SWIM Flight Data Publication Service (SFDPS):

Integrating SWIM Apps to Visualize Aviation Data

By: Melissa Matthews

Federal Aviation Administration

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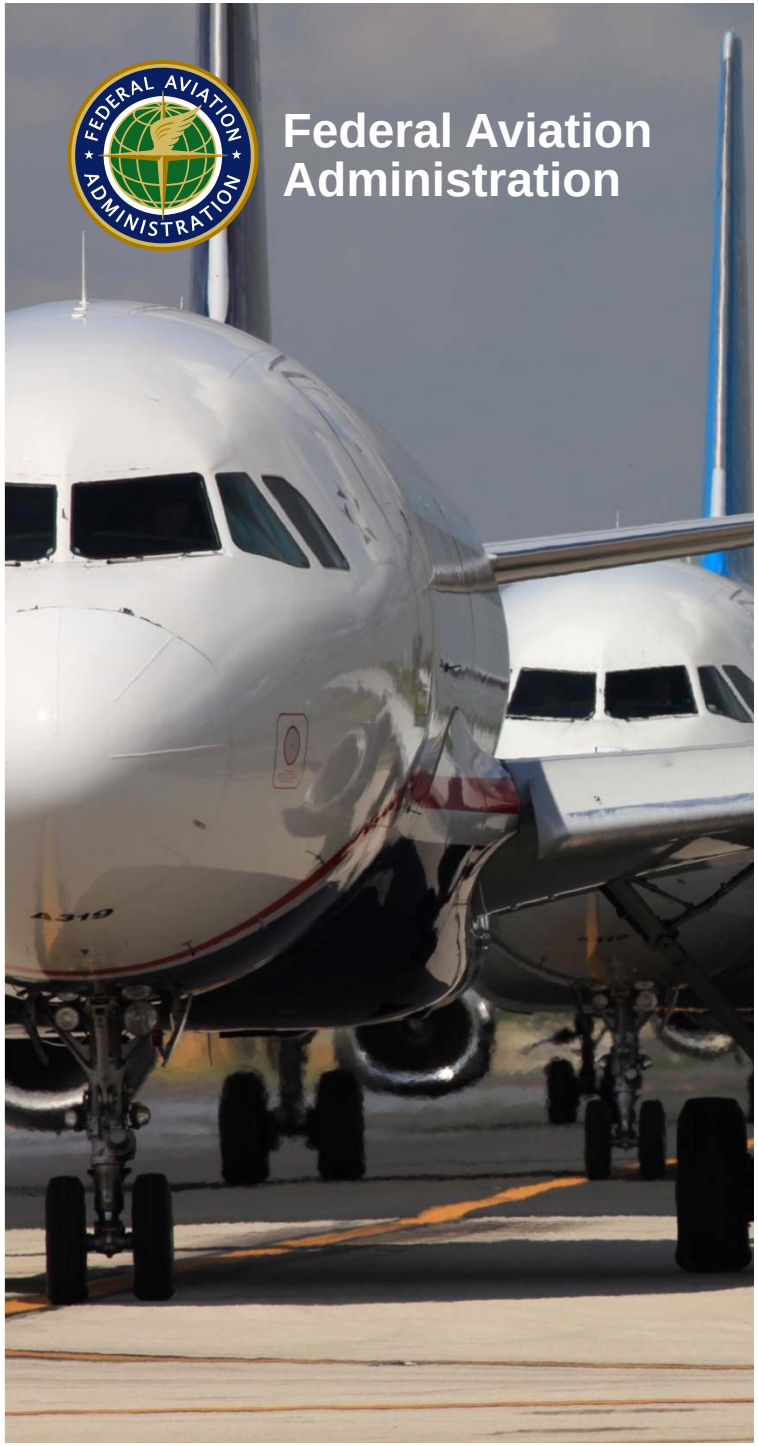
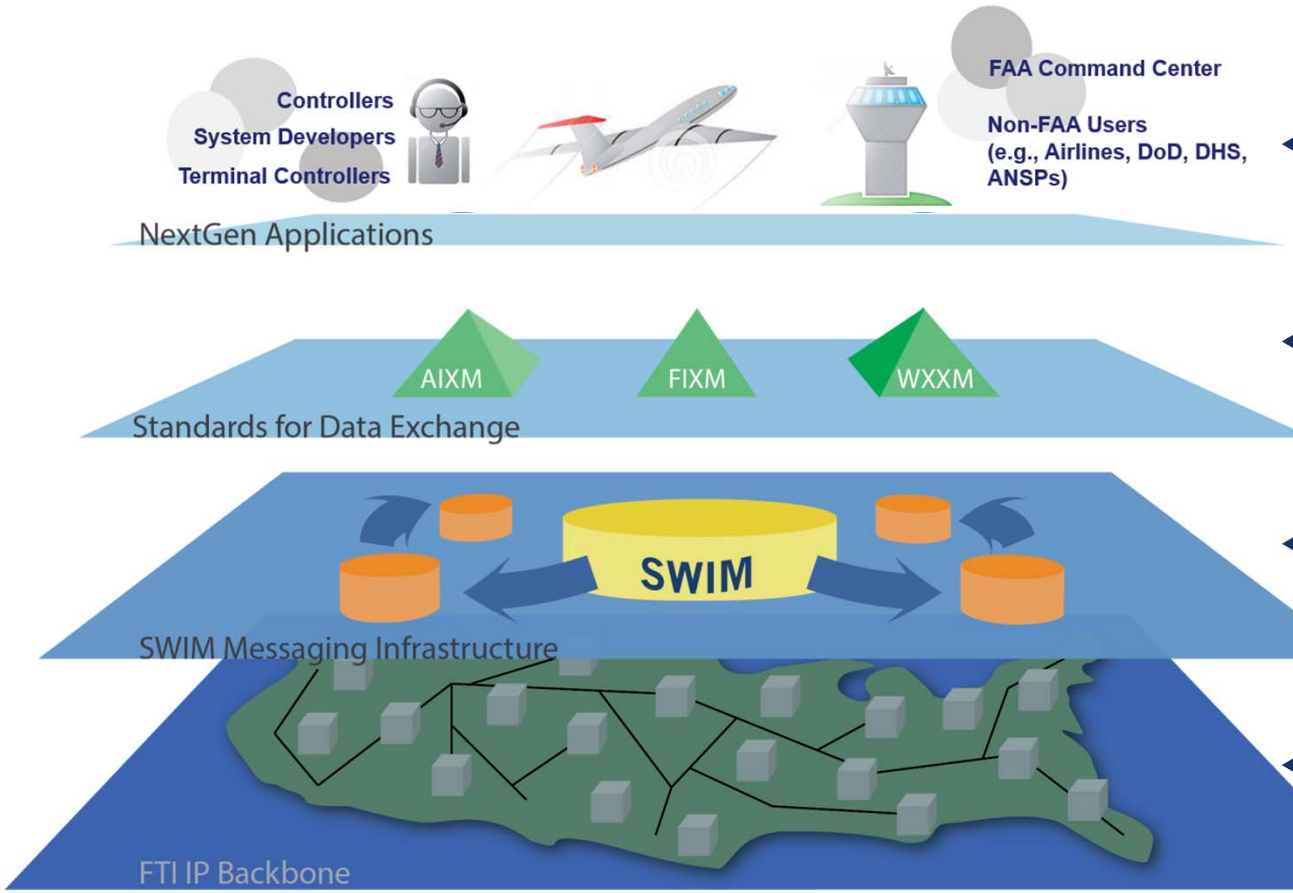
Air Traffic Information Exchange Conference



