

Air Traffic Organization

NextGen TBO Demonstrations Update

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Federal Aviation
Administration



Why Demonstrations?

- Identification of performance requirements
- Develop and refine operational concepts
- Validate new technologies and benefits
- Provide early user benefits

Support CRD and IARD phases of AMS

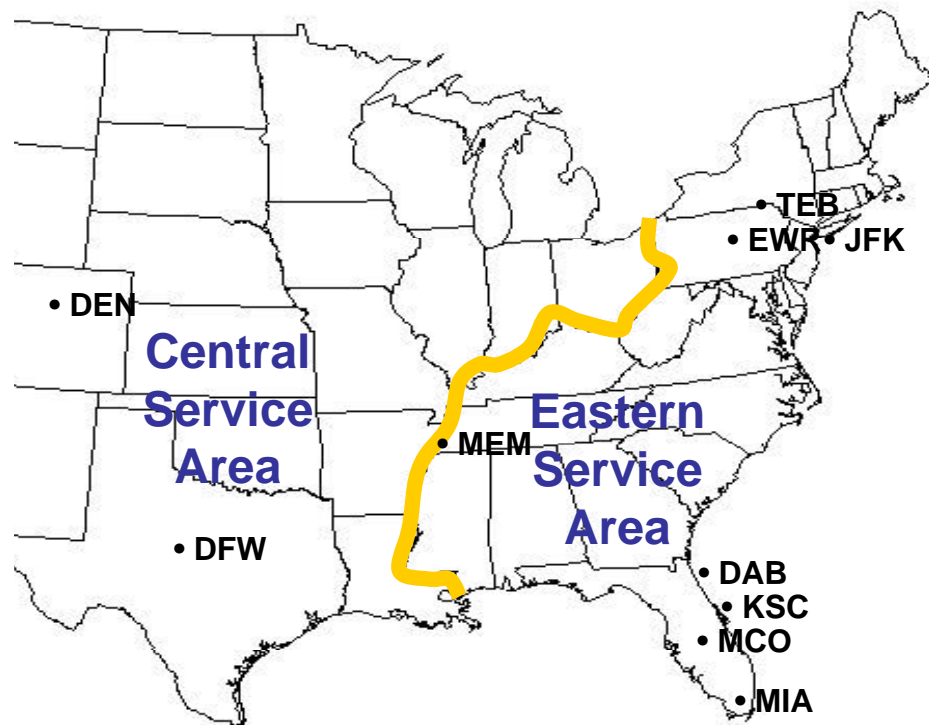


History

- **“Accelerating NextGen” initiative from Jan – Apr 08 resulted in designation of three geographic focus areas**
 - Florida Test Bed
 - New York Area Airports
 - Texas Airports
- **OMB also called for the designation of a NextGen Test Bed**

