SWIM Flight Data Publication Service (SFDPS):

Integrating SWIM Apps to Visualize Aviation Data

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Federal Aviation Administration
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Air Traffic Information Exchange Conference
Agenda

- SWIM Overview
- SWIM Flight Data Publication Service (SFDPS)
  - Overview
  - Services
  - Data
  - Consumers
  - Benefits
  - Key Resources
NextGen Information Sharing Architecture

**NextGen Applications:**
- SFDPS, STDDS, ITWS, AIM, etc.

**Standards for Data Exchange:**
- Data Standards & Harmonization

**SWIM Messaging Infrastructure:**
- SWIM Core Services

**FTI IP Backbone:**
- FTI Operational IP network provides secure transport

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**Standards for Data Exchange:**
- AIXM
- FIXM
- WXXM

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**SWIM Flight Data Publication Service (SFDPS)**

Federal Aviation Administration
Access To Aviation Data Through SWIM

Before SFDPS:
Point-to-point connections for each ARTCC

With SFDPS:
One connection for data from multiple ARTCCs
FAA NAS Producers / Consumers

Producers
- Time-Based Flow Management (TBFM)
- SWIM Flight Data Publication Service (SFDPS)
- Special Use Airspace (SUA)
- Weather and Radar Processor (WARP)
- Enhanced WINS Dissemination (EWD)
- SWIM Terminal Data Distribution System (STDDS)
- Traffic Flow Management System (TFMS)
- Weather Message Switching Center Replacement (WMSCR)
- Integrated Terminal Weather System (ITWS)
- Aeronautical Information Management Special Activity Airspace (AIM SAA)
- Aeronautical Information Management Federal Notices to Airmen (NOTAM) System (AIM FNS)
- NOTAM Distribution Service (NDS)

Internal Consumers
- TRACON TMUs
- ASH/EON
- ATO Safety
- CSC DUATS
- AIM
- PDARS
- CIWS
- Data Comm
- EWD
- NDP
- TBFM
- NAS Data Warehouse
- ITWS
- OASIS
- TFMS
- WARLP

External Consumers
- N E S G - security gateway
- Aeronautical Information Management Modernization Segment 2 Release 2 (AIMM S2R2)
- NAVIGATION Lean (NAVLean)
- Data Communications Network Service (DCNS)
Data from SWIM Producers (Messages)

NAS Enterprise Messaging Service (NEMS)
Data Exchange, Routing, Transformation, Security, Reliability

NAS Consumer
non-NAS Consumer

NESG
SWIM Flight Data Publication Service (SFDPS)

- Provides data using Service-Oriented Architecture paradigms
- Publish-Subscribe and Request-Response message patterns
- Leverages SWIM filtering, routing, and security capabilities to disseminate data and accept requests
- Maintains historical data for 15 days
- Continuously publishes data and provides historical or reconstitution data on request
- Provides value-added functionality:
  - Correlation of flight messages
  - Globally Unique Flight Identifier (GUFI)

**LEGEND**
- AIXM – Airspace Information Exchange Model
- CMS – Common Message Set
- ERAM – En Route Automation Modernization
- FIXM – Flight Information Exchange Model
- HADDS – Host ATM Data Distribution System
- NEMS – NAS Enterprise Messaging Services
- SFDPS – SWIM Flight Data Publication Service
- XML – Extensible Markup Language
SWIM Flight Data Publication Service (SFDPS)

- Transforms ERAM data from legacy into XML formats
- Publishes flight and track data in FIXM and custom XML formats
- Publishes airspace data in AIXM and custom XML formats
- Publishes operational and general message data in a custom XML format
SFDPS Services

- **En Route Flight Data Publication/Query**
  - Flight data (FIXM/custom XML)
  - Track updates at 12-second or one-minute frequencies
  - Data reconstitution
  - Historical data

- **En Route Airspace Data Publication/Query**
  - Airspace data (AIXM/custom XML)
  - Data reconstitution
  - Historical data