Agenda

- SWIM Overview
- SWIM Flight Data Publication Service (SFDPS)
  - Overview
  - Services
  - Data
  - Consumers
  - Benefits
  - Key Resources

NextGen Information Sharing Architecture



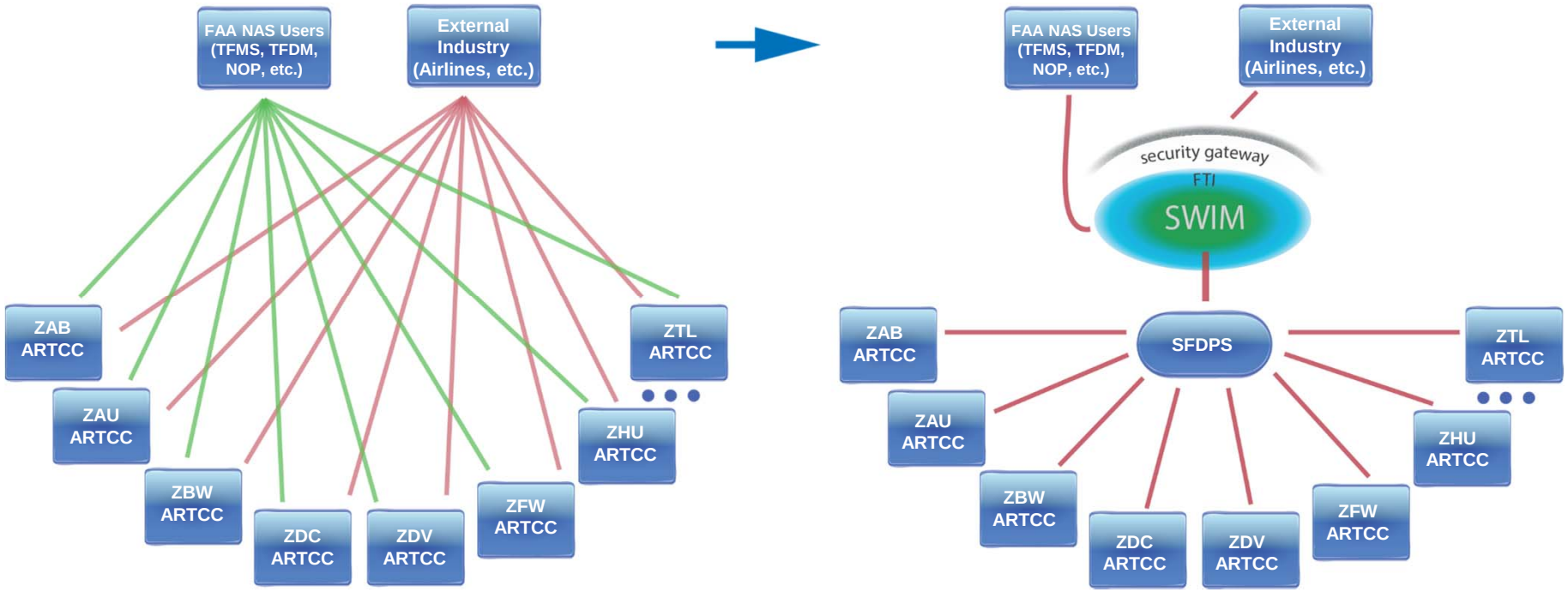
NextGen Applications:
SFDPS, STDDS, ITWS, AIM, etc.