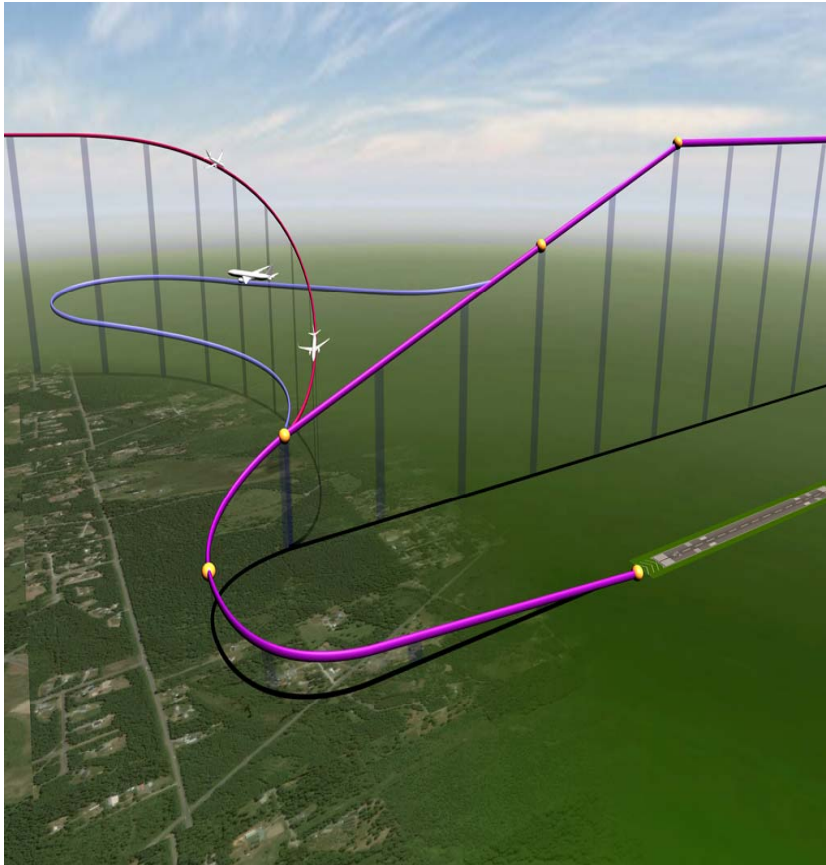


FY09/10 Demonstrations Locations



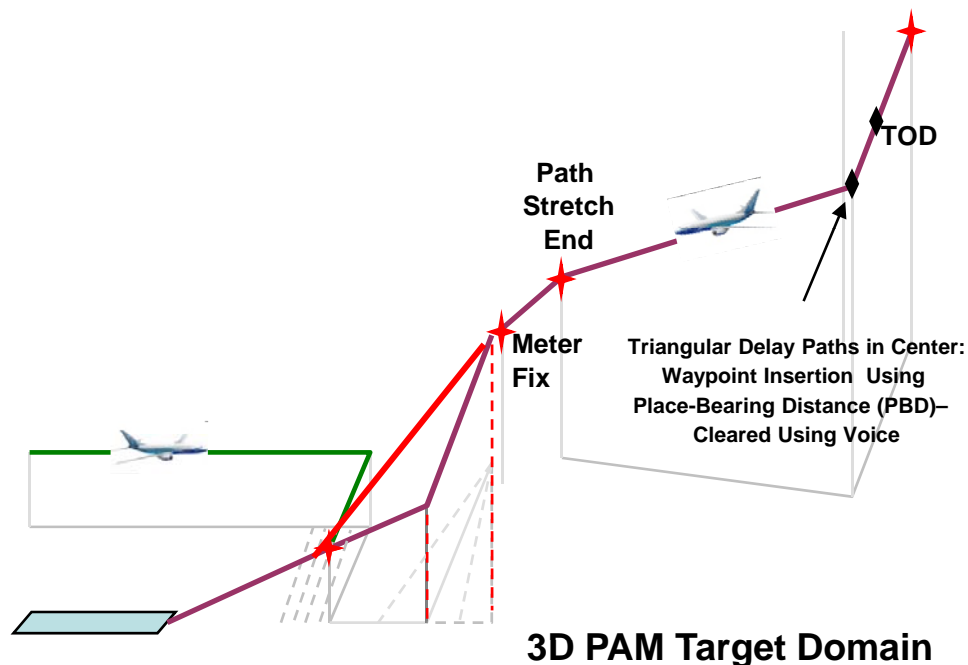
- **Surface Management: MEM, MCO, JFK**
- **Tailored Arrival: MIA**
- **Oceanic: MIA**
- **Flight Object: DAB**
- **4D FMS: TBD**
- **UAS: KSC**
- **GBAS: EWR, TEB**
- **3D PAM: DEN**

Demonstrations: Continuous Descent Arrivals (CDA)



