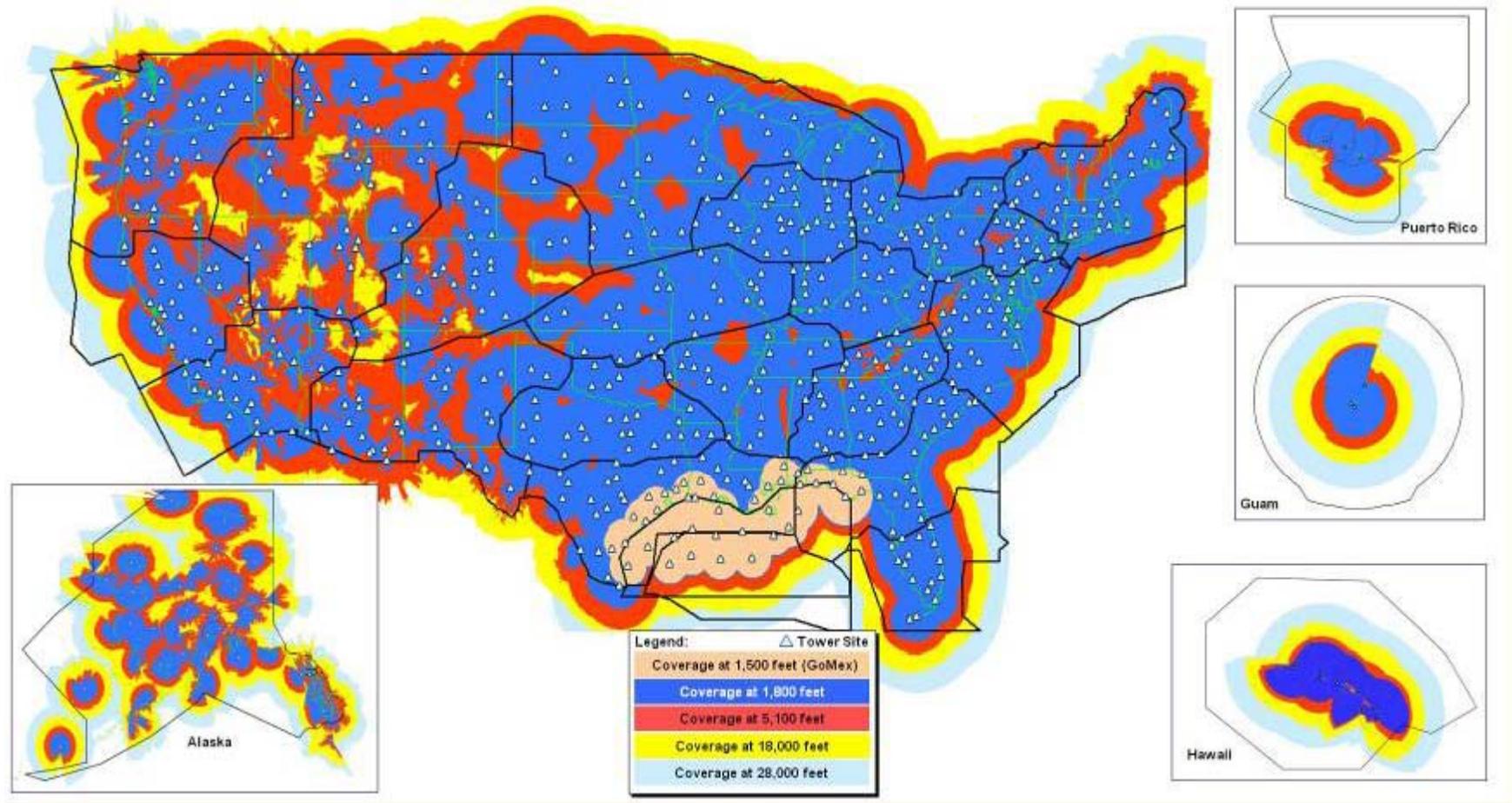


Dual Track Strategy

Ground Infrastructure



800 Ground Station Solution Provides National Coverage

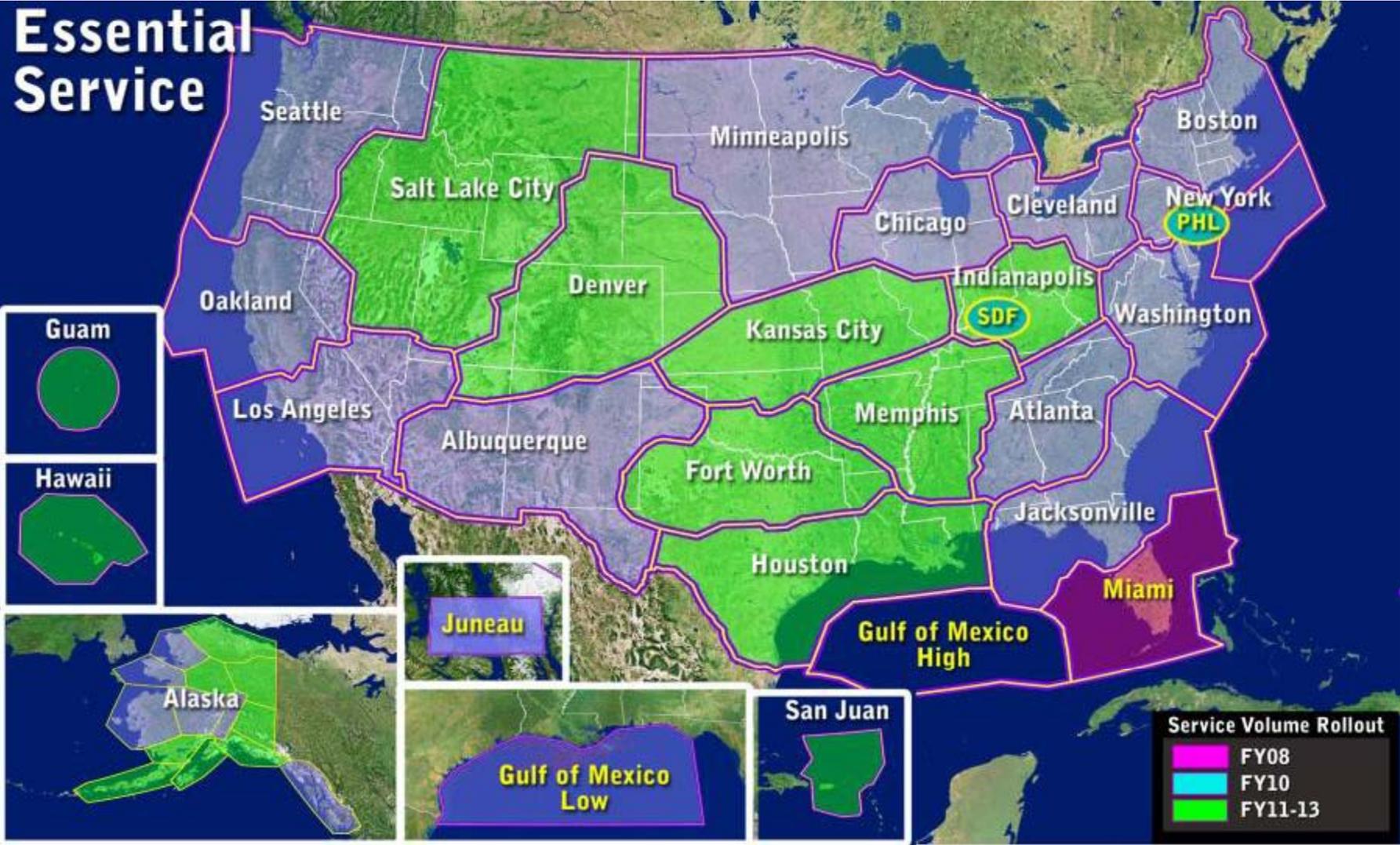


ADS-B Program Schedule

	FY2008				FY2009				FY2010				FY2011				FY2012				FY2013			
	Q1	Q2	Q3	Q4																				
ESSENTIAL SERVICES																								
Key Site - Initial Operational Capability (IOC)				▲																				
In-Service Date (ISD)				▲																				
Segment 1 Continued Roll-Out																								
Segment 2 Roll-Out																								
CRITICAL SERVICES																								
Key Sites - Initial Operational Capability (IOC)																								
In-Service Date (ISD)																								
Segment 2 Roll-Out																								
WEATHER OBSERVATION																								
Gulf of Mexico Roll-Out																								
Alaska Roll-Out																								

