

# Surveillance and Broadcast Services

## ADS-B Program Overview

**Presented to: ADS-B Technology Forum**

**Date: 8 February 2011**

**By: Andy Leone, FAA, SBS Program**



**Federal Aviation  
Administration**



# Agenda

- **Overview**
- **Strategy**
- **Infrastructure and Implementation Status**
- **Applications**



# ADS-B Services and Applications

<b>Services:</b>
<b>ATC Separation Services (En Route, Terminal, Surface): ADS-B and ADS-R</b>
<b>Cockpit Services: Traffic / Flight Information Broadcast Services (TIS-B / FIS-B)</b>
<b>Situational Awareness Applications:</b>
<b>Enhanced Visual Acquisition</b>
<b>Enhanced Visual Approaches (1)</b>
<b>Final Approach and Runway Occupancy Awareness</b>
<b>Airport Surface Situational Awareness</b>
<b>Traffic Situational Awareness with Alerts (2)</b>
<b>Advanced Applications:</b>
<b>In Trail Procedures (ITP)</b>
<b>Interval Management (IM)</b>
<b>Surface Indications and Alerts (SURF-IA)</b>

(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

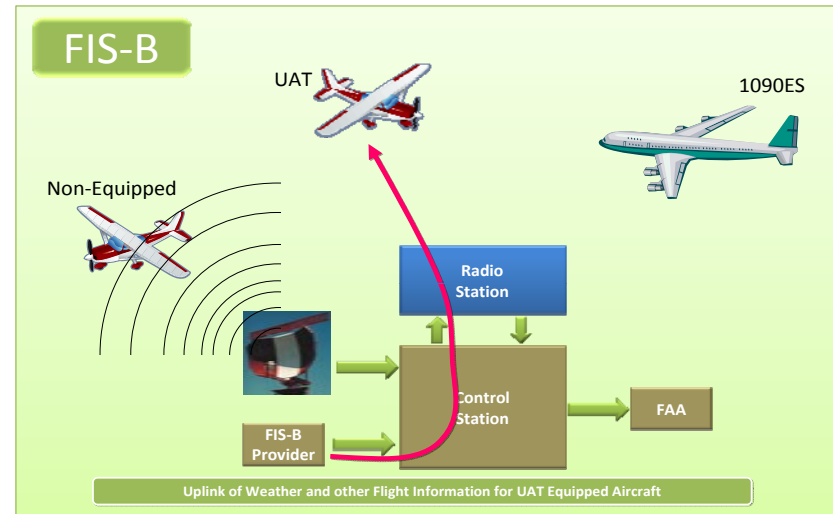
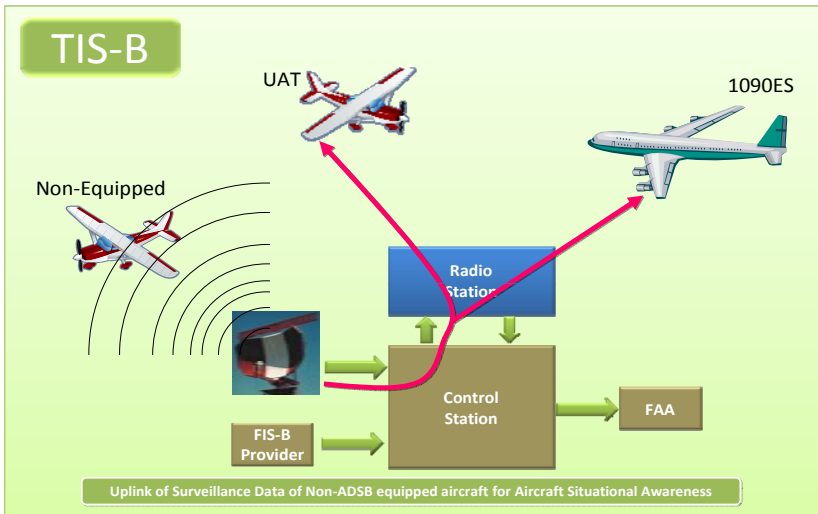
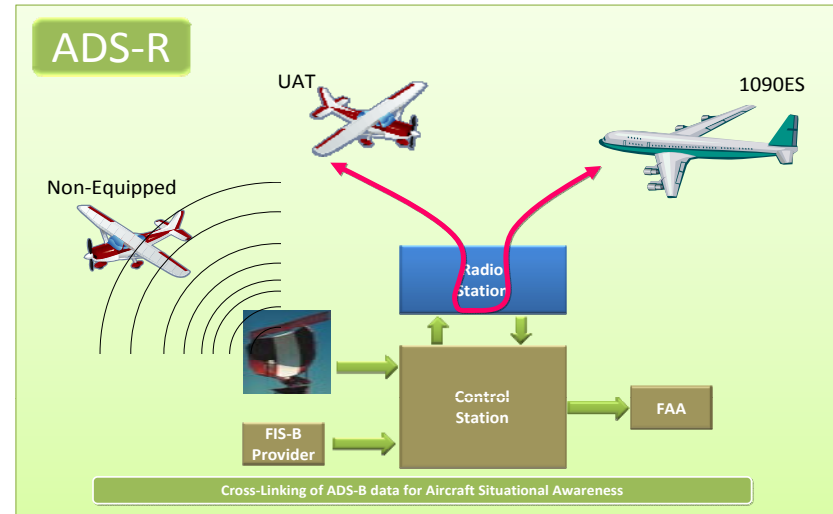
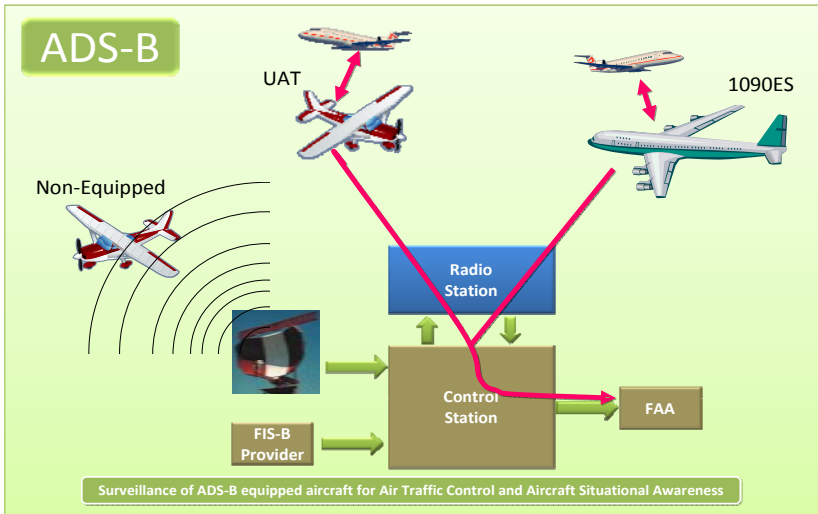
**Traffic Information Services – Broadcast TIS-B is a service which provides ADS-B equipped aircraft with position reports from secondary surveillance radar on non-ADS-B equipped aircraft.**



