

Surveillance and Broadcast Services

Overview of the FAA ADS-B Program

By: Rick Castaldo

Date: June 20, 2007



Federal Aviation
Administration



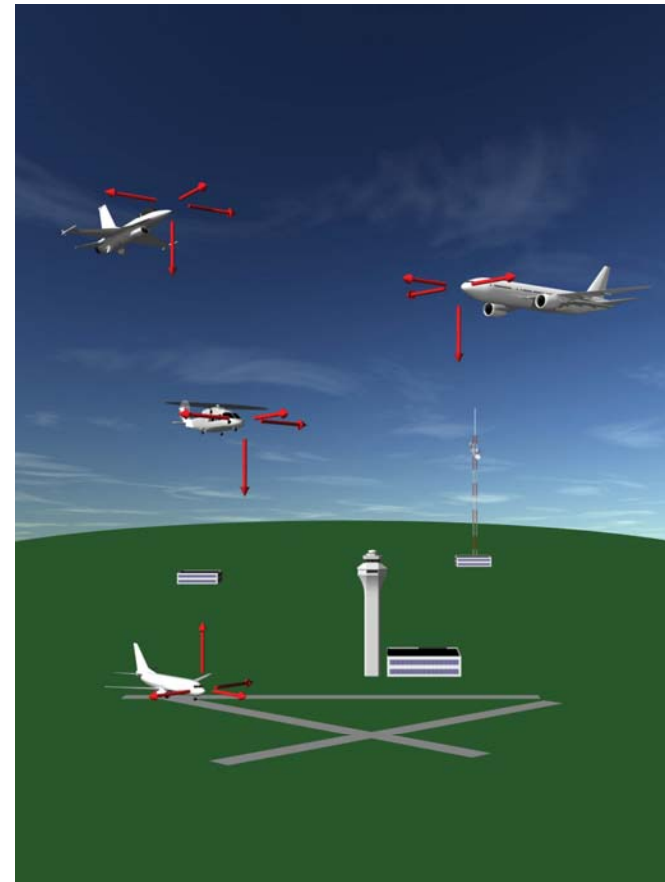
Agenda

- **Program Background**
- **Gulf of Mexico Operations**
- **Gulf of Mexico Mission**
- **Project Description**
- **Discussion Points**
- **Summary**
- **Questions and Actions**



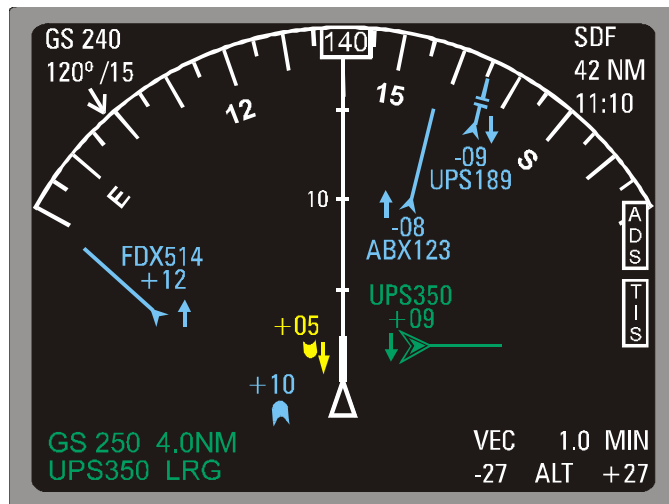
Background: Automatic Dependent Surveillance - Broadcast (ADS-B)

- **Automatic**
 - Periodically transmits information with no pilot or operator input required
- **Dependent**
 - Position and velocity vector are derived from the Global Positioning System (GPS) or a Flight Management System (FMS)
- **Surveillance -**
 - A method of determining position of aircraft, vehicles, or other asset
- **Broadcast**
 - Transmitted information available to anyone with the appropriate receiving equipment



Background: Traffic Information Service - Broadcast / Flight Information Service - Broadcast

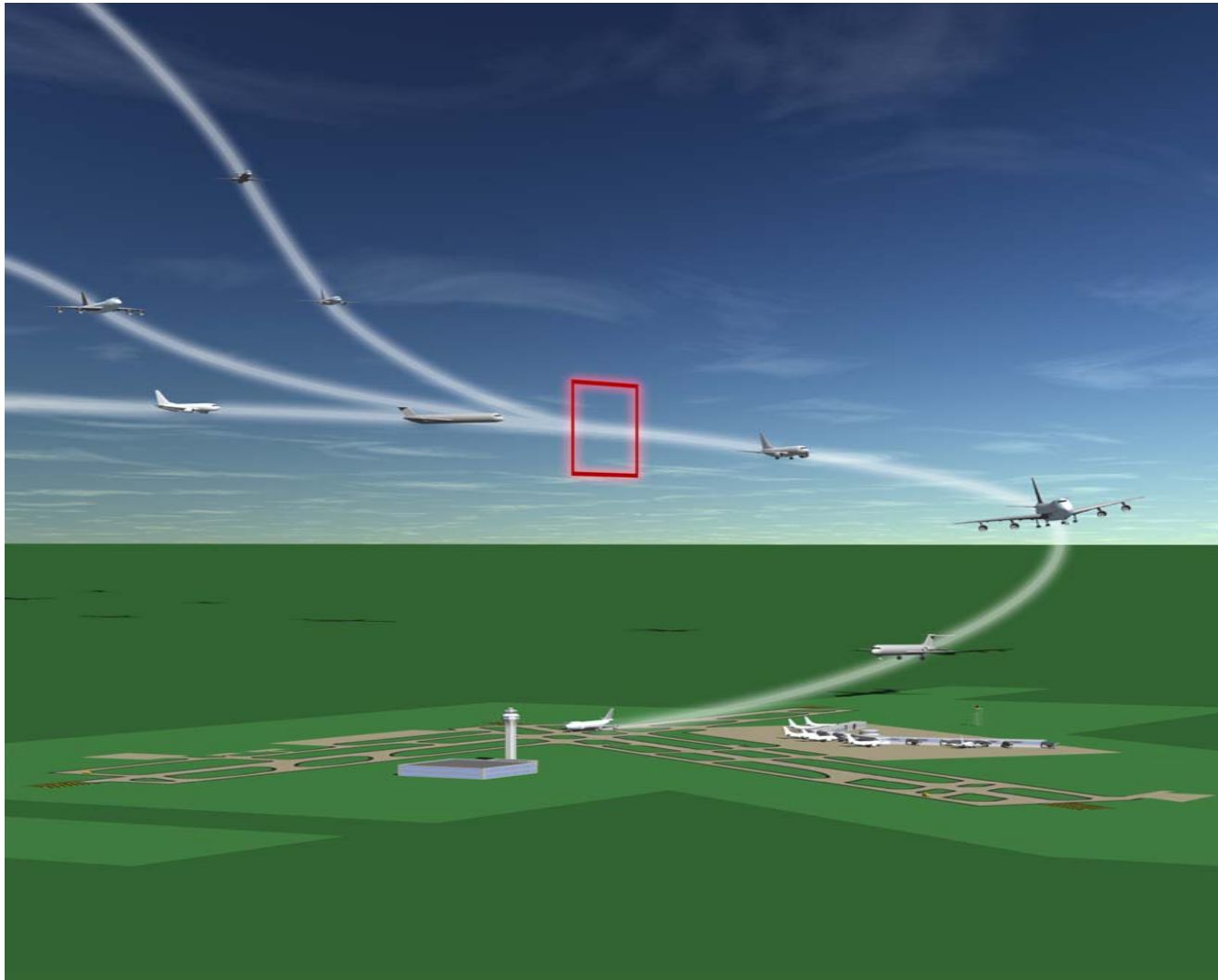
TIS-B is a service which provides ADS-B equipped aircraft with position reports from secondary surveillance radar on non-ADS-B equipped aircraft.



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



Reliable Precision Operations Improve Predictability, Safety and Airspace System Capacity