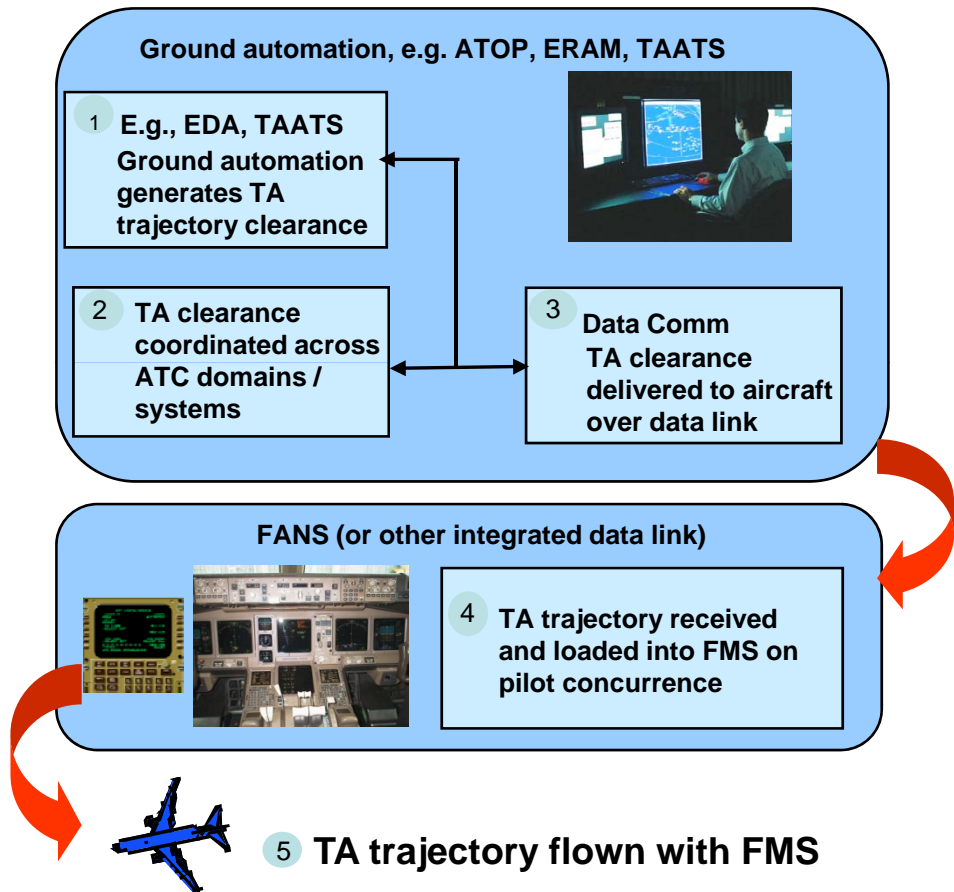
- **Initiative:** Uses Area Navigation (RNAV) / Required Navigation Performance (RNP) arrivals with optimized vertical profile
- **Benefit:**
 - Approximately 200 to 400 LBS of fuel per arrival
 - Reduced noise and emissions
- **Partners:** American Air Lines, Delta, US Air Force Mobility Command (AMC), International Air Carriers, Georgia Tech, MITRE
- **Schedule:**
 - Prioritized list of recommended CDAs – Apr 09
 - CHS Flight Test – Sept 09
- **Status:**
 - ATL Flight Tests: May 5 -16th, 11 partial/full CDAs conducted (Delta)
 - MIA Flight Tests: May 5-19th, 10 partial/full CDAs conducted (American)
 - CHS Flight Test: Fly draft procedures in C-17
 - Delta simulations in Dec 08
 - C-17 simulation in Mar 09
 - Flight Demos planned in Sept 09
- **Results (Initial)**
 - Benefits analysis ongoing
 - Initial Results indicate approximately 50-135 gallons per flight savings

Demonstrations: 3D Path Arrival Management (3D PAM)



- **Initiative:** Move toward 4-D Trajectory Management; aircraft executes TMA plan
- **Benefit:** Move from controller-based to Trajectory Management using automation for fuel and emissions saving with reduced controller work load
- **Approach:** Conduct live trials at DEN; integrate enhancements to TMA with FMS equipage
- **Partners:** NASA Ames, Boeing, Sensis, Continental, AAL
- **Schedule:**
 - FY09 Human-in-the-Loop Simulation (HITLS)
 - FY09 Live Flight Trials at DEN
- **Status:**
 - Integrated ATC / Flight Deck Simulation completed September 18, 2008
 - HITL Flight Deck on going
 - HITLS ATC starting Apr 09
 - Sept 09 flight trials at Denver