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

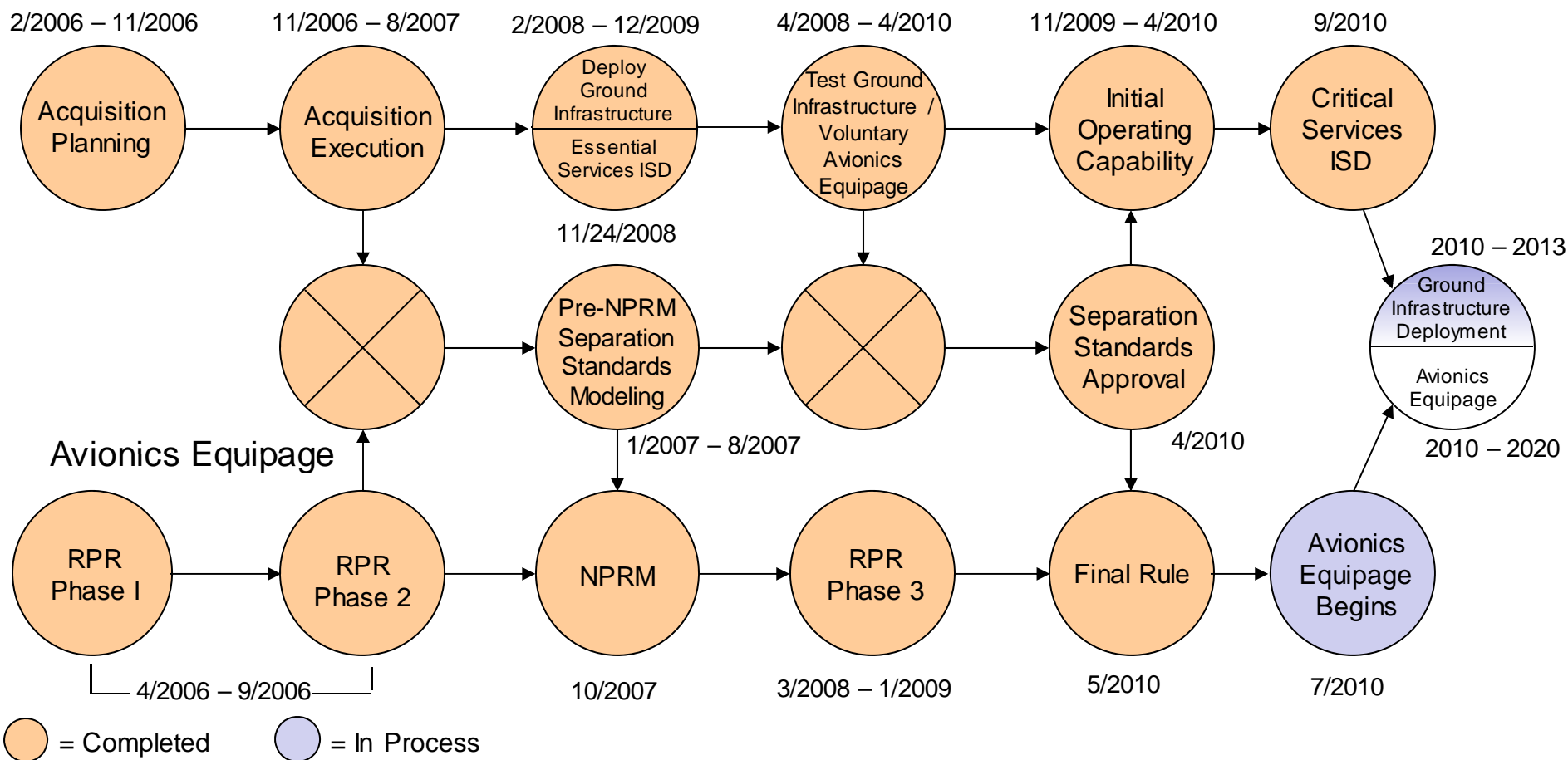
# Surveillance Broadcast Services

SEPARATION ADVISORY



# Strategy

## Ground Infrastructure

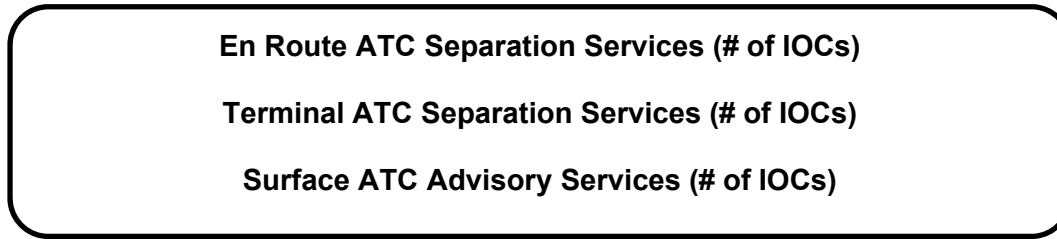


RPR = Rulemaking Project Record; NPRM= Notice of Proposed Rulemaking; ISD = In-Service Decision



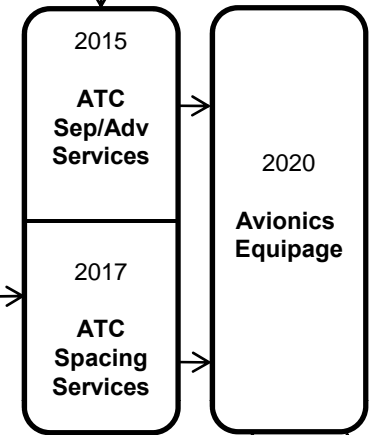
