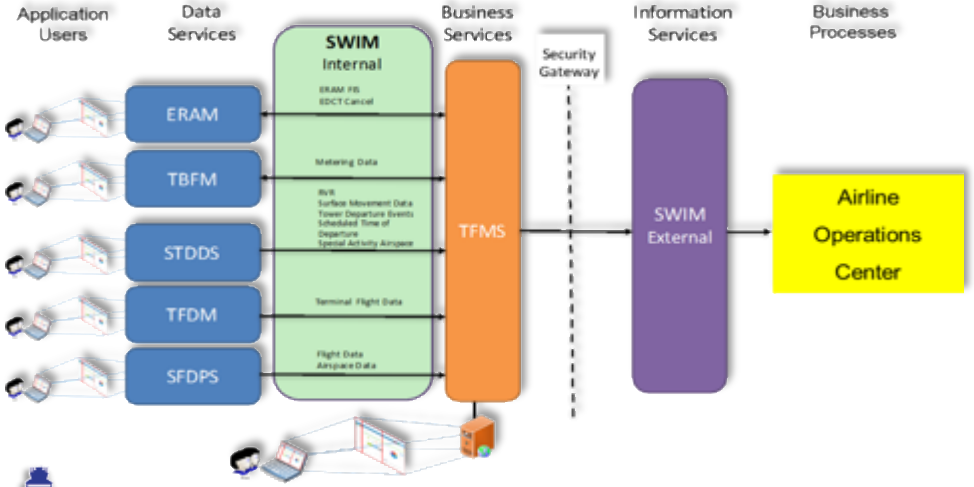
# SWIFT: SWIM Industry-FAA Team

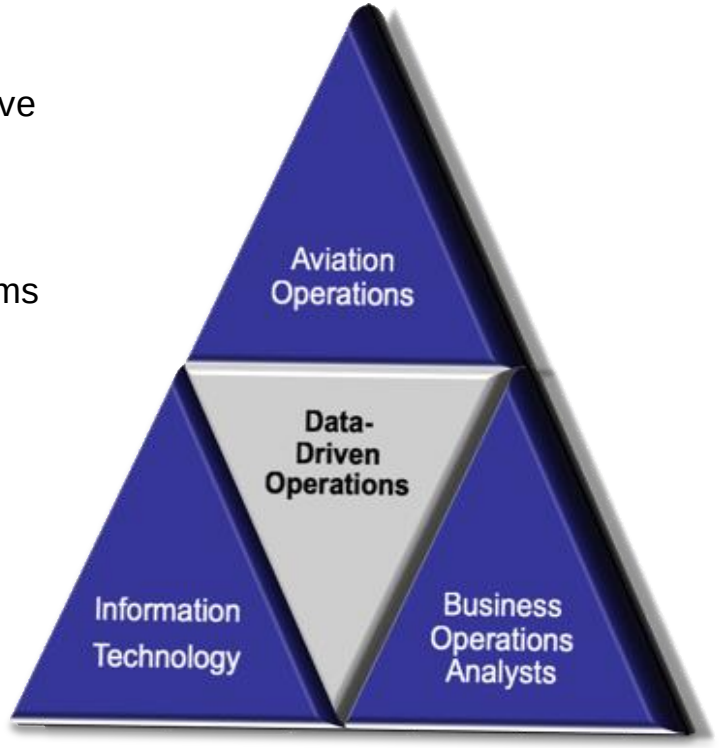
## SWIFT #21 Collaboration Workshop

Date: 11/09/23

# SWIFT: The Intersection of Operations, Technology & Data

- SWIFT addresses industry recommendation to:
  - A community forum that acts as a clearinghouse for collaborative engagement around NAS information and data sharing
  - **Educate**: Synchronize community on information services
  - **Collaborate**: Discuss issues most relevant to community
  - **Communicate**: Inform community about SWIM & NAS programs



# The SWIFT Flight Plan…

**2023**

- Back to Basics: “Right” access, to the “right” SWIM information service for strategic planning
- More Responsive: Focus Groups to address specific ad-hoc Ops issues where data can help
- More Focused: Shift in-person events to Ad-hoc FG activities & report out at SWIFT events