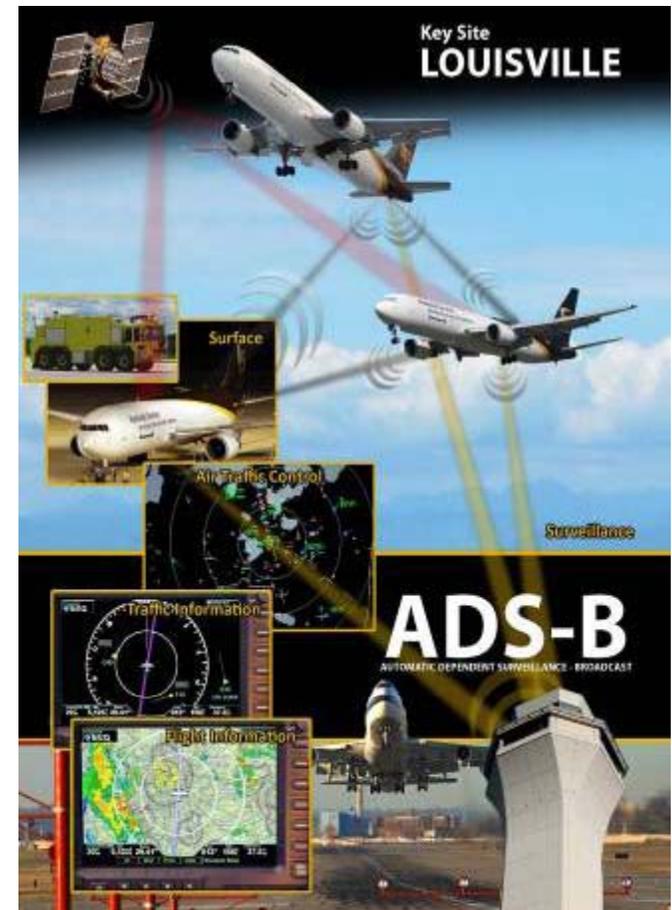


Essential Services - Service Volume Roll-Out



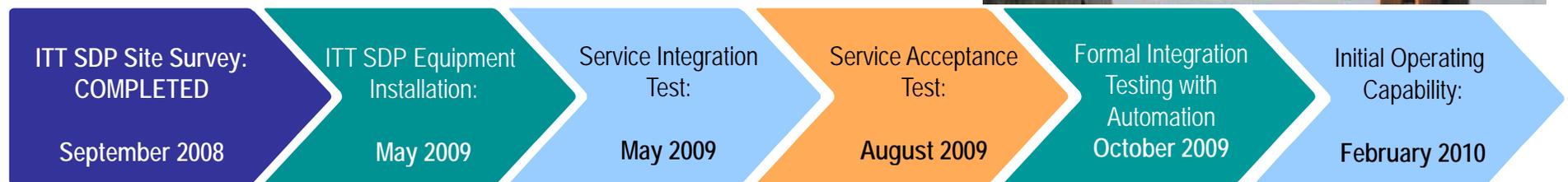
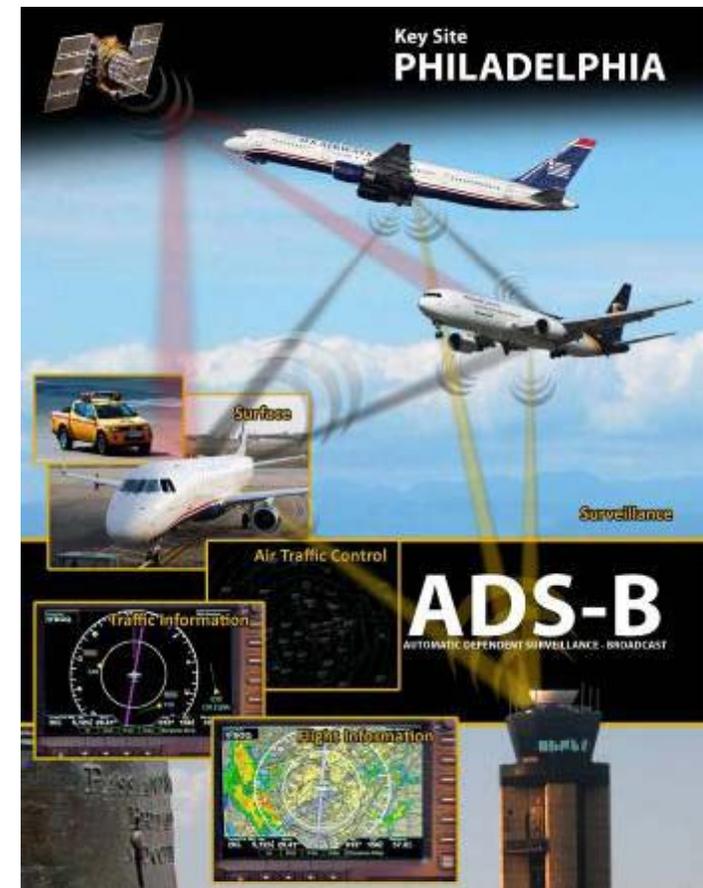
Critical Services: Eastern Service Area

- **Louisville**
 - Terminal Service Volume (#85)
 - Surface Service Volume (#211)
- **Service Delivery Point**
 - Louisville TRACON / SDF ATCT
- **Automation**
 - CARTS



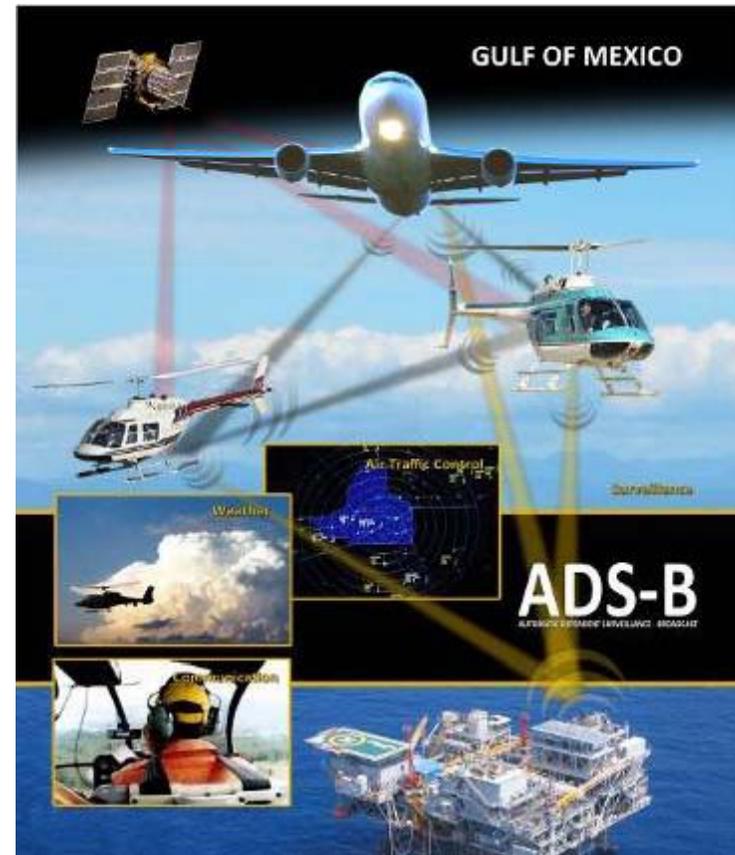
Critical Services: Eastern Service Area

- **Philadelphia**
 - Terminal Service Volume (#28)
 - Surface Service Volume (#207)
- **Service Delivery Point**
 - Philadelphia TRACON / Philadelphia ATCT
- **Automation**
 - STARS