Standards for Data Exchange:
Data Standards & Harmonization

SWIM Messaging Infrastructure:
SWIM Core Services

FTI IP Backbone:
FTI Operational IP network provides secure transport

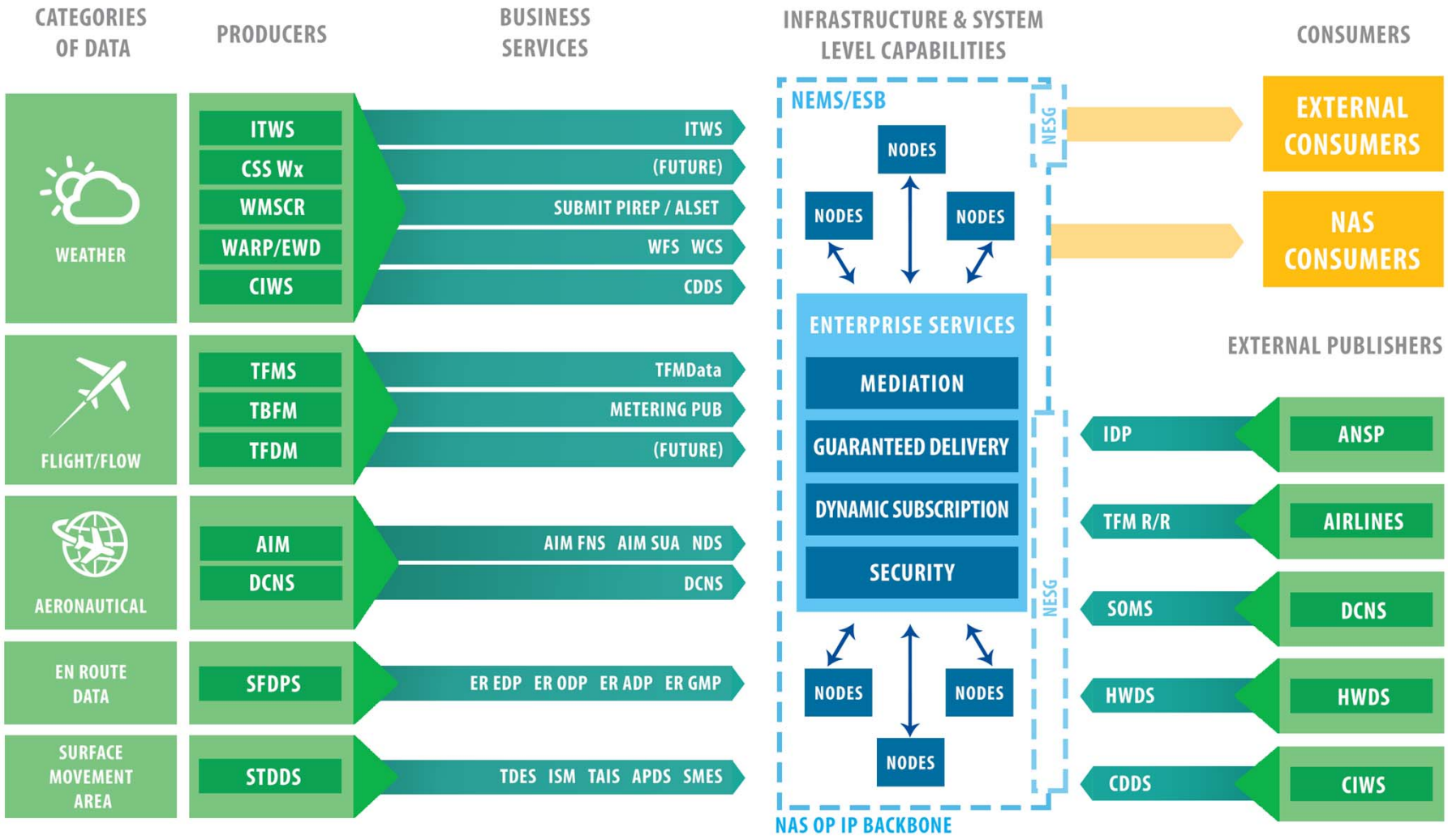
Access To Aviation Data Through SWIM



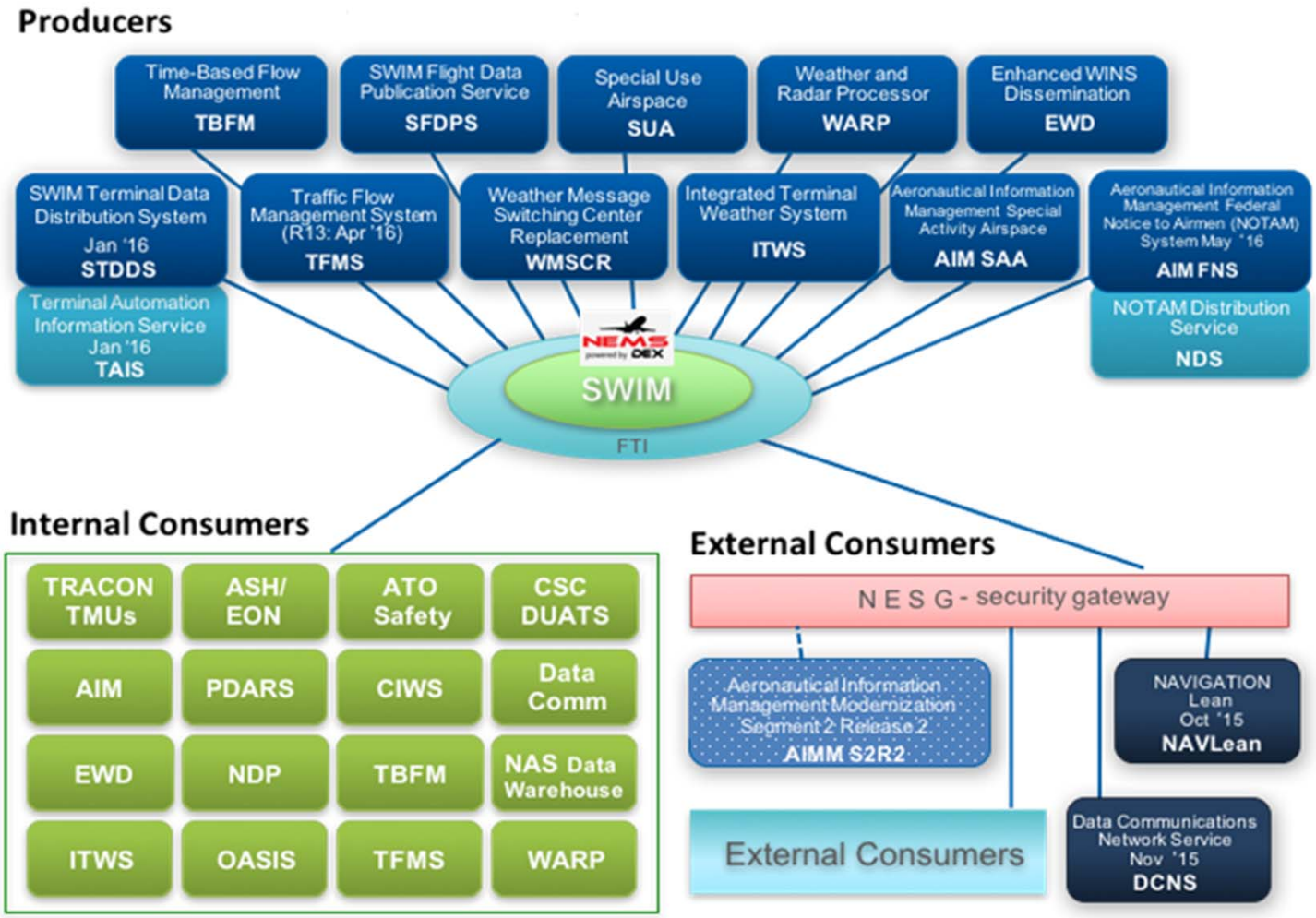
Before SFDPS:
Point-to-point connections for each ARTCC