**2020-2022**

- Worked with NAS Programs & FAA Initiatives
- Industry partnership: flight planning, flow data
- Widget Case Studies: “Art of Possible” in Data
- Applying SWIM information services to support NAS Ops issues (Early Disruptions)

**2018-2019**

- SWIM awareness, connectivity & data access
- Understanding SWIM data & NAS ops context
- Partnered with TFDM, AIM on new services
- Develop & review case studies

# FAA Collaborative Workshop #21

- **Welcome and Introductions:**
  - Introductions: David Almeida – LST
  - Opening remarks: Rebecca Guy – FAA
- ***Special Topic: Trajectory Management Overview – ATC Perspective***
- ***Featured Program – TFDM Deep Dive: TFDM update on TTP, Program update and Demo***
- ***SWIM Topic: SWIFT Portal & SWIM Cloud (SCDS) Subscription Updates***

**LUNCH until 1PM EST**

- ***1PM EST Start on SWIFT Topic: "Back to the Basics": Ops Context Documents***
- ***SWIM Topic: FENS & Information Management Services for Cloud***
- ***Program Update: TBFM Program status & update on Metering Information Service***
- ***Program Update: Common Support Services – Flight Data (CSS-FD) Update***
- ***Special Topic: FAA-Industry Panel on the "T" Programs & Information Services***
  - Traffic Management (TFMS), Time-Based Flow Metering (TBFM) and Terminal Flight Data Manager (TFDM)
    - *The System, operational value, available information services & data integration*
- ***Close Out***

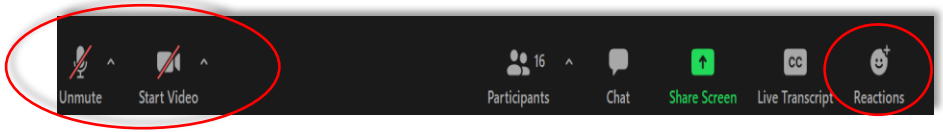
# “Airwave Procedures”

- Please note during the session all attendees will have full control… “Hot Mics” and cameras.

- Please be mindful and mute when not interacting during the presentation.

SWIFT 21

Zoom Controls: Mic and Camera identified via red circles




- The “Chat & Raise Hand ” features will also be available.
  - During the presentations to ensure you are recognized for an opportunity to voice comments /questions please leverage the “raise hand” feature found under reactions.

# SWIFT Stakeholders

# Role of TBO and Traffic Management Overview

## SWIFT 21 Update

Presented to: SWIFT 21

By: Steve Bradford - Chief Scientific and Technical Advisor,
Office of NextGen, ANG-3

Date: November 9, 2023

Federal Aviation Administration

# Trajectory Based Operations

- TBO is an air traffic management concept that enhances strategic planning

- TBO is foundational for future operations using the trajectory as the reference for airspace user intent supporting collaboration. It is not only consistent with, but dependent upon, the integrated information environment described in the FAA's Info-Centric NAS Concept of Operations

- The TBO environment is characterized by the shift from voice-based exchanges to one of highly automated, digital exchanges sharing broader, richer, and more timely information supporting better informed strategic decisions

# ICAO and TBO

- The International Civil Aviation Organization's (ICAO) Global Air Traffic Management Operational Concept (GATMOC) has driven changes in the Air Traffic Management (ATM) systems across the globe for well over a decade. The ICAO Global Trajectory Based Operations (TBO) Concept refines the Global ATM Operational Concept with detailed processes, procedures, and information flows.

- To more fully understand the impacts of the Global TBO Concept, the MR TBO demonstration project brings industry and international partners together with the FAA to identify, mature, and demonstrate key TBO capabilities.