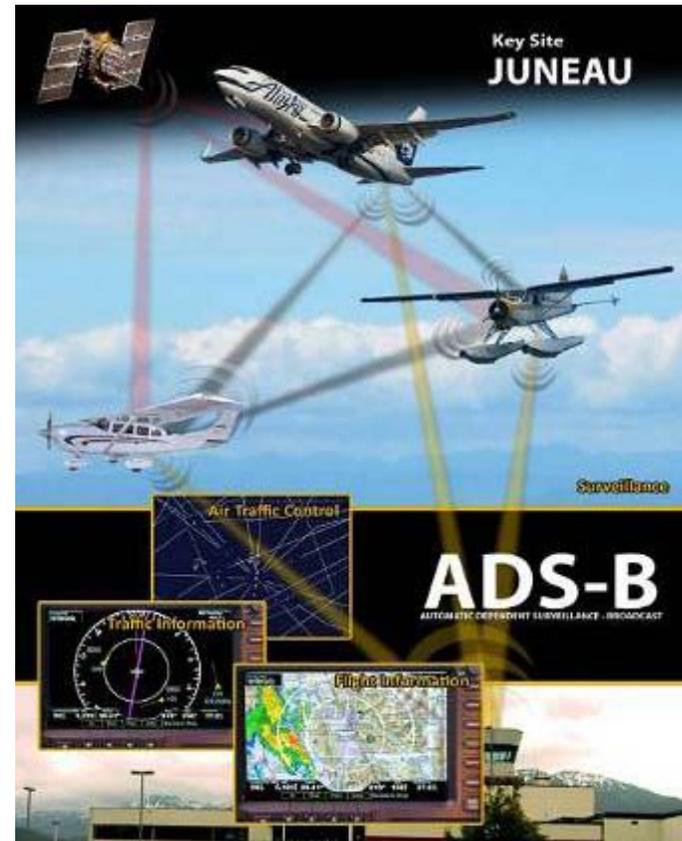
Critical Services: Central Service Area

- **Gulf of Mexico**
 - Service Volumes (#179 & #180)
- **Service Delivery Point**
 - Houston ARTCC
- **Automation**
 - HOST (ERAM delayed)

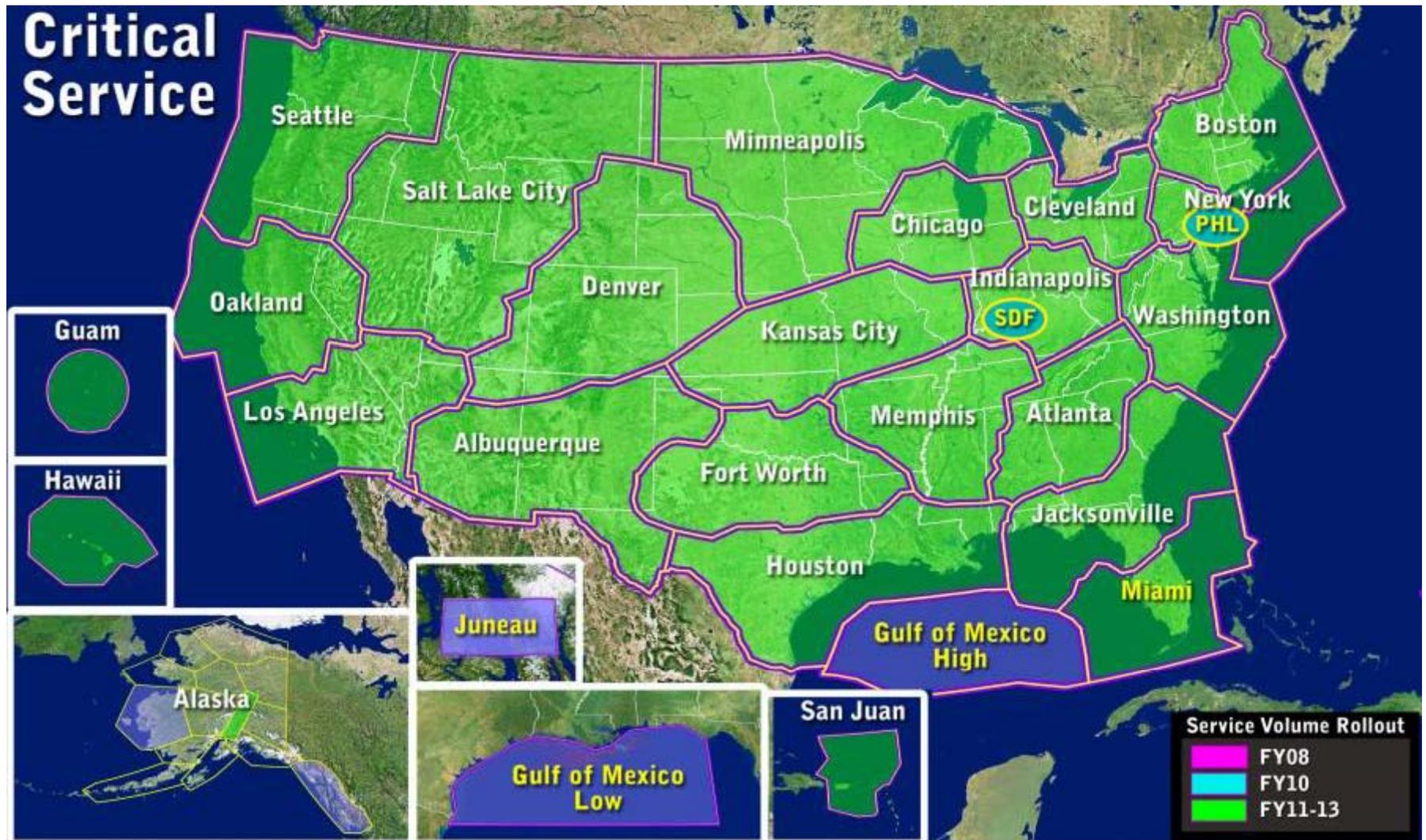


Critical Services: Western Service Area

- **Juneau**
 - En Route Service Volume (#178)
- **SDP**
 - Anchorage ARTCC
- **Automation**
 - MEARTS