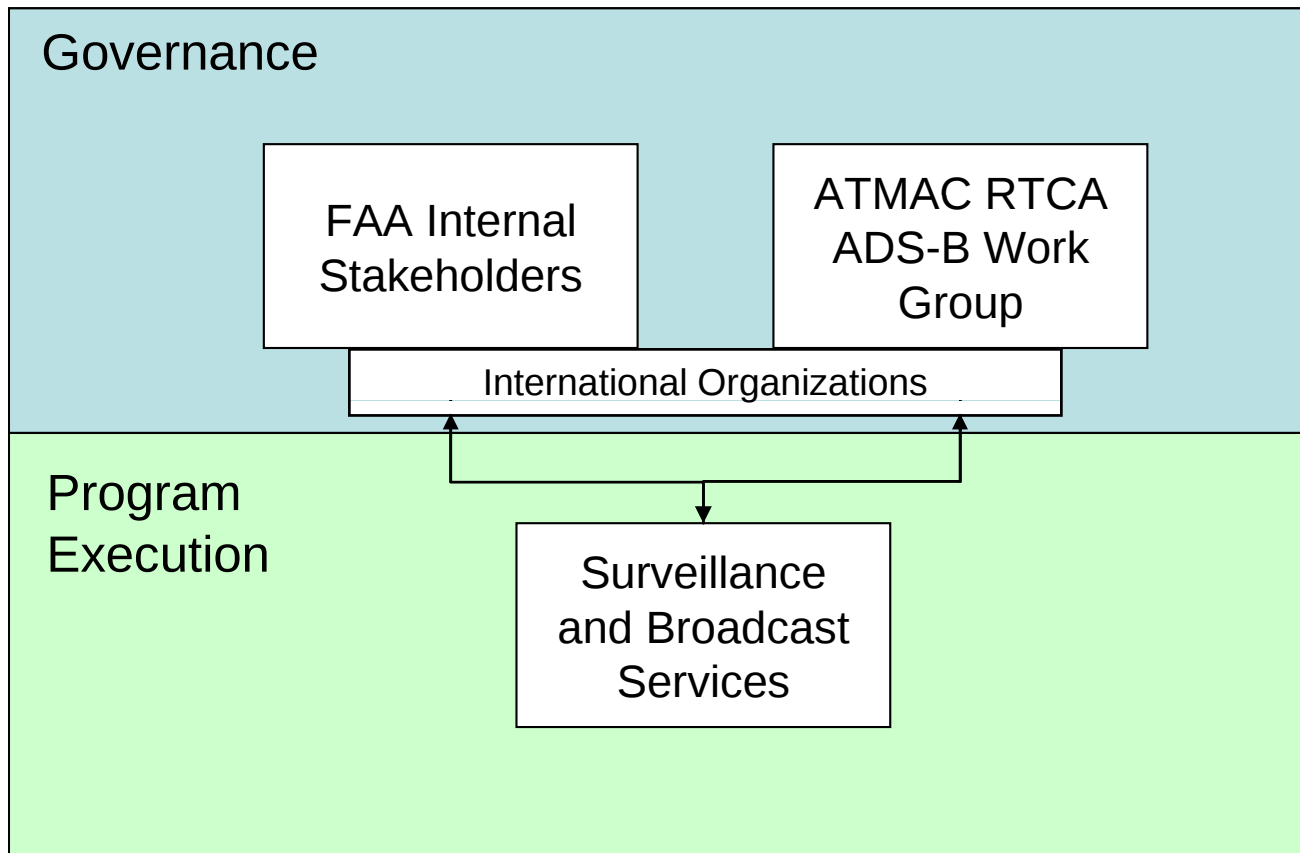


Background: Objective

- **Develop a multi-segment, life cycle managed, performance based ADS-B strategy that aligns with the Next Generation Air Transportation System (NGATS) vision and generates value for the National Airspace System (NAS)**
 - Integrate Concept of Operations for Portfolio of ADS-B Applications
 - Develop Application Life Cycle Management Approach
 - Establish Infrastructure
 - Continuously Monitor Value and Adjust Investments



Background: Program Governance



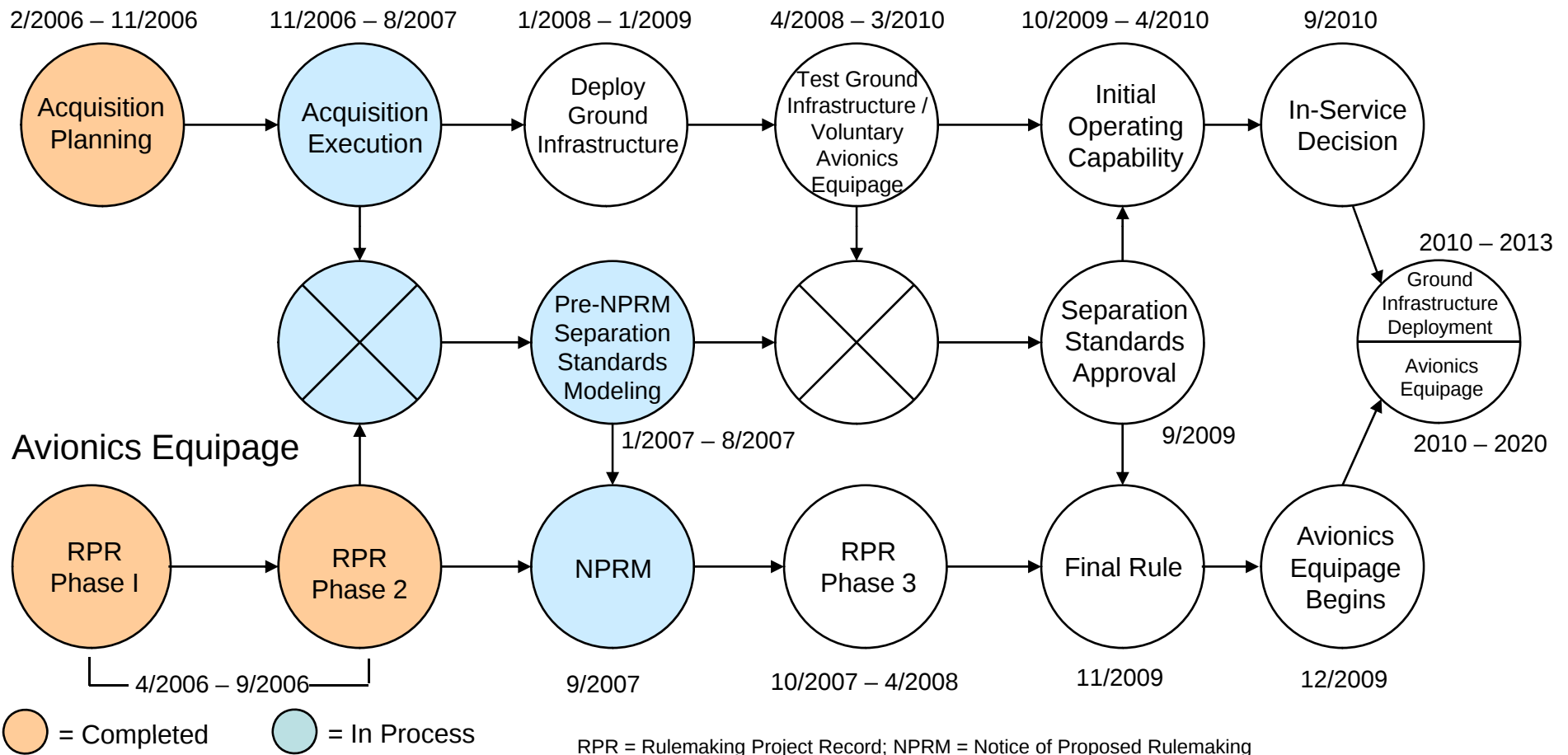
Background: International Harmonization

- **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 the future
 - 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



Dual Track Strategy

Ground Infrastructure



Acquisition Status: Schedule

Task:	Date / Status:
Release of Request for Offer (RFO)	Complete / March 2007
Business and Technical Responses Due	Complete / June 2007
Cost Proposals Due	June 20, 2007
RFO Evaluation Complete (Business, Technical and Cost)	July 5, 2007
RFO Final Report Completion	July 20, 2007
Final Report Approval	July 27, 2007
CIT Review	August 17, 2007
Executive Council Briefing	August 21, 2007
Joint Resource Council (JRC)	August 28, 2007
Contract Award	August 30, 2007



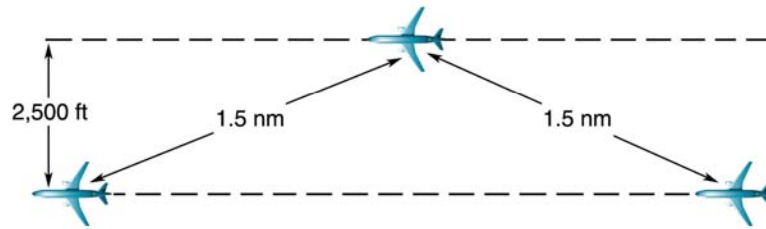
Separation Standards Activities

Task	En Route Sep. with HCS/ERAM	Terminal Sep. with CARTS	Terminal Sep. with STARS	En Route Sep. with MEARTS
Preliminary Analytic Modeling, including Close Approach Probability and Monte Carlo	6/18/2007	7/13/2007	7/13/2007	8/1/2007
Final NPRM Modeling	6/25/2007	7/27/2007	7/27/2007	8/14/2007
Model Results	6/30/2007	8/1/2007	8/1/2007	8/20/2007
Report on Results of Modeling and Simulation for Separation Standards Complete	September 2007 (tied to NPRM)			
Preliminary Modeling of WAM Systems	Apr 2008	--	--	Apr 2008
Assessment of WAM System Performance	May / Aug. 2008			Sep 2008
Verification and Validation of Models	October 2008			
Assessment of ADS-B System Performance	Sep 2009	Aug 2009	Sep 2009	Sep 2009
Evaluation of Operational Trials at Key-sites	September 2010			
				Link to Details

