

Global Harmonization Through Collaboration

System Wide Information Management (SWIM) Program Overview

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Federal Aviation
Administration

AIR TRANSPORTATION INFORMATION
EXCHANGE CONFERENCE - (FEATURING
AIXM, WXXM AND FIXM)

August 28, 2012 - August 31, 2012
NOAA Auditorium and Science Center
Silver Spring, Maryland



Agenda



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- Background
- Segment 1
- Segment 2
- Governance
- Standards
- International
Coordination

Program Definition



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SWIM consists of *standards, infrastructure, and governance* that enable the management of Air Traffic Management related information and its exchange between qualified parties via interoperable services.

(ICAO Working Paper)

The SWIM Program:

- Implements a **Service-Oriented Architecture (SOA)** in the **National Airspace System (NAS)**

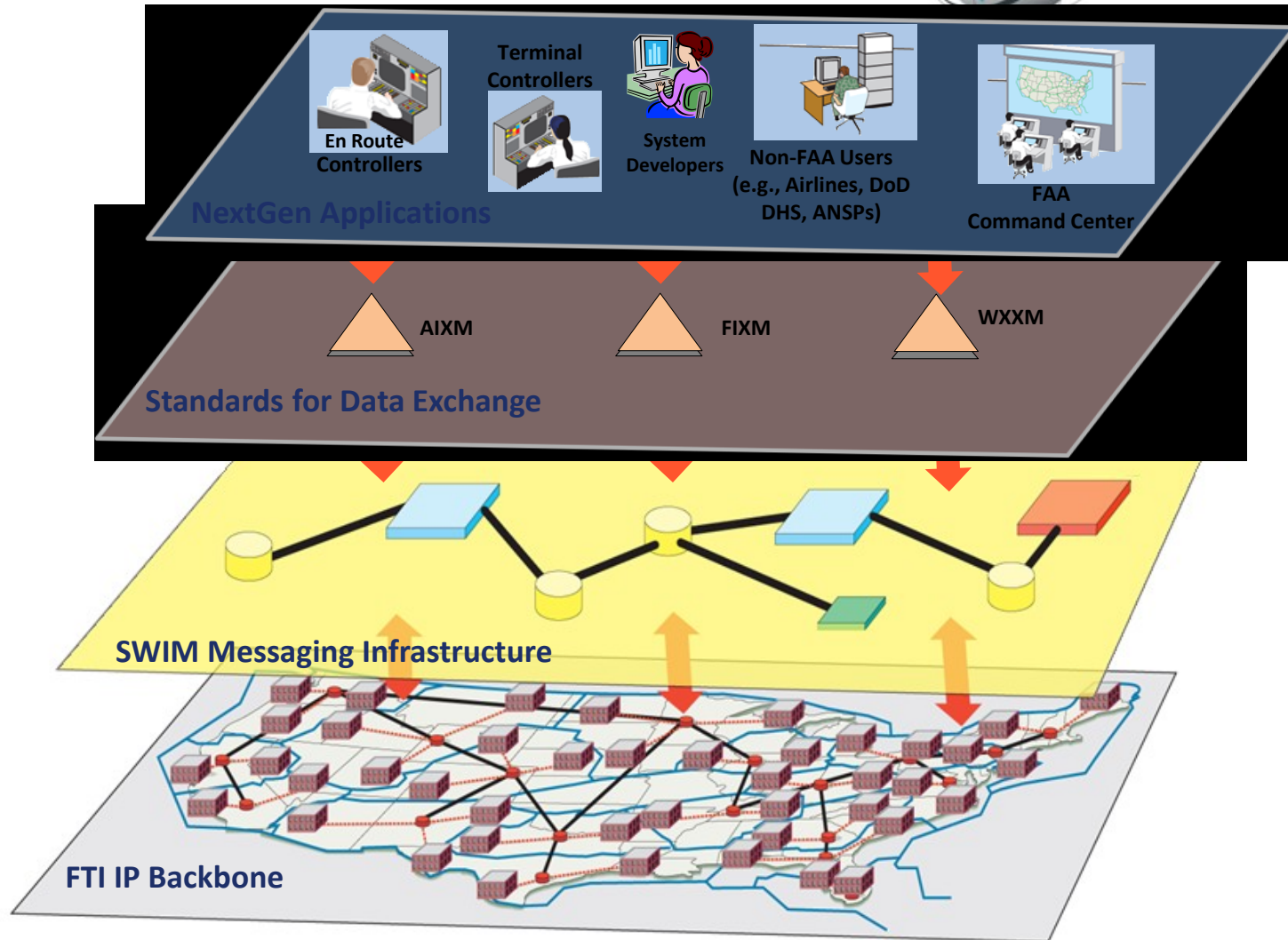
In order to:

