

Surveillance and Broadcast Services

ADS-B opStatus

ADS-B Workshop – SP/9

To: Regulator's Workshop and ADS-B Avionics Equipage Requirements and the Ninth Meeting of ADS-B Implementation Task Force (ADS-B SITF/9)

By: Jim Linney, Program Manager, SBS

Date: August, 2010



Federal Aviation
Administration



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



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



SBS External Agreements: Model for Collaboration



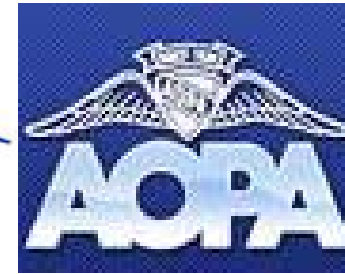
Delta MOA
Underway



DoD (US Air Force)
Underway



SSA MOA
December 2009



AOPA MOA
October 2009



Auburn University MOA
September 2009



United MOA
April 2009



U.S. Airways/ACSS MOA
January 2009



NetJets MOU
December 2008



Honeywell
October 2008



Aviation Communication
and Surveillance Systems
October 2008



Alaskan Aviation Community
& State Representative MOA
February 2007



UPS MOA
November 2006



Colorado DOT
September 2006



HAI & Gulf of Mexico
Helicopter/Platform Owners MOA
May 2006

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**



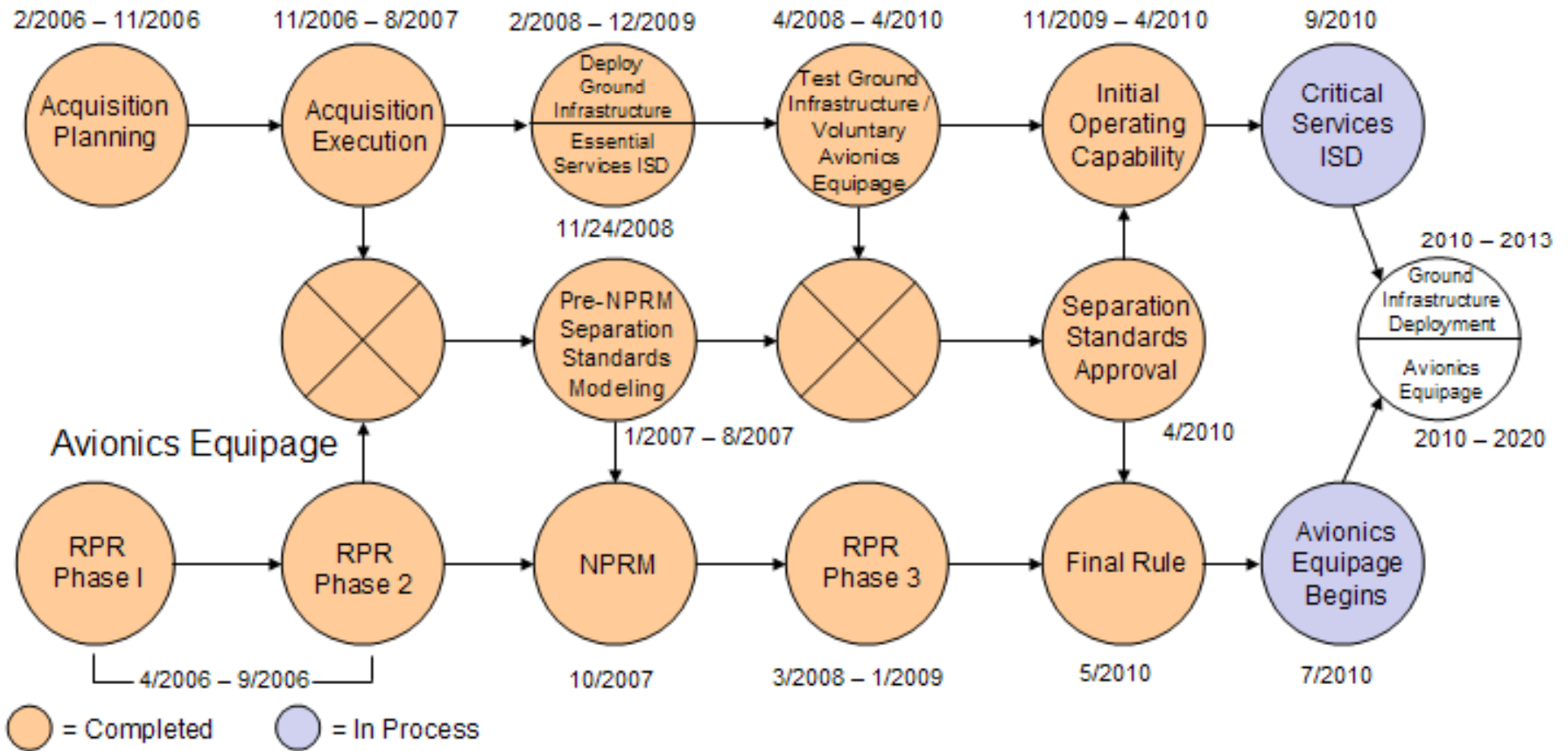
Contract Value

- **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**



Strategy

Ground Infrastructure



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

Overview

- **On May 27, 2010, the FAA published the Final Rule for ADS-B Out equipage**
 - This rule mandates performance requirements for ADS-B avionics that will be required to fly in certain airspace
 - ADS-B Out transmits location information received from the Global Navigation Satellite System out of the aircraft to ADS-B ground stations and to other aircraft equipped to receive ADS-B broadcasts. The rule does not preclude other navigation source methods.
 - This rule does not mandate ADS-B In
 - A new Aviation Rulemaking Committee (ARC) will be chartered in June 2010 to address ADS-B In strategy



Dual Frequencies

- **Two frequencies have been designated for ADS-B transmissions in the national airspace system:**
 1. 1090 Extended Squitter MHz (1090ES) for commercial aircraft
 2. Universal Access Transceiver 978MHz (UAT) for general aviation and airport vehicles. This frequency is needed because of the high-bandwidth required to transmit the weather data that is most beneficial for general aviation aircraft.
- **The rule requires all aircraft flying in Class A airspace (Flight Level 180 and above) to transmit on the 1090ES MHz link**
- **The rule does not preclude aircraft from equipping with both the 1090ES MHz and 978MHz or general aviation equipping with 1090ES MHz**



Timeline

- **The final rule establishes 2020 as the date by which all aircraft flying in the designated airspace must be equipped with ADS-B Out avionics**
 - This gives aircraft owners time to determine the most cost-effective solution for the mix of aircraft in their fleets.
 - Because of the efficiencies that come with ADS-B, the FAA expects that most air-transport category aircraft will be equipped by 2015 with only stragglers waiting until the 2020 deadline