Critical Services – Service Volume Roll-Out



Next Steps: FY2009 / FY2010 Schedule

Milestone	Planned Date of Completion / Status
FY2009	
In Service Decision for Broadcast Services	November 2008
Louisville Service Acceptance Test (SAT)	April 2009
Gulf of Mexico Service Acceptance Test (SAT)	June 2009
Philadelphia Service Acceptance Test (SAT)	August 2009
Gulf of Mexico Initial Operating Capability (IOC) of Communication Services	September 2009
FY2010	
Juneau Service Acceptance Test (SAT)	October 2009
Louisville IOC of Surveillance Services	October 2009
Gulf of Mexico IOC of Surveillance Services	December 2009
Philadelphia IOC of Surveillance Services	February 2010
Juneau IOC of Surveillance Services	April 2010
Final Rule Published	April 2010
Surveillance Services ISD for ADS-B	September 2010



Contract Award Announcement

- On August 30, 2007 the FAA awarded the ADS-B national contract to ITT, Corp as the prime contractor
- ITT has a team of sub contractors which includes AT&T, Thales, WSI, SAIC, PriceWaterhouseCoopers, Aerospace Engineering, Sunhillo, Comsearch, MCS of Tampa, Pragmatics, Washington Consulting Group, Aviation Communications and Surveillance Systems (ACSS) and NCR Corporation
- In addition, ITT has partnered with L-3 Avionics Systems and Sandia Aerospace



Contract Value

- **Initial Award of approximately \$207M**
 - Segment 1 Critical and Essential Broadcast Services Development and Installation
- **Potential Options of approximately \$1.6B**
 - Segment 1 Critical and Essential Broadcast Services subscription charges
 - Segment 2 Critical and Essential Broadcast Services subscription charges
 - Generic Surface, Terminal and En Route service volumes
 - Program Management
 - Engineering Services
 - Weather Activations
 - Delivery of data to FAA Command Center
 - Provision of service to other service delivery points
- **Period of Performance**
 - First option period ends FY2016
 - Second option period ends FY2021
 - Final option period ends 2025
- **Total Contract Value of approximately \$1.86B**

Traditional Acquisition Approach

- **The government owns and maintains equipment**
- **Functional design and hardware deliverables are specified**
- **Extensive component level testing**
- **Land lease / acquisition with complicated environmental due diligence process**
- **Proposal evaluation focuses on costs because each vendor proposes the same design**



Service Acquisition Approach: ADS-B

- **The ADS-B ground structure -- including hardware, software, and ground stations -- will be owned by the vendor**
- **The vendor is responsible for obtaining the sites used for the ground stations**
 - Could include government furnished sites
- **FAA provides Frequency Transmit Authority (FTA)**
- **The FAA will own the system configuration and data**
- **Contractor will respond to a Statement of Objectives (SOO), which includes detailed constraints for ADS-B**

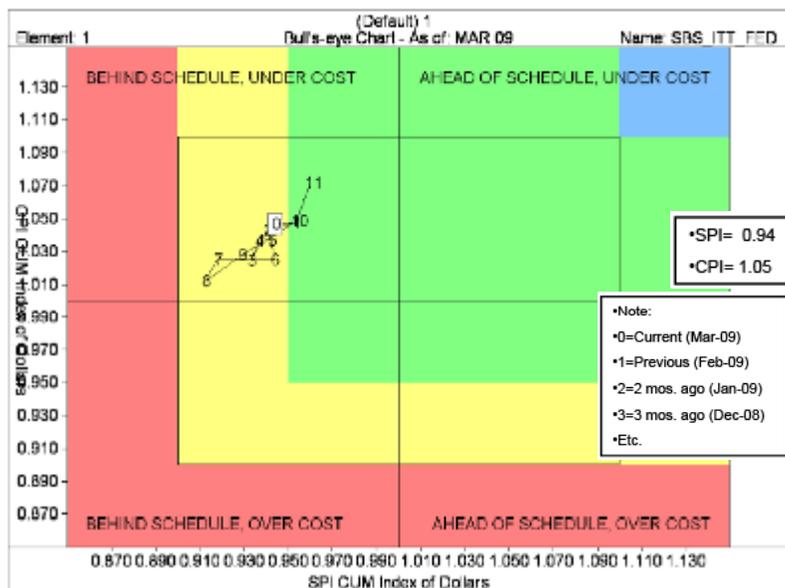
Service Acquisition Attributes

- **Contractors provide services in lieu of equipment**
- **Reduces impact of FAA equipment requirements (grounding, electrical, leases, etc.)**
- **Contractor responsible for equipment installation operation, and maintenance**
- **Contractor may have existing infrastructure to utilize**
- **Contractor may decide to build additional infrastructure to support FAA and contractor requirements**



Surveillance and Broadcast Services

Program Earned Value Management



Technical Performance Measures (TPMs)

TPM Category	TPM	Current Status
Latency	ADS-B, ADS-R, TIS-B, FIS-B	Green
Availability	ADS-B, ADS-R, TIS-B, FIS-B	Green
Update Interval ★	ADS-B, ADS-R, TIS-B	Green
Transmission Interval	FIS-B	Green
Position Independent Validation	ADS-B	Green

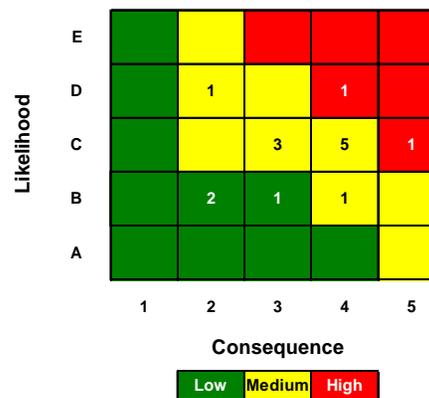
★ •FIS-B Transmission Interval: NEXRAD Reflectivity (CONUS) is turned off and the issue is being worked on. No impact on the system performance.