- Allow the FAA to create reusable system interfaces more quickly and cost effectively
- Facilitate interoperability and data-sharing needed for NextGen

Conceptual Overview



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Segmented Approach to SWIM



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- **SWIM Segment 1:**


- Implementation of a set of federated services in the NAS with SWIM-provided governance, standards, and software to support development of reusable SOA services
- SWIM provides requirements, schedule, and funding to seven SWIM Implementing Programs (SIPs)
- Segment 1 results in SOA services deployed to all Air Route Traffic Control Centers (ARTCCs), 39 Terminal Radar Approach Controls (TRACONS), the Air Traffic Control System Command Center, the William J. Hughes Technical Center (WJHTC), and NAS Enterprise Management Centers (NEMCs)

- **SWIM Segment 2:**




- Continues provision of governance, standards, and software to additional NAS programs
- Implements enterprise messaging service for other NAS programs and facilitates transition by Segment 1 SIPs

Current SWIM Capabilities



Operational	2012 completion	2013 completion	2015 completion
Corridor Integrated Weather System (CIWS) Publication 	Special Use Airspace (SUA) Automated Data Exchange ¹ 	Flow Information Publication 	Flight Data Publication   
Integrated Terminal Weather System (ITWS) Publication 	Reroute Data Exchange 	Runway Visual Range (RVR) Publication 	
Pilot Report (PIREP) Data Publication 	SWIM Terminal Data Distribution System (STDDS) ² 		

Currently using, or considering use:

-  AIMX
-  WXXM
-  FIXM

Notes:

¹ AIM SUA declared Initial Operating Capability (IOC) in December 2011

² STDDS declared IOC in May 2012

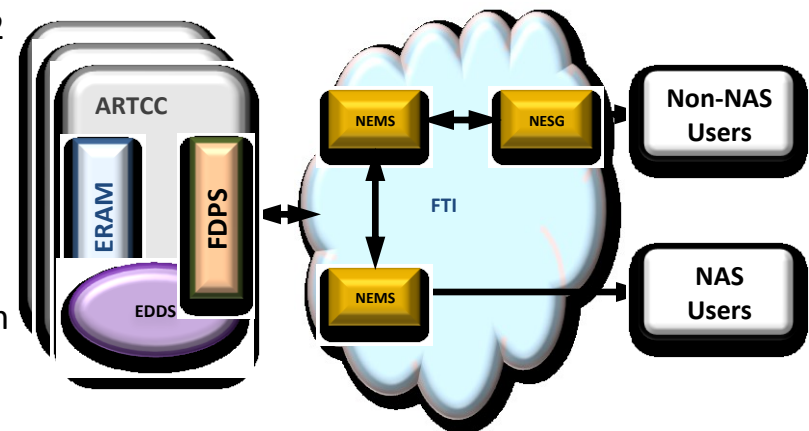
FDPS



- SWIM identified an alternative approach to develop and deploy FDPS
 - Approach uses data available from En Route Data Distribution System (EDDS) with no impact to ERAM
 - Development to be performed by Volpe and William J. Hughes Technical Center (WJHTC) team
- FDPS will provide a SWIM-compliant flight data service to NAS and non-NAS users
 - Original requirements expanded to include International Civil Aviation Organization (ICAO) 2012 and Flight Information eXchange Model (FIXM) considerations
 - Consistent with National Flight Information Service and architecture
 - Supports goal of Common Message Set (CMS)/Host-Automation Data Distribution System (HADDSS) migration

Proposed FDPS Services

- En Route Flight Data Service
- En Route Airspace Data Service
- En Route Operational Data Service
- En Route General Message Service