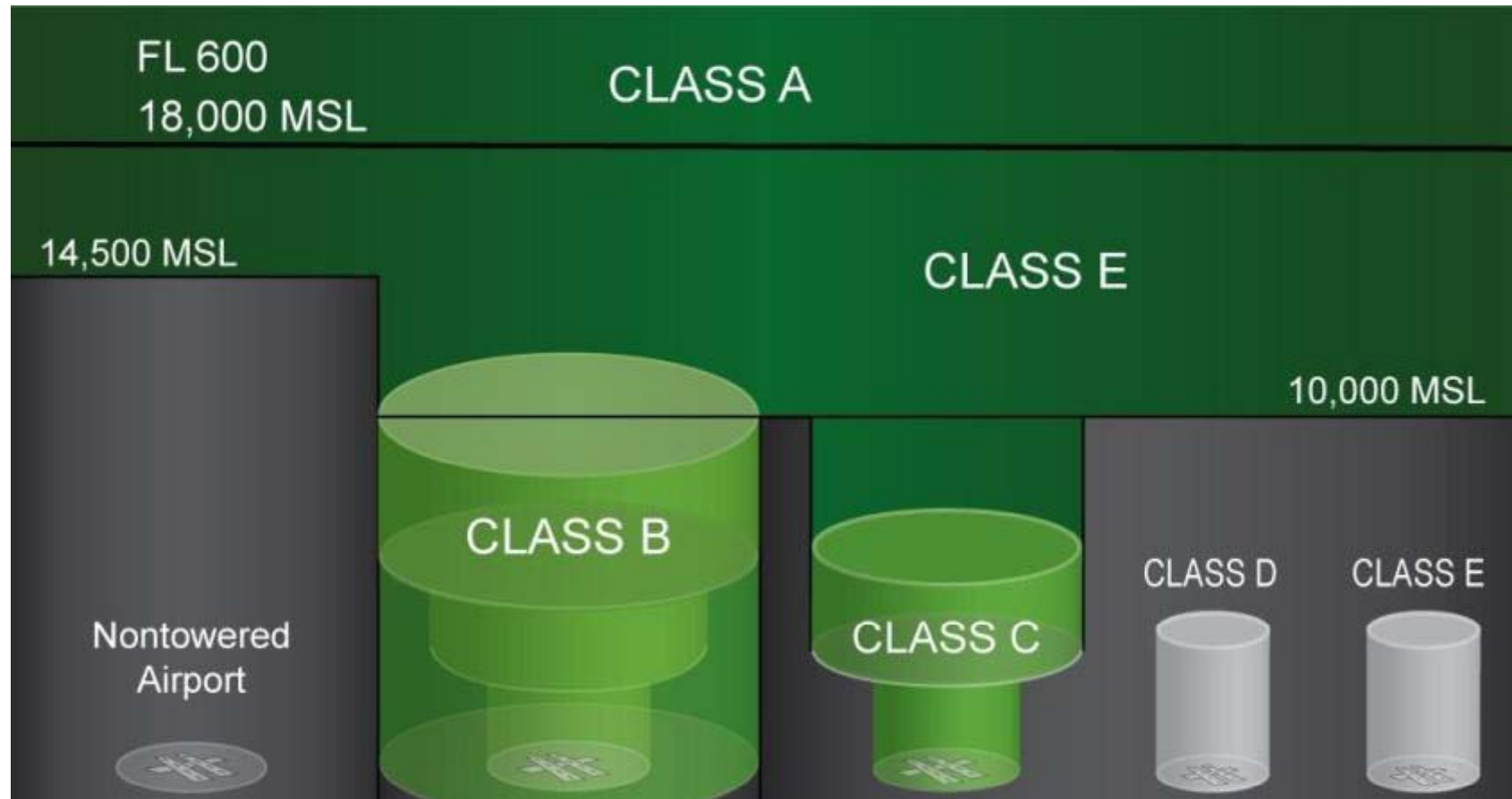


Airspace

- **ADS-B Performance is required in the following airspace:**
 - Class A, B, and C airspace
 - Class E airspace areas at or above 10,000 feet MSL over the 48 contiguous United States and the District of Columbia, excluding the airspace at and below 2,500 feet above the surface
 - Airspace within 30 nautical miles (NM) of certain identified airports that are among the nation's busiest (based on annual passenger enplanements, annual airport operations count, and operational complexity) from the surface up to 10,000 feet MSL. These airports are listed in appendix D to part 91.
 - Above the ceiling and within the lateral boundaries of a Class B or Class C airspace area up to 10,000 feet mean sea level (MSL)
 - Class E airspace over the Gulf of Mexico at and above 3,000 feet MSL within 12 NM of the coastline of the United States

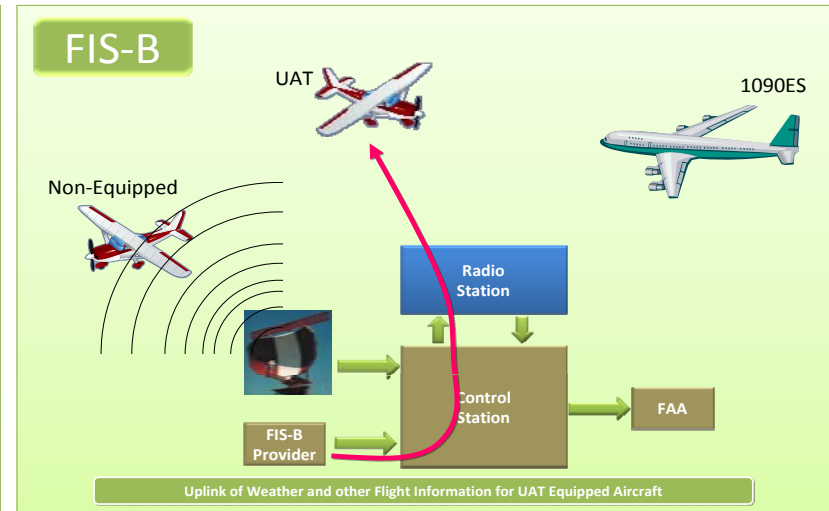
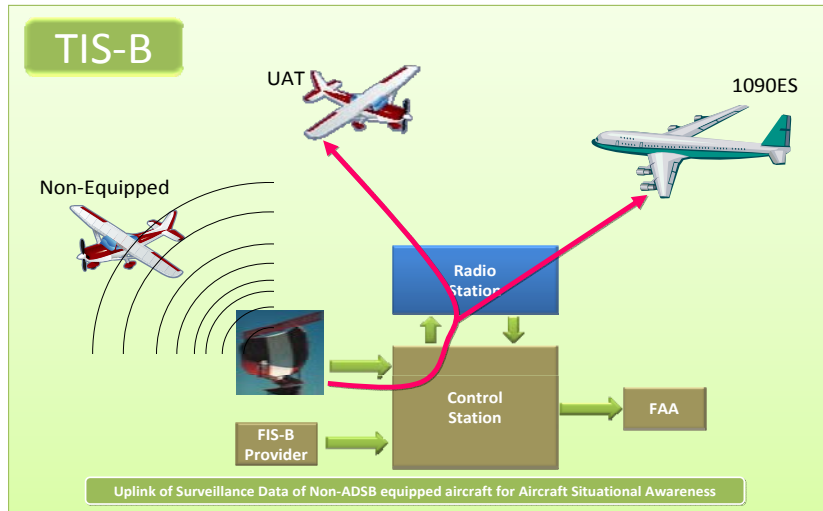
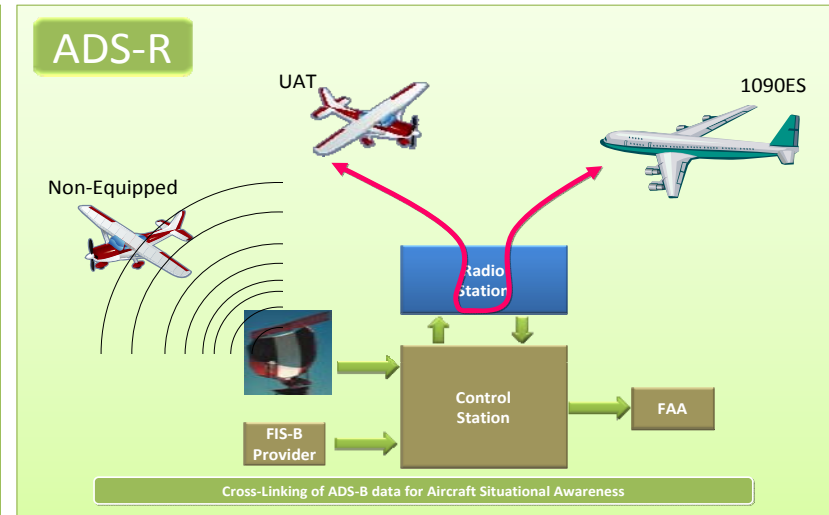
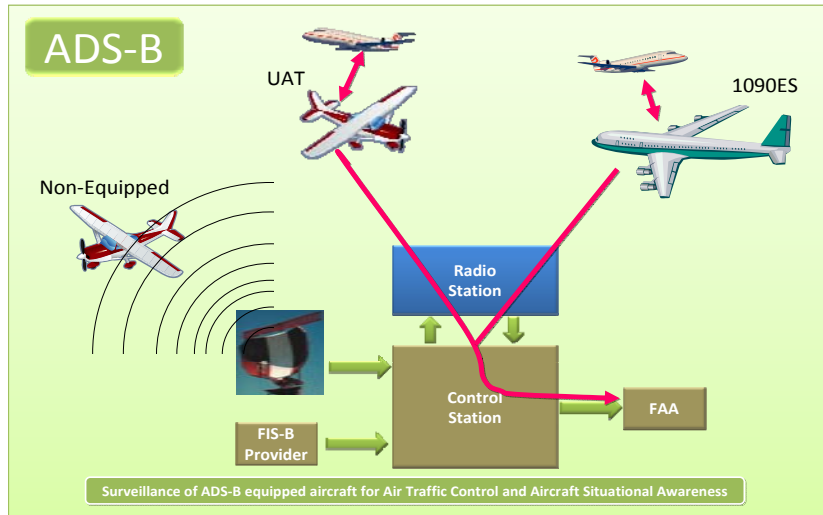


