SWIM Users Forum – Session #5

By: SWIM Program Office
To: SWIM Consumers
Date: July 9, 2015

Agenda

- **Welcome/SWIM User Forum Highlights**
  - Jeri Groce/Chris Pressler
- **SFDPS Overview/Data**
  - Chris Pressler
- **STDDS 3.1 Patch Release**
  - Jeri Groce
- **NSRR 2.0 Sneak Peak**
  - Mark Kaplun
- **Harris VPN Connection Process**
  - Michelle Head
- **SWIM Calendar**
  - Jeri Groce
- **Questions/Open Discussion**

User Forum Logistics

- Date:
  - July 9, 2015 - 2:30 pm – 4:00pm
- Location:
  - Noblis Lakes Conference Rm – A&B
- Go-to-Meeting: Please register for “SWIM Users Forum” at SWIM website:

  http://www.faa.gov/nextgen/programs/swim/users_forum/, http://1.usa.gov/1HyD6SW
- User Forum briefing distributed via invitation & on SWIM website www.faa.gov/nextgen/programs/swim/user-forum

SWIM Users Forum - Overview

- Purpose: Monthly forum for SWIM Users to obtain program updates, provide feedback, obtain answers to SWIM related questions or data concerns

- Scope: SWIM Portfolio of Services
  - Aeronautical Data
  - Flight and Flow Data
  - Weather Data

SWIM Users Forum – Overview *(cont.)*

- Forum Participation:
  - NAS and non-NAS consumers
    - Airlines, Industry service providers, research & development, FAA Programs, Airports
    - Average 70-90 attendees 1st four sessions
- SWIM Resources:
  - SWIM website: http://www.faa.gov/nextgen/programs/swim/
  - NSRR: https://swimrep.faa.gov/soa
  - SWIM Help Desk:
    - **1-855-FAA-NEMC** (*855-322-6362*)
      Option #3, “Enterprise Services” for phone support
    - **NEO-ES@faa.gov** for email support

SWIM Flight Data Publication Service (SFDPS)

Status, Capabilities, Benefits, Cost Savings, and Future Capabilities

July 9, 2015

Chris Pressler
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Federal Aviation Administration

Summary

- What is HADDS and SAFA?
- What is SFDPS?
- SFDPS Phase 1 Schedule
- SFDPS Phase 1 Benefits

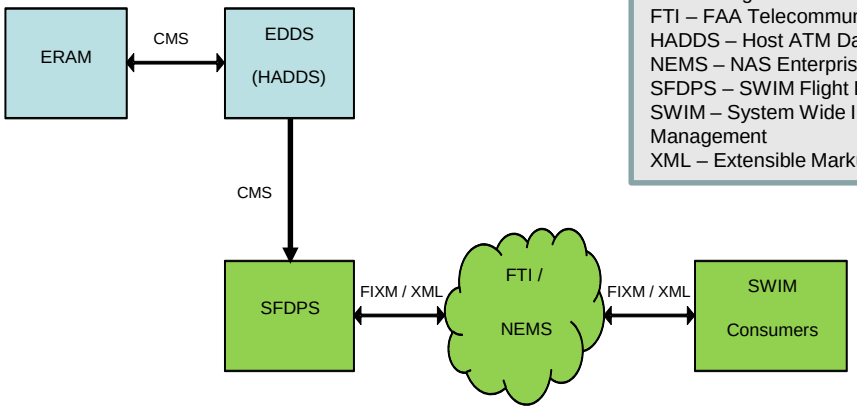
What is SWIM Flight Data Publication Services (SFDPS)?

- SFDPS makes Air Traffic Control Center (ARTCC) data available to authorized consumers as SWIM services including the following received from a legacy system called HADDS:
  - En Route Flight Data
  - En Route Airspace Data
  - En Route Operational Data
  - En Route General Message Data

What is a Host ATC Data Distribution System (HADDS)?

- HADDS is an Air Traffic Control legacy system providing 49 different message types referred to as the Common Message Set (CMS). HADDS has a complementary system called Store and Forward Application (SAFA) providing much of the same data.
- These messages can be roughly categorized as follows:
  - Flight Data
  - Airspace Data
  - Operational Data
  - General Message Data
  - Traffic Management Data

SFDPS System Diagram



LEGEND
CMS – Common Message Set
EDDS – ERAM Data Distribution System
ERAM – En Route Automation Modernization
FIXM – Flight Information Exchange Model
FTI – FAA Telecommunications Infrastructure
HADDS – Host ATM Data Distribution System
NEMS – NAS Enterprise Messaging Services
SFDPS – SWIM Flight Data Publication Service
SWIM – System Wide Information Management
XML – Extensible Markup Language