# Future Trajectory Management Video

# Operational Values

# Live Flight Execution Route

**Aircraft: B787-10**

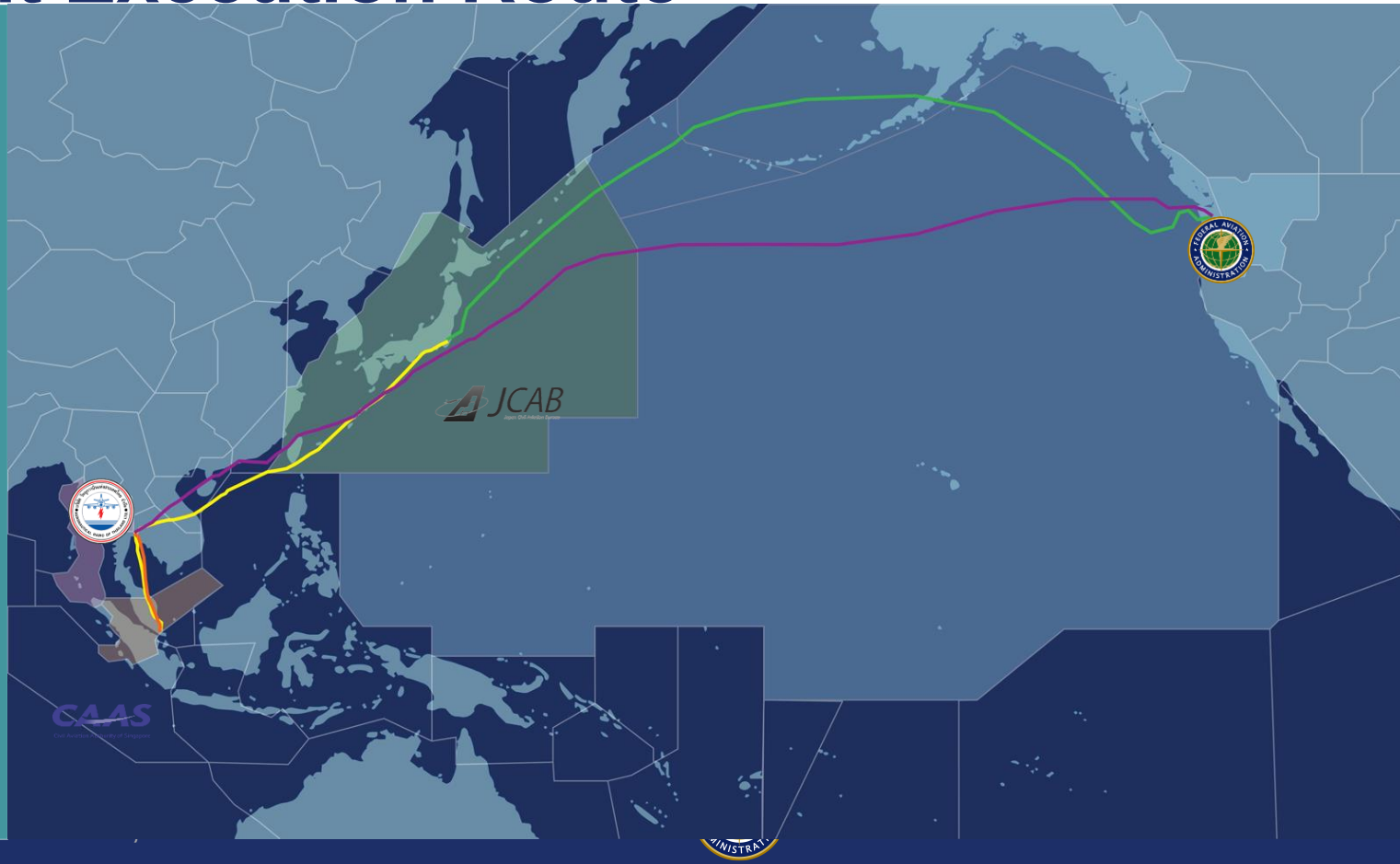
**Schedule: 6 days**

**Depart: June 11th**

**Arrive: June 16th**

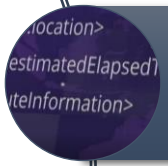
**Flight Segments**

1. Seattle → Tokyo
2. Tokyo→ Singapore overflying Thailand
3. Singapore → Bangkok
4. Bangkok → Seattle



# Overarching Lessons Learned

TBO required sharing, maintaining, and using trajectories as a common reference is possible – even across multiple FIRs and authorized stakeholders.




The global data exchange standards are foundational to TBO success.