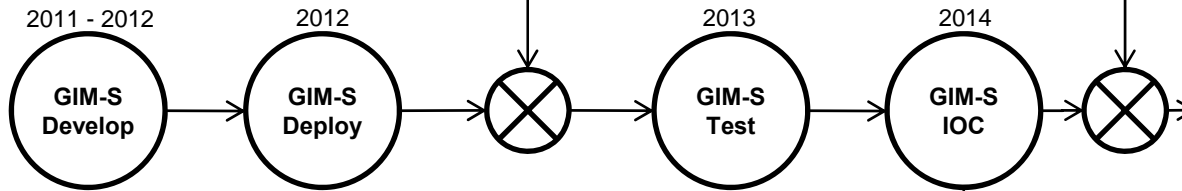
2011 - 2015

**ATC Separation/ Advisory Services**



**ATC Spacing Services**

*Ground-Based Interval Mgmt - Spacing (GIM-S) (En Route only)*

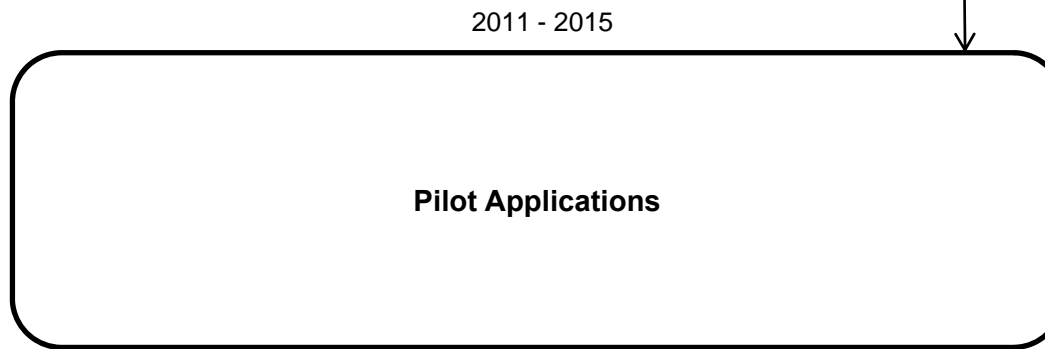


**Pilot Applications**

*Flight Deck Based Interval Mgmt - Spacing (FIM-S)*

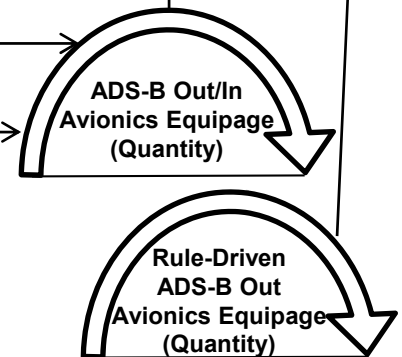
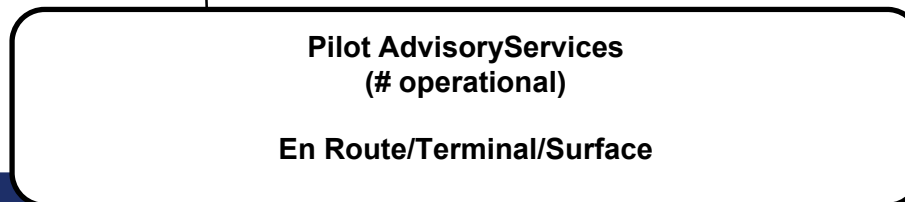
*In Trail Procedures (ITP)*