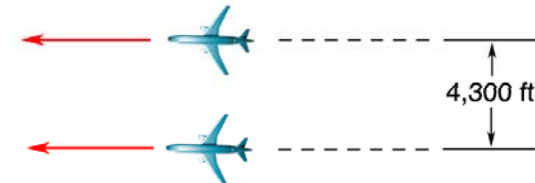


Separation Standards: Success Criteria

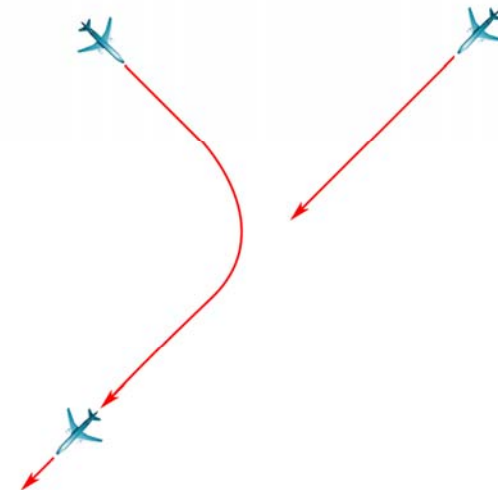
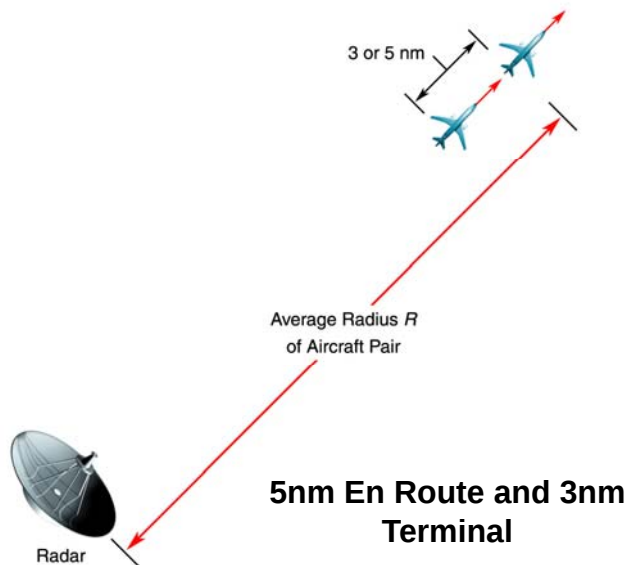
- Results show equivalent or better performance to radar-to-radar separation error



1.5nm Terminal on Staggered Dependent Approaches



4,300 feet on Independent Approaches



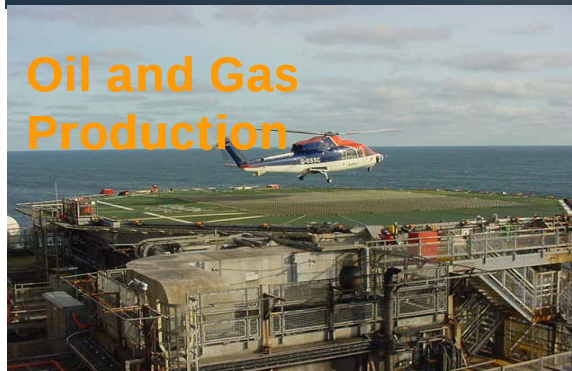
2.5nm on Approach

Rulemaking Status

Task:	Date / Status:
Preliminary Team Concurrence of NPRM	Complete / December 2006
Economic Evaluation of NPRM	Complete / February 2007
Final Team Concurrence (through Director level) of NPRM	Complete / May 2007
Associate Level Concurrence of NPRM	Complete / May 2007
ADA/AOA Approval of NPRM	Complete / May 2007
OST Approval of NPRM (given standard 30 days as indicated in the rulemaking manual)	6/29/2007
OMB Approval of NPRM (given standard 90 days as directed by Executive Order)	9/28/2007
Issuance	No later than September 2007



Gulf of Mexico Operations: 100,000 Miles of Airspace



Objectives for Gulf of Mexico Airspace

- **Enhance the Safety, Efficiency, and Capacity of the National Airspace System by Incorporating Existing and Emerging Technologies into the Gulf of Mexico.**
- **Provide an Equivalent Level of Safety and Service in the Gulf of Mexico as Provided in U.S. Domestic Airspace.**

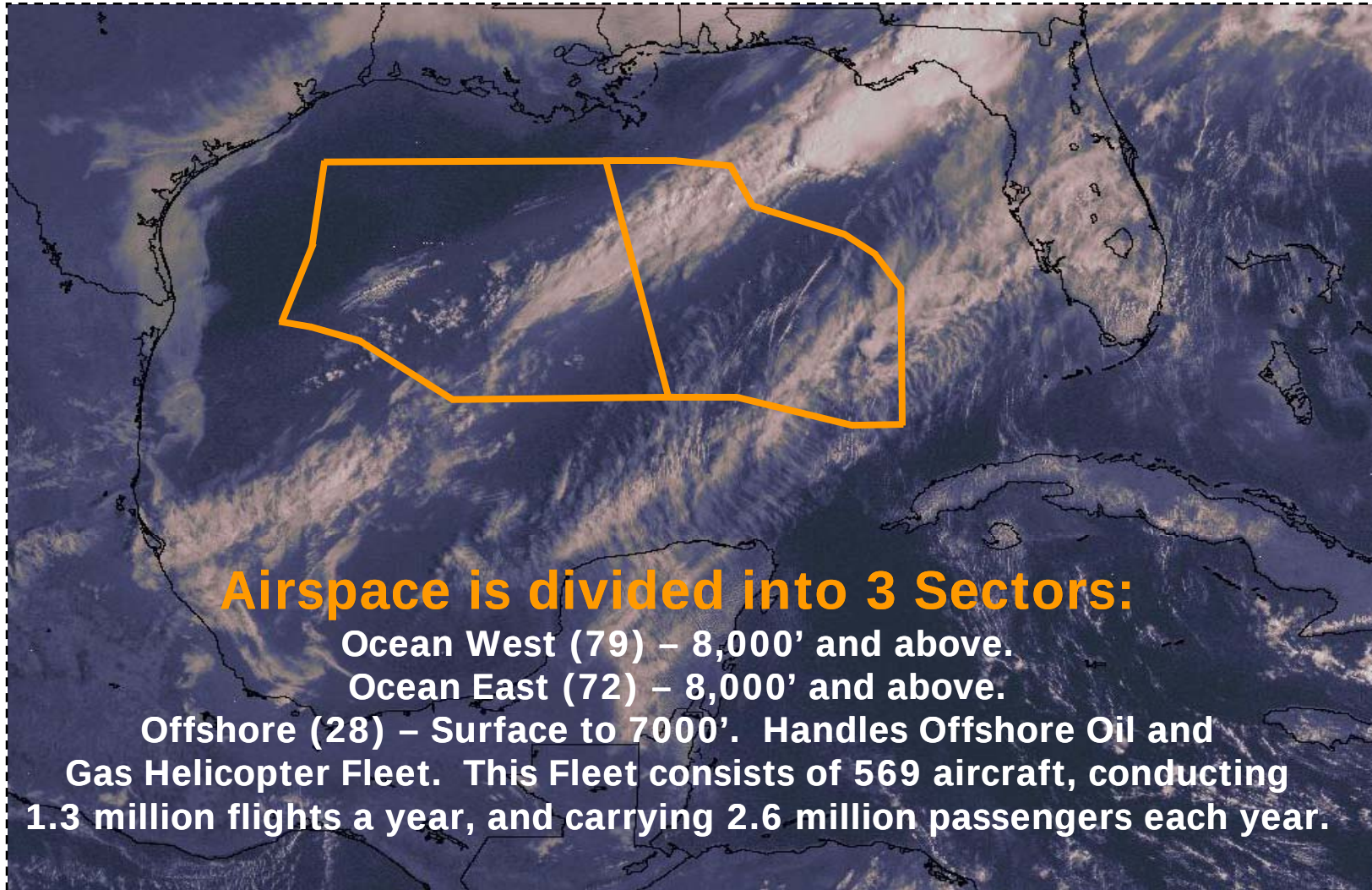


Gulf of Mexico: Benefits (BY\$M)

Applications		Benefit Description	FY07-FY35
Surveillance Broadcast Services			\$ 2,347.6
Gulf of Mexico	Non-Radar Airspace ATC Separation Services (Host / ERAM)	High Altitude	\$ 2,143.7
		Increased Capacity	\$ 1,911.9
		Optimal Routing	\$ 206.6
		VERN Communications Cost Avoidance	\$ 25.2
		Low Altitude	\$ 203.9
		Increased Capacity	\$ 190.7
		Reduction in Mid-Air Collisions	\$ -
		Reduction in Weather Related Accidents	\$ 13.1