With SFDPS:
One connection for data from multiple ARTCCs

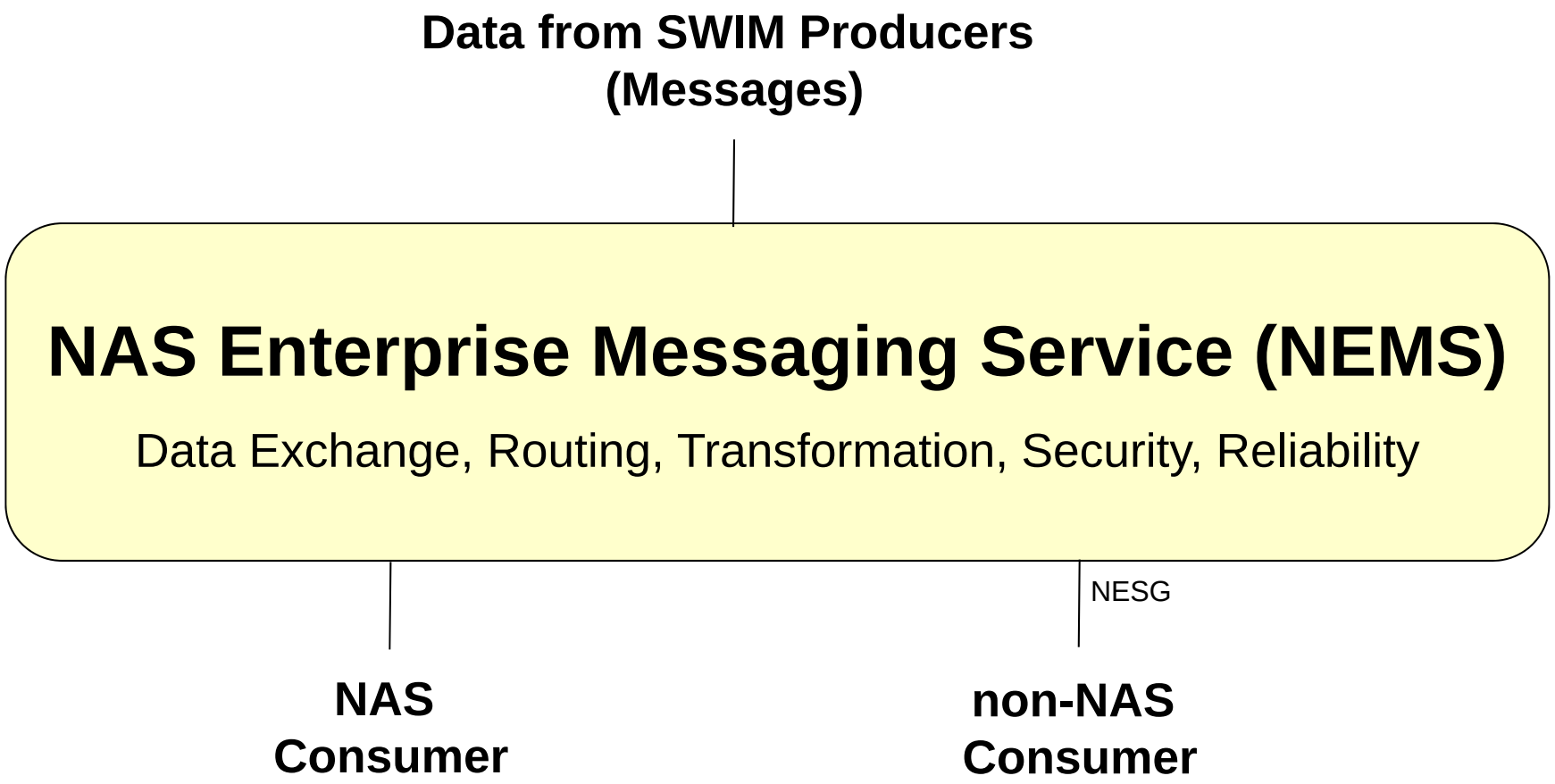
SWIM Portfolio



FAA NAS Producers / Consumers

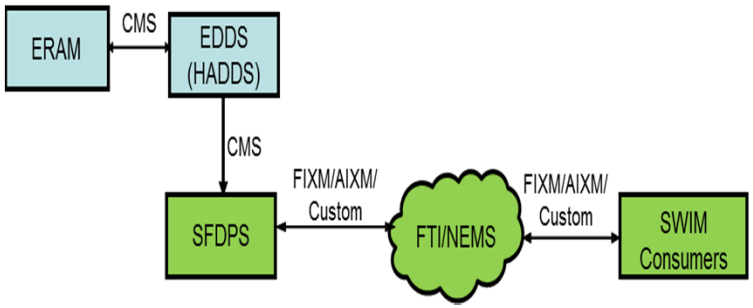


SWIM NEMS


Data from SWIM Producers
(Messages)
NAS Enterprise Messaging Service (NEMS)
Data Exchange, Routing, Transformation, Security, Reliability
NESG
NAS
Consumer
non-NAS
Consumer

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)