SFDPS Services

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

SFDPS Phase 1 Schedule Baseline

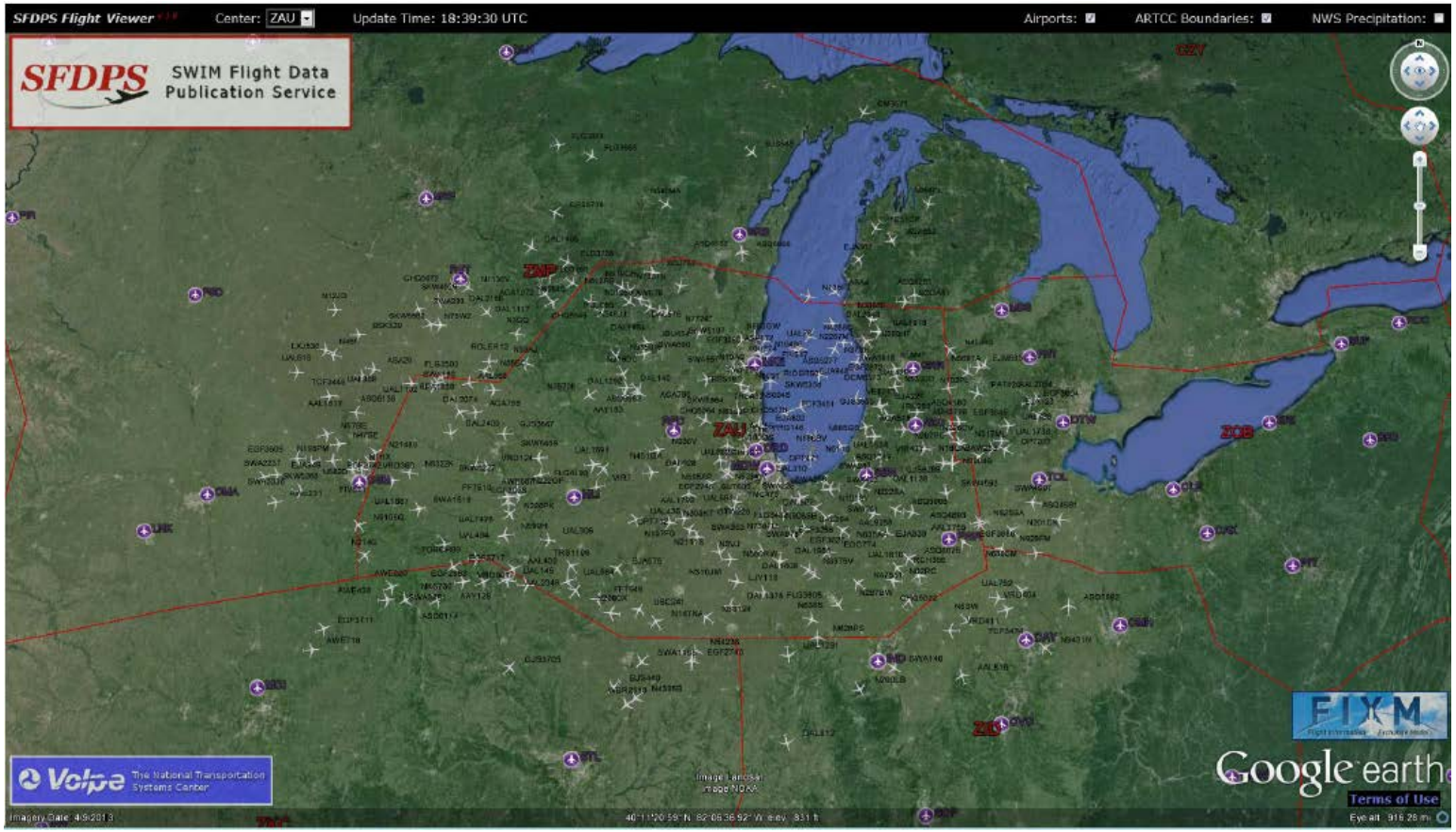
Milestone	APB Planned Date	Duration
Flight Data Publication OT&E complete (SIP=FDPS)	Mar-14	81 months
Flight Data Publication operational (SIP=FDPS)	Jul-15	97 months

Ref: SWIM Segment 1 Acquisition Program Baseline (APB) CIP G05C.01-01

Deployment to Key Sites (SLC & ATL)

Planned	NEMC	Completed
04/2015	SLC	04/23/2015
05/2015	ATL	05/13/2015

Product Generated from SFDPS Information



SFDPS Prospective Consumers

FAA Programs
- TFMS
- TBFM
- TFDM
- PDARS
- NOP
- Data Comm
- STDDS

R&D Organizations
- MITRE
- NASA
- MIT Lincoln Lab
- University of North Dakota UAS

Aviation Community
- PASSUR
- JetBlue
- Delta Airlines
- FedEx
- Aerospace Engineering
- Boeing ATM
- CSC DUATS
- General Dynamics Information Technology
- Mosaic ATM
- NetJets
- Noblis
- Northrop Grumman
- Thales

What are SFDPS Phase 1 Benefits?

- Service Oriented Architecture (SOA)
- Compliance with International Standards FIXM and AIXM in XML format
- Use of SWIM Infrastructure and Core Services
- Better Services for More Users
- SFDPS vs HADDS/SAFA Platforms
- Delivering NEXTGEN Improvements
- Saving the big bucks

Advantages of Service Oriented Architecture

- HADDS and SAFA do not use SOA and any of the capabilities listed below
- Developing an SFDPS client can be accomplished in a day using simple SWIM program examples to connect and receive data
- SFDPS uses Publish/Subscribe and Request/Response
  - Consumers receive custom services meeting specific needs rather than one size fits all
  - Dramatically reduces bandwidth requirements because of filtering
  - Eliminates stovepipe connections to existing ARTCC centric interfaces with up to 20 separate interfaces needed to receive flight information from departure to arrival
- SFDPS provides loosely coupled XML services for easy user integration
- Redundant connections to SFDPS services are optional
- Data exchange, Routing, Filtering, Transformation, Security are available with SFDPS

Use of SWIM Infrastructure and Core Services

- HADDS/SAFA does not use SWIM Infrastructure or NEMS shared core services
- SFDPS uses NEMS hardware and software infrastructure
- SFDPS uses numerous core services for performing filtering, routing, failover, Pub/Sub, data exchange and Request/Response, security, etc.
- Use of all of these core services including new core services available in SWIM S2B provide capabilities that far exceed the legacy HADDS/SAFA services

Compliance with International Standards

- HADDS and SAFA do not provide any of the features listed below
- SFDPS data is SWIM compliant
- SFDPS data uses FIXM and AIXM standards
- SFDPS provides clean data eliminating the ARTCC centric data with redundant and conflicting updates
  - HADDS data is complicated to work with because of duplicate messages and conflicting messages when more than one center is processing the same flight. This requires users to perform special processing.
- Replaces HADDS once size fits all distribution with customizable Pub/Sub and Request/Response
- SFDPS uses the ERAM supplied GUFI and makes it into a FIXM compliant GUFI.
  - This feature will eliminate software problems resulting from ambiguities.