*Traffic Situation Awareness with Alerts (TSAA)*



2011 - 2014

**Pilot Advisory Services**  
*TIS-B*  
*FIS-B*  
*ADS-R*



Surveillance and Broadcast Services



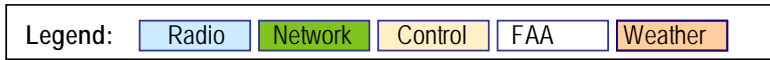
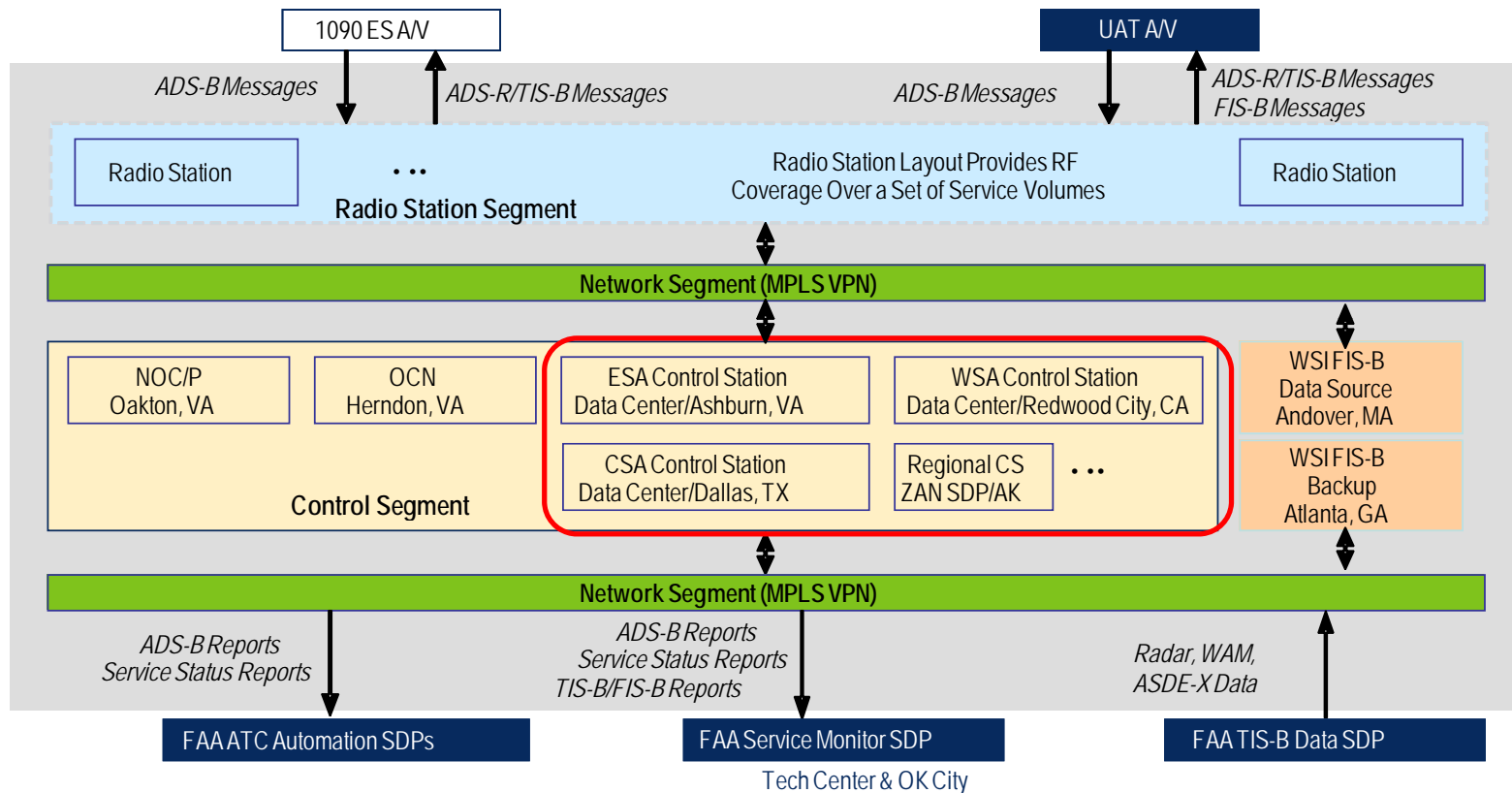
Federal Aviation Administration