★ •NEXRAD Reflectivity (Regional) software fix is under testing

Schedule Status (FY08 / FY09 / FY10)

FY08 Milestones	FY09 Milestones	FY10 Milestones
Preliminary Design Review (PDR) November 2007	✓	Independent Assessment November 2008
Critical Design Review (CDR) February 2008	✓	In-Service Decision November 2008
Close of NPRM Comment Period March 2008	✓	Louisville SAT April 2009
Factory Acceptance Test for Essential Services May 2008	✓	Gulf of Mexico Weather Service Acceptance Test (SAT) June 2009
Service Acceptance Test for Essential Services June 2008	✓	Gulf of Mexico SAT June 2009
End to End System Test / Operational Test August 2008	✓	Philadelphia SAT August 2009
Initial Operating Capability (IOC) August 2008	✓	Gulf of Mexico Comm. and Weather IOC September 2009
		Juneau SAT October 2009
		Louisville IOC of Surveillance Services October 2009
		Gulf of Mexico IOC of Surveillance Services December 2009
		Philadelphia IOC of Surveillance Services February 2010
		Juneau IOC of Surveillance Services April 2010
		Final Rule Published April 2010
		Surveillance Services ISD for ADS-B September 2010

Program Risks



High:

1. Rule
2. Spectrum

Medium:

1. Avionics Standards
2. Application Standards
3. Separation Standards
4. Juneau WAM
5. Gulf Surv. Sites
6. CARTS
7. STARS
8. MEARTS
9. CD-2 Status Message

15 Rated Risks: 2 High, 10 Medium, 3 Low
WAM CD-2 Status Message



Agenda

- Section 1: ADS-B Overview
- **Section 2: ADS-B Infrastructure**
 - Physical and Functional Architecture
 - Rollout Plans
 - System Data Validation Plans
- Section 3: Program Governance and Structure
- Section 4: NPRM Status and Rulemaking Overview
- Section 5: ADS-B Supported Future Applications
- Section 6: Questions and Answers





ITT



Automatic Dependent Surveillance – Broadcast (ADS-B)

John Kefaliotis

Vice President, Next Generation
Transport Systems

Engineered for life

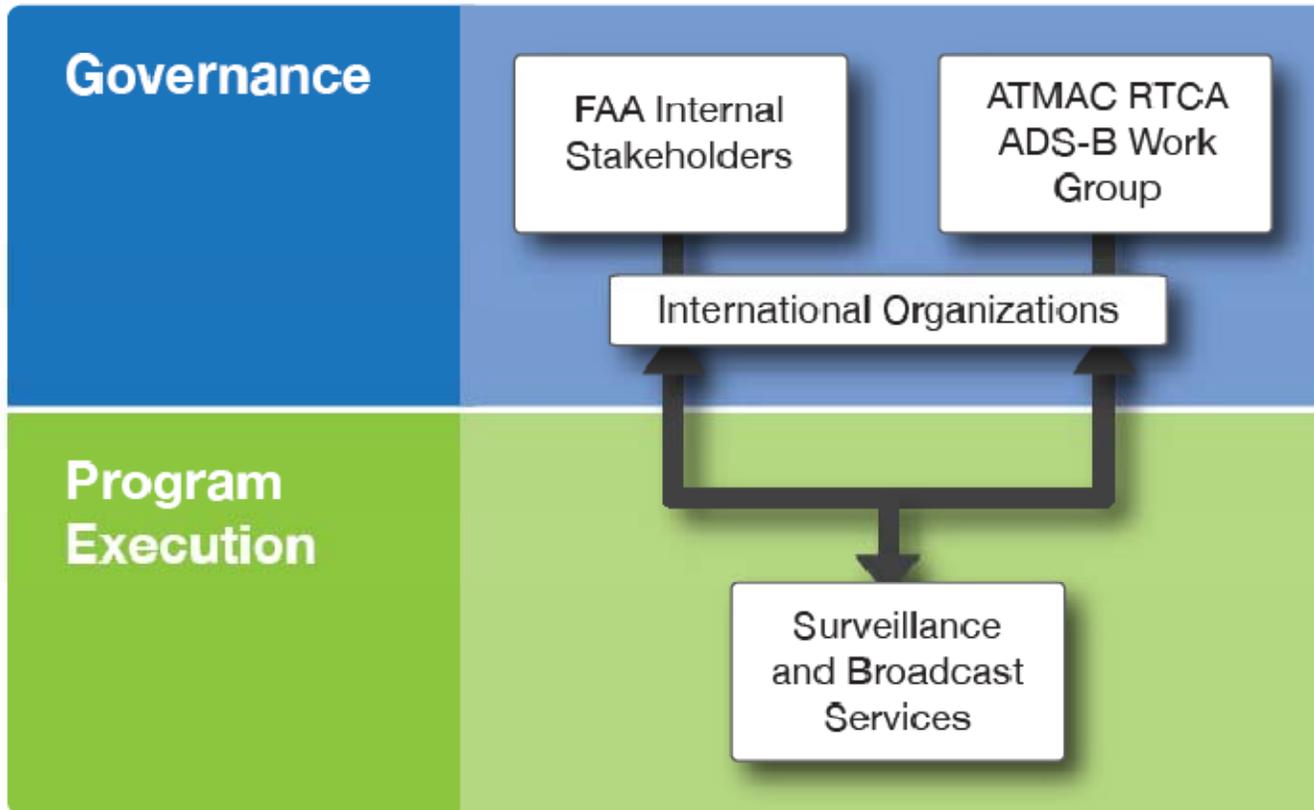
Automatic Dependent Surveillance - Broadcast (ADS-B) Services Acquisition
Federal Aviation Administration Contract DTFAWA-07-C-00067