SFDPS vs. HADDS/SAFA Platform

- HADDS and SAFA use older technology systems with custom software with both systems located at all 20 ARTCCs
- SFDPS uses state of the art consolidated scalable hardware and software
- SFDSP is consolidated at SLC and ATL
- SFDPS will be supportable far longer than HADDS/SAFA with the existing technology

Better Services for More Users

- The HADDS and SAFA systems exist in 2 separate platforms to satisfy the needs of different users and require special access.
- Sensitive Data Filtering rules will be available for all NAS and Non NAS consumers via NEMS/NESG
  - Sensitive Data Filtering from SFDPS means a single service will serve a much larger group of consumers
- SFDPS services will provide several service options:
- All current data with information tagged to assist the user with handling duplicates and conflicting data
- All data cleaned to eliminate duplicate and conflicting data
- An SFDPS user can have data reconstituted

Better Services for More Users *(cont.)*

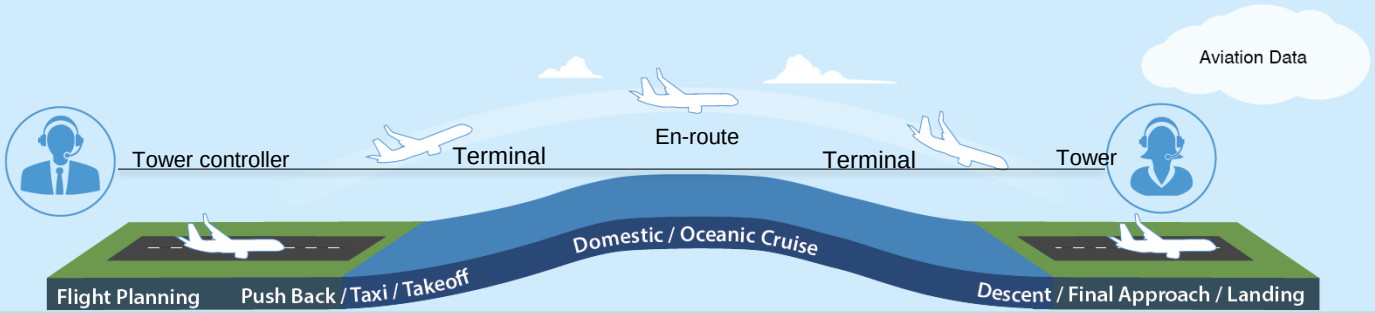
- The HADDS and SAFA users would be required to consume, process and filter all of the flight data from the selected ARTCC for the systems listed below to receive the data needed.
- SFDPS data can be filtered to meet very specific requirements
  - Users like TBFM will be able to avoid processing a significant volume of flight data irrelevant to their objectives
  - Users like TFDM will be able to create a subscription for departure and arrival flights specific to their airport
  - TAMR/STARS will be able to create a subscription for departures, arrivals and overflights specific to TRACON
- An SFDPS client can be developed in a day with simple SWIM program provided examples
- An SFDPS user can request 15 days of historical data

Saving the Big Bucks

- SFDPS Phase 1 reduces the cost of delivering CMS data to consumers over the legacy HADDS and SAFA systems in the following ways:
  - **SFDPS saves money for NAS and Non NAS users**
  - SFDPS Phase 1 can provide all of the data needed by SAFA systems eliminating the need for 2 servers located at all 20 ARTCCs
  - SFDPS Phase 1 will be less expensive to maintain with a smaller footprint at 2 locations
  - SFDPS Phase 1 will be less expensive to maintain because it operates on *state of the art,* shared, commercially available hardware and software with a longer shelf life.
  - CMS data users transitioning to SFDPS will require far fewer connections to receive SFDPS data.
    - Systems currently connecting to all or several HADDS or SAFA systems to receive data will substantially reduce bandwidth costs
    - Systems using filtering to limit the volume of data to specific subscriptions will reduce bandwidth costs

Delivering NextGen Major Investments

Legacy System		NextGen
Radar	→	Satellite
Voice Communications	→	Voice & Digital Communications
Disparate Information	→	Automated Decision Support Tools



NextGen

Automatic Dependent Surveillance-Broadcast (ADS-B),
DataComm, National Airspace System (NAS) Voice System (NVS),
Terminal Flight Data Manager (TFDM), System-Wide Information Management (SWIM)

Foundational

En Route Automation Modernization (ERAM)
Terminal Automation Modernization/Replacement (TAMR)

STDDS 3.1 Patch Release

July 9, 2015

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Federal Aviation Administration

STDDS 3.1 Patch Release

- ASSC data
  - Issue identified with the ASSC packet captured data.
  - PTR assigned
  - PTR verification and testing planned – late July
  - Software build/adaption – late July
- Key site testing @ NCT (SFO data) planned – mid August
- Key site testing @ CLE (BUF data) planned – early September
- Follow –on ASSC sites planned – STDDS R 3.2