# GROUND INFRASTRUCTURE

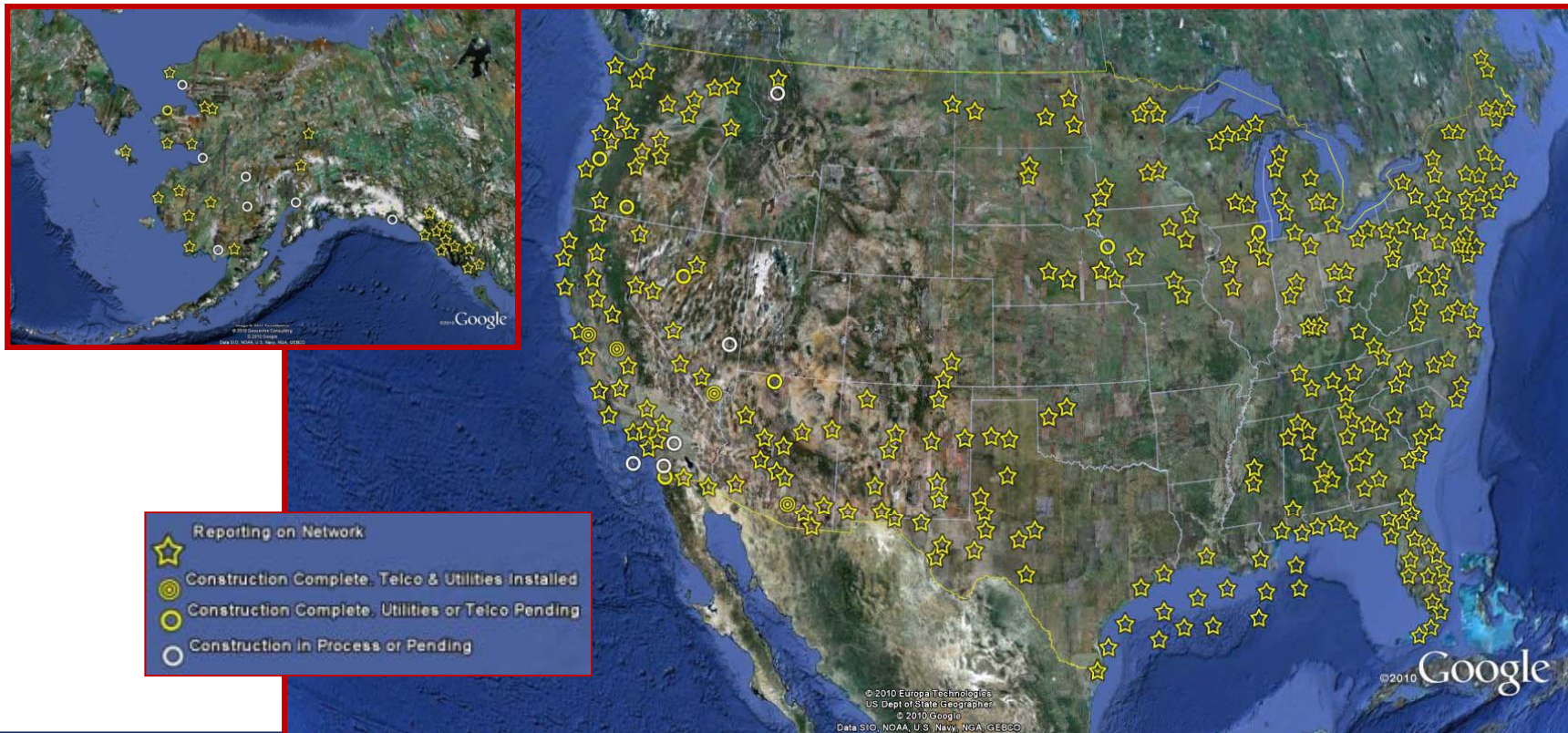


# SBSS Architecture Overview

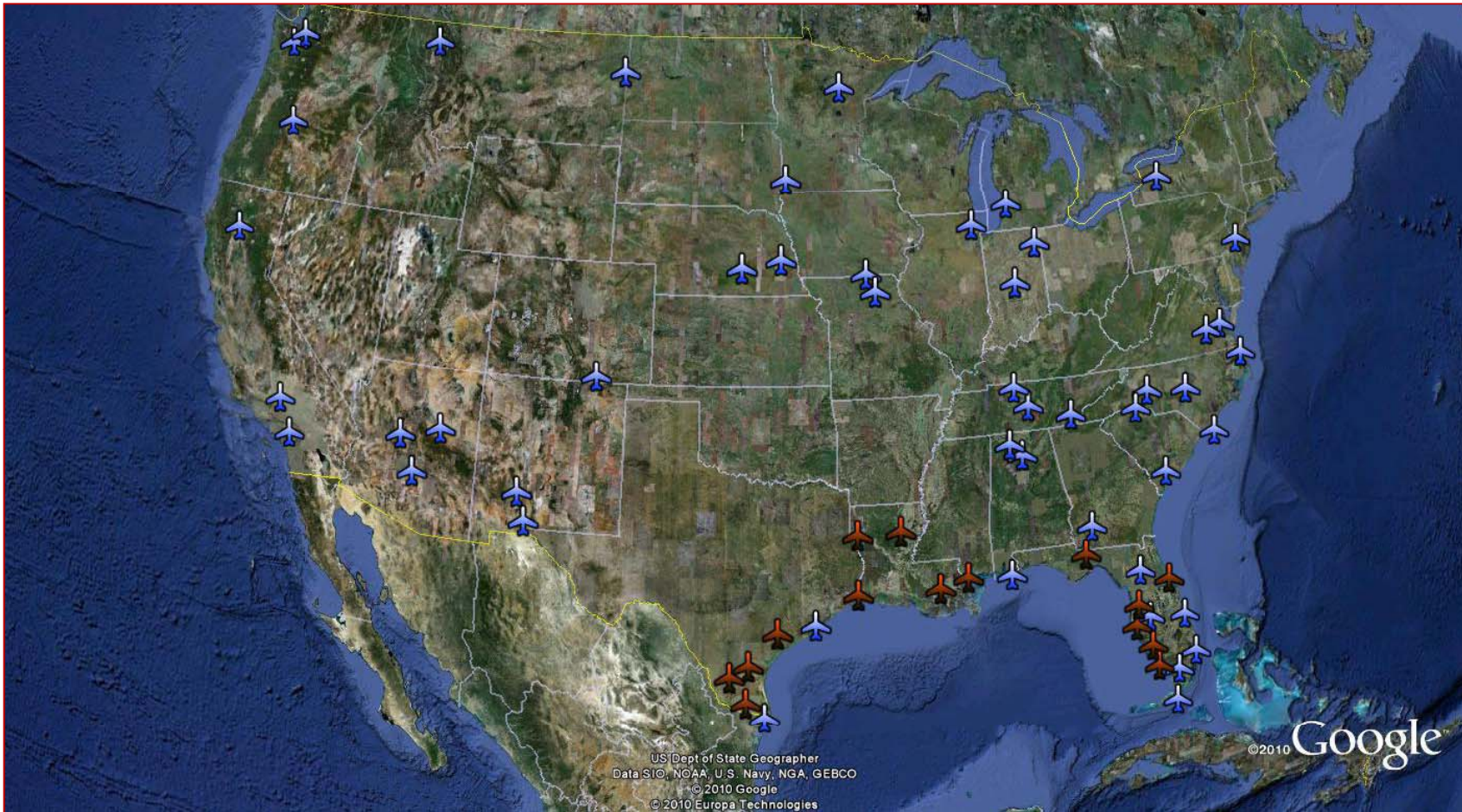


# Implementation Status: 2008-2010

- 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)]