The varying security needs across authorized stakeholders can be met flexibly, consistent with International Aviation Trust Framework (IATF) principles.

TBO's reliance on the sharing of more information across relevant, authorized stakeholders is supported by the continued maturation and evolution of the Connected Aircraft concept and advances in Electronic Flight Bag (EFB) technology.

# Key Terms

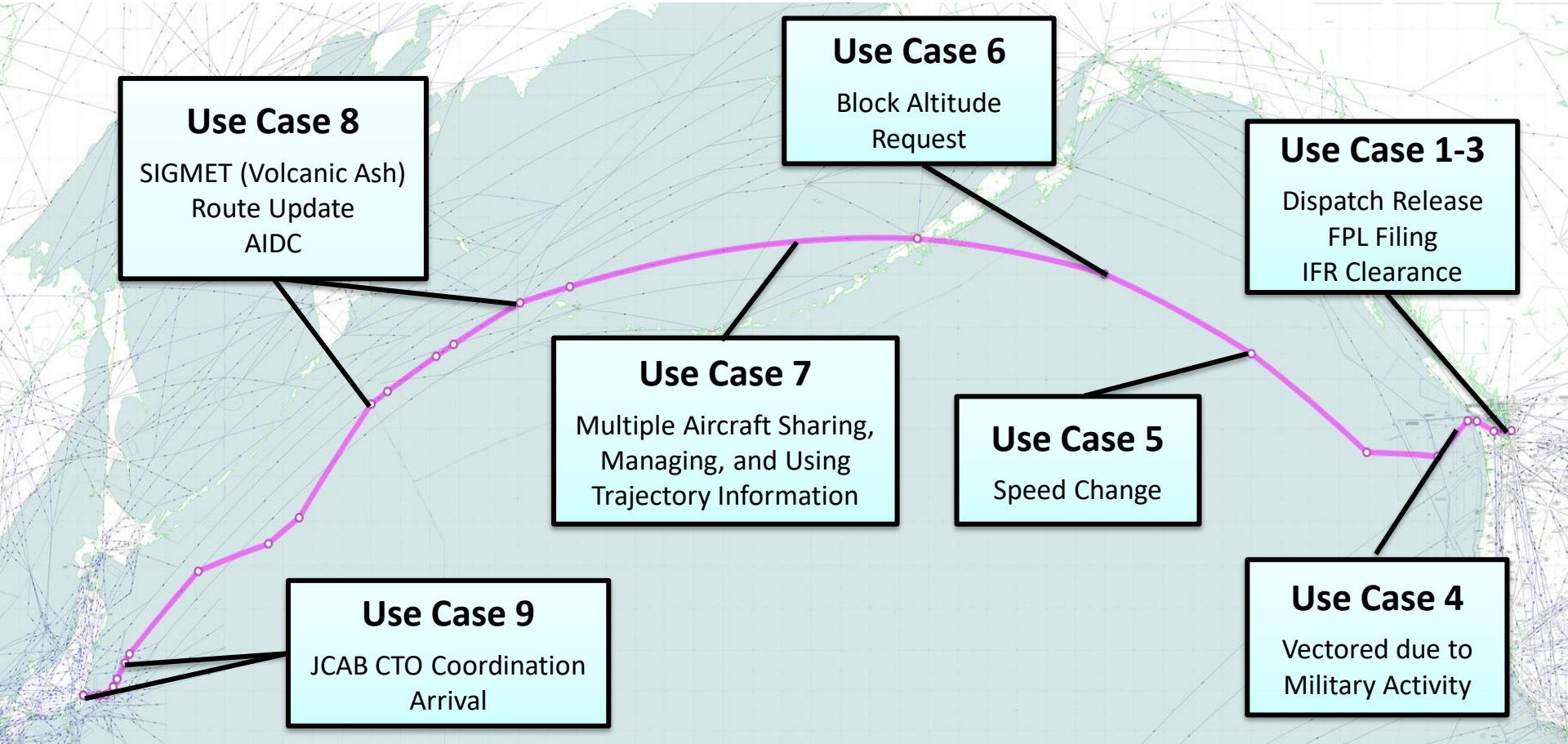
**Trial Request:** A query to evaluate a possible alternative or change to a flight plan