NSRR 2.0

July 9, 2015

Mark Kaplun
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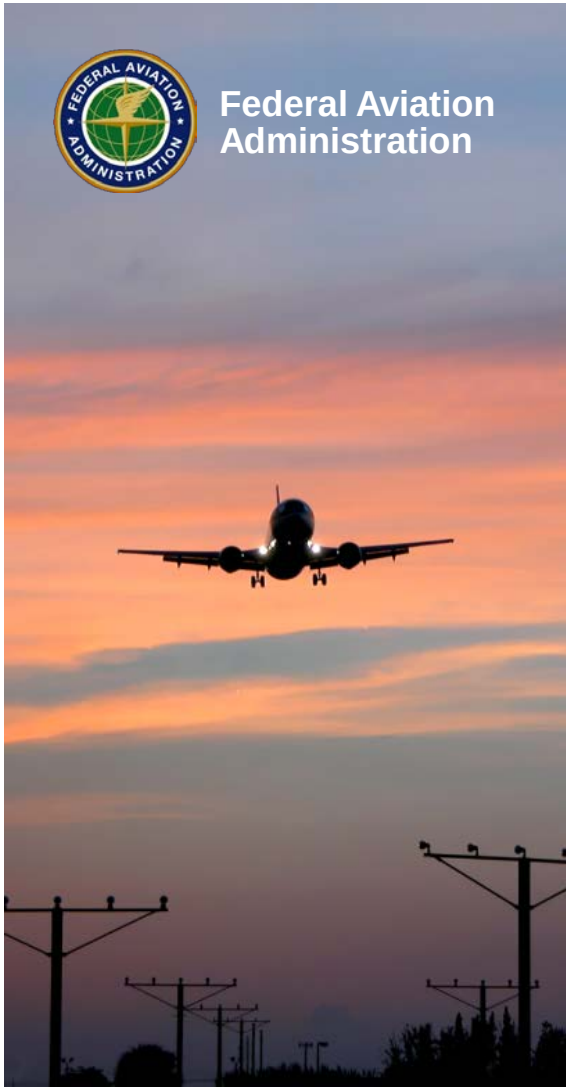


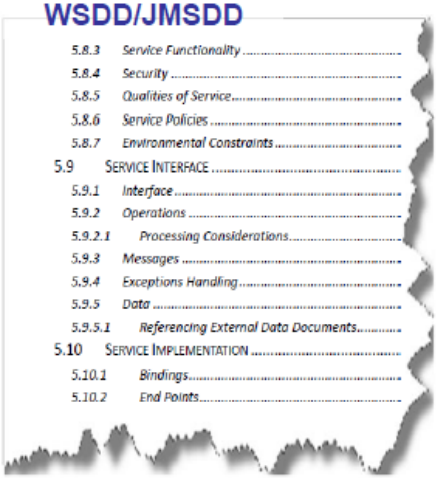
NSRR 2.0 Major Objectives

The NSRR 2.0 will support:

- Discovery of NAS Services through enriched service meta-data.
- SWIM Governance Processes prescribed by SWIM Governance policies and regulations.
- Registries integration between FAA and EUROCONTROL SWIMs.

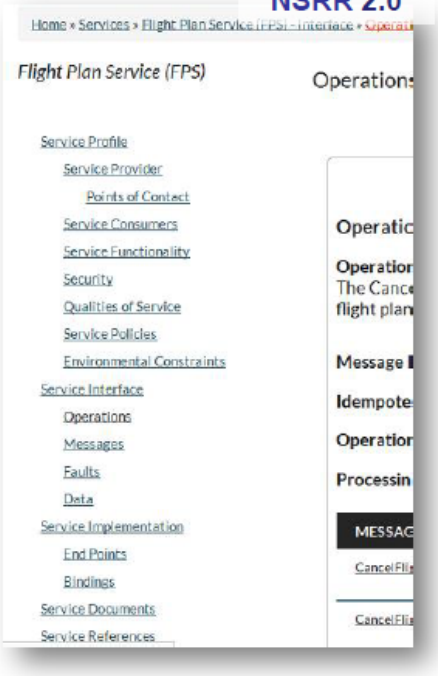
Alignment with FAA/SWIM SOA Standards

WSDD/JMSDD



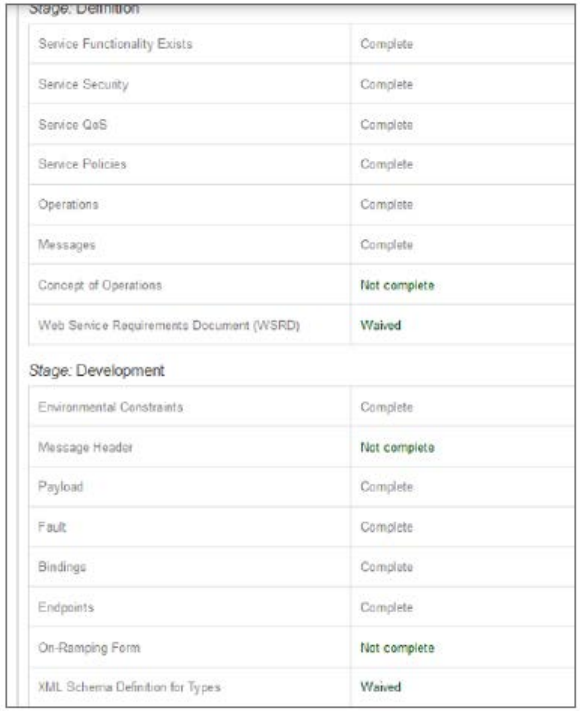
NSRR 2.0 will capture, display and allow entry of all information that is currently presented in the WSDDs and JMSDDs.