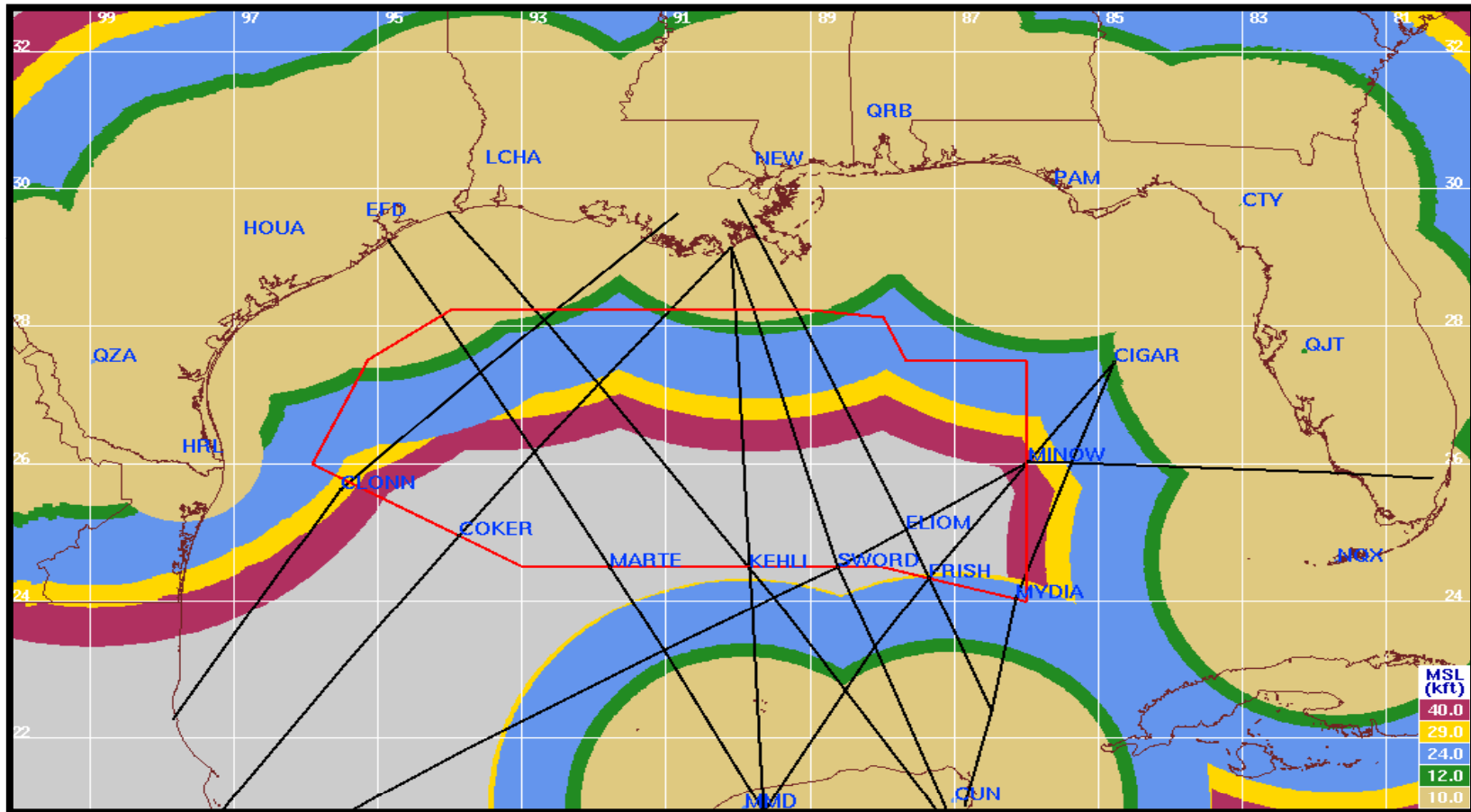
- **Major Assumptions (High):**
 - High Altitude Capacity: Hourly capacity increase from 60 to 80 aircraft constrained by Mexico and current number of sectors; 4% annual traffic growth
 - High Altitude Optimal Routing: Applies to flights that currently cross the non-radar region and those that do not; constrained by capacity
 - High Altitude VERN Communications: Approximately \$1M per year average savings from 2011 to 2035
- **Major Assumptions (Low):**
 - Low Altitude Capacity: Increase IFR capacity from 13 to 54 aircraft per hour; IFR demand of 78 per hour; Approximately 15%-20% of days
 - Low Altitude Reduction in Weather Related Accidents: 20% accident reduction based on AWSS deployment
 - Aid to search and rescue operations
 - Direct routing granted (instead of grid routes) - vectors (Specifically in emergency conditions)

Gulf of Mexico Airspace

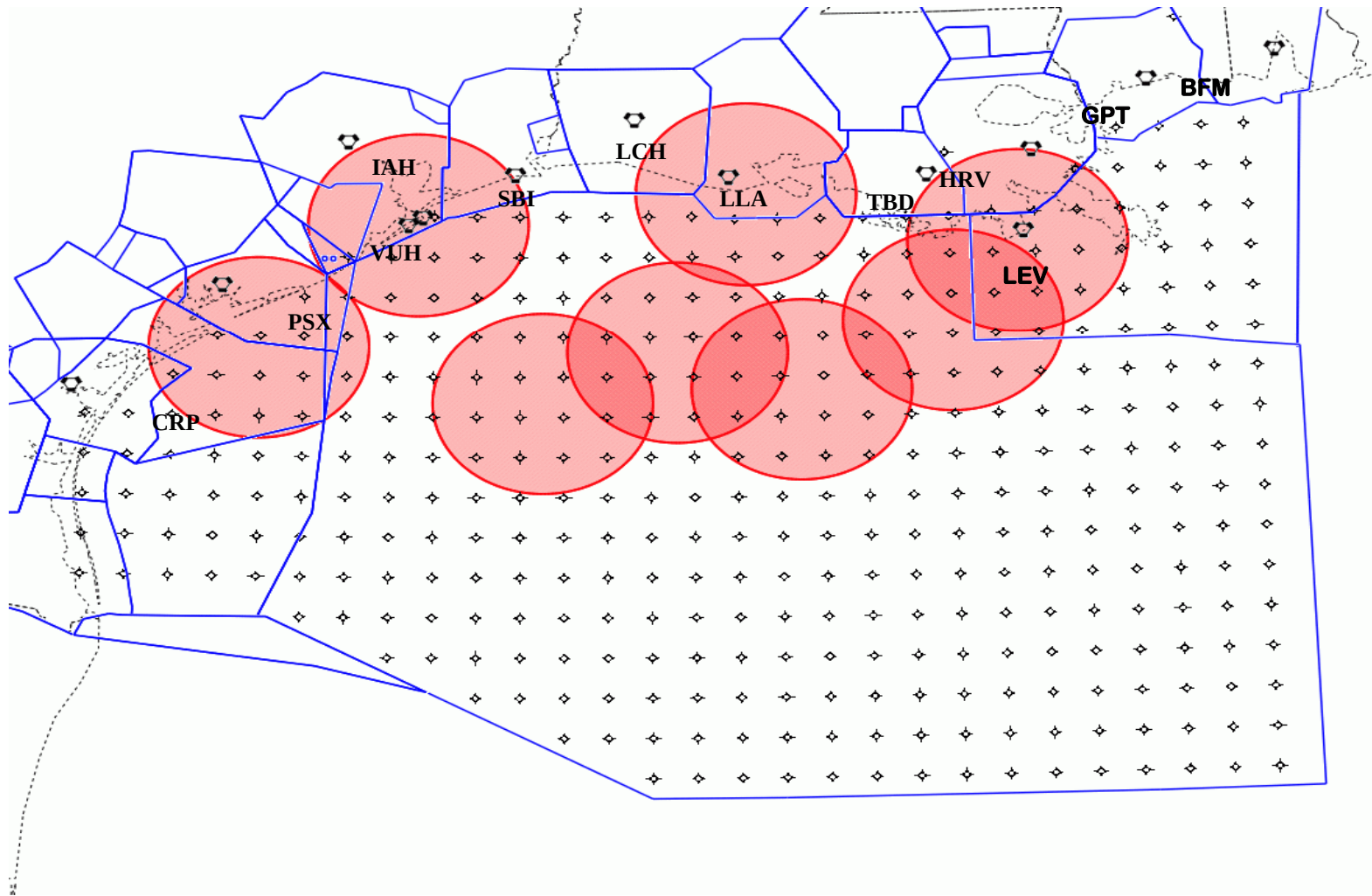


Gulf of Mexico Radar Coverage

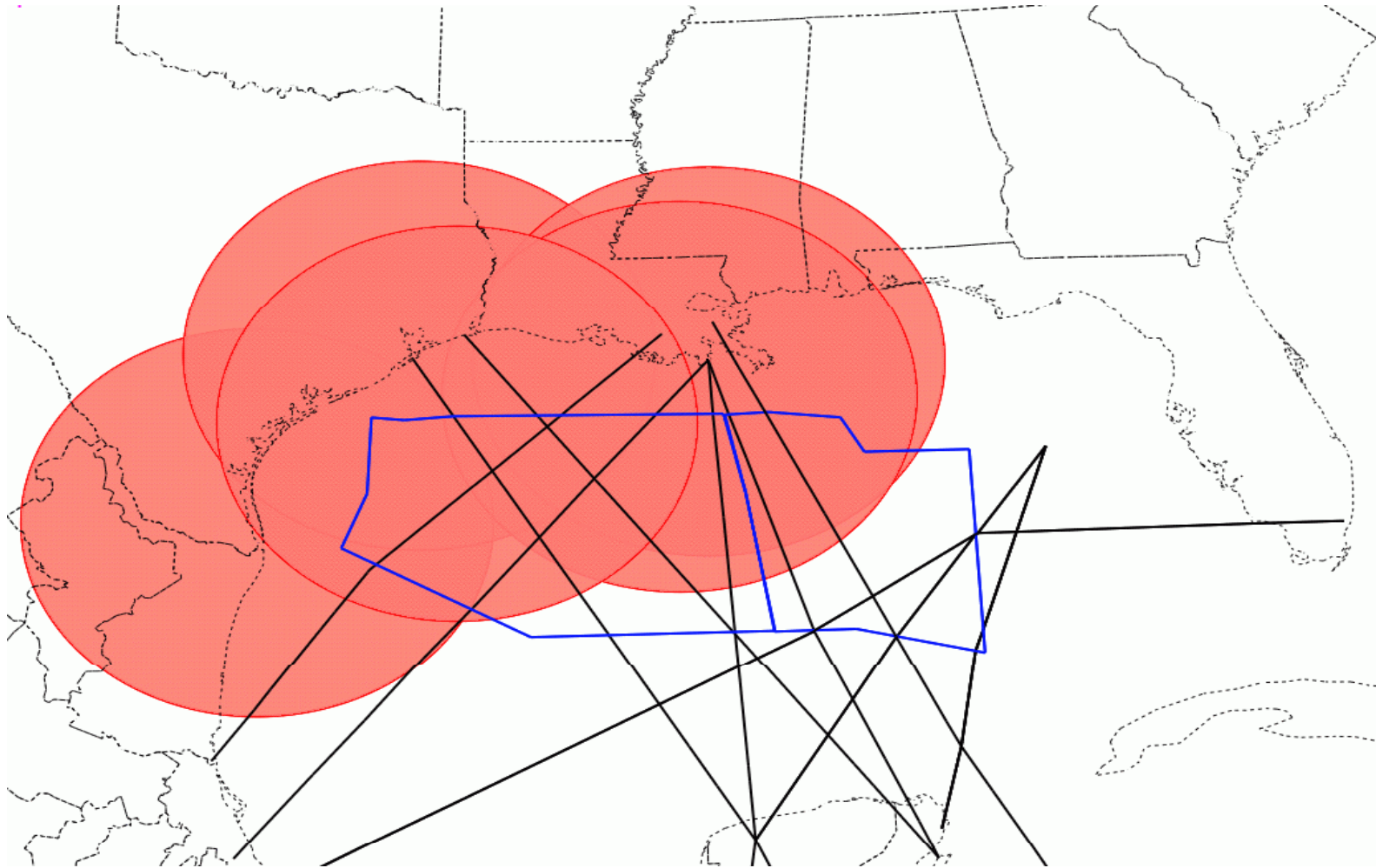
Red line denotes Houston Center CTA/FIR boundary.