Current SWIM Products



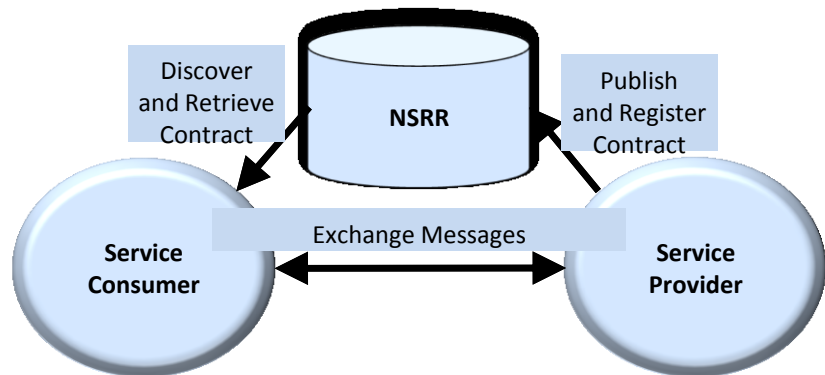
Capability	Products		
AIM SUA Data Exchange	<ul style="list-style-type: none"> • SUA data, dynamically provided in the AIXM standard • AIXM SUA definitions 		
ITWS Data Publication	<ul style="list-style-type: none"> • Airport Lightning Warning • Configured Alerts • Forecast Accuracy • Forecast Contour • Forecast Image • Gust Front TRACON Map • Microburst TRACON Map • Precipitation 5nm • Precipitation Long Range • Precipitation TRACON 	<ul style="list-style-type: none"> • SM SEP 5nm • SM SEP Long Range • SM SEP TRACON • Terminal Weather Text Normal • Tornado Alert • Tornado Detections Wind Profile • AP Indicated Precipitation • AP Status • Gust Front ETI • Hazard Text 5nm 	<ul style="list-style-type: none"> • Hazard Text Long Range • Hazard Text TRACON • ITWS Status Information • Microburst ATIS • Runway Configuration • Storm Motion 5NM • Storm Motion TRACON • Terminal Weather Text Special • Wind Shear ATIS
CIWS Data Publication	<ul style="list-style-type: none"> • VIL Mosaic (1km resolution) • VIL 2-hr. Forecast • Echo Tops Mosaic (1 km resolution) • Echo Tops 2-hr. Forecast • Satellite Mosaic 	<ul style="list-style-type: none"> • Storm Info: Echo Top Tags • Storm Info: Leading Edges • Storm Info: Motion Vectors • VIL Forecast Contours (Std. Mode) • VIL Forecast Contours (Winter Mode) 	<ul style="list-style-type: none"> • Echo Tops Forecast Contours • Growth & Decay Contours • Forecast Accuracy: Echo Tops • Forecast Accuracy: Std. Precip • Forecast Accuracy: Winter Precip
PIREP Data Publication	<ul style="list-style-type: none"> • Transmission of voice PIREPs to WMSCR 	<ul style="list-style-type: none"> • Stored PIREPs 	<ul style="list-style-type: none"> • Altimeter settings
Reroute Data Exchange	<ul style="list-style-type: none"> • Pre-departure flight reroute information between Traffic Managers and Air Traffic Controllers 		
ASDE-X/STDDS	<ul style="list-style-type: none"> • ASDE-X streaming data service 	<ul style="list-style-type: none"> • Surface Movement Events (SME) 	<ul style="list-style-type: none"> • Tower Departure Events (TDE)
Flow Information Publication	<ul style="list-style-type: none"> • Flow Constrained Area (FCA) • Airspace Flow Program (AFP) 	<ul style="list-style-type: none"> • Ground Delay Program (GDP) • Ground Stops (GSs) 	<ul style="list-style-type: none"> • Reroutes • Advisories
RVR Data Pub.	<ul style="list-style-type: none"> • Runway visibility data 		
Flight Data Pub.	<ul style="list-style-type: none"> • Flight data 		

Segment 1 Enterprise Infrastructure and Tools



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- NAS Service Registry/Repository (NSRR), a central repository to help users discover, use and (whenever possible) reuse web services
 - Lets users know what NAS information is available and how to receive it
 - Registering with the NSRR will be the only way to receive FAA NAS data