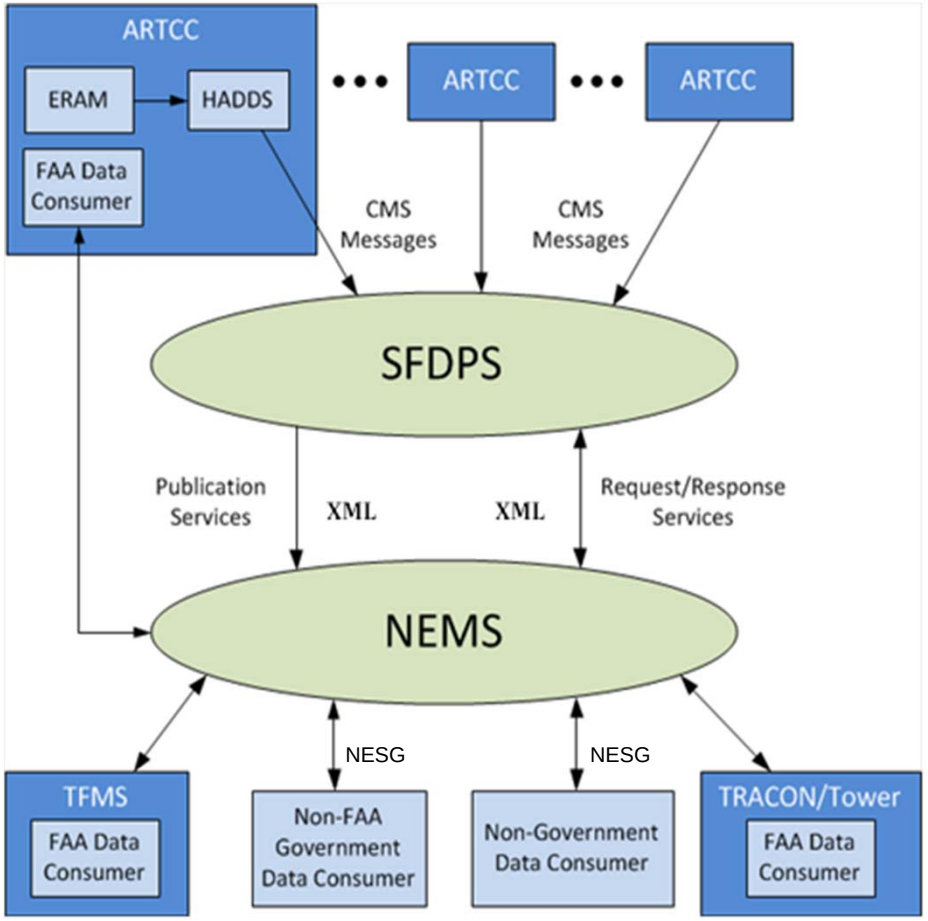


LEGEND

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

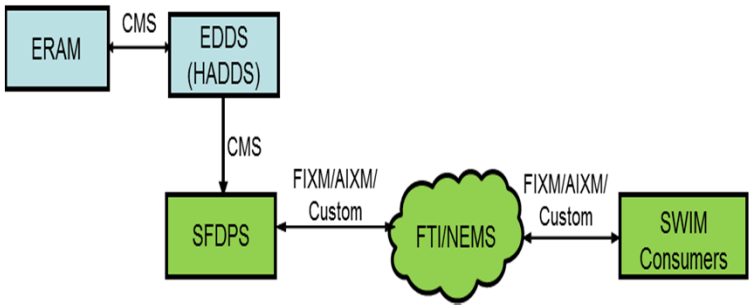
SWIM Flight Data Publication Service (SFDPS)

- 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



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XML – Extensible Markup Language

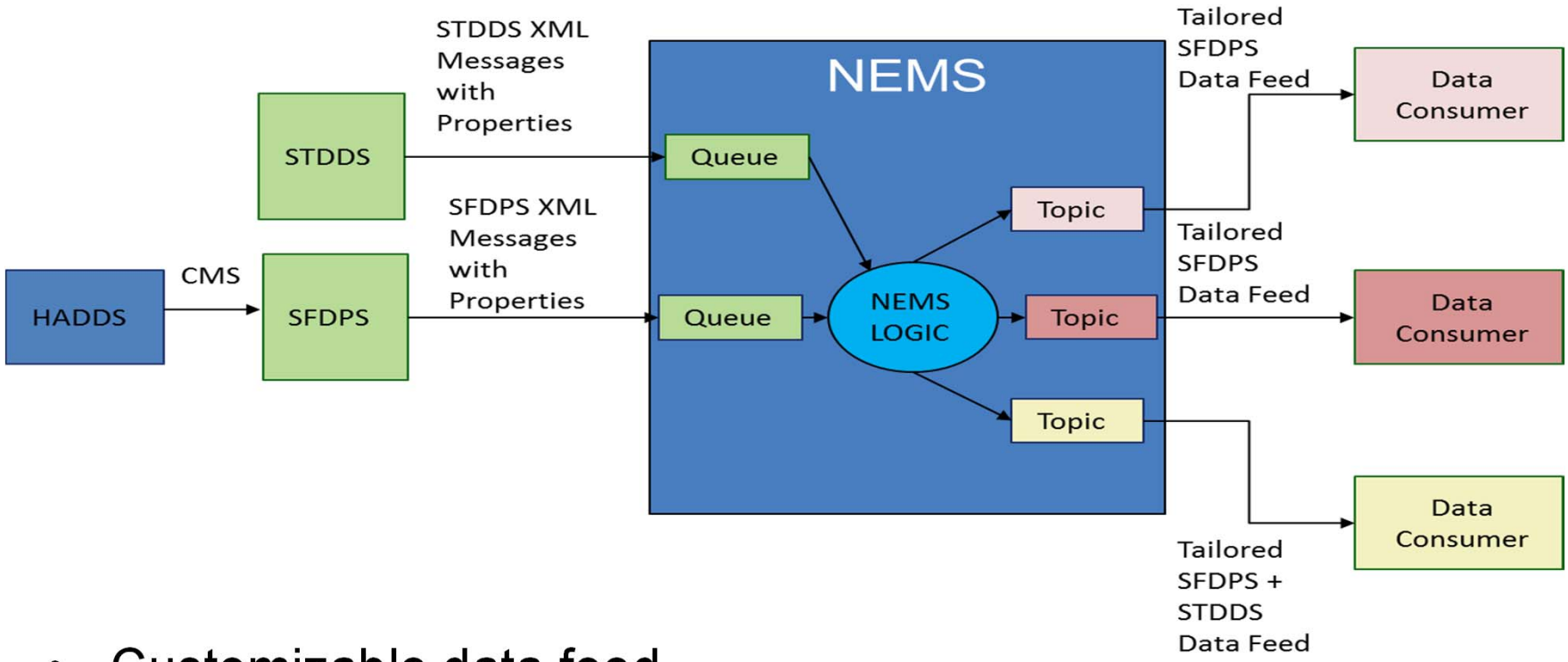
En Route Flight Data Publication/Query

- 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 Information2
- Beacon Code Reassignment