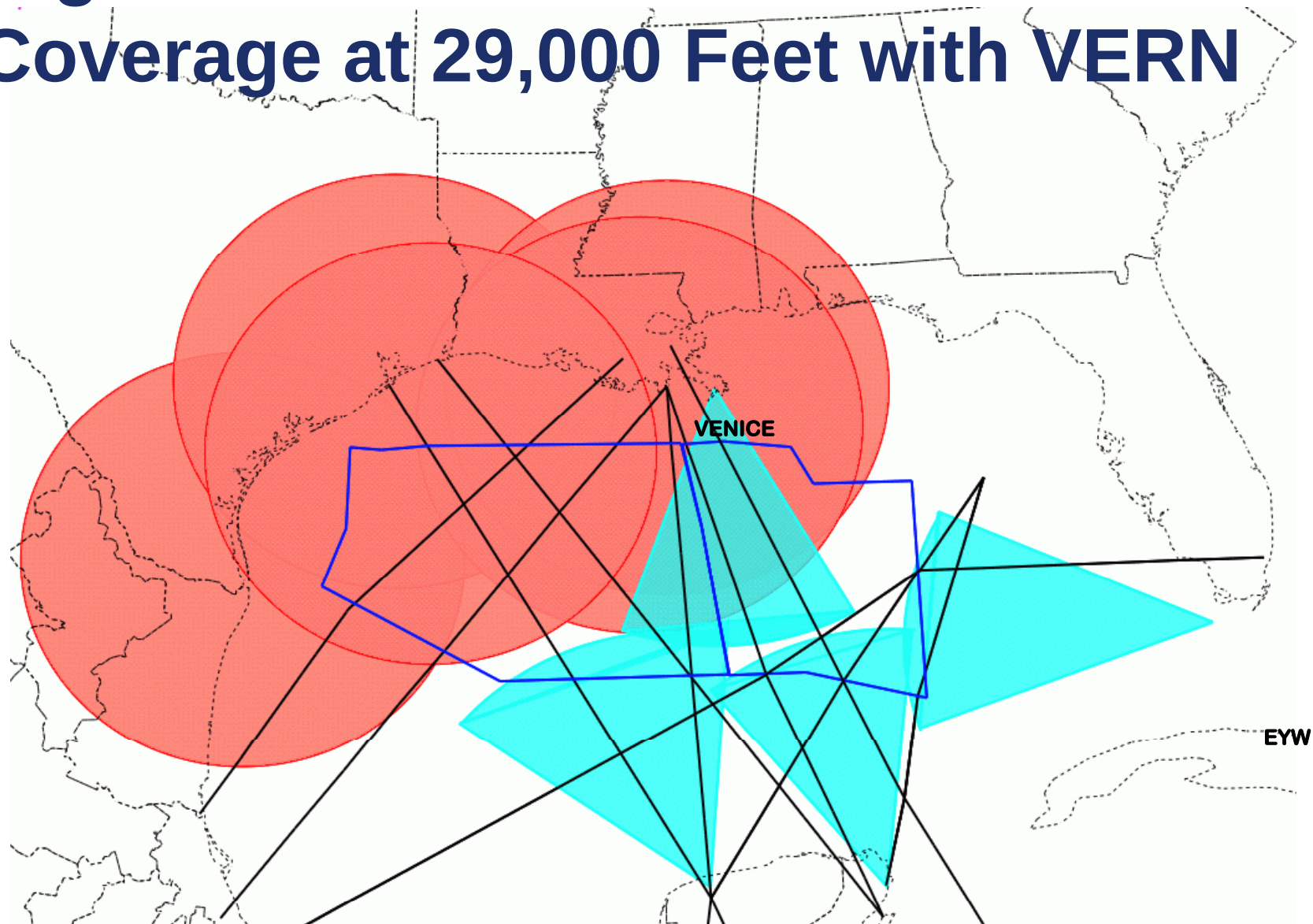
Offshore Communication Coverage at 4000 Feet



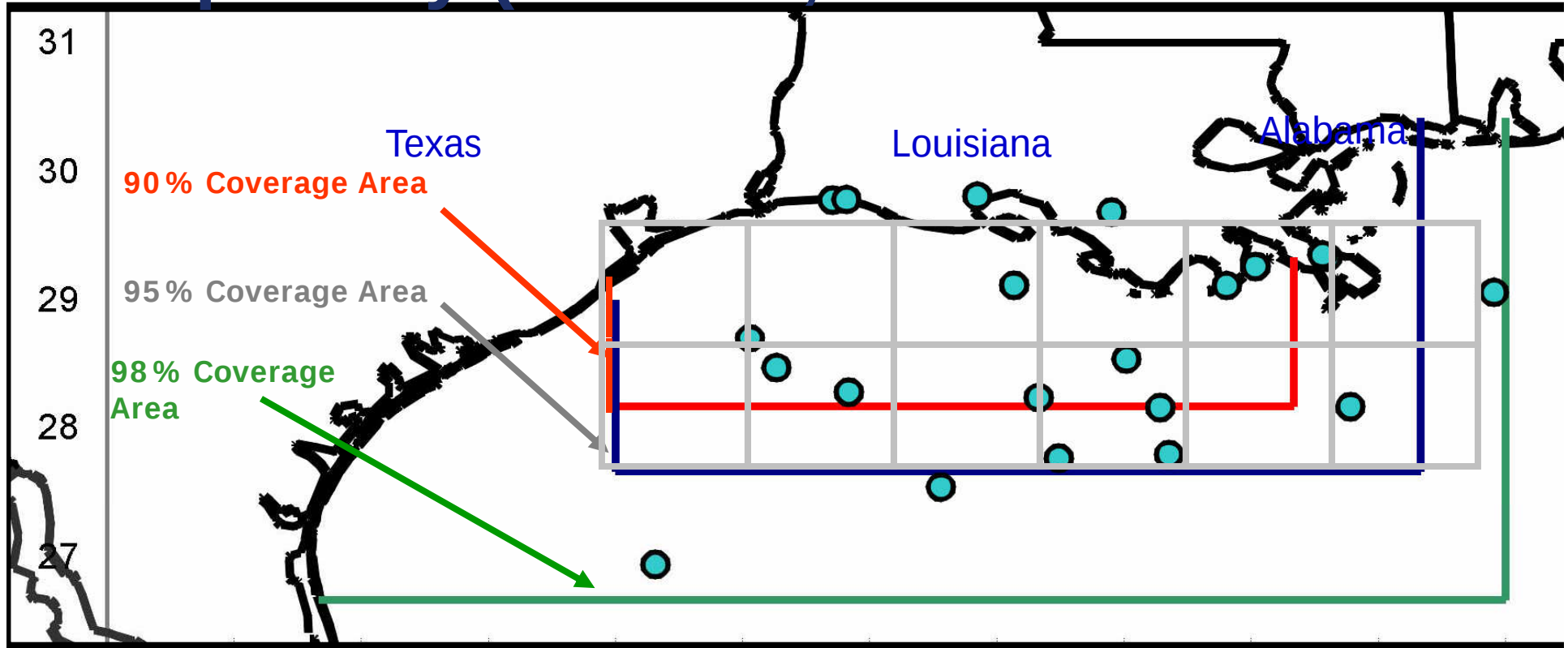
High Altitude Communication Coverage at 29,000 Feet