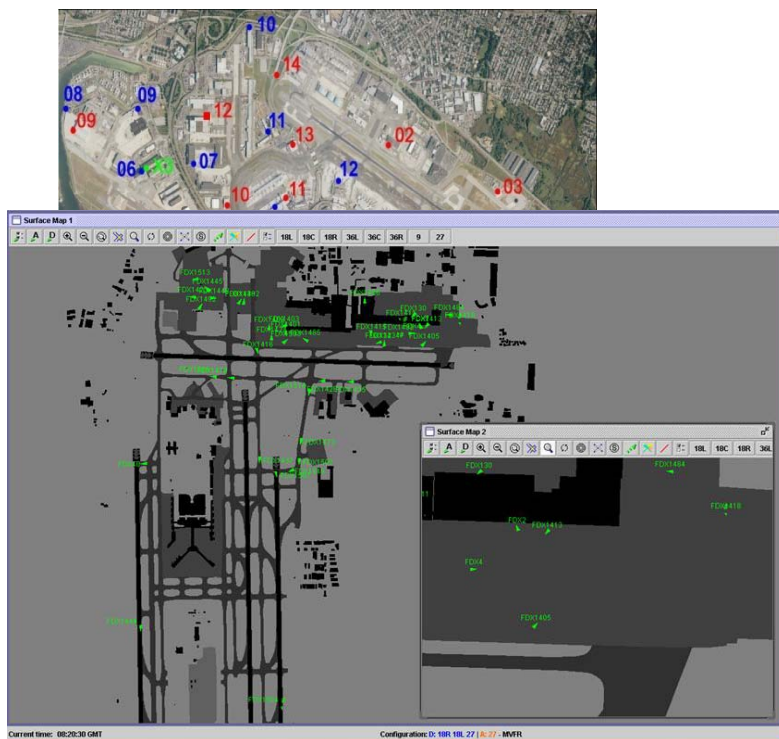
Demonstrations: Tailored Arrivals (TAs)



* Supporting Atlantic Interoperability Initiative to Reduce Emissions (AIRE)