Other Services

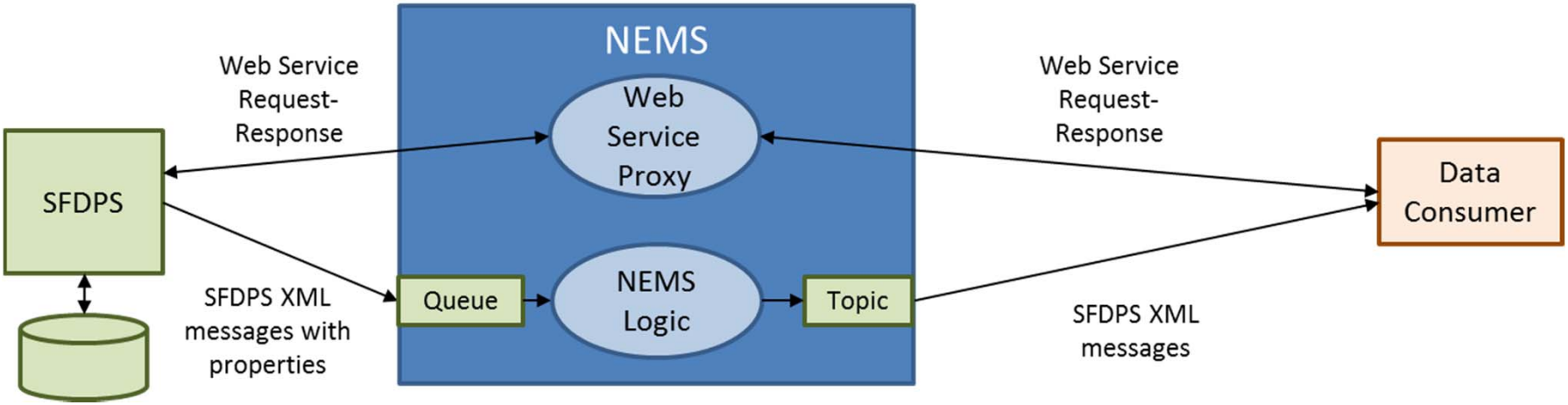
- En Route Airspace Data Publication/Query Service
  - Sector Assignment Status
  - Special Activities Airspace (SAA)
  - Altimeter Setting
  - Route Status
- En Route Operational Data Publication/Query Service
  - Traffic count Adjustment
  - Instrument Approach Count Adjustment
  - Sign In Sign Out
  - 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

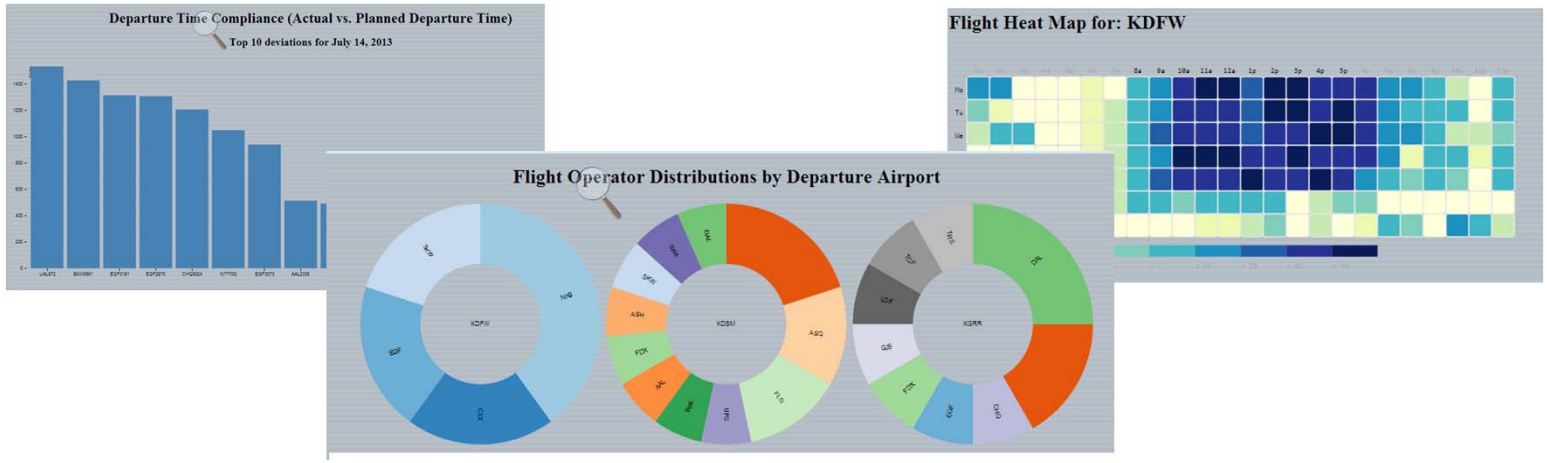
- On-ramping and cutover process for clients
  - Documentation review
  - Data authorization
  - R&D testing
  - FNTB testing
  - Cutover to operational system
- Contact Data-to-Industry@faa.gov