High Altitude Communication Coverage at 29,000 Feet with VERN



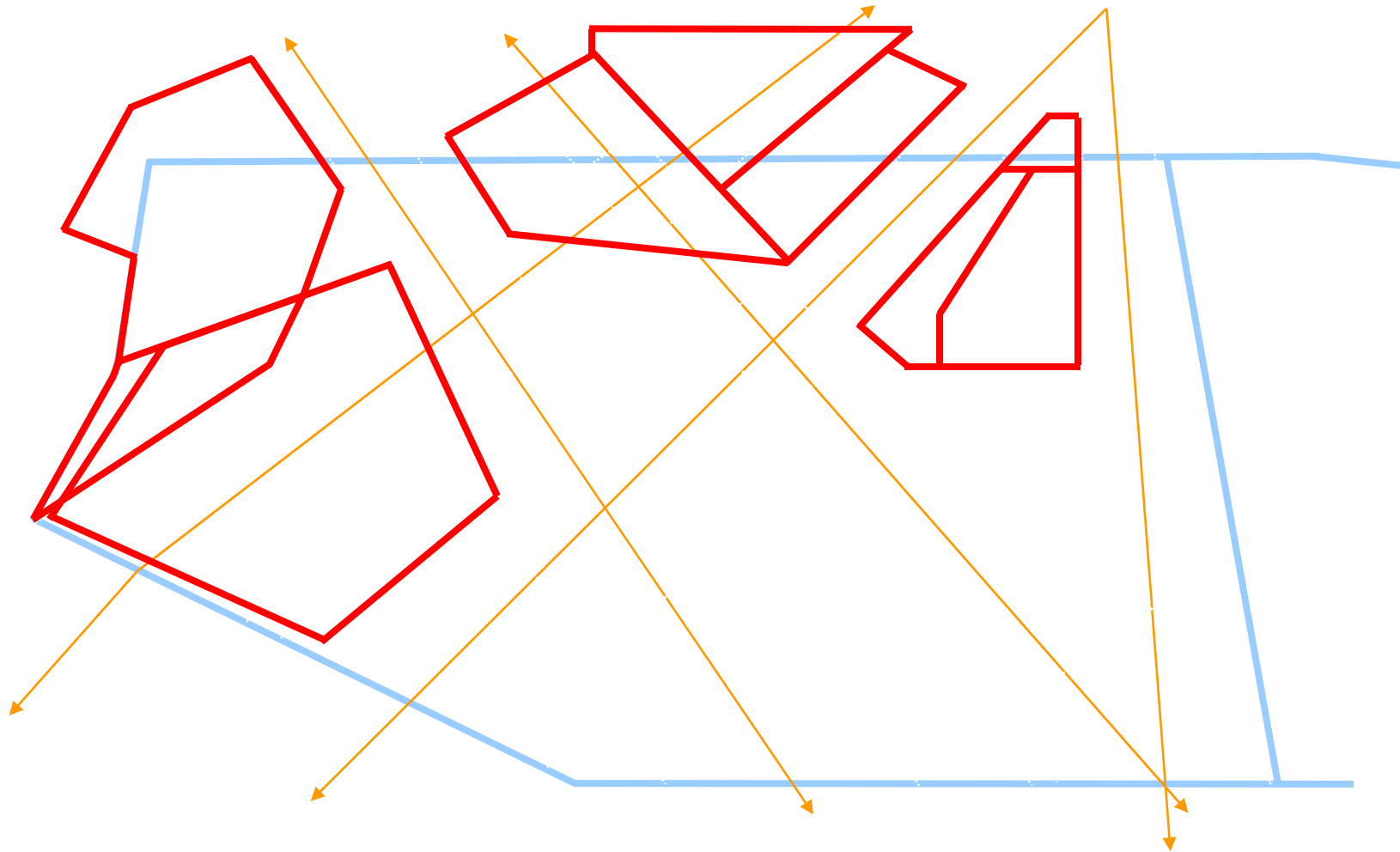
Current Weather Observation Capability (SAWRS, ASOS and AWOS)



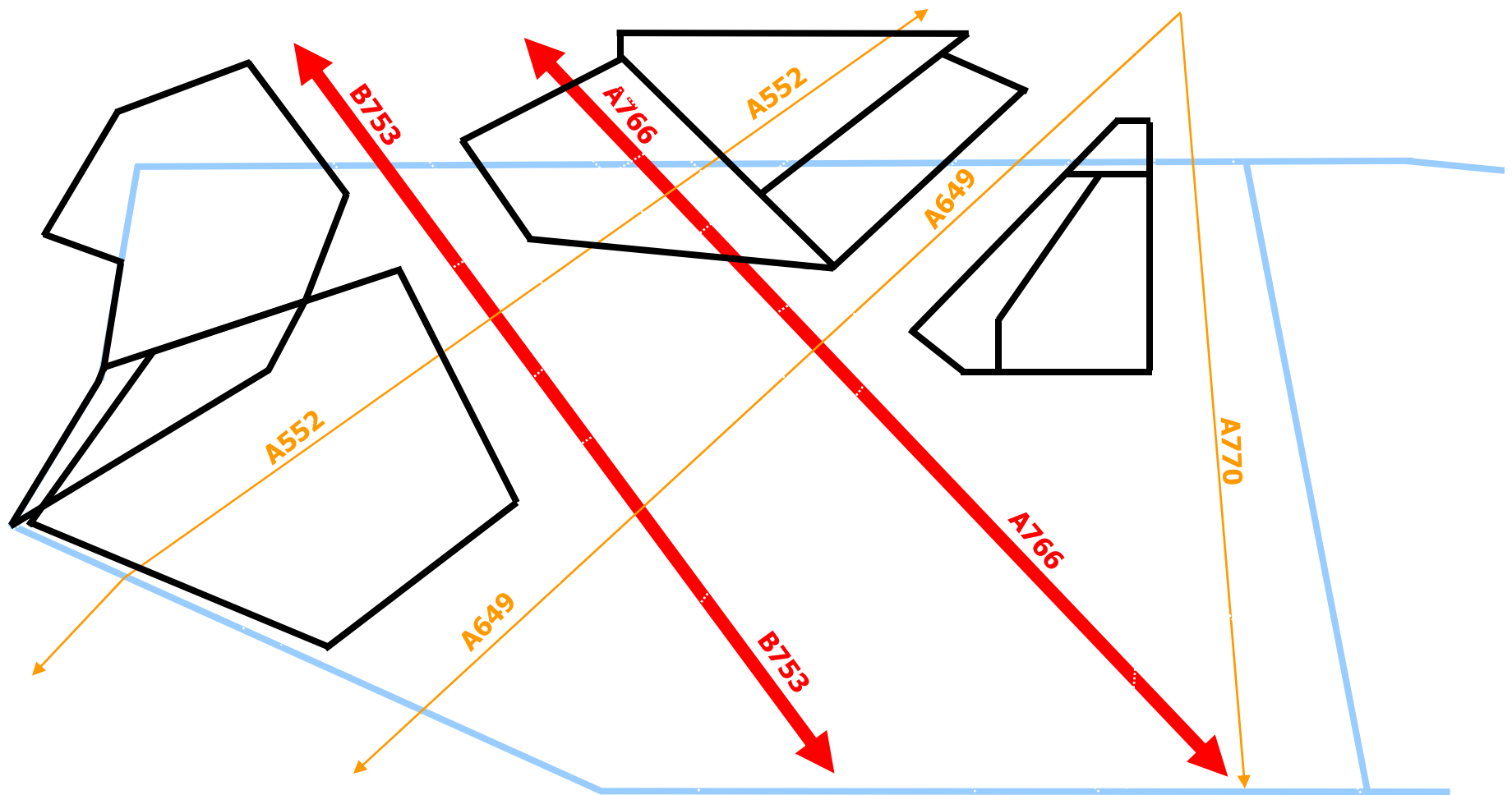
Each gray box represents a 60 x 80 mile area that requires two weather observation sites for Part 135 IFR helicopter operations.

- Weather observation stations currently owned by helicopter operators or oil companies – Helicopter operators request that the FAA augment the current capability or replace (For Replacement: ~ 24 stations needed for IFR operations in the 95% coverage area).