- **En Route Operational Data Publication/Query**
  - Operational data (custom XML)
  - Historical data
  - Restricted to Government Furnished Information (GFI) and Internal NAS Consumers

- **En Route General Message Publication/Query**
  - General message data (custom XML)
  - Historical data
En Route Flight Data Publication/Query

- Flight Plan information
- Converted Route Information
- Cancellation Information
- Departure Information
- Aircraft Identification Information
- Hold Information
- Progress Report Information
- Flight Arrival Information
- Flight Plan Update Information
- Expected Departure Time Information
- Beacon Code Restricted
- FDB Fourth Line Information
- Point Out Information
- Inbound Point Out Information
- Handoff Status
- Flight Amendment Information
- Position Update Information
- Tentative Flight Plan Information
- Tentative Aircraft Identification Amendment Information
- Tentative Flight Plan Removal
- Tentative Flight Plan Amendment Information
- Track Information
- Drop Track Information
- Interim Altitude Information
- Automated Radar Terminal System (ARTS) Flow Control Track/Full Data Block Information
- Beacon Code Reassignment
Other Services

- **En Route Airspace Data Publication/Query Service**
  - Sector Assignment Status
  - Special Activities Airspace (SAA)
  - Altimeter Setting
  - Route Status

- **En Route Operational Data Publication/Query Service**
  - Traffic count Adjustment
  - Instrument Approach Count Adjustment
  - Sign In Sign Out
  - Beacon Code Utilization
  - Geographic Beacon Code Utilization

- **En Route General Message Publication/Query Service**
  - General Information
  - Interim Altitude Status Information
  - Unsuccessful Information Transmission
  - ERAM Status Information
  - Hold Status Information
Publish/Subscribe Message Pattern

- Customizable data feed
- Consumer can aggregate data from multiple applications through SWIM
Request/Response Message Pattern

- Supports standard SOAP-over-HTTP(s)
- Supports a wide variety of queries
- Common use cases (such as single flight history lookup) engineered to run with very fast performance
- Ad-hoc queries for current data and historical data over two weeks (e.g. flight status, sector configuration)
SFDPS Consumers

• Widely adopted by Industry with the number of consumers quickly growing
• 35+ consumers currently in the operational environment
  – NAS Consumers
  – Data Research Organizations
  – Air Traffic Industry Systems and Technology Providers
  – Other Government Organizations
• 35+ consumers in the pipeline
• External consumers access SFDPS via NAS Enterprise Security Gateways (NESGs)
External Consumer On-Ramping

• On-ramping and cutover process for clients
  – Documentation review
  – Data authorization
  – R&D testing
  – FNTB testing
  – Cutover to operational system

• Contact Data-to-Industry@faa.gov
### SFDPS Benefits

- One connection for consolidated feed from multiple CONUS ARTCCs
- XML message formats (FIXM, AIXM, and custom)
- Publish-Subscribe and Request-Response message patterns
- Fast and accurate flight matching
- Enhanced feeds (eliminating redundant or conflicting information)
- Current and historical databases providing snapshots and reconstitution
- Consumer-customizable data feeds
- Built on a modern and scalable infrastructure
  - Uses the FUSE Enterprise Service Bus
  - Uses HBase and Hadoop
- Uses industry standard transport protocols: JMS and HTTP/S
- Loosely coupled services enabling simple integration, consumption and reuse
- Data can be easily integrated with applications such as Google Maps
SFDPS Empowers Consumers

• Allows consumers to:
  – Compare predicted and actual departure times
  – Compare control times and actual departure times
  – Determine the busiest departure and arrival fixes
  – Measure the busiest traffic areas and glean other such valuable insights
SFDPS Connect – SWIM Apps

Information & Tutorials Available on SFDPS Website
Source Code Available on NSRR
SFDPS Flight Viewer – SWIM Apps
SFDPS Data Visualizations – SWIM Apps
Key Resources