Required ADS-B Airspace (In Green)



Note: 1090MHz ES link is required above FL180

ADS-B Service Descriptions



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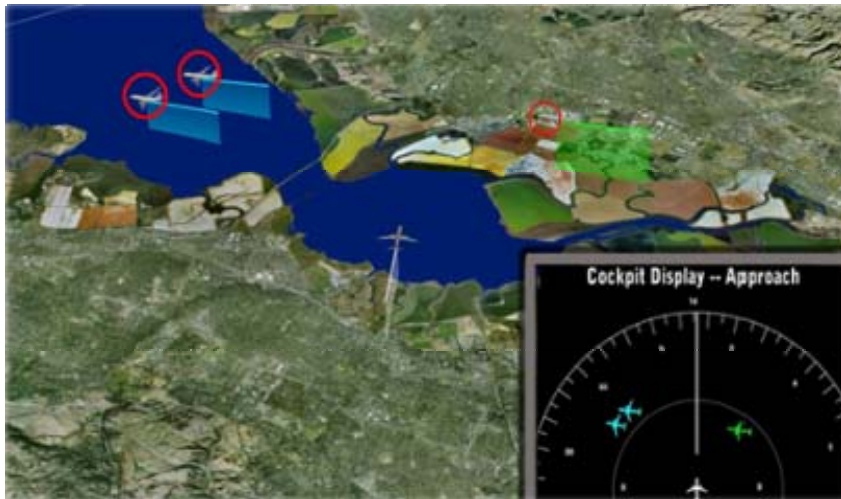
Essential Services: Traffic Information Service - Broadcast