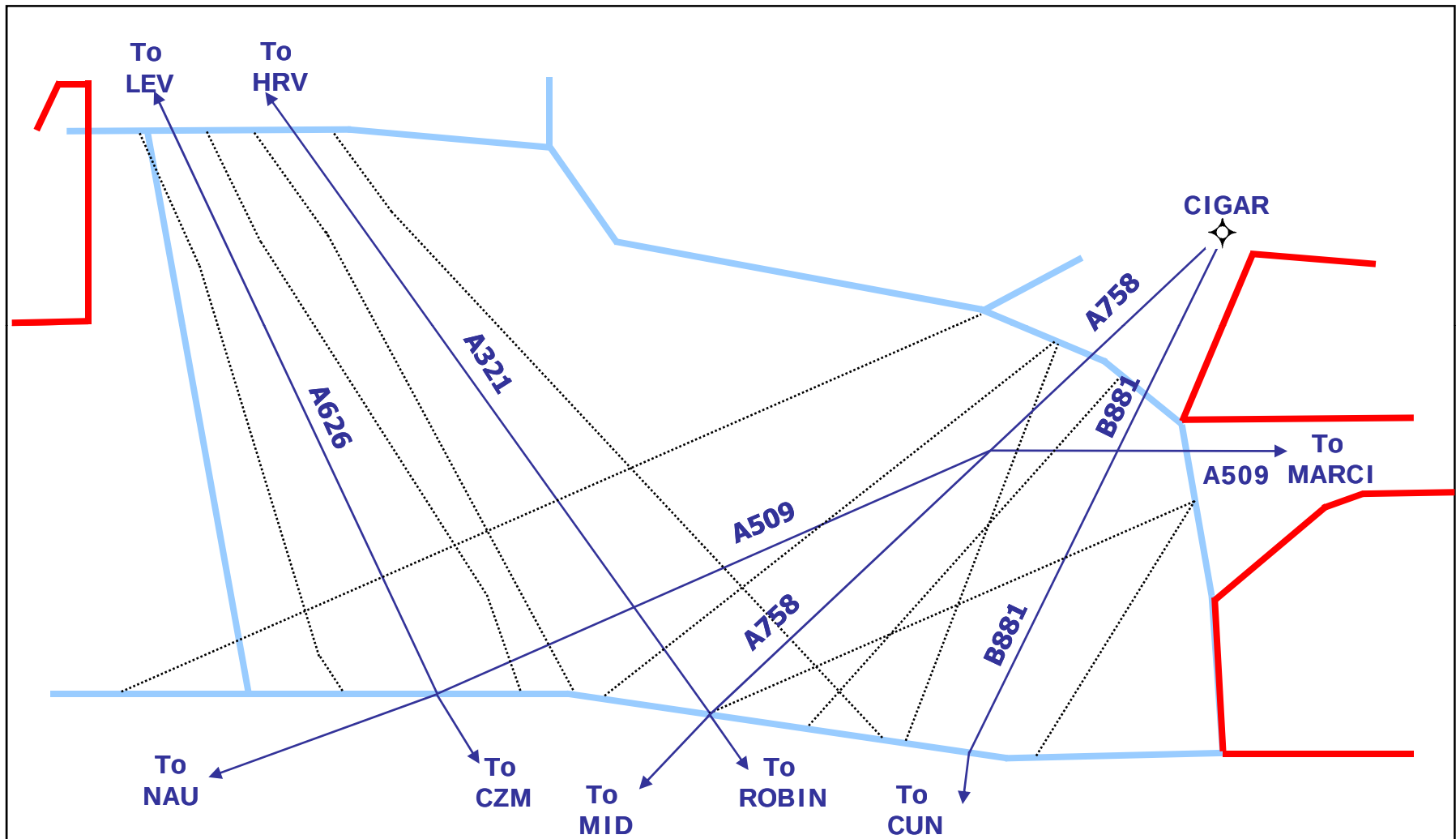
Gulf of Mexico Current Ocean West Airspace



Gulf of Mexico: 73% of Ocean West Traffic Utilizes A766 and B753

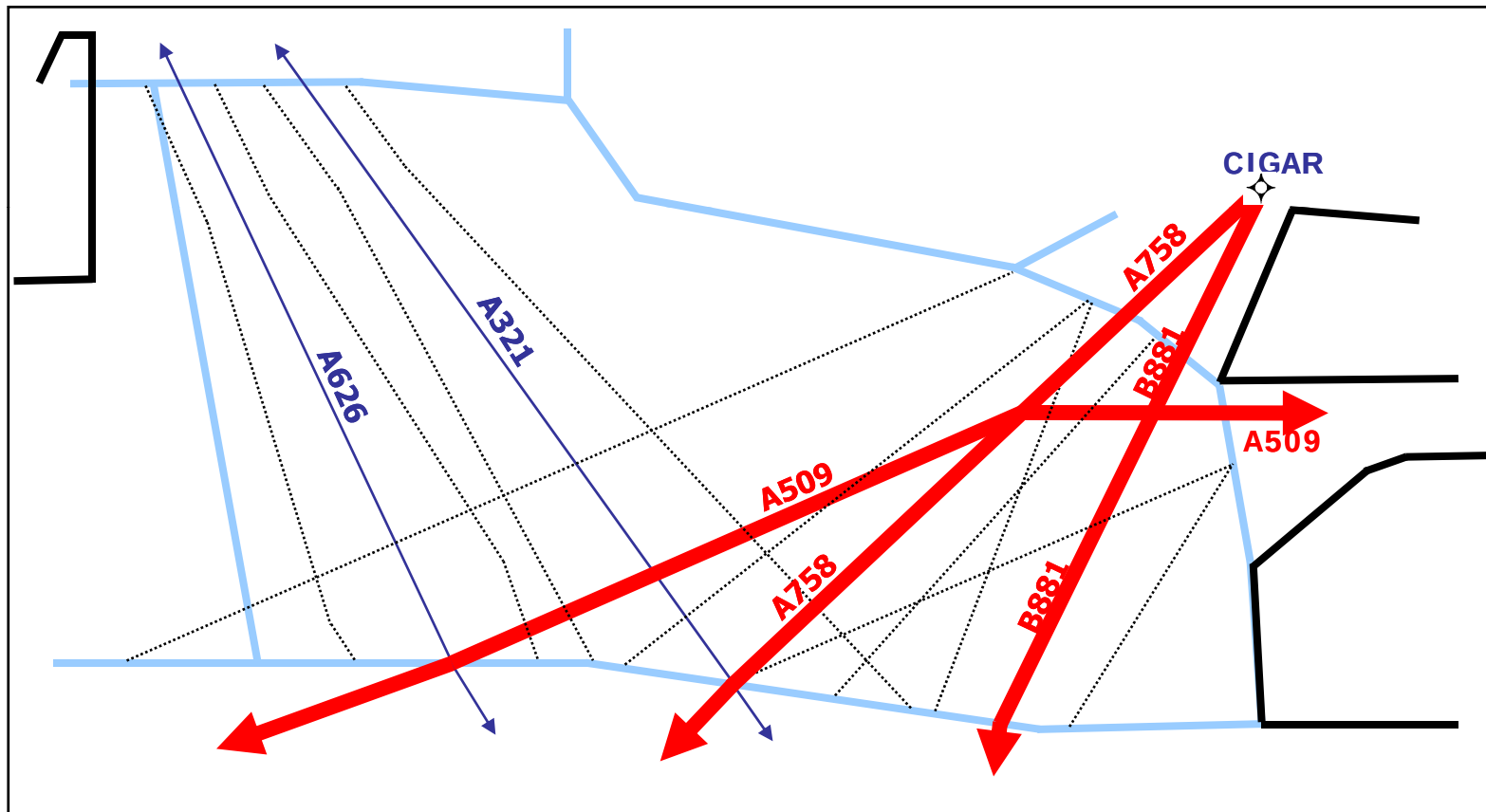


Gulf of Mexico Current Ocean East Airspace



Gulf of Mexico Ocean East Airspace (Continued)

61% of Ocean East Traffic utilizes 3 ATS Routes (A509, A758, & B881) Whose Non-Radar Protected Airspace Overlaps



Gulf of Mexico Mission

- Provide ATC services in the Gulf of Mexico to meet Current and Forecasted Customer Demand.
- Maximize the use of new and existing Communication/Navigation/Surveillance Technology (CNS).



Project Description

- **Service Coverage Volume: Gulf of Mexico Area**
 - Service Delivery Point: Houston Center and Helicopter Operator Dispatch Center
 - Service: Communication, Weather, Surveillance
 - Interface: Host / ERAM Automation Platform
- **High Altitude**
 - Commercial airlines, military, and high-end general aviation aircraft operate at altitudes above flight level 28,000 feet
 - Because of lack of sufficient CNS, oceanic separation standards are required over some portions of the Gulf, which degrade the efficiency of high-altitude operations
 - Improved CNS capabilities will:
 - Increase availability of more fuel efficient altitudes
 - Enable direct routings
 - Accommodate weather deviations without impacting adjacent routes
 - Eliminate lengthy delays in issuing clearances through a third party
 - Increase Houston Center (ZHU) sector capacity in oceanic airspace