NSRR 2.0



Support of SWIM Governance Policies

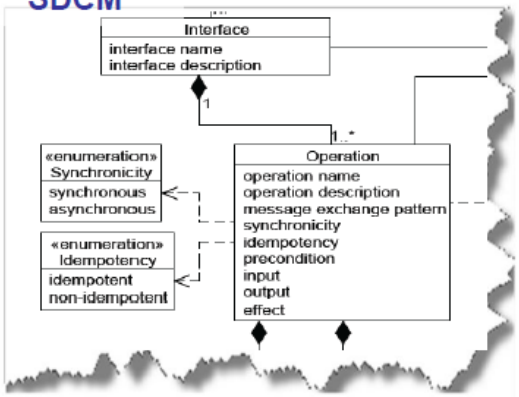
NSRR 2.0 will support service lifecycle management processes to ensure metadata completeness and integrity in compliance with SWIM Governance Policies and other Governance regulations.



Stage: Definition	
Service Functionality Exists	Complete
Service Security	Complete
Service QoS	Complete
Service Policies	Complete
Operations	Complete
Messages	Complete
Concept of Operations	Not complete
Web Service Requirements Document (WSRD)	Waived
Stage: Development	
Environmental Constraints	Complete
Message Header	Not complete
Payload	Complete
Fault	Complete
Bindings	Complete
Endpoints	Complete
On-Ramping Form	Not complete
XML Schema Definition for Types	Waived

Alignment with International SOA Standards

SDCM



To support collaboration with the international partners, NSRR 2.0 will conform fully to the Service Description Conceptual Model (SDCM).

NSRR 2.0

Edit » Delete »

Operation *FileFlightPlan*

Operation Description:
The FileFlightPlan operation allows the creation of persistent information defining an intended flight (flight plan)

Message Exchange Pattern: In-Out

Idempotency: Idempotent

Operation Type: Synchronous

Processing Considerations:

Message Name	Message Description
FileFlightPlanRequest	Used by a service consumer to submit (file) a flight plan.
FileFlightPlanResponse	Used to inform a service consumer that flight plan information has been accepted and returns the ID that has been assigned to the flight plan.

+ Add Message

Technical Approach

- Current proprietary system with its limited capability for customization, Systinet HP, is replaced with an open-source web publishing framework, Drupal, with almost no limitations on possible modifications.
- Both NSRR 2.0 and European SESAR Registry are built on the Drupal v.7 platform.

Drupal /ˈdruːpəl/ is a free and open- source web publishing framework written in PHP and distributed under the GNU General Public License. It is used as a back-end framework for at least 2.1% of all Web sites worldwide ranging from personal blogs to corporate, political, and government sites including whitehouse.gov and data.gov.uk.

VPN Connection Process

July 9, 2015

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Federal Aviation Administration

FTI VPN Briefing

Agenda

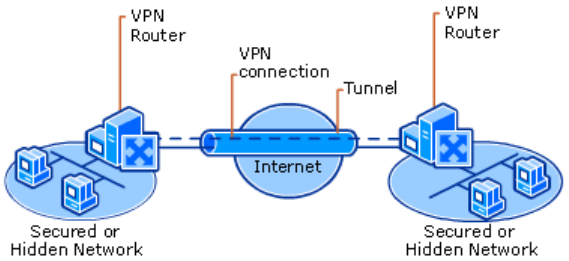
- NAS Enterprise Security Gateway
- VPN Overview
- FTI VPN Requirements
- Connection Options
- Tips for a Successful On-boarding Call

NAS Enterprise Security Gateway (NESG)

- Provides secure data transfer between the NAS and external entities via the use of specific application architectures and data flows
- Prevents unsecured traffic from entering the NAS
- Aggregation Points for Access
  - Internet connectivity or Dedicated Telecom Services, depending on whether availability is critical
  - Fewer connections needed by external user
  - Consistent security policies

VPN Overview

What is a VPN?



- A Virtual Private Network (VPN) implements a restricted access network that makes use of public network infrastructure. The VPN encrypts communications between hosts so that only the machines within the network can access and understand them.

- A VPN establishes a virtual tunnel ensuring that any communications and information traveling through it remains secure, even when running on public networks.

VPN Overview

Site-to-Site vs Remote Access:

- ✓ ***Site-to-Site VPNs*** connect entire networks to each other. Traffic is sent and received through a VPN gateway, which encapsulates and encrypts outbound traffic, then sends it through a VPN tunnel to a peer VPN gateway at the target site. Only Site-to-Site VPNs are supported for FTI NESG connections.
- ✘ ***Remote Access (Client-based) VPNs*** connect individual hosts to private networks. Every host must have VPN client software, which encapsulates and encrypts traffic before sending it to the VPN gateway at the edge of the target network. Remote Access VPNs are not supported for FTI NESG connections.