SFDPS Benefits

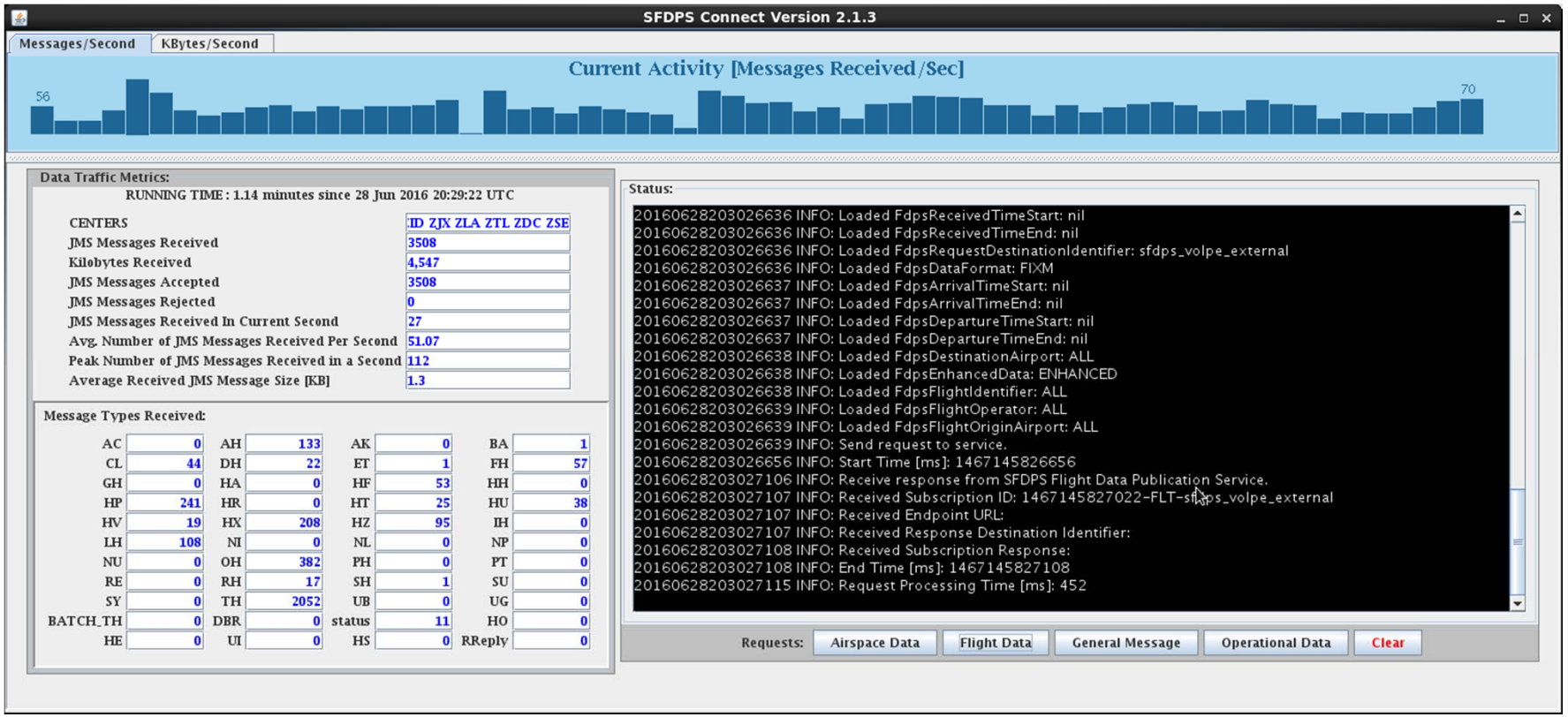
- One connection for consolidated feed from multiple CONUS ARTCCs
- XML message formats (FIXM, AIXM, and custom)
- Publish-Subscribe and Request-Response message patterns
- Fast and accurate flight matching
- Enhanced feeds (eliminating redundant or conflicting information)
- Current and historical databases 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