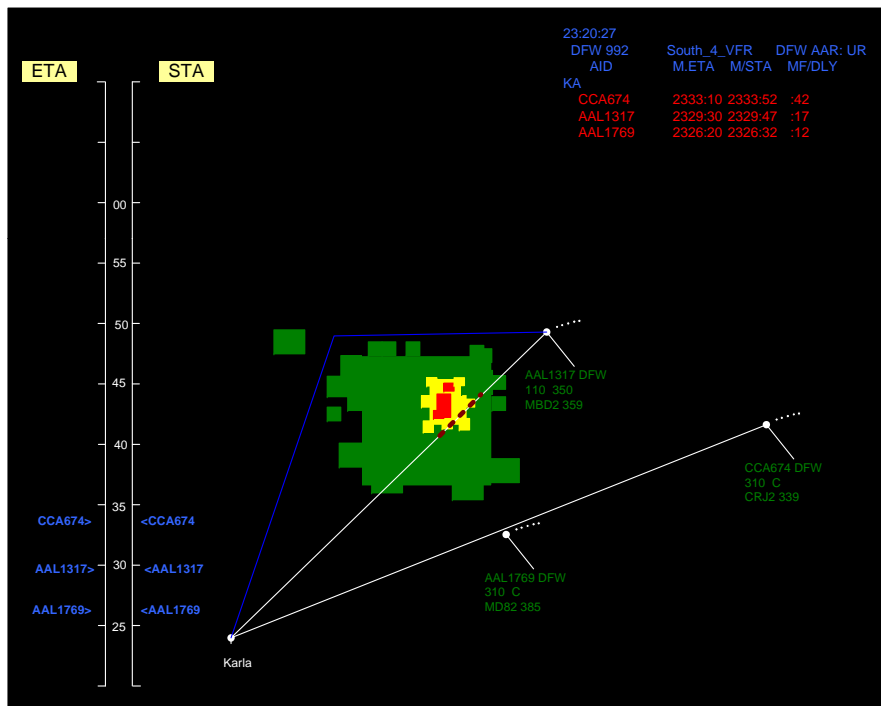
- **Initiative:** Integrate automation tools and Data Comm* to provide cleared trajectory path, which is uplinked to the aircraft and flown by Flight Management System (FMS)
- **Benefits:**
 - 400/600 LBS of fuel reduction per arrival in end-state
 - Reduced fuel burn and environmental footprint
- **Partners:** NASA Ames, Boeing, Sensis, American Air Lines & Foreign Carriers
- **Status:**
 - SFO: Flight Trials: Since December 2007
 - MIA:
 - Flight Trails: Total of six TA conducted with American and Air France (09/22/08 to 9/24/08). Four full and two partial TAs
 - ATOP issue identified – resume flight trials (Jun 2009)
 - LAX:
 - TA profiles in development
 - FY09 live flight trails (Mid CY 2009)
- **Results (Initial)**
 - Since December 2007 – over 1700 complete and partial TAs at SFO (Both B-777 & B-747)
 - As of May 08 estimate 38,000 gals of total fuel saved or about 100 – 130 gallons per flight
 - Four check flights on 3/9/09 at LAX with Qantas reporting fuel savings of 3000 lbs (B747) over typical arrival

Demonstrations: Surface Management at John F. Kennedy (JFK) Memphis (MEM) & Orlando (MCO)



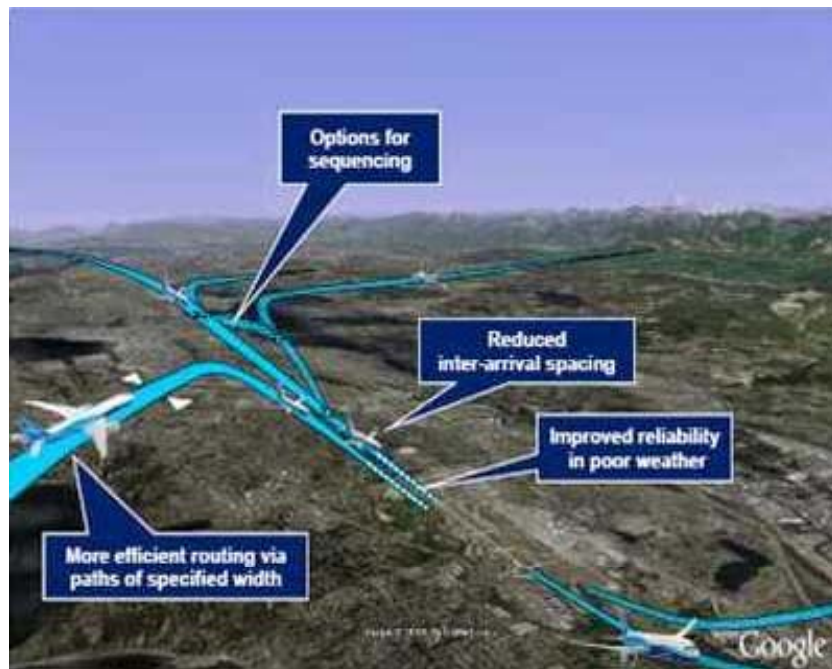
- **Initiative:** Leverage FAA investment in surface detection equipment (ASDE-X) to support new decision support tools
- **Benefits:**
 - Collaborative planning at airport
 - Reduced fuel burn and environmental footprint
- **Partners:** Airport Authorities, FedEx, NWA
- **STATUS:**
 - JFK Commercial Ramp Surveillance System installed / operating late 08
 - Feeds to ATC, Airline Ramp Towers and TSA
 - MEM Surface Decision Support System installed late 2008
 - Working group formed to evaluate benefits / future enhancements
 - Flight Operations Surface Application (FOSA) interface concept development ongoing (i.e., data sharing interface) – estimated completion Nov 09
 - Collaborative departure Queue Management demo begins Nov 09
 - MCO installation Nov 09
 - Concept Requirement Definition (CRD) documentation completed Dec 09
 - Coordination with ATO-T and SysOps ongoing