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

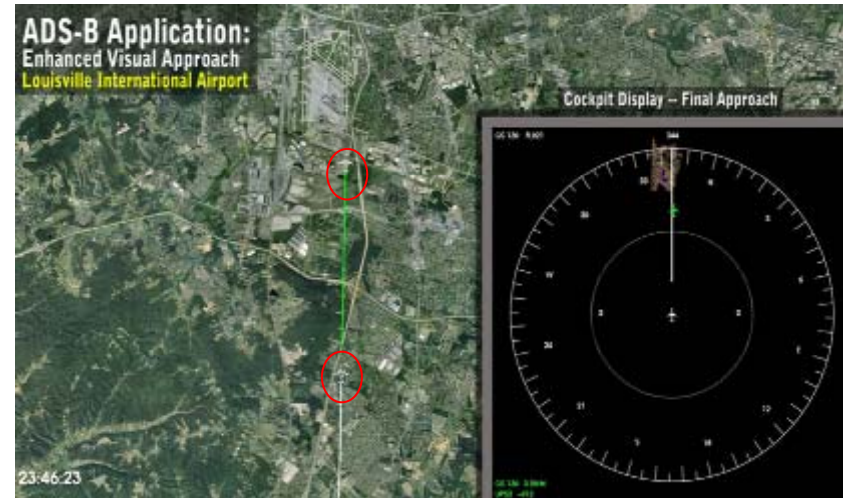


Essential Services - Airborne Applications

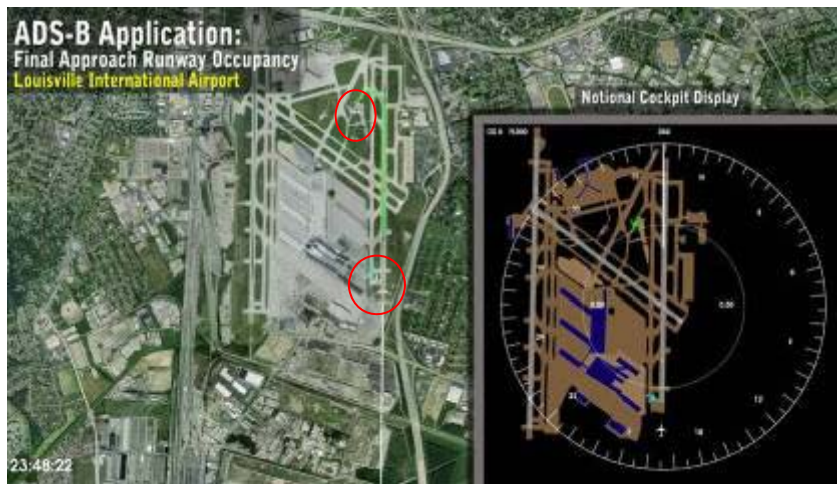
Enhanced Visual Acquisition



Enhanced Visual Approach



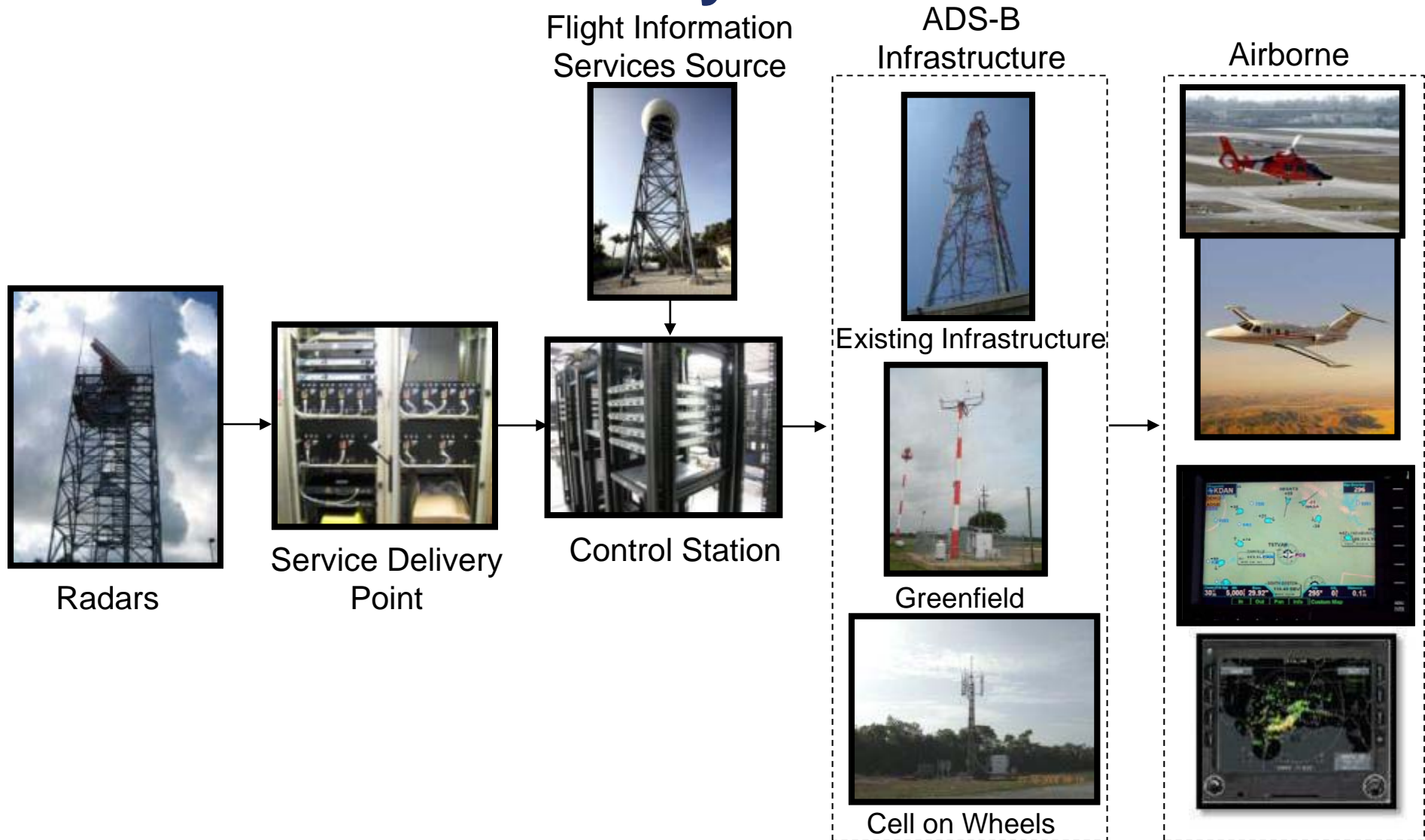
Final Approach and Runway Occupancy



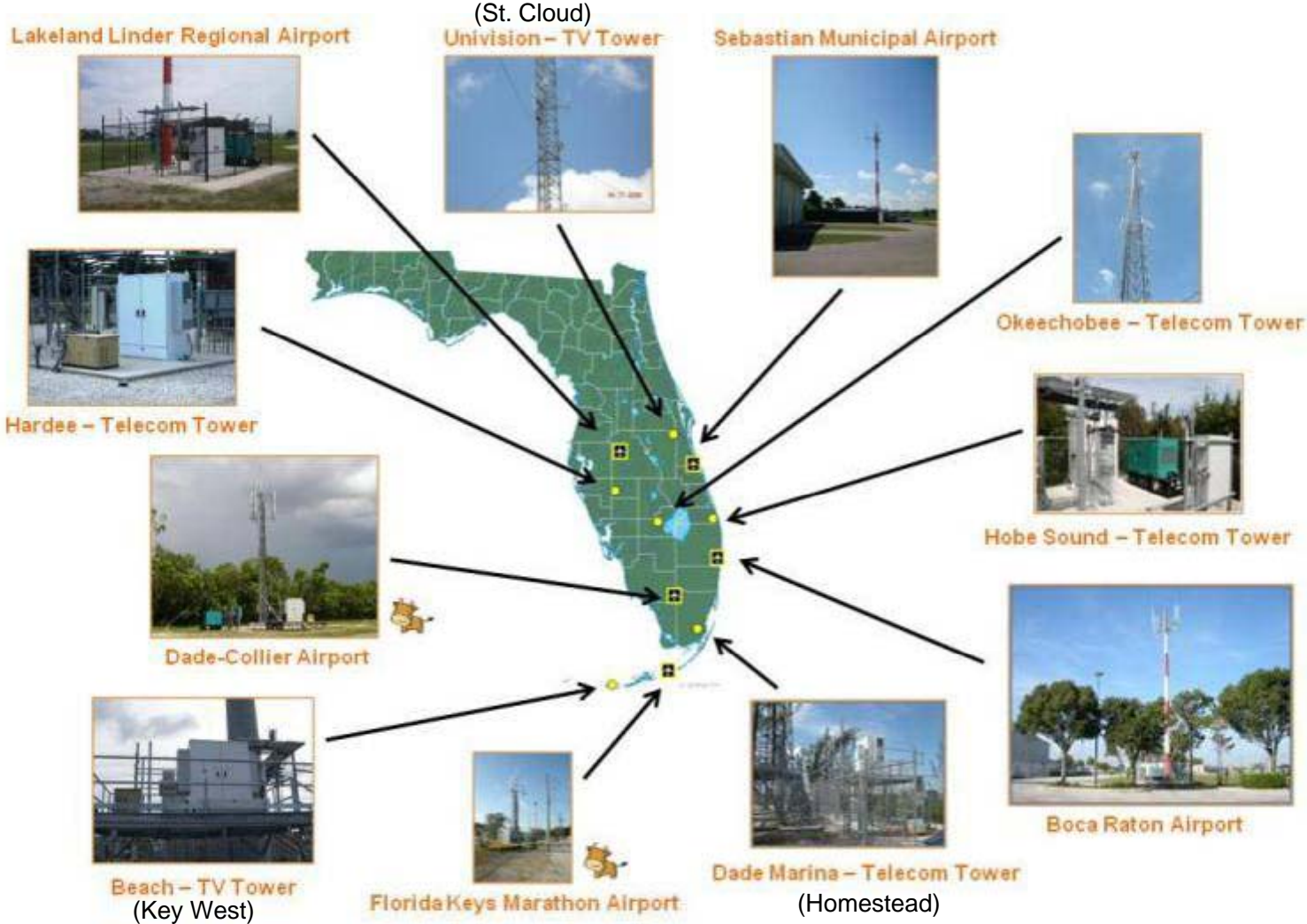
Airport Surface Situational Awareness



Essential Services System

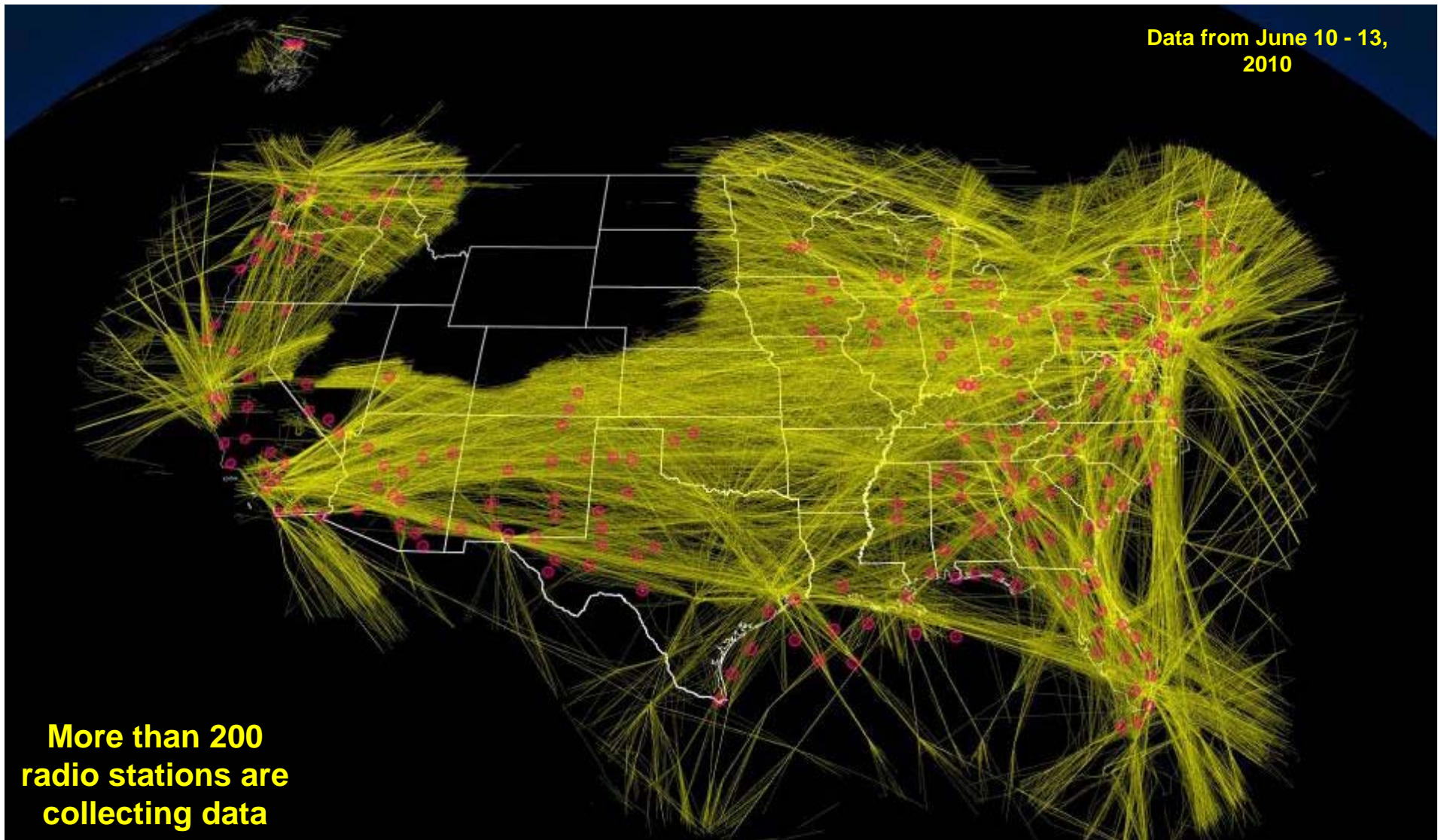


Essential Services: Miami 'Key Site'