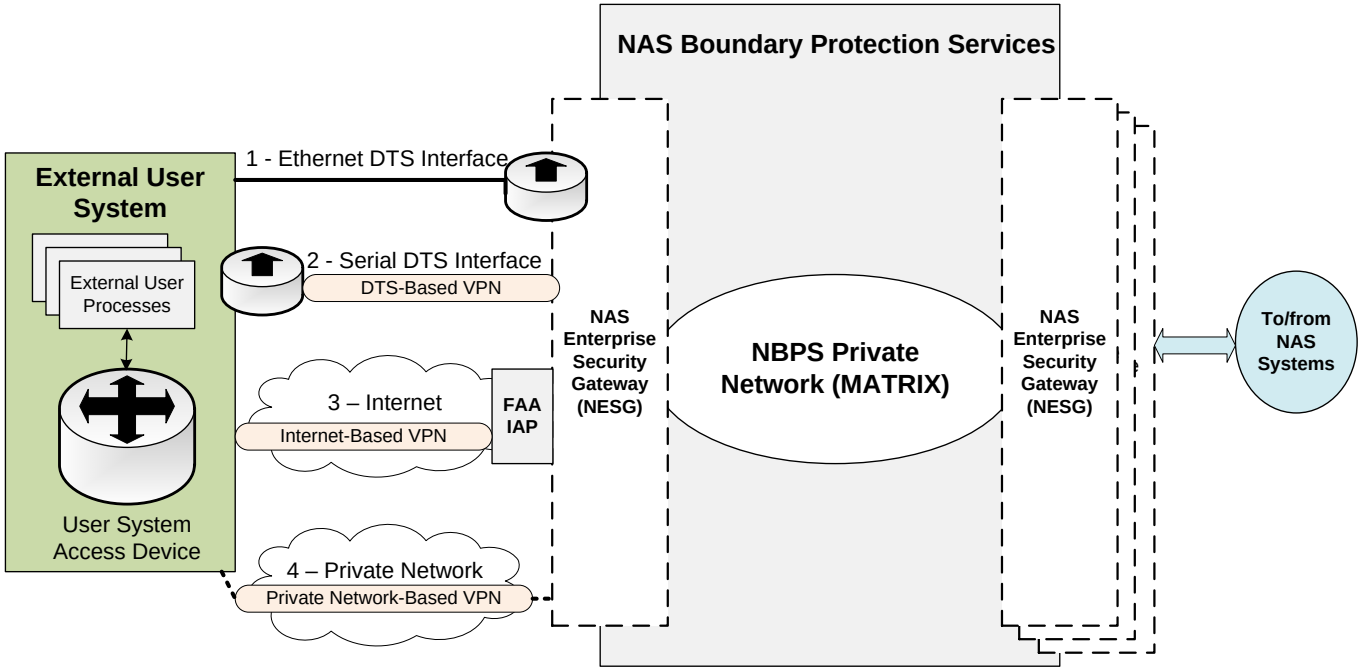
Upon receipt, the target VPN gateway strips the headers, decrypts the content, and relays the packet towards the target host inside its private network.

FTI VPN Requirements

Requirements are the same for R&D, FNTB, and operational environments

- Site-to-Site VPN
- At least one fixed public IP address
- Unique IP address per NAS Program
- Permit only required application traffic (Source/Destination IP, TCP port); prohibit all other access.
- IPSec with pre-shared key, AES-256

Connection Options



Connection Options

Connections between the external user and the gateway are secured using Virtual Private Networking based on IPSec for all connections.

1. **User-provided Dedicated Transmission Service (DTS) – Ethernet:**
   - LAN based Ethernet connection attached to the gateway
   - Requires established point of presence physically collocated with the gateway

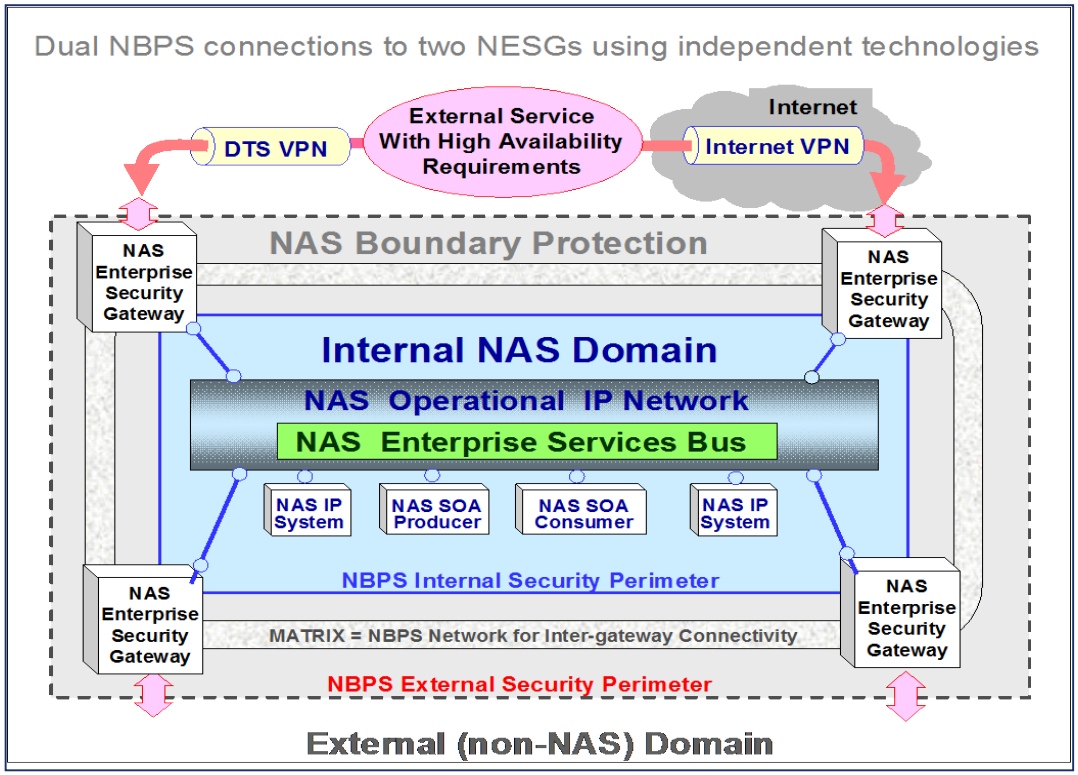
2. **User-provided Dedicated Transmission Service (DTS) – Serial:**
   - External user provides a dedicated circuit attached to the gateway
   - FAA-provided T1/E1 interfaces integrated with the gateway
   - No external user equipment at the FAA gateway location beyond the digital demarcation