Demonstrations: Weather Integrated into TMA / ERAM



- **Initiative:** Initial demonstration showed incorporation of convective weather data into Traffic Management Advisor (TMA) and EnRoute Automation Modernization (ERAM) to maintain better airport arrival rates
- **Benefits:**
 - Alleviate weather impacts through advanced planning tools
- **Partners:** Embry Riddle, Lockheed Martin, CSC
- **Status:**
 - Laboratory demonstration Nov 08
 - Final Report delivery Apr 09

Demonstrations: Ground Based Augmentation System (GBAS)



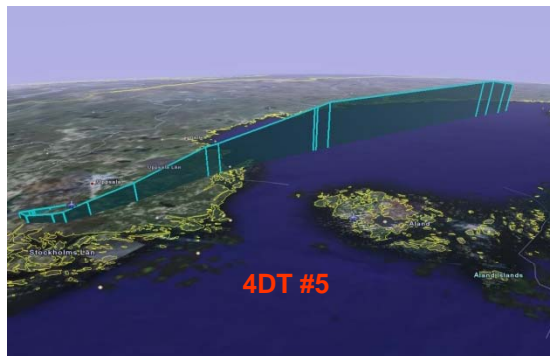
- **Initiative**
 - Demonstrate the use of Performance Based Navigation technology to improve arrival rates at airports
- **Benefit**
 - Additional throughput to maximize airport efficiency
 - Reduced fuel consumption and lower noise and emissions
 - Improved airport access
- **Partners**
 - NY Port Authority, Continental and NetJets
- **Status**
 - MOU Finalization and signing – Feb 09
 - GBAS installation at EWR – Jun 09 and TEB Aug 09
 - Aircraft modification – Aug 09
 - Conduct evaluation – Late 2009/10
 - First Commercial Flight Oct 09

Demonstrations: Unmanned Aircraft System (UAS)