Agenda

- Section 1: ADS-B Overview
- Section 2: ADS-B Infrastructure
- **Section 3: Program Governance and Structure**
 - Program Governance
 - WBS Structure
 - Rulemaking Involvement
 - Internal and External Agreements
- Section 4: NPRM Status and Rulemaking Overview
- Section 5: ADS-B Supported Future Applications
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Background: Program Governance



RTCA: Air Traffic Management Advisory Committee (ATMAC) ADS-B Workgroup

Member Affiliation



Recommendations:

- Rulemaking
- Positioning Source Backup
- Data Fusion

Tasks:

- Aviation Rulemaking Committee (ARC)
- Industry / FAA Tasking
 - Respond to industry for recommendations to the FAA
 - Respond to tasking from the FAA in support of the Surveillance and Broadcast Services milestones
- ADS-B Performance Control Board

International Harmonization



- **International Civil Aviation Organization (ICAO)**
 - Aeronautical Surveillance Panel (ASP)
 - Separation and Airspace Safety Panel (SASP)
 - Caribbean and South American Regional Planning and Implementation Group (GREPECAS)
 - Asia Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG)
- **Eurocontrol**
 - CASCADE: ADS-B is main focus of CASCADE, standardization, trials and implementation activities are being funded, and it is the largest EUROCONTROL partner in terms of budget and staff
 - Action Plan 23: exchange information and ideas for future airborne applications
 - Airborne Separation Assistance System Thematic Network 2 (ASAS –TN 2): European Commission funded forum
- **Requirements Focus Group (RFG)**
 - Joint RTCA / EUROCAE Working Group
- **Recurring Coordination Meetings**
 - Transport Canada
 - NAV CANADA
 - Civil Aviation Safety Authority
 - Airservices Australia
 - Eurocontrol





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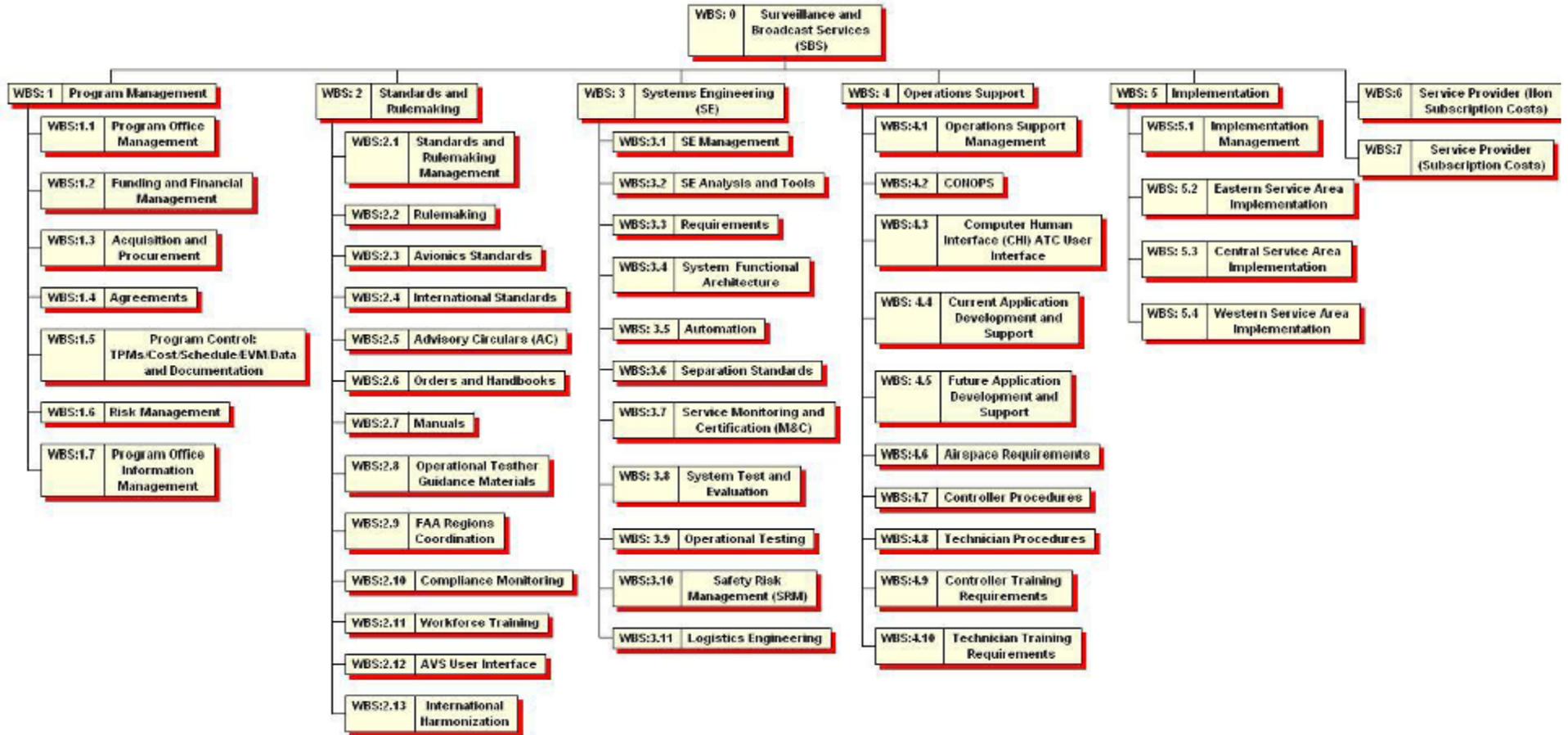
**Policy,
Rulemaking,
Standards and
Oversight**
Pat Zelechowski