- SWIM website:  
  www.faa.gov/nextgen/programs/swim/

- SFDPS website:  
  www.faa.gov/nextgen/programs/swim/sfdps/

- Contact / Questions  
  Data-to-Industry@faa.gov
FAA Documents and Links

SWIM Background
www.faa.gov/nextgen/programs/swim

Access Agreement Portal
data.faa.gov

NSRR Account Request Form
www.faa.gov/nextgen/programs/swim/nsrr_form/

SWIM Jumpstart Kit v4.3
www.faa.gov/nextgen/programs/swim/documentation/media/swim_standards/JumpstartR4.zip

FTI NBPS User Guide Volume II- For Non-NAS Users

SWIM NEMS User Guide

VPN Technical Requirements (excerpt from FTI NBPS User Guide Volume II- For Non-NAS Users)

Consumer On-Ramping Form
www.faa.gov/nextgen/programs/swim/documentation/media/user-guide/External_Consumer_On-Ramping_Form_Template.xls
Questions? Comments?

www.faa.gov/nextgen/programs/swim/sfdps/
Data-to-Industry@faa.gov
### Acronyms

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<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>ANSP</td>
<td>Air Navigation Service Provider</td>
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<tr>
<td>AIM</td>
<td>Aeronautical Information Management</td>
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<tr>
<td>AIXM</td>
<td>Aeronautical Information Exchange Model</td>
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<td>ARTCC</td>
<td>Air Route Traffic Control Centers</td>
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<td>ASH</td>
<td>Office of Security and Hazardous Materials Safety</td>
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<td>ATO</td>
<td>Air Traffic Organization</td>
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<td>CMS</td>
<td>Common Message Set</td>
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<td>CONUS</td>
<td>Contiguous United States</td>
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<td>CSC</td>
<td>Computer Sciences Corporation</td>
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<td>DCNS</td>
<td>Data Comm Network Services</td>
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<td>Department of Homeland Security</td>
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<td>DoD</td>
<td>Department of Defense</td>
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<tr>
<td>DUATS</td>
<td>Direct User Access Terminal Service</td>
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<td>EON</td>
<td>Emergency Operations Network</td>
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<td>ERAM</td>
<td>En Route Automation Modernization</td>
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<td>EWD</td>
<td>Enhanced WINS Dissemination</td>
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<td>FAA</td>
<td>Federal Aviation Administration</td>
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<tr>
<td>FIXM</td>
<td>Flight Information Exchange Model</td>
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<td>FNS</td>
<td>Federal NOTAM System</td>
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<td>FNTB</td>
<td>FAA Telecommunications Infrastructure (FTI) National Test Bed</td>
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<td>FTI</td>
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<tr>
<td>GFI</td>
<td>Government-Furnished Information</td>
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<td>HADDS</td>
<td>Host ATM (Air Traffic Management) Data Distribution System</td>
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<td>HTTPS</td>
<td>Hypertext Transfer Protocol Secure</td>
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<td>ITWS</td>
<td>Integrated Terminal Weather Service</td>
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<td>JMS</td>
<td>Java Message Service</td>
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<td>NAS</td>
<td>National Airspace System</td>
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<tr>
<td>NBPS</td>
<td>NAS Boundary Protection</td>
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<td>NOTAM Distribution Service</td>
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<td>NAS Enterprise Messaging Service</td>
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<td>NESG</td>
<td>NAS Enterprise Security Gateway</td>
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<td>NOP</td>
<td>National Offload Program</td>
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<td>NSRR</td>
<td>NAS Service Registry Repository</td>
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<td>PDARS</td>
<td>Performance Data Analysis Reporting System</td>
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<td>R&amp;D</td>
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<td>System Wide Information Management</td>
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<td>Terminal Automation Information Service</td>
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<td>TBFM</td>
<td>Time-Based Flow Management</td>
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<td>TFDM</td>
<td>Terminal Flight Data Manager</td>
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<td>TFMS</td>
<td>Traffic Flow Management System</td>
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<td>TMU</td>
<td>Traffic Management Unit</td>
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<td>TRACON</td>
<td>Terminal Radar Approach Control Facilities</td>
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<td>VPN</td>
<td>Virtual Private Network</td>
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<td>Weather and Radar Processor</td>
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