Connection Options *(cont.)*

3. **Internet Based Virtual Private Network (VPN):**
   - Public Internet transport mechanism
   - No external user equipment physically installed at the gateway

4. **Private Network Based Virtual Private Network (VPN):**
   - External user-provided private network service as the wide-area / long-haul transport mechanism
   - A private network access device is typically required at the gateway

Connection Options *(cont.)*



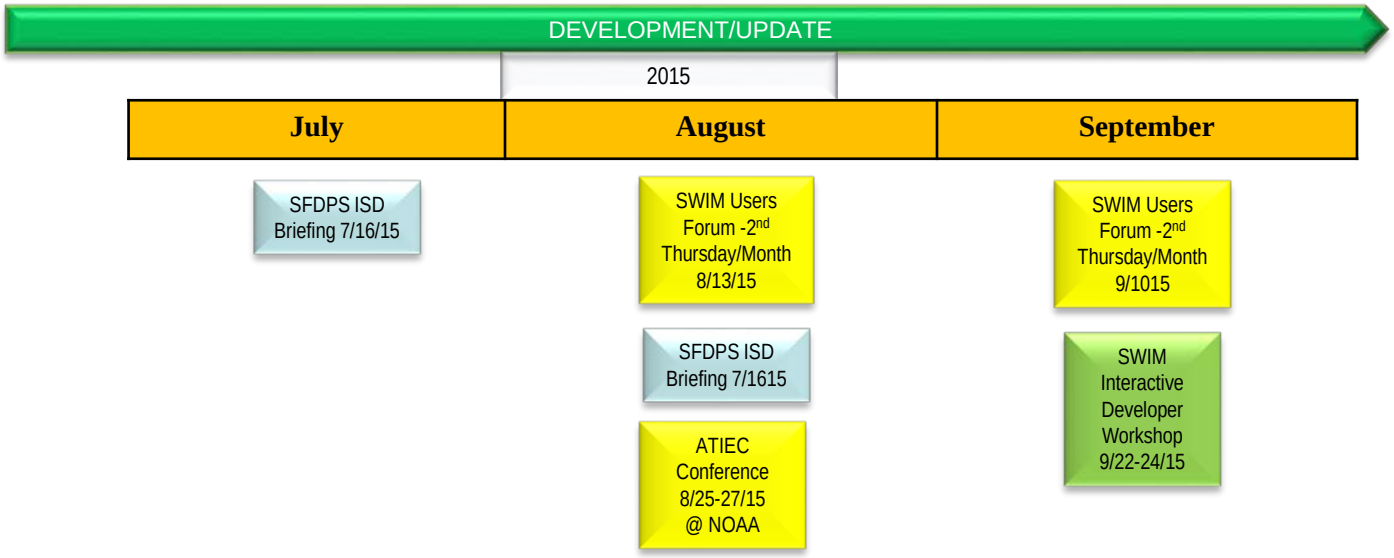
Connection Options *(cont.)*

NESG Location	Internet VPN	DTS - Ethernet	DTS - Serial
ACY	✓	✓	✓
OEX	✓	✓	✓
ATL		✓	✓
SLC		✓	✓

On-boarding Tips

- ✓ **Pre-configure your VPN connection settings before the call**
  - Pre-shared key will be received on the call
- ✓ **Have your network engineer available during the call**
- ✓ **For R&D and FNTB environments, only one VPN connection is needed**