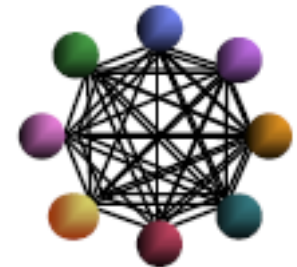
- SWIM Commercial-Off-The-Shelf (COTS) Products Repository
- SWIM Wiki

<https://swimrep.faa.gov/soa/web/login>

Transition From Segment 1 To Segment 2



- **Segment 1 – Federation among Programs**
 - No common infrastructure
 - Each Program responsible for message delivery using SWIM-provided software
 - Governance policies/processes to ensure interoperability
- **Segment 2 – Common Infrastructure**
 - SWIM provides common messaging infrastructure
 - SWIM responsible for message delivery
 - More agile Governance (i.e. not dependent on SWIM-provided software)
 - SWIM will assist Segment 1 Programs in transition to new infrastructure



Segment 2 Infrastructure



- **NAS Enterprise Messaging Service (NEMS)**
 - Prototype messaging nodes deployed
 - Additional nodes will be installed
- **Domain Name Service (DNS)**
 - Capability deployed and operational
- **Network Time Protocol/Precision Time Protocol (NTP/PTP)**
 - Capability deployed and operational



NEMS Overview



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NEMS is providing Messaging Services for the NAS

- Any service available on one NEMS node will be available on any other NEMS node
- Intelligent Routing, routing decisions made based on certain data attributes or pre-defined conditions
- Data Filtering, based on Java Messaging Service (JMS) message header contents or attributes of the Extensible Markup Language (XML) schema
- Meets Enterprise Boundary Protection (EBP) requirements through integration with the NAS Enterprise Security Gateway (NESG)

SOA Suitability Assessments



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- **Purpose**
 - To determine which FAA programs need to use SOA/SWIM services
 - To plan SWIM funding and SWIM infrastructure for future customers
 - Ensure SWIM compliance in programs, as needed
 - Provide cost estimates to FAA programs of using SWIM services

- **Timeline**
 - The SOA Suitability Assessment process starts in the early stages of the program lifecycle, at Investment Analysis Readiness Decision (IARD) with the SOA scorecard questionnaire
 - Engagement with the candidate program continues through Initial Investment Decision (IID) and Final Investment Decision (FID), and completes with a SWIM Memorandum for the FID

SOA Suitability Results



Program	SOA Score
Alaska Satellite Telecommunications Infrastructure (ASTI)	Low
ATO Resource Management Tool	Medium
Airport Surveillance Radar-Model 9 (ASR-9) and Mode-Select (Mode-S) Service Life Extension Program (SLEP) Phase II	Medium
Automatic Terminal Information System (ATIS)	Low
Aviation Environmental Design tool (AEDT)	High
Aviation Safety Knowledge Management Environment (ASKME) Segment 2	High
Aviation Surface Weather Observation Network (ASWON)	High
ERAM D-Position Upgrade and System Enhancements	Low
Facility Security Risk Management (FSRM) (Phase 2)	Medium
Flight Standards Inspector Aircraft Replacement (FSIAR)	Low
Instrument Flight Procedures Automation (IFPA) (Includes Tech Refresh)	High
Logistics Center Supply System (LCSS) Segment 2	Medium
Mobile Airport Surveillance Radar (MASR)	High
Next Generation Radar (NEXRAD) SLEP	High
Surveillance and Broadcast Services (SBS)	High
Surveillance Interface Modernization (SIM)	High
System of Airports Reporting (SOAR II)	High
Terminal Automation Modernization & Replacement (TAMR) Phase 3 Segment 2	Medium
Tower Flight Data Manager (TFDM)	High
Wind Shear Detection Services (WSDS) Work Package (WP) 1 (Tech Refresh)	Low

Two-Way SOA



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- **Two-Way SOA will enhance NAS Boundary Protection System (NBPS)**
 - Securely allow external entities to publish information using SOA services into the NAS
- **Two-Way SOA components include:**
 - Traffic Director (TD)
 - Web Application Firewall (WAF)
 - XML Gateway
- **Scheduled availability June 2013**

FAA Standards Developed By SWIM



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FAA-STD-063

XML Namespaces

Requirements for
namespaces in XML
documents

FAA-STD-064

Web Service Registration

Requirements for
registering services and
minimum content for
documenting services