**Revision Request:** A request from an eAU for a change to the Agreed Route/Trajectory

**Trajectory Update:** When differences from the Agreed Trajectory exceed established tolerances, the Agreed Trajectory is updated and shared across relevant participants. Tolerances may be adjusted based upon local and temporal ATM performance needs

**Agreed Trajectory:** The current trajectory that is agreed between the eAU and the eASP after collaboration, or imposition of pre-collaborated rules

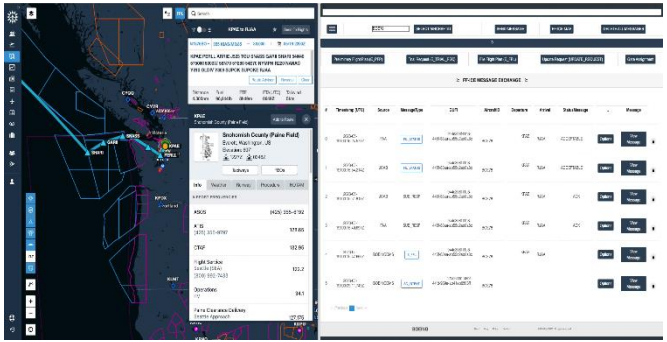
# Leg 1 – Use Cases



# Leg 1 – eAU Tools

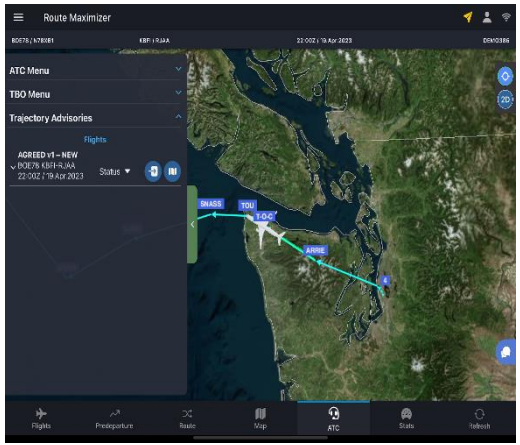
## Dispatch

### Flight Operations Center (FOC)



## Flight Crew

### Electronic Flight Bag (EFB)

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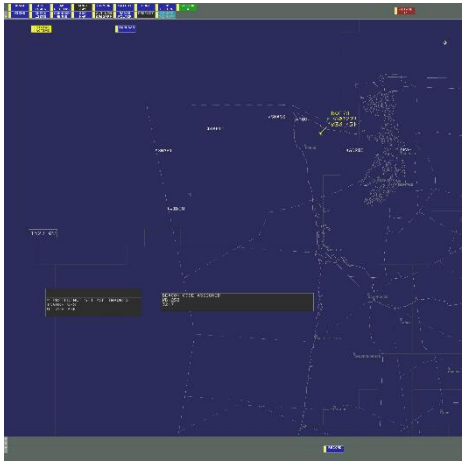
### Flight Management System (FMS)