Ops Support
Robert Novia

**Systems
Engineering**
Bob Pomrink

Implementation
Bobby Nichols

SBS Work Breakdown Structure



Partnerships

Signatories	Where	Purpose
HAI / AK Safety Organizations / AK Aircraft Operators	Alaska	To establish a cooperative government/industry relationship to support safer aviation and increase rural access in Alaska.
HAI / Energy Companies / Helicopter Operators	Gulf of Mexico	Industry partners are providing in-kind contributions at no cost to the FAA of platform space, power, telecommunications and lodging, aircraft transportation to the platforms for equipage installation and maintenance, and aircraft avionics equipage.
Net Jets		Will allow a number of NextGen technologies and procedures to be tested on a fleet of about 600 aircraft. Under the agreement, NetJets will focus on RNAV and RNP, ADS-B, Wide Area Augmentation System and Data Communications.
UPS	Louisville, KY	Upgrade UPS aircraft avionics and to develop a prototype ground tool to test, validate, and mature a Merging & Spacing ADS-B application for potential use by UPS.
US Airways		This Agreement establishes an Agreement Implementation Committee (AIC) to develop a work plan to implement selected NextGen technologies.
United Airlines (Pending)	South Pacific	This Agreement describes an operational flight evaluation of In-Trail Procedures (ITP) in the South Pacific, using United B747-400s. Data from the flight evaluation will be used to validate requirements for ADS-B ITP and as input to the ADS-B benefits case.



SBS Internal FAA Agreements

- **Standards and Rulemaking – interdependent**
- **Directorate Level Agreement**
 - ATO-E Program Operations
 - MEARTS (Juneau) and HOST/ERAM (Houston and Denver)
- **Service Level Agreement**
 - ATO-T Automation
 - CARTS (Louisville) and STARS (Philadelphia)
 - ATO-W Air-Ground Communications
 - Installation of 9 new communication systems in the Gulf of Mexico
- **Informal ad-hoc groups through Stakeholders**

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Notice of Proposed Rulemaking (NPRM) Summary

- **All aircraft operating in the following airspace would have to meet the proposed performance requirements for ADS-B Out:**
 - Class A, B and C airspace
 - All airspace at and above 10,000 feet MSL over the 48 contiguous United States and the District of Columbia
 - Within 30 nautical miles of airports listed in 41 CFR Part 91, Appendix D, from the surface up to 10,000 feet MSL
 - Class E airspace over the Gulf of Mexico from the coastline of the United States out to 12 nautical miles, at and above 3,000 feet MSL

NPRM Summary: Broadcast Links and Performance Requirements

- **Broadcast Links (as in the NPRM)**
 - Below FL240: UAT and 1090ES allowed
 - Above FL240: 1090 ES required
- **Performance Requirements (as in the NPRM)**
 - Meets the performance requirements in TSO-C166a (1090ES), or later version; or
 - Meets TSO-C154b (UAT), or later version; and
 - Meets minimum broadcast message elements in NPRM

Aviation Rulemaking Committee Status

- **The Aviation Rulemaking Committee (ARC) Was Chartered in July 2007**
 - Developed report of operational and financial incentives for early ADS-B equipage and delivered to FAA in October 2007

Organization	Organization
Air Transport Association (ATA)	General Aviation Manufacturers Association (GAMA)
Aircraft Owners and Pilots Association (AOPA)	International Air Transport Association (IATA)
Airbus	Massachusetts Institute of Technology (MIT)
Air Line Pilots Association (ALPA)	MITRE / CAASD
Alaska Airlines	National Air Traffic Controllers Association (NATCA)
Aviation Communication and Surveillance Systems, LLC (ACSS)	National Business Aviation Association (NBAA)
The Boeing Company	Regional Airline Association (RAA)
Cessna Aircraft Company	Rockwell Collins
Department of Defense (DoD)	Southwest Airlines
Joint Planning and Development Office (JPDO)	United Airlines
Federal Express	UPS
Garmin	



Rulemaking Next Steps: Draft Schedule to Final Rule

Milestone	Planned Date of Completion	Status / Comments
FAA Rulemaking Team finalizes RPR Phase 3	January 14, 2009	Complete
RPR Phase 3 Submitted to ARM	January 21, 2009	Complete
Rulemaking Council Approval of RPR	January 27, 2009	Complete
Rulemaking Team Drafts Final Rule	May 2009	
Final Rule Economic Assessment	August 2009	
Final Rule Concurrence through Directors	October 2009	
Final Rule Concurrence through Associates	November 2009	
Final Rule Concurrence through Administrator	December 2009	
Final Rule Approved through OST	January 2010	
Final Rule Approved through OMB	April 2010	
Final Rule Published in Federal Register	April 2010	

•RPR = Rulemaking Project Record