FAA-STD-065

Web Service Description Documents

Minimum content for
documenting properties
and capabilities of web
services

FAA-STD-066

Web Taxonomies

Minimum set of
taxonomies to
categorize service
metadata

FAA-STD-070

Preparation of Web Service Requirements Documents

Content and structure of
a Web Service
Requirements
Document (WSRD)

International Coordination



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- **International Civil Aviation Organization (ICAO)**
 - Air Traffic Management (ATM) Requirements and Performance Panel (ATMRPP)
- **Single European Sky ATM Research Joint Undertaking (SESAR JU)**
 - Information Management Workgroup
 - SWIM Interoperability Coordination Plan
- **Japan Civil Aviation Bureau (JCAB)**
 - Future Air Transportation System (FATS) Working Group
 - May 2011, United States
 - October 2011, Japan
 - May 2012, United States
 - Asia/Pacific Flight Data Object Demo (May 2012)
- **Civil Aviation Authority of China/
Air Traffic Management Bureau (CAAC/ATMB)**
 - December 2010, China
 - March 2011, United States
 - September 2011, United States
 - October 2011, China
- **Airservices Australia (ASA)**
 - Asia/Pacific Flight Data Object Demo (May 2012)

Aircraft Access to SWIM (AAtS)



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- **What is AAtS?**
 - AAtS - The aircraft is *accessing* SWIM
 - Qualified subscribers consuming NAS data on the flight deck such as meteorology and aeronautical information
- **Why AAtS?**
 - Provides in-flight users access to the same information / decision support tools that FAA and AOCs have
 - Supports NextGen Collaborative Decision-Making

To learn more about SWIM...



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The SWIM website describes the SWIM program and provides news, announcements, and information on current issues

It also contains key documentation, including select briefings, the SWIM Newsletter, and SWIM Q&A

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System Wide Information Management (SWIM)

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The link for www.swim.gov that redirects to this page will be going away soon. It will be replaced by <http://www.faa.gov/nextgen/swim>. Please update your bookmarks accordingly.

Highlights

SWIM The Current

System Wide Information Management » www.SWIM.gov

SWIM publishes the 6th edition of our newsletter

October 11 - SWIM publishes the 6th edition of our newsletter

More »

Announcements

SWIM Brown Bag #12: LISA: Service Simulation Solutions for Developing Applications in Composite and Cloud Environments - Wednesday January 11, 2012 - 12:00pm-1:00pm FOB10A Rooms 8ABC (telcon information can be found [HERE](#)) (Download slides [HERE](#))

SWIM Brown Bag #13: Progress Software - Wednesday February 8, 2012 - 12:00pm-1:00pm FOB10A Rooms 5ABC

SWIM Brown Bag #14: Securing a SOA Environment - Wednesday, March 7, 2012 - 12:00pm-1:00pm FOP10A

Recent News

January 6, 2012 - SWIM Brown Bag #12: LISA - Sametime and Telcon Information for Wednesday January 11, 2012

December 7, 2011 - SWIM Brown Bag #11: Testing - Sametime and Telcon Information for Tuesday December 13, 2011

October 14, 2011 - SWIM Brown Bag #10: REST - Sametime and Telcon Information for Wednesday November 9, 2011