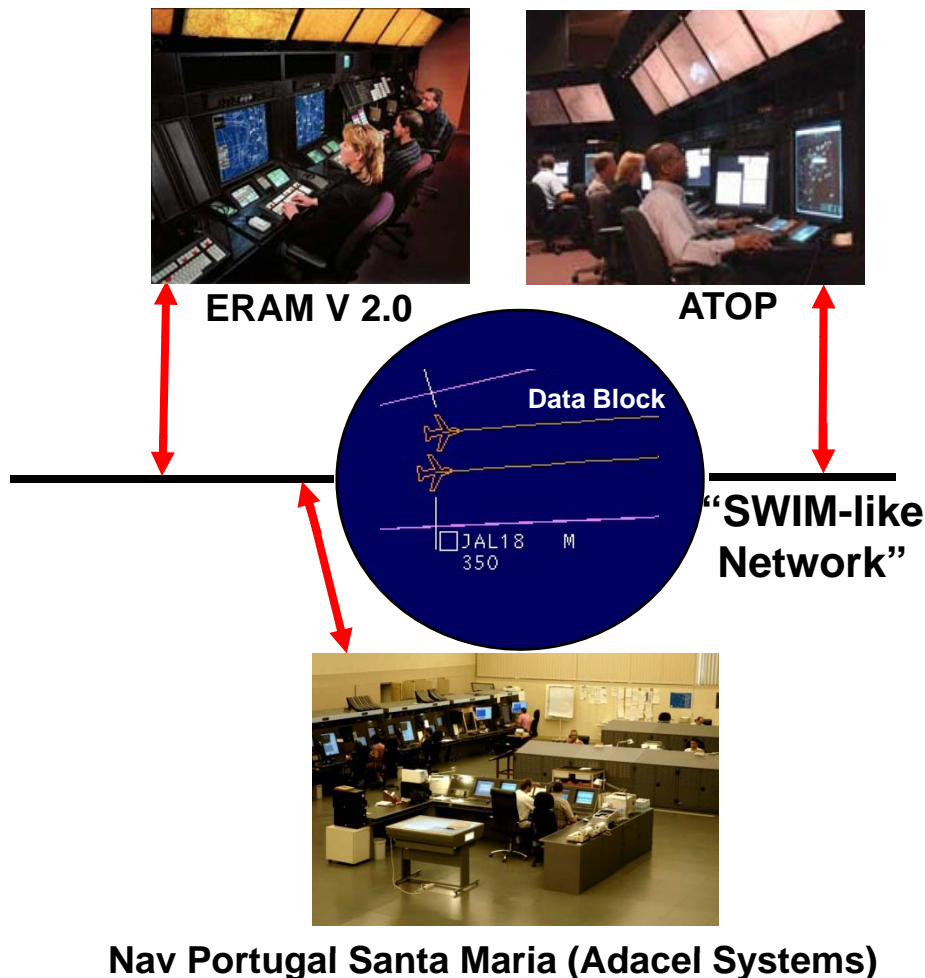
- **Initiative:**
 - Utilize advanced capabilities of UAS community as tested for exploring future 4D trajectory based Concepts
 - Examine potential concepts for wide-spread integration of UAS into future NextGen environment
- **Benefits:** Enables full range of UAS applications
- **Partners:** AAI, General Atomics, GE
- **Status:**
 - On track to complete UAS OTA with Embry-Riddle Aeronautical University in June 2009
 - UAS Baseline Flight Test – Aug 09

Demonstrations: International Air Traffic Interoperability



- **Initiative:** Series of joint demonstration projects aimed at promoting global ATC leadership and collaboration with R&D activities with other countries
- **Benefit:**
 - Global harmonization of ATC infrastructure and advancement
 - Reduce environmental impact
- **Partners:** Boeing, Airbus, Air France, Air Europa, American, Delta, Quantas, United, Air Lufthansa, New Zealand, Airways New Zealand, Airservices Australia, Nav Portugal
- **Status:**
 - Gate to Gate Green Flight demonstration CDG to MIA (June 09)
 - Conduct integrated oceanic/arrival demonstration (July 09)

Demonstrations: International Flight Data Object



- **Initiative:** Integrated “disparate” domestic and foreign ATC systems through use of a common “SWIM-like” enabled “Flight Data Object”
- **Benefits:** Helps define requirements and ConOps for common data object across automation platforms
- **Partners:** “SWIM Alliance” partners (Lockheed Martin, Computer Sciences Corp, Boeing, Harris), Adacel, Nav Portugal
- **Status:** Proof of concept lab demo completed Mar 09
- **Fall CY-09 (Oct / Nov) Demonstration –** Extend Flight Data Object to include Surface TBO

Demonstrations: 4-D Flight Management System (4-D FMS)



Initiative:

- Demonstrate operational capabilities and potential benefits of 4 Dimensional (4-D) Flight Management Systems in Trajectory Based Operations (TBO).
- Aid in defining “required performance” of 4 Dimensional (4-D) Flight Management Systems in trajectory prediction, negotiation, and guidance.

Benefits:

- Reduce controller workload and improved productivity
- Enhance reliability, repeatability and predictability of operations, leading to increased throughput.
- Improve efficiency and flexibility by increasing use of operator-preferred trajectories NAS-wide, at all altitudes.

Partners: Embry Riddle Aeronautical University, General Electric, and Partners in Aviation Consortium

Status:

- Held stakeholder coordination meeting to gain buy-in on project plan
- Finalizing OTA with ERAU
- Initiate coordination for kick-off meeting in May 09

Discussions