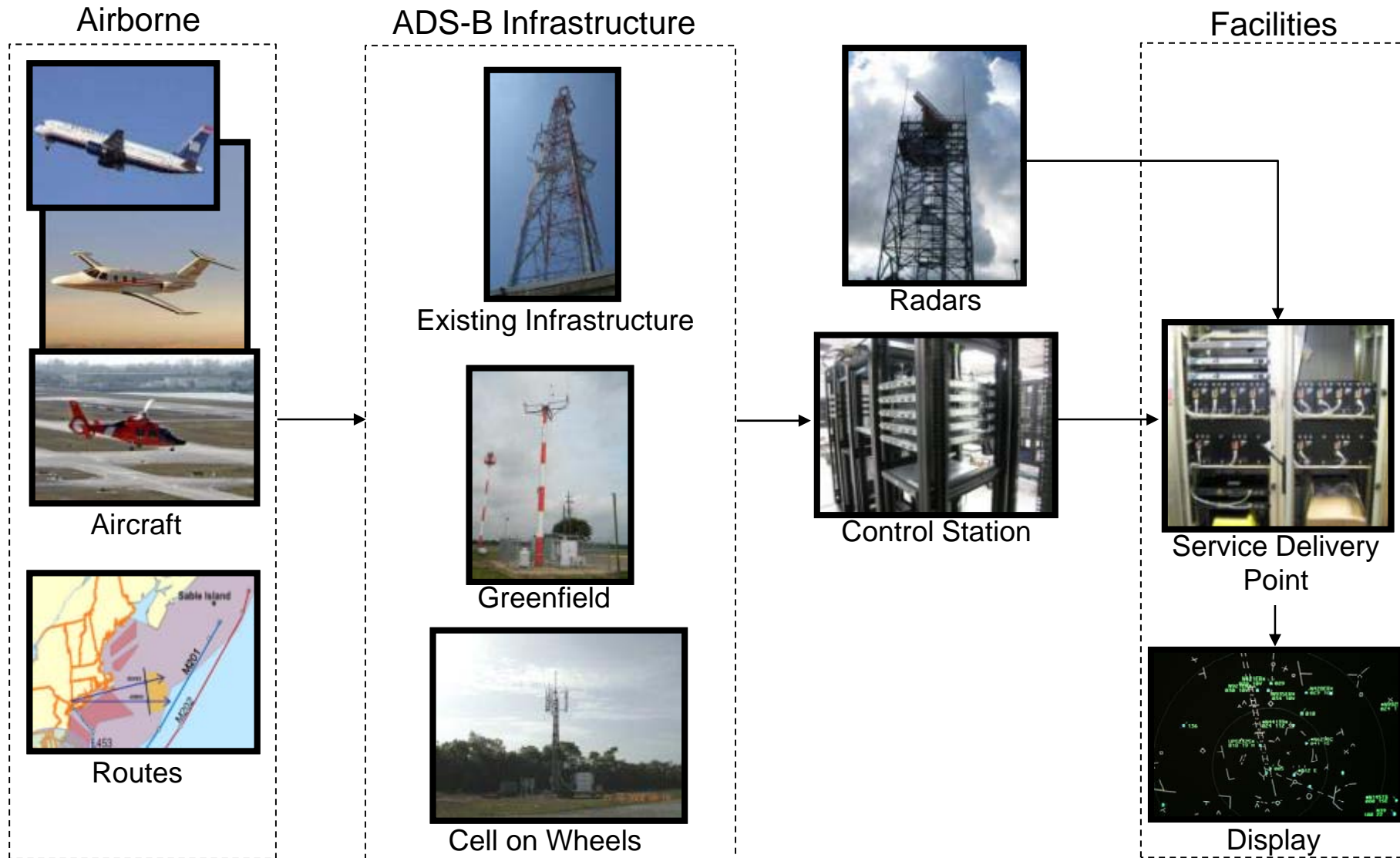


Coverage from Radio Stations

Data from June 10 - 13,
2010

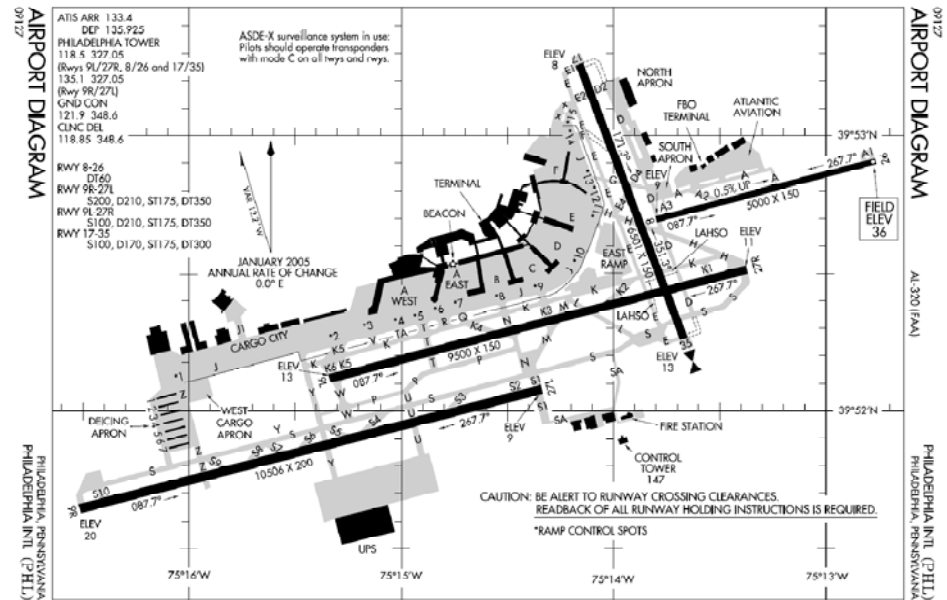


Critical Services System



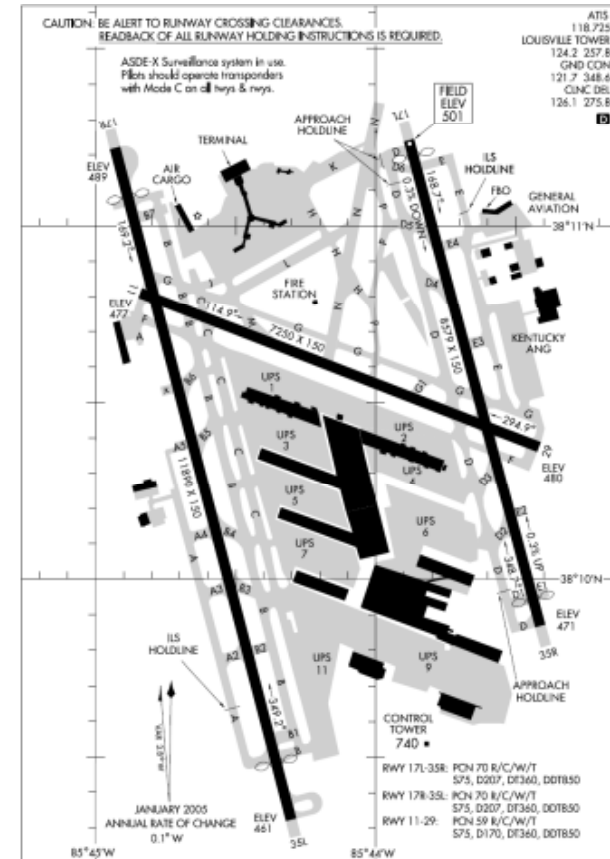
Critical Services: Philadelphia 'Key Site'

- Philadelphia Terminal Service Volume (#28) / Surface Service Volume (#207)
- Service Delivery Point: Philadelphia TRACON / Philadelphia ATCT
- Automation: STARS and ASDE-X
- Initial Operating Capability: February, 2010



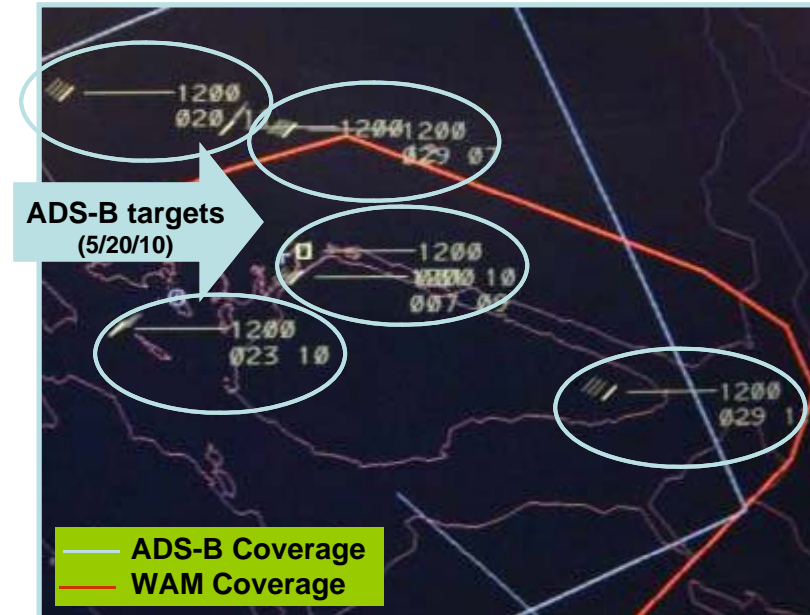
Critical Services: Louisville 'Key Site'