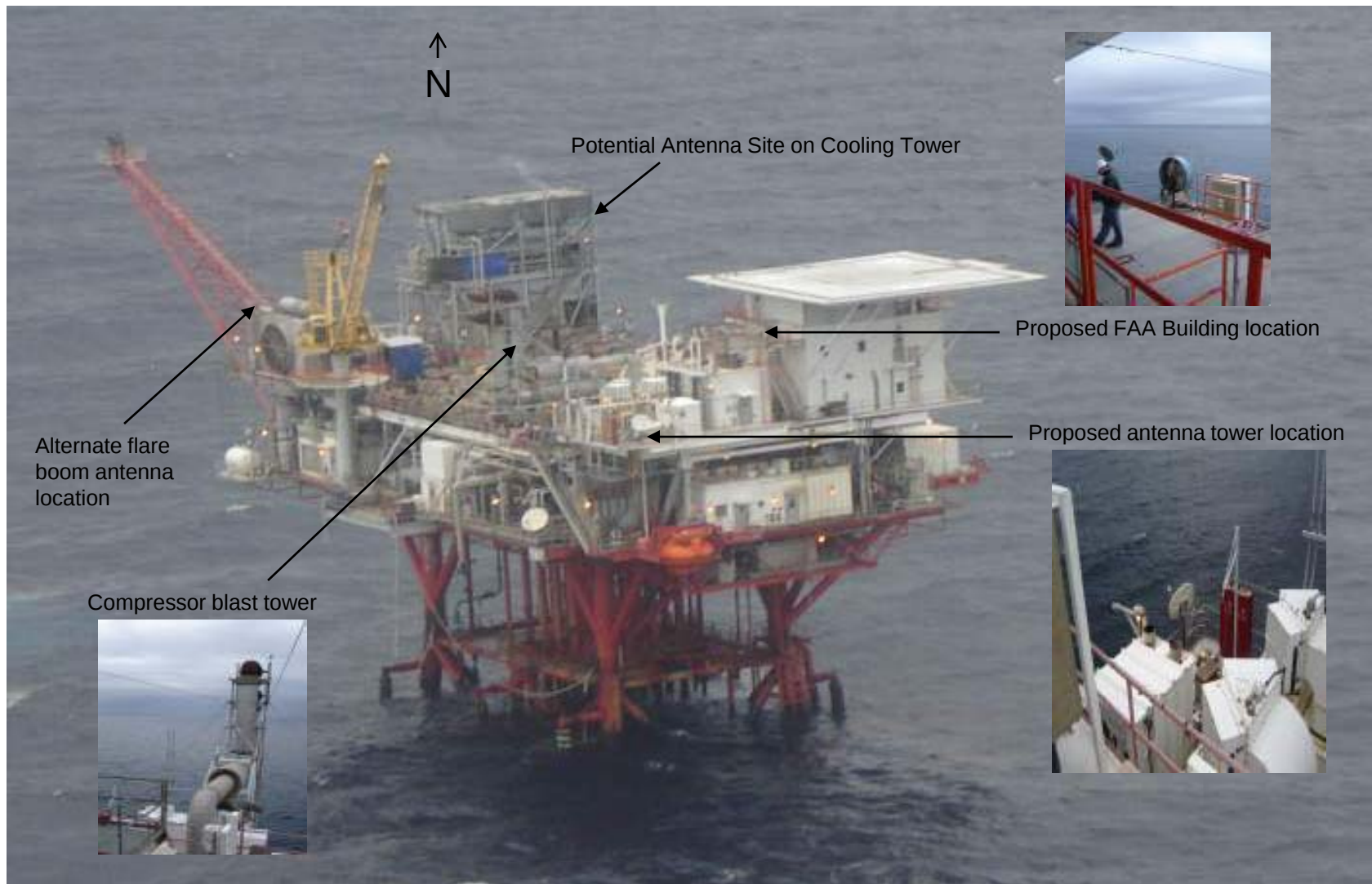
Project Description (Continued)

- **Low Altitude**

- The highest volume of air traffic is from the helicopters that support oil platform operations
 - The Gulf helicopter fleet logs between 5,000 and 9,000 trips a day according to figures recorded by HAI (approximately 2.1 million operations per year)
 - Flights are highly dependent on weather conditions
 - Current communications and weather infrastructure significantly limits the number of flights under instrument flight rules
 - The proposed infrastructure, when functionally integrated into the Air Traffic Management (ATM) system, will enable air traffic services to become more capable of meeting the demands of low-altitude system users



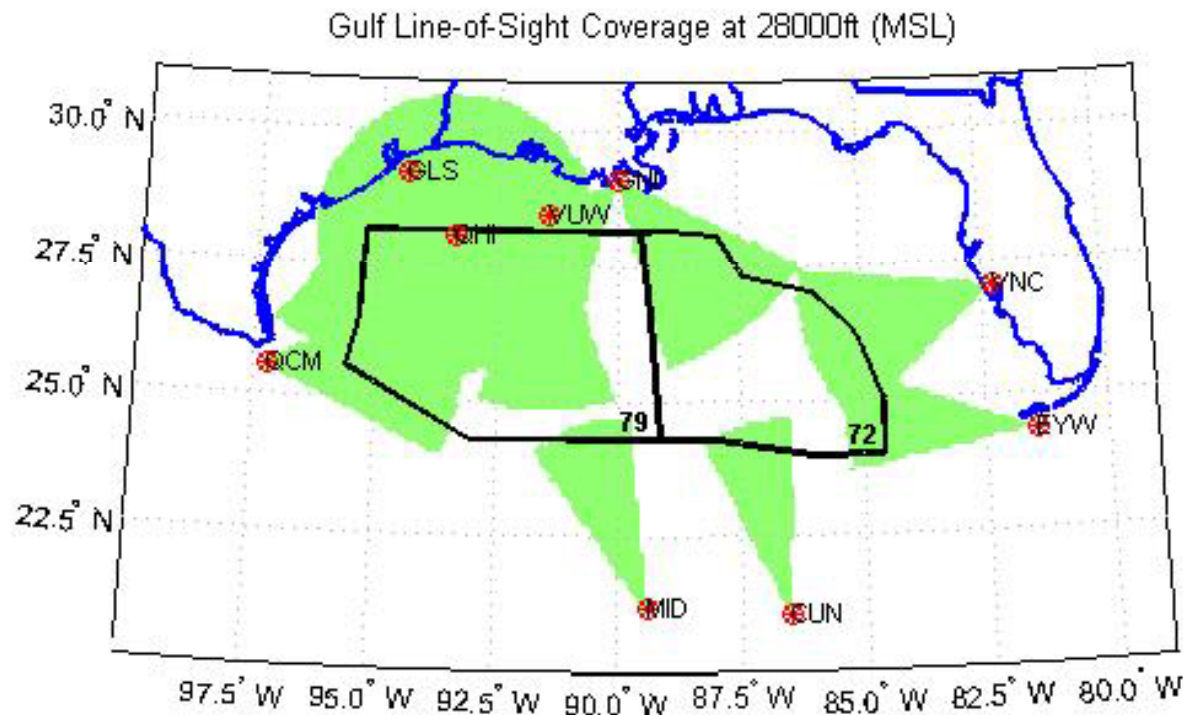
Deep Water Platform



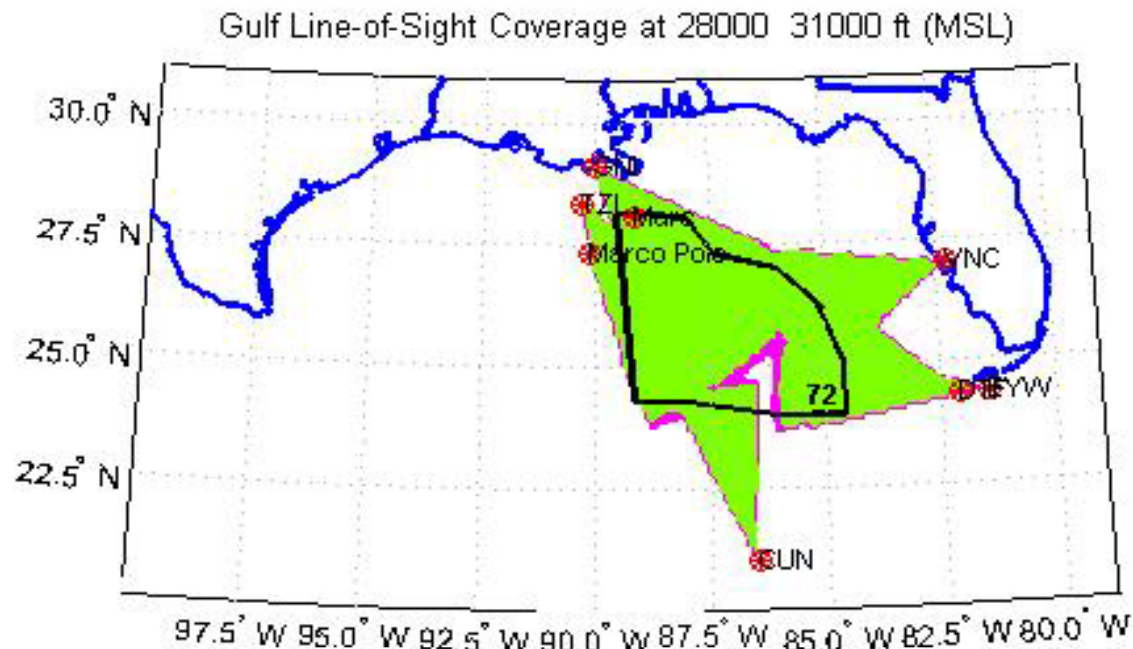
Discussion Points



Current Oceanic Sector Communications Coverage at FL280



Proposed Communications Coverage Oceanic Sector 72



ICAO Collaboration Needs for ADS-B Implementation in Gulf of Mexico

- **Rulemaking for ADS-B performance in Offshore airspace outside of US 12 mile limit but within Houston CTA/FIR.**
- **Application of ADS-B performance requirements on foreign carriers.**
- **Amend ICAO related documents to reflect equivalence between ADS-B derived surveillance coverage and ATC radar coverage in meeting ICAO International Standards and Recommended practices.**
- **Expedite revision to PANS/ATM (DOC 4444) ICAO document that will require ADS-B performance indicator in ICAO Flight Plan.**



Summary: Gulf of Mexico Operational Enhancements 2007- 2010

- **Seamless ADS-B surveillance and VHF Communications FL280 and above. (Dec 2009)**
 - Increases traffic capacity in GOMEX airspace
 - Enables more fuel efficient altitudes
 - Enables direct routings
 - Accommodates WX deviations without impacting adjacent routes
 - Eliminates lengthy delays in issuing clearances thru 3rd party
- **Enhance today's automated flight plan exchange between US and Mexico to manage traffic growth.**
- **Air Traffic Control Systems Command Center (ATCSCC) continues to develop traffic management model with Centro de Control Flujo de Mexico (CCFMEX)**



Questions / Actions