SWIM Calendar



FYI: 60th Annual ATCA Conference & Exposition 11/1-4/15

Questions/
Open Discussion

Federal Aviation Administration

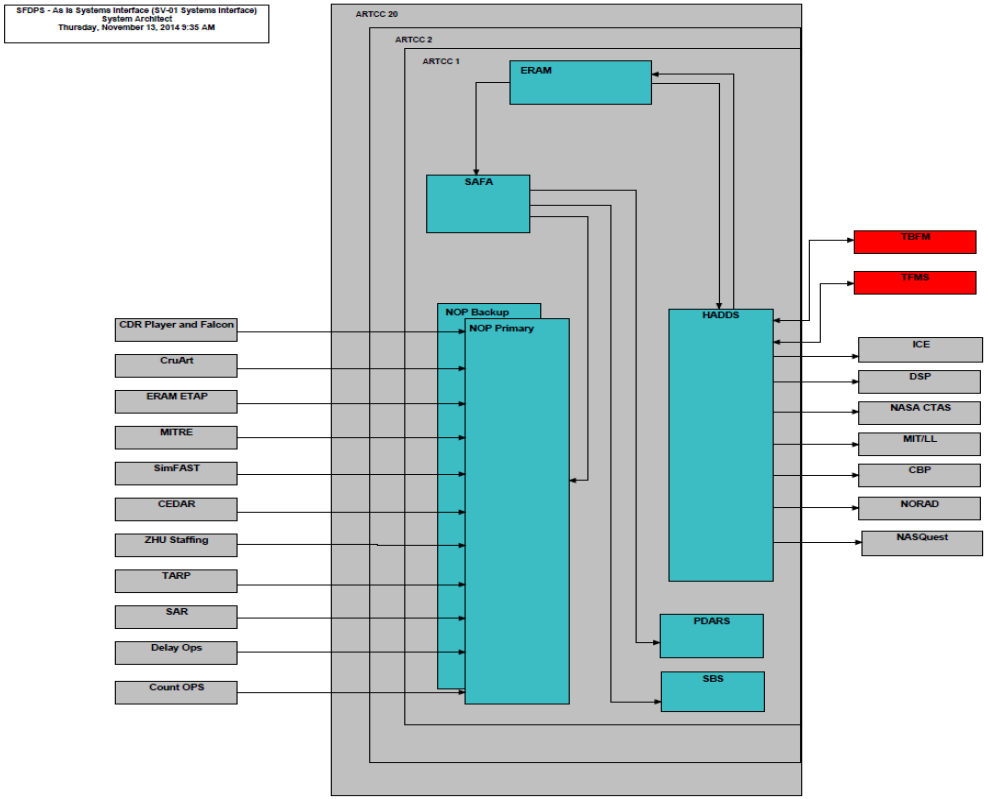
Post-User Forum Survey: We want your feedback

https://www.surveymonkey.com/r/XJTFJ95

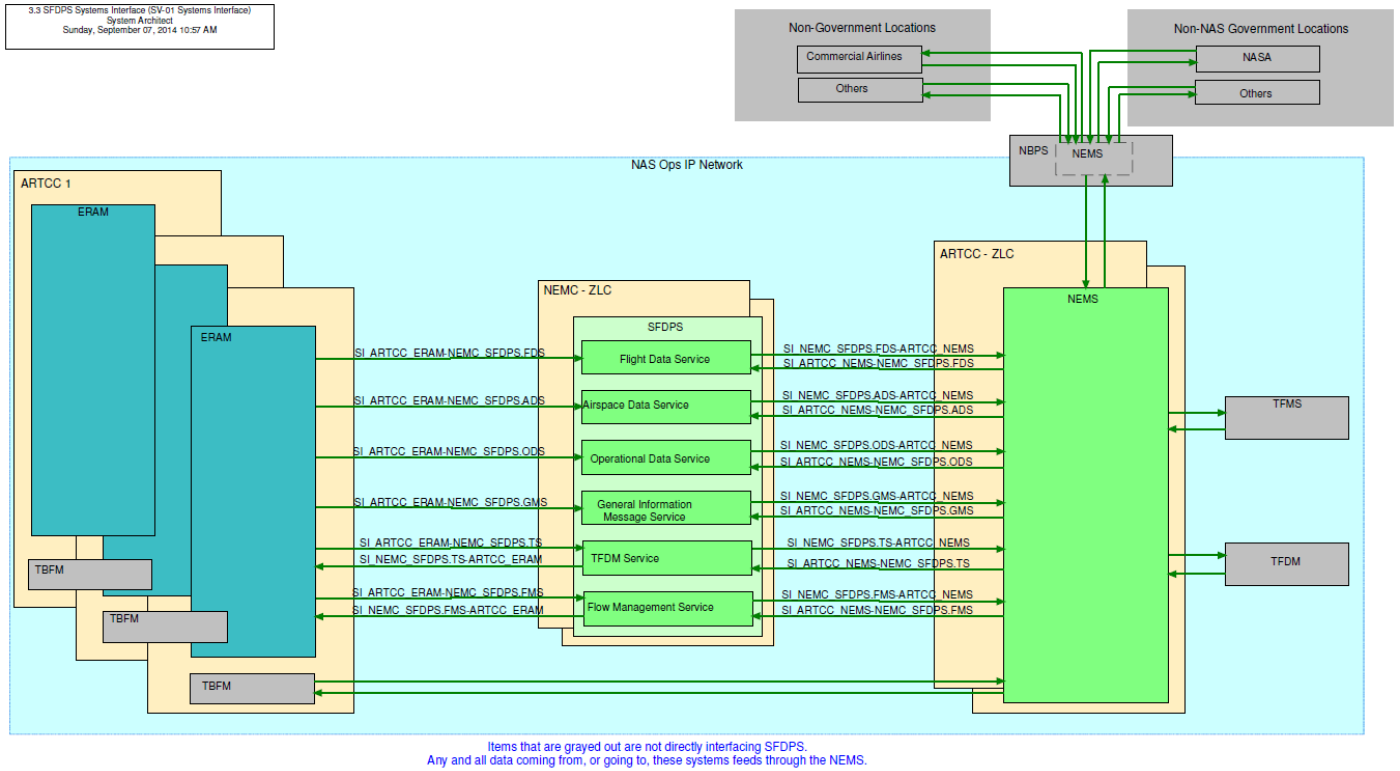
Note: Your comments and your contact information (if applicable), will not be shared outside of the SWIM User Forum planning team. If the survey results are presented publicly in a future Forum or in an internal FAA capacity, the User Forum planning team will not disclose names associated with the comments.

Backup Slides

ERAM EDDS (HADDS) As Is Architecture



SFDPS Final Architecture



Items that are grayed out are not directly interfacing SFDPS.
Any and all data coming from, or going to, these systems feeds through the NEMS.

Delivering NextGen Improvements