- **Louisville Terminal Service Volume (#85) / Surface Service Volume (#211)**
- **Service Delivery Point: Louisville TRACON / Louisville ATCT**
- **Automation: CARTS**
- **Initial Operating Capability: November 2009**



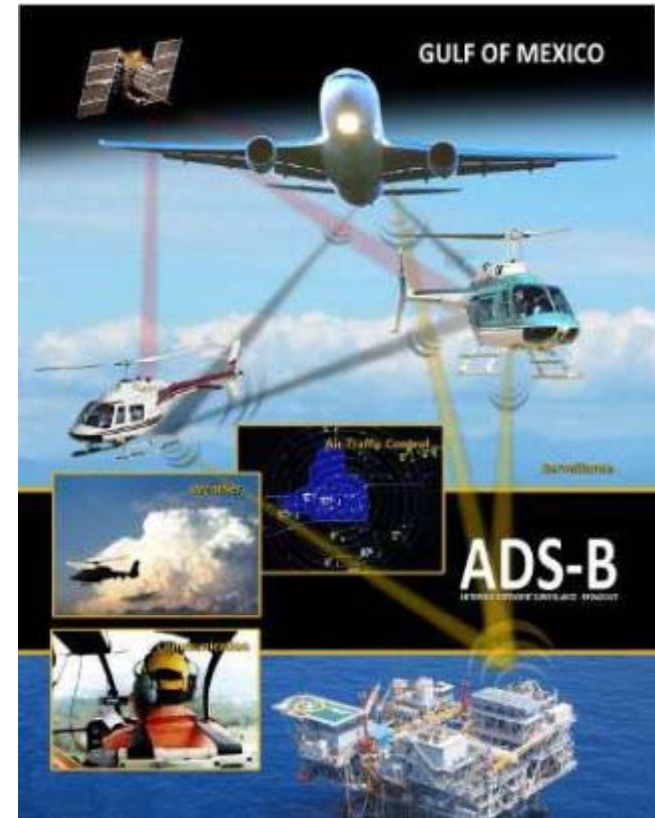
Critical Services: Juneau 'Key Site'

- Juneau En Route Service Volume (#178)
- Service Delivery Point: Anchorage ARTCC
- Automation: MEARTS
- Initial Operating Capability: April, 2010



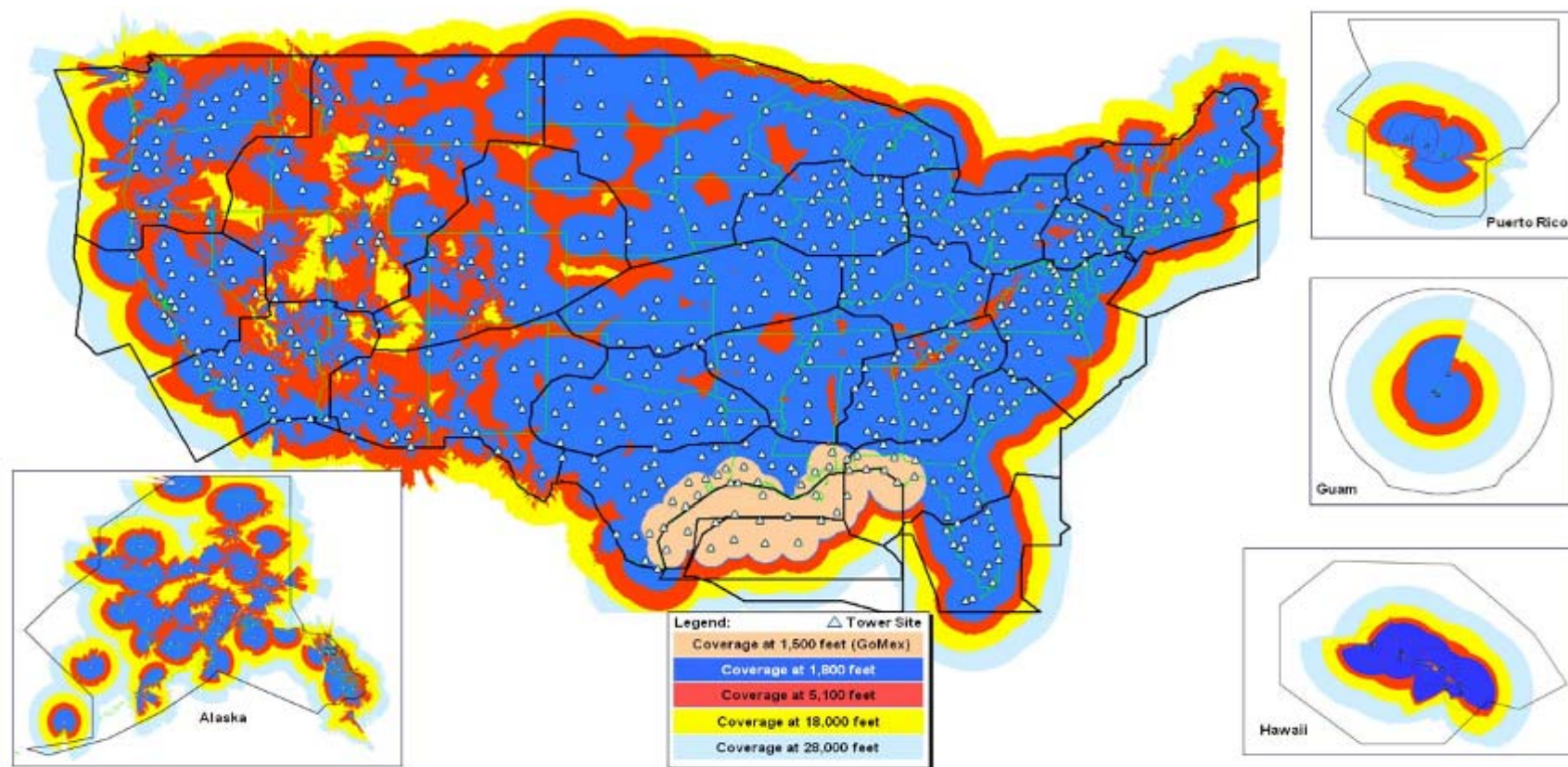
Critical Services: Gulf of Mexico 'Key Site'

- **Gulf of Mexico Service Volumes (#179/180)**
- **Service Delivery Point: Houston ARTCC**
- **Automation: HOST**
- **Installations completed:**
 - VHF Communications: 7
 - ADS-B: 20
 - AWOS: 25
- **December 2009 = 95% coverage of low altitude airspace with Communications & ADS-B**
- **Installations remaining (provides further coverage south & redundancy):**
 - VHF – Communications – 2
 - ADS-B – Surveillance – 1
 - AWOS - Weather Installations – 9



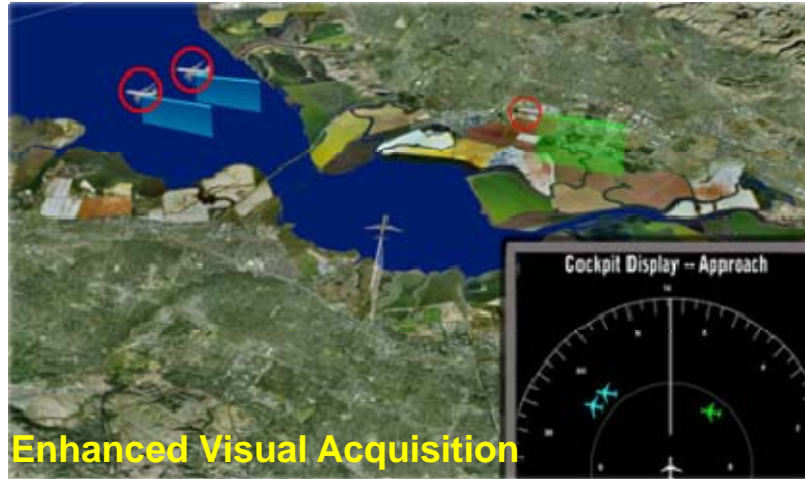
ADS-B: Nationwide Deployment with Extension to Some Non-Radar Areas