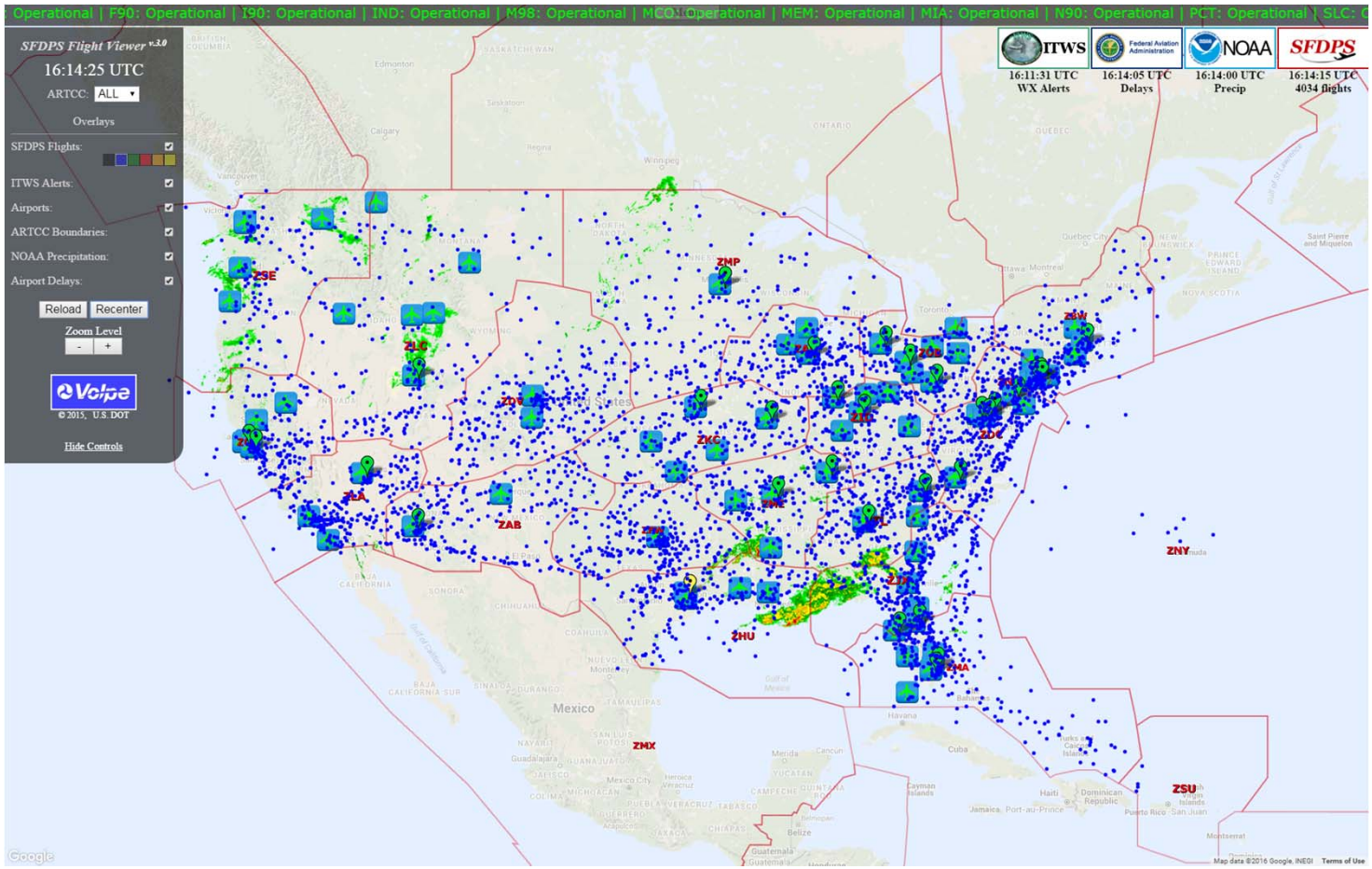
SFDPS Connect – SWIM Apps



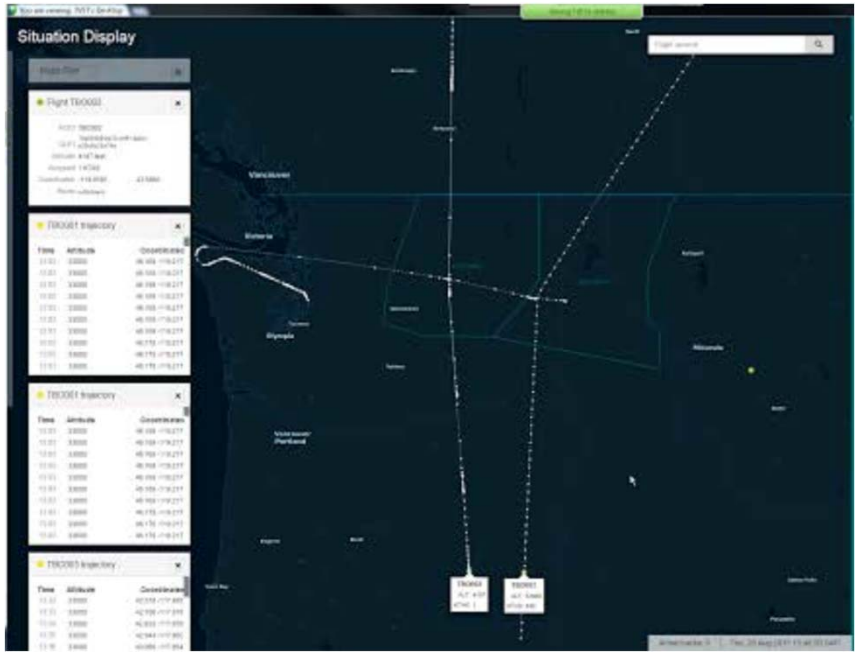
Information & Tutorials Available on SFDPS Website

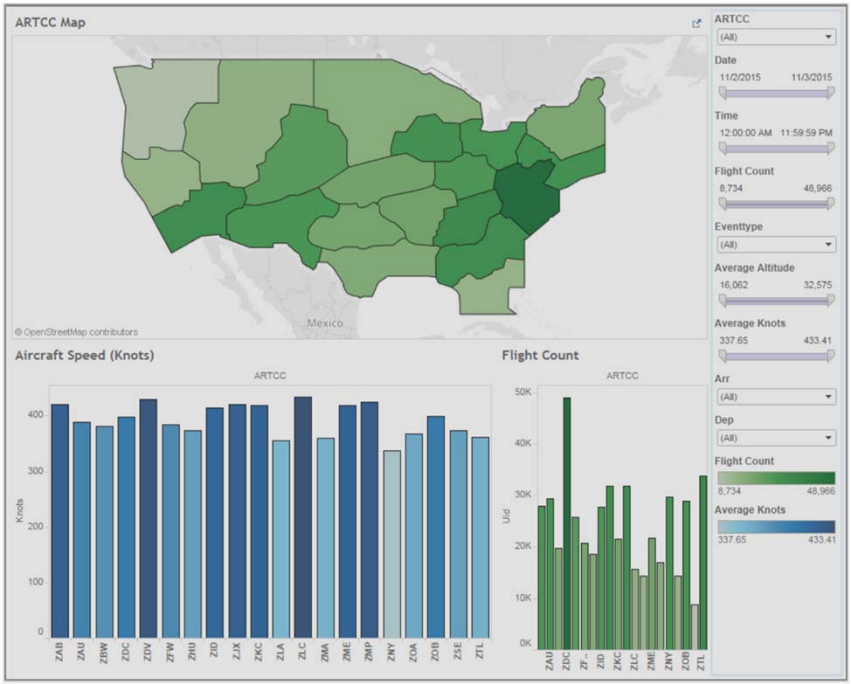
Source Code Available on NSRR

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
www.faa.gov/nextgen/programs/swim/documentation/media/user-guide/FTI_NBPS_User_Guide.pdf

SWIM NEMS User Guide
www.faa.gov/nextgen/programs/swim/documentation/media/user-guide/SWIM_NEMS_User_Guide.pdf

VPN Technical Requirements (excerpt from FTI NBPS User Guide Volume II- For Non-NAS Users)
www.faa.gov/nextgen/programs/swim/documentation/media/user-guide/VPN_Technical_Requirements.pdf

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

ANSP	Air Navigation Service Provider
AIM	Aeronautical Information Management
AIXM	Aeronautical Information Exchange Model
ARTCC	Air Route Traffic Control Centers
ASH	Office of Security and Hazardous Materials Safety
ATO	Air Traffic Organization
CMS	Common Message Set
CONUS	Contiguous United States
CSC	Computer Sciences Corporation
DCNS	Data Comm Network Services
DHS	Department of Homeland Security
DoD	Department of Defense
DUATS	Direct User Access Terminal Service
EON	Emergency Operations Network
ERAM	En Route Automation Modernization
EWD	Enhanced WINS Dissemination
FAA	Federal Aviation Administration
FIXM	Flight Information Exchange Model
FNS	Federal NOTAM System
FNTB	FAA Telecommunications Infrastructure (FTI) National Test Bed
FTI	FAA Telecommunications Infrastructure
GFI	Government-Furnished Information
HADDS	Host ATM (Air Traffic Management) Data Distribution System
HTTPS	Hypertext Transfer Protocol Secure
ITWS	Integrated Terminal Weather Service
JMS	Java Message Service
NAS	National Airspace System
NBPS	NAS Boundary Protection
NDS	NOTAM Distribution Service
NEMS	NAS Enterprise Messaging Service
NESG	NAS Enterprise Security Gateway
NOP	National Offload Program
NSRR	NAS Service Registry Repository
PDARS	Performance Data Analysis Reporting System
R&D	Research and Development
SAA	Special Activities Airspace
SFDPS	SWIM Flight Data Publication Service
STDDS	SWIM Terminal Data Distribution System
SUA	Special Use Airspace
SWIM	System Wide Information Management
TAIS	Terminal Automation Information Service
TBFM	Time-Based Flow Management
TFDM	Terminal Flight Data Manager
TFMS	Traffic Flow Management System
TMU	Traffic Management Unit
TRACON	Terminal Radar Approach Control Facilities
VPN	Virtual Private Network
WARP	Weather and Radar Processor
WMSCR	Weather Message Switching Center Replacement
WXXM	Weather Information Exchange Model
XML	Extensible Markup Language