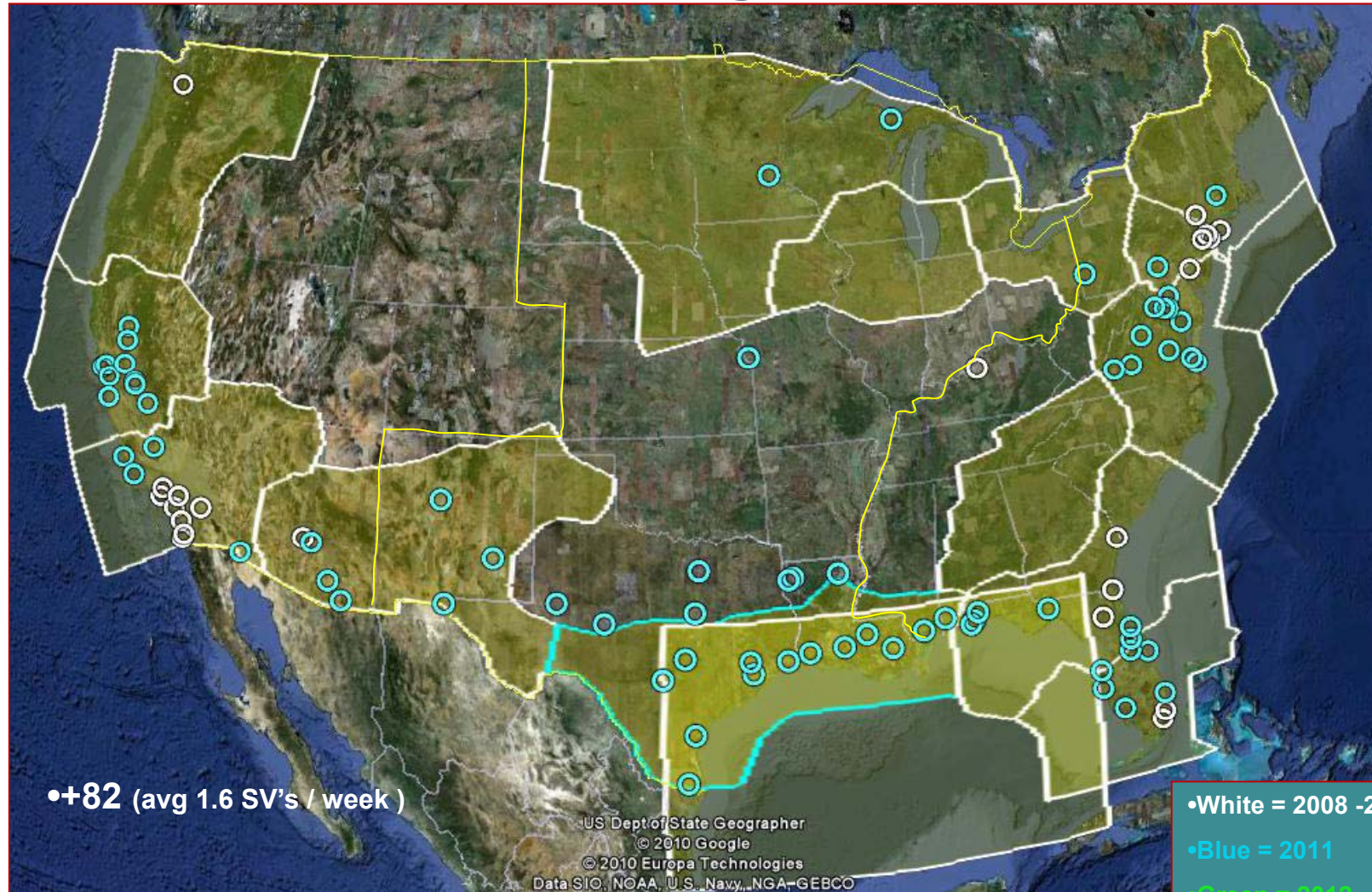


# ADS-B - General Aviation Airports

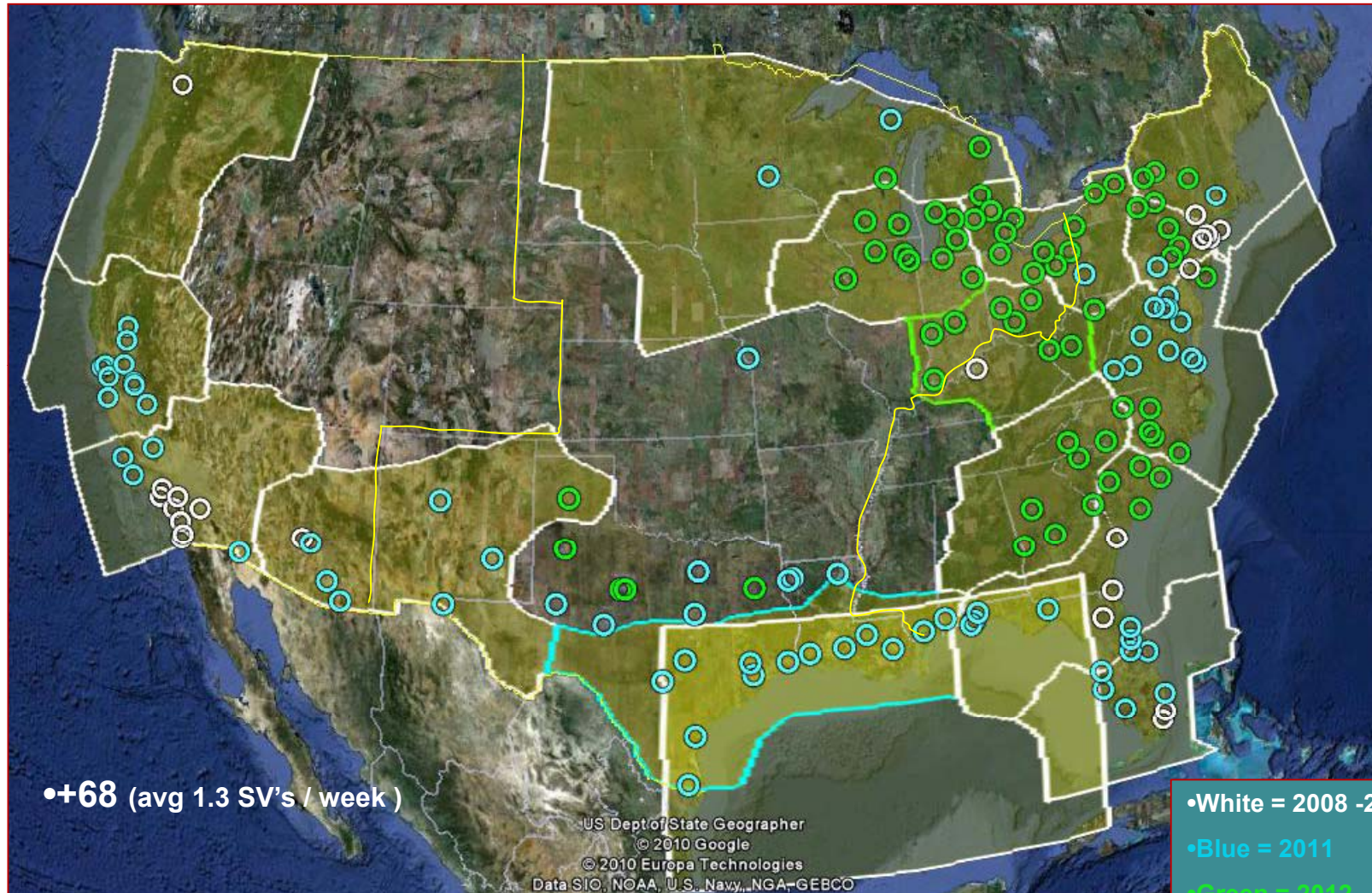


- Segment 1 – 49 (blue)
- Segment 2 (so far) – 15 (red)

# 2011 – 126 SV's through Acceptance



# 2012 – 194 SV's through Acceptance



# 2013 – 295 SV's through Acceptance



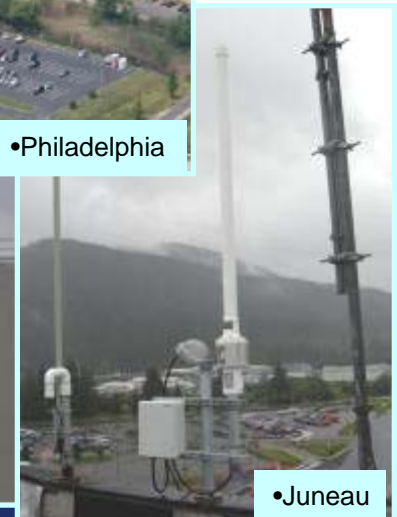
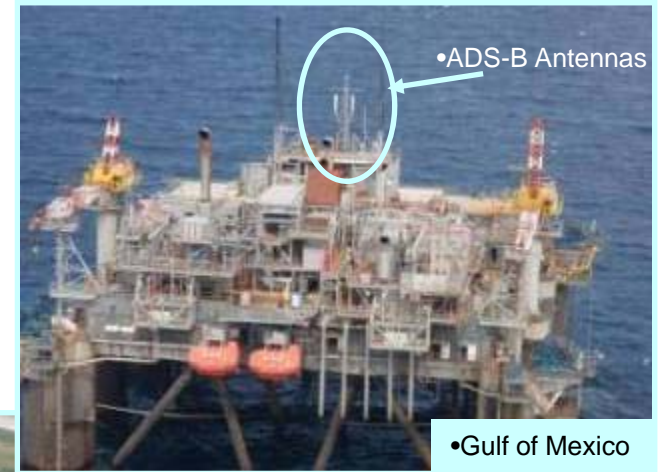
# Key Sites

## ➤ Essential (Advisory) Services

- Miami Area In Service Decision – November 2008 ✓

## ➤ Critical (Separation) Services

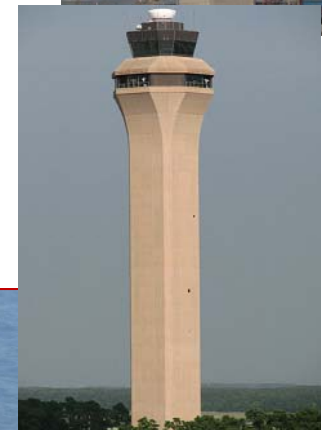
- Louisville Initial Operating Capability (IOC) – November 2009 ✓
  - Terminal Automation (Common ARTS)
- Gulf of Mexico IOC – December 2009 ✓
  - Enroute Automation (HOST)
- Philadelphia IOC – March 2010 ✓
  - Terminal Automation (STARS)
- Juneau IOC – April 2010 ✓
  - Enroute Automation (MicroEnrouteARTS)
- 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.