Nationwide build-out of ADS-B Ground Stations on track 2013 completion



Building Block for Airborne Applications

Situational Awareness



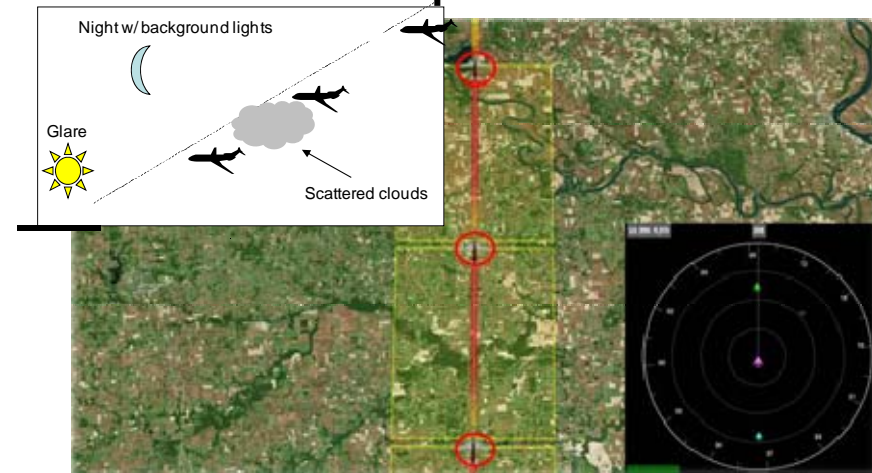
Merging and Spacing



Indications and Alerts



Separation



ADS-B Surveillance Based Routes and Procedures

“Best Equipped, Best Served”

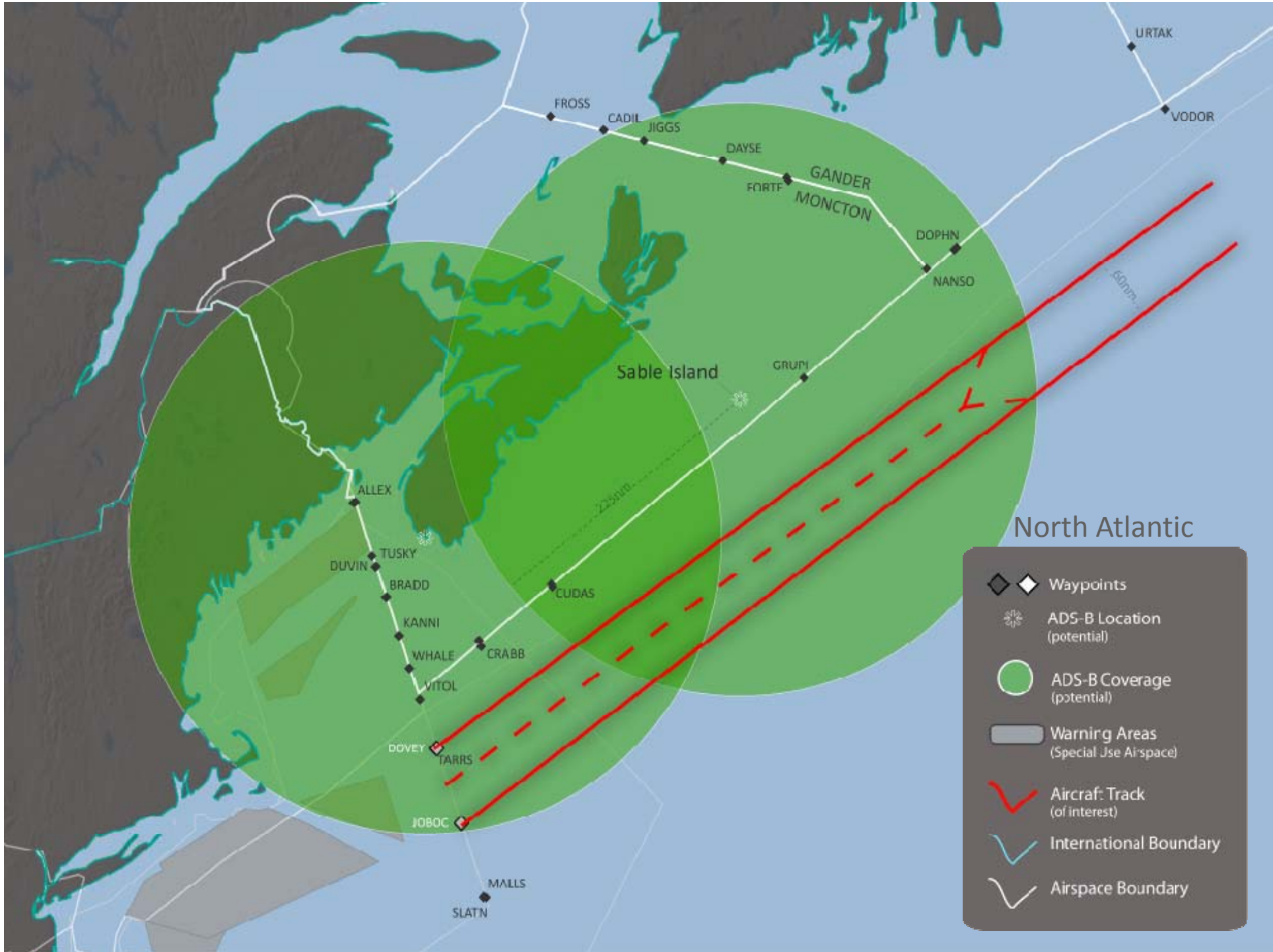
- **NextGen guiding principles for avionics equipage**
 - Target equipage and associated capabilities to maximize operational benefits for the specific locations or airspace that require a higher performance level to elevate system performance and meet demand.
 - Consistent with safe and efficient operations, provide “best-equipped, best-served” priority in the NAS to early adopters.



ADS-B Surveillance Based Routes and Procedures

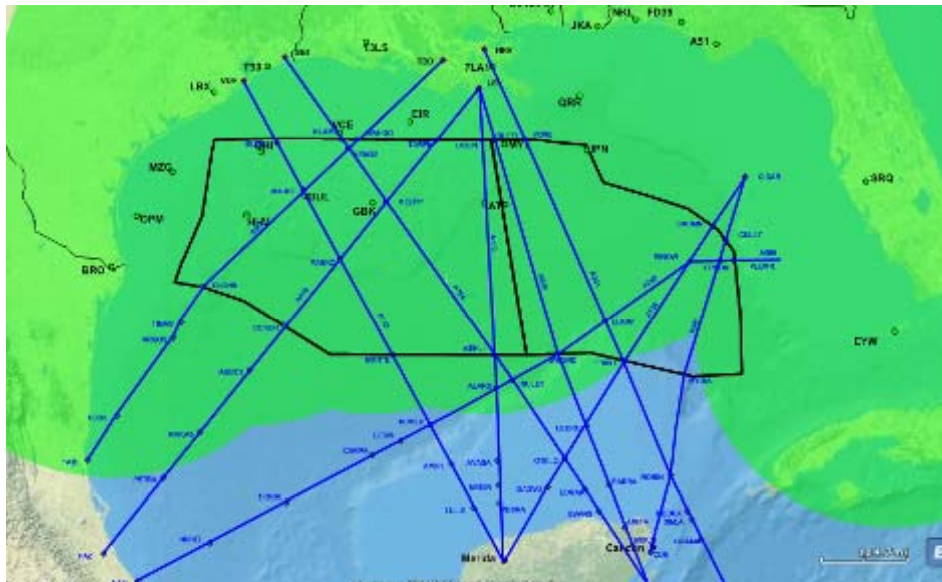
- **ADS-B routes in non-radar airspace.**
 - Outside of non-radar route structure.
- **Non-radar routes accommodating mixed equipage.**
 - Low equipage: Better access to airspace.
 - Medium equipage: Dedicate specific altitudes
 - High equipage: Dedicated ADS-B Performance Route
- **Radar routes closed due to radar outage or wx.**
 - East Coast, GOMEX Q routes, Caribbean