Download NSRR User Account Request Form

SWIM Video

www.swim.gov

Questions



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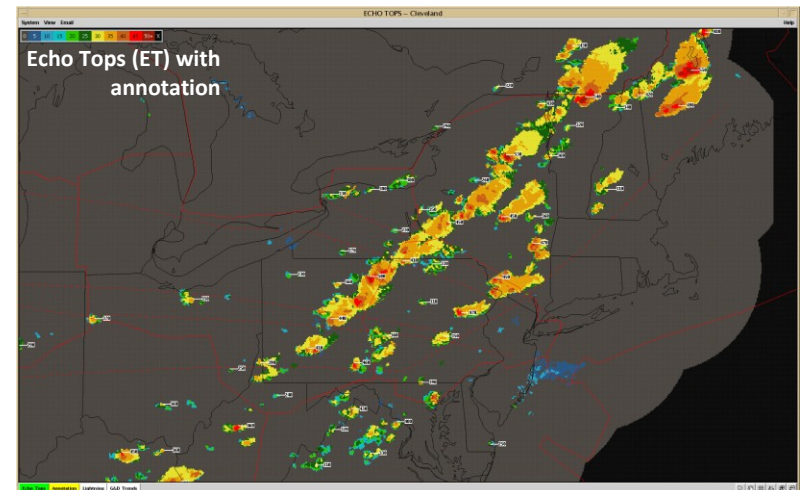
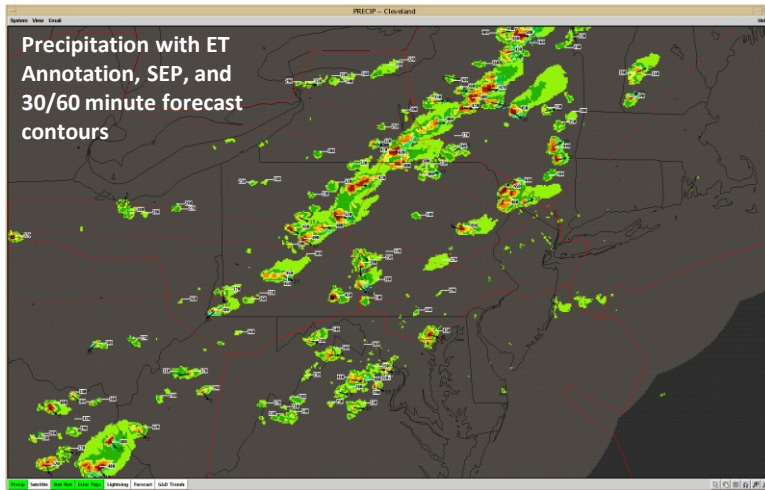
Backup



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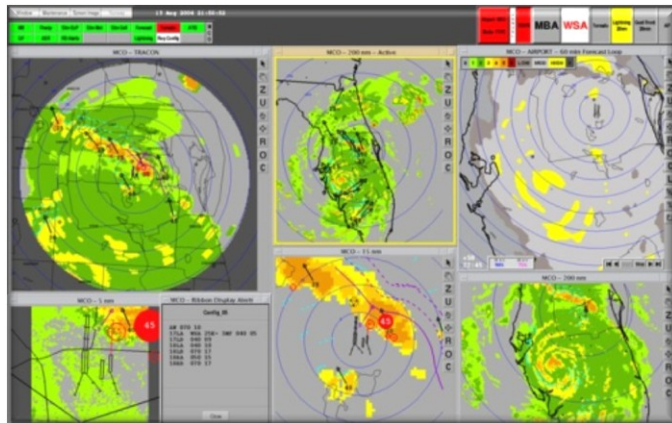
- Products range from current weather depictions, including growth and decay trends, to convective weather forecasts of precipitation and echo tops out to two hours
- Available to traffic managers, area supervisors, Airline Operating Centers (AOCs), and other approved subscribers within the NAS and external to the NAS
- Narrows the gap between unavoidable delay and actual delay associated with convective weather
- Services publish digital versions of the CIWS products to serve the varied needs of the consumers, enabling wider access to weather products and reducing integration costs



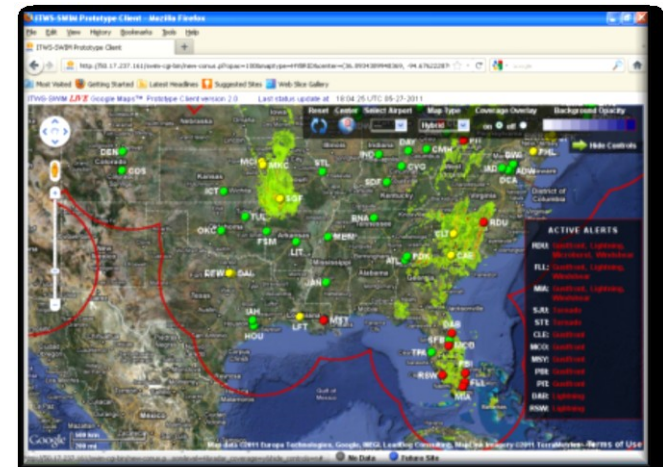
The SWIM CIWS Capability became operational on September 27, 2010