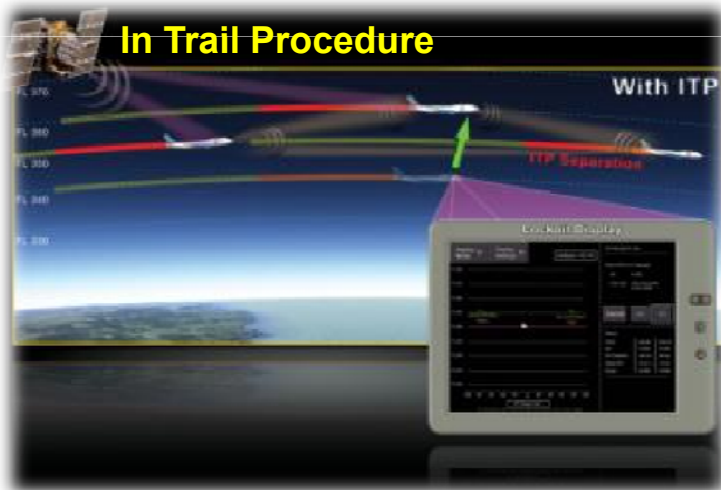
# Air Interface

- **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.**



# Airborne Applications

## Situational Awareness



## Spacing



## Indications and Alerts

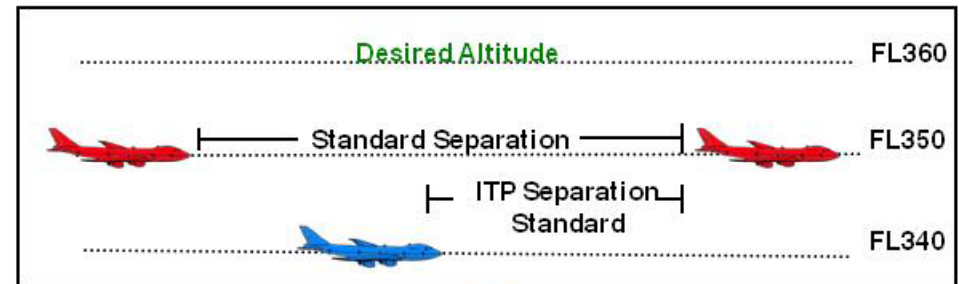


## Indications and Alerts



# 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



Complete    Not Yet Started  
In Progress



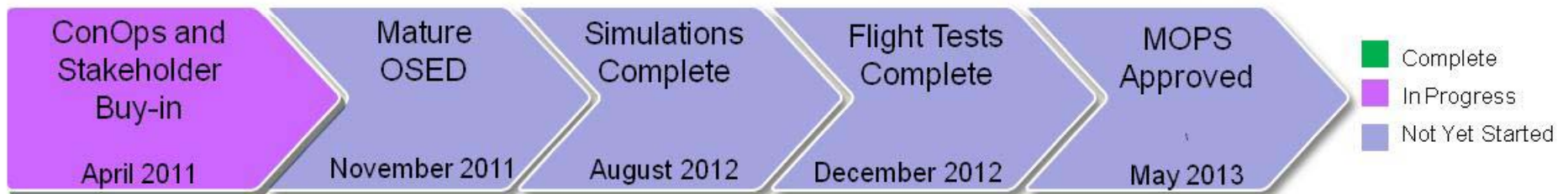
# Traffic Situation Awareness with Alerts (TSAA) Application Overview

**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



# •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

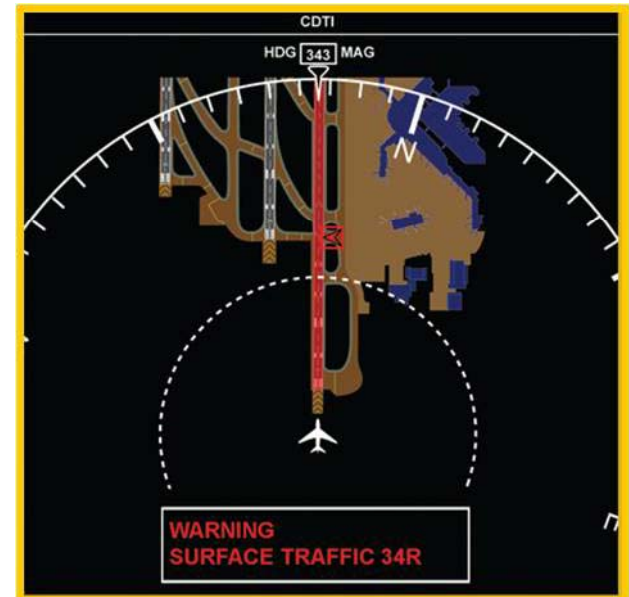
*Give immediate warnings of probable collisions/incursions directly to cockpit flight crews*

**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 8<sup>th</sup> (DO-323)  
Resolve Line of Sight and Drop-out Issues



- Completed
- In Process
- Not Yet Started



# Questions / Comments

Andy Leone (andrew.leone@faa.gov)  
SBS Program, Systems Engineering  
(609)485-5578