Gulf of Mexico ADS-B Coverage at FL280

BEFORE



AFTER



* Coverage with three additional ADS-B radio stations in Mexico

Atlantic & Caribbean

Radar Height

FL300

Radar Coverage from Long Range Radar

225nm from Shore

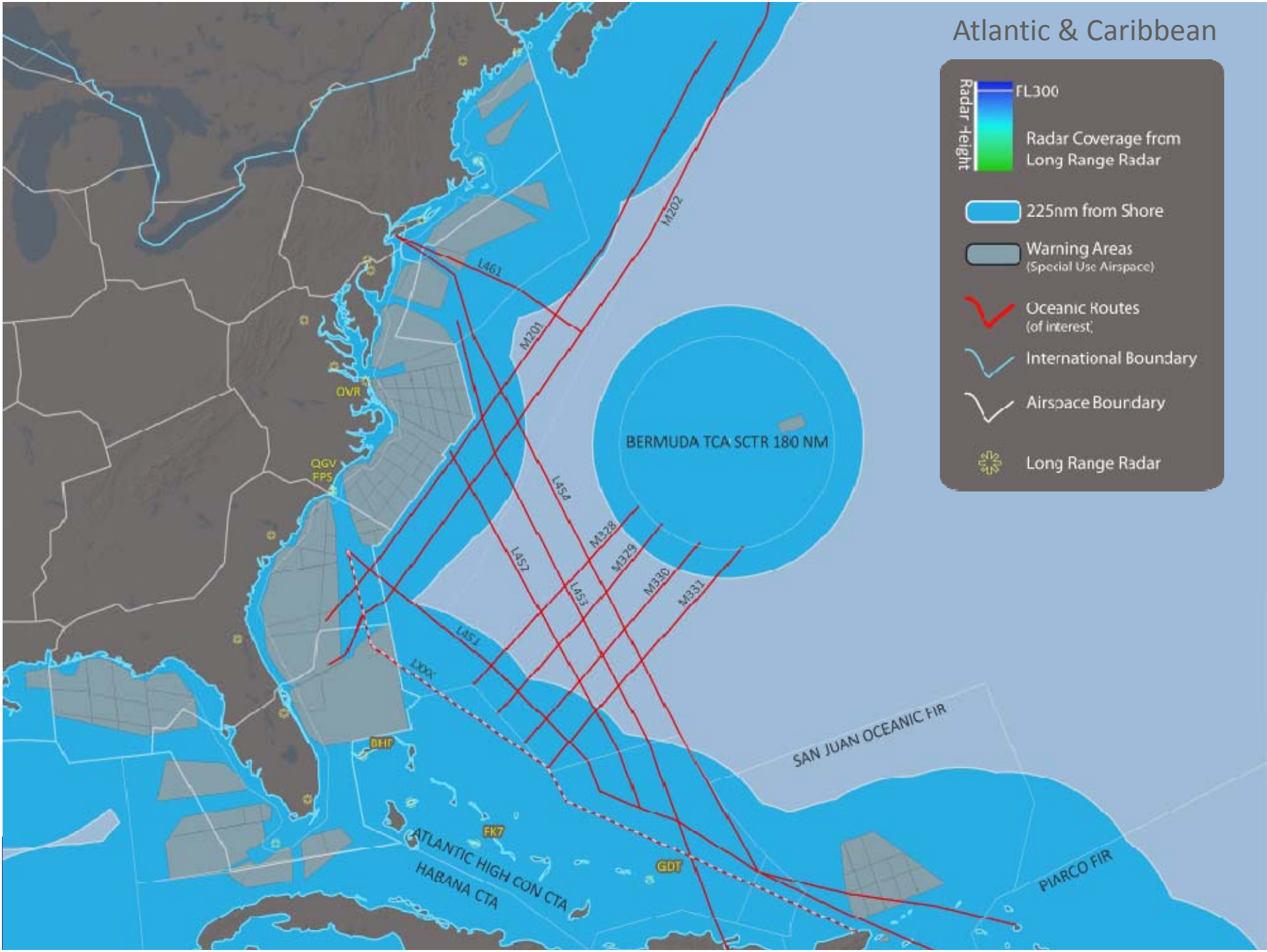
Warning Areas (Special Use Airspace)

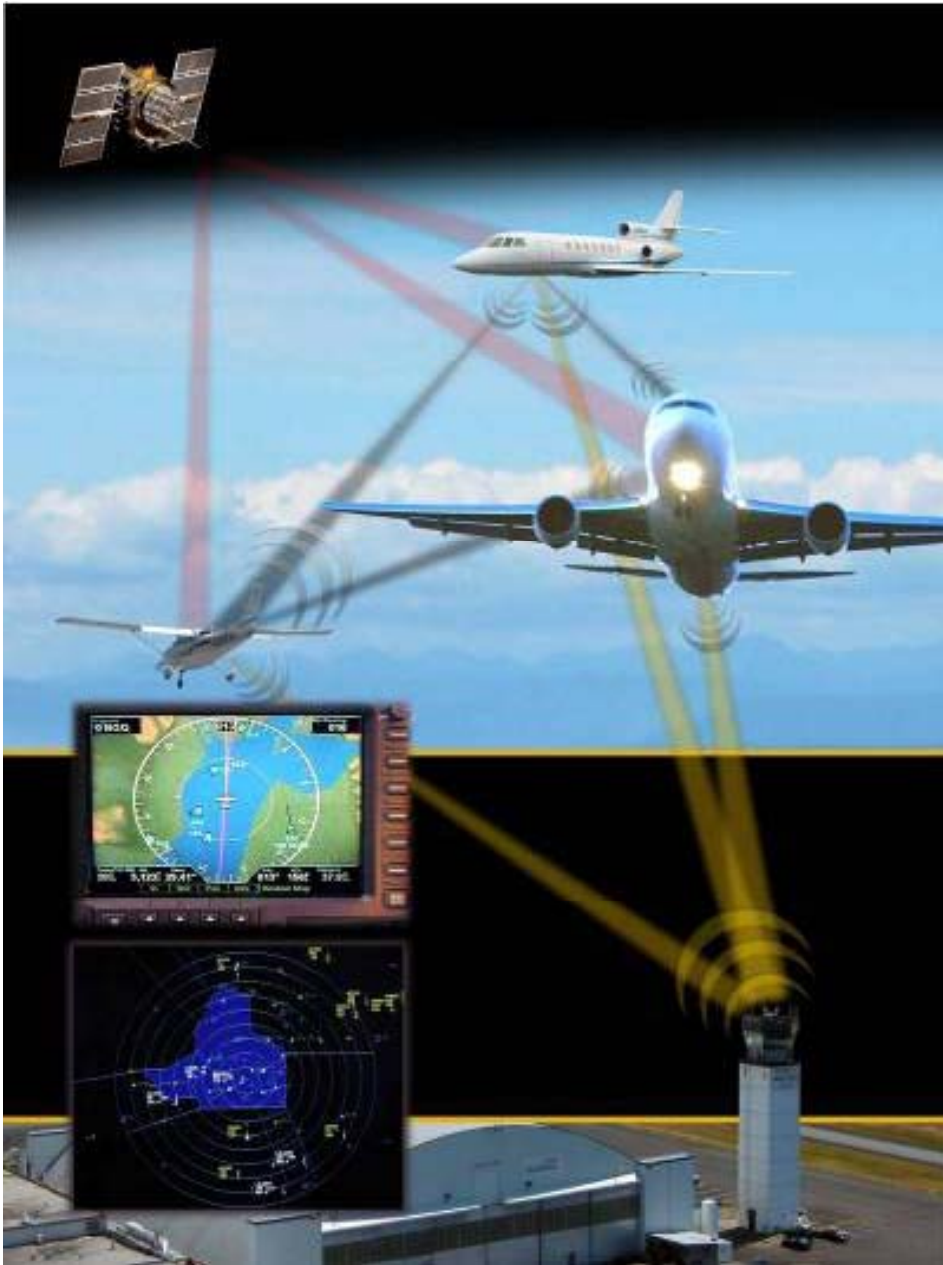
Oceanic Routes (of interest)

International Boundary

Airspace Boundary

Long Range Radar





Jim Linney

Program Manager CSA, Surveillance
& Broadcast Services

(W) 817-222-5655

(W) 202-385-8833 - HQ support
(schedule, link to Program
Office & data management)

Jim.Linney@faa.gov

www.adsb.gov