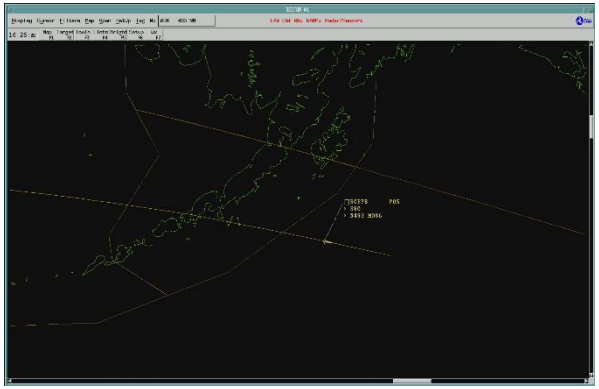
# Leg 1 – eASP Tools

## FAA

### Domestic ATC (ERAM)

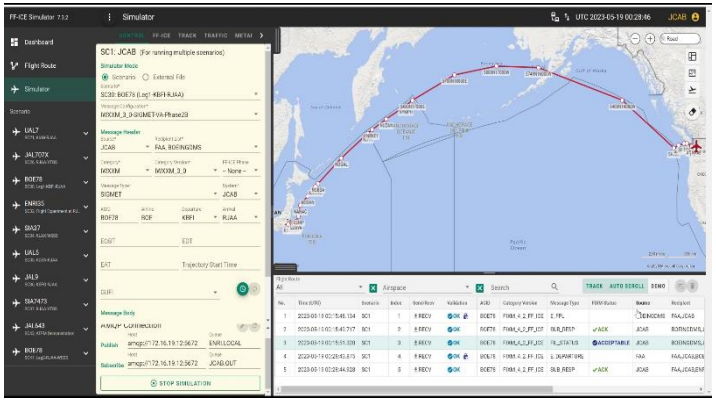


### Oceanic ATC (ATOP)



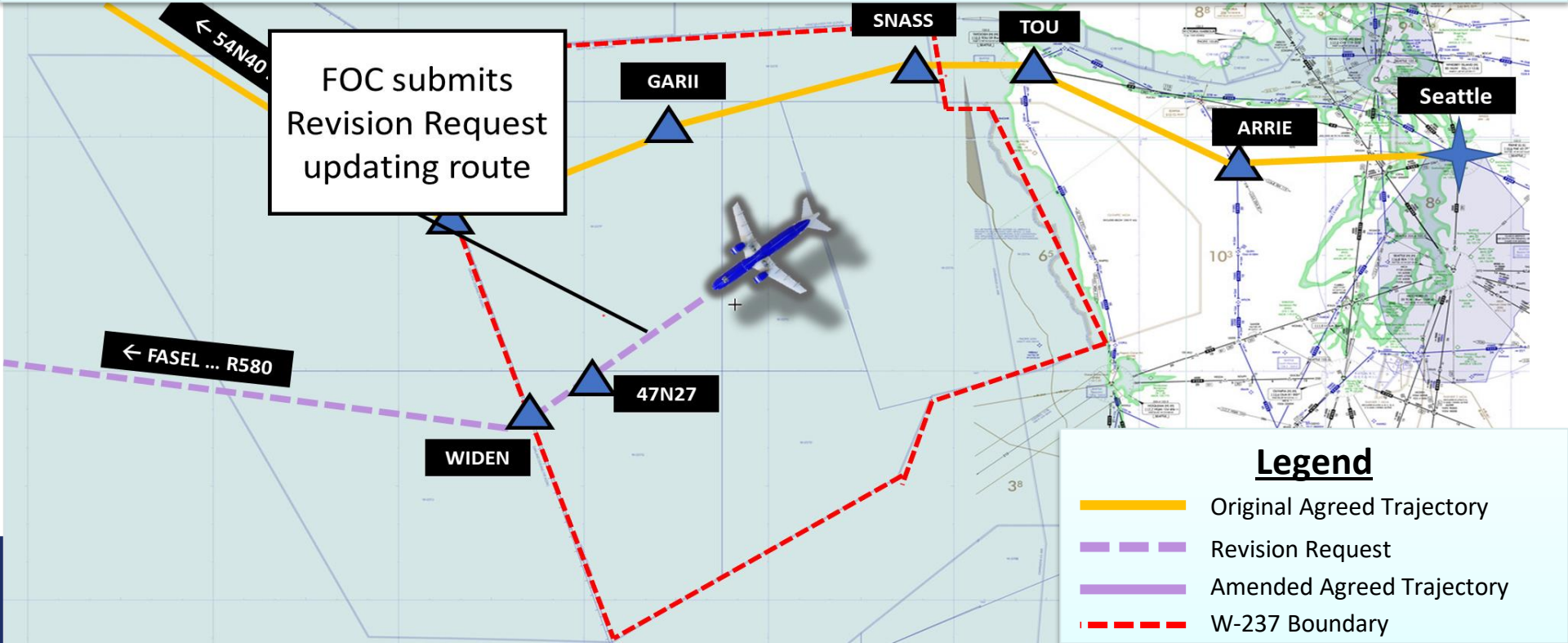
## JCAB

### FF-ICE Simulator