- Improves and enhances NAS efficiency and capacity by creating and displaying weather products at selected NAS pacing airports to AOC dispatchers and traffic managers
- Provides ITWS products digitally to the AOCs and other subscribers onto user workstation displays for greater common situational awareness
- Using SWIM standards reduces integration costs for weather information while enabling wider access to weather products



ITWS information accessed through ITWS Situation Display



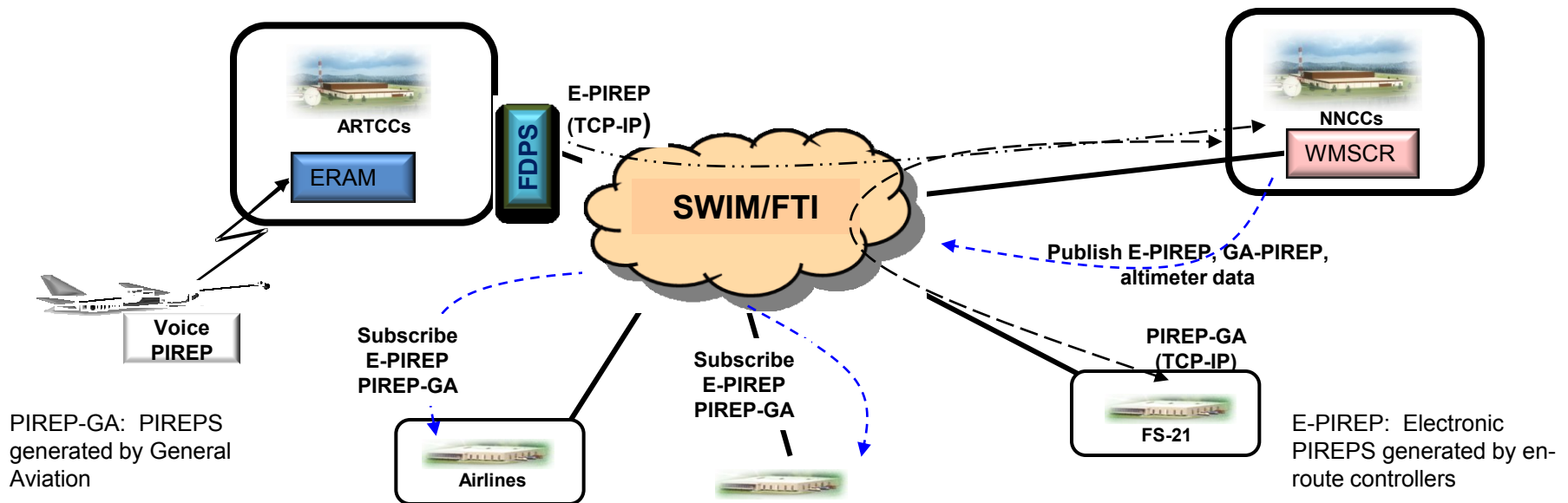
ITWS information accessed via Internet

ITWS Data Publication became operational on January 25, 2011

PIREP Data Publication



- WMSCR will provide web services to create and retrieve PIREP weather data reports
- Capture of crucial pilot observations and distribution of these to other NAS users by WMSCR via the SWIM service will significantly enhance NAS safety and greatly increase the scope of coverage of the pilot reported weather product
- Phase 1 of WMSCR Data Publication is complete and installed in June 2012 for data consumption within the NAS
 - Future phases of this service will provide for customer consumption external to NAS and additional features and services
- A new capability will be developed for En Route controllers to receive these voice reports from pilots, enter into ERAM directly and distribute them to WMSCR through Flight Data Publication Service (FDPS) as SOA services. WMSCR will distribute the PIREPs to other NAS users. FDPS will also subscribe to the PIREPS from WMSCR and distribute to ERAM as needed.



STDDS



- Is a web service enabled IP-based front end to several Terminal legacy systems
 - Existing flight data interfaces to Terminal are antiquated and are limited to receiving a subset of the available data
- Will allow for the flow of information and make available status event information previously only available in Terminal
- An operational STDDS prototype installed at the TRACON in Windsor Locks, CT, declared IOC in May 2012. Full deployment is expected to be completed in 2014 at 39 TRACONS with feeds from approximately 100 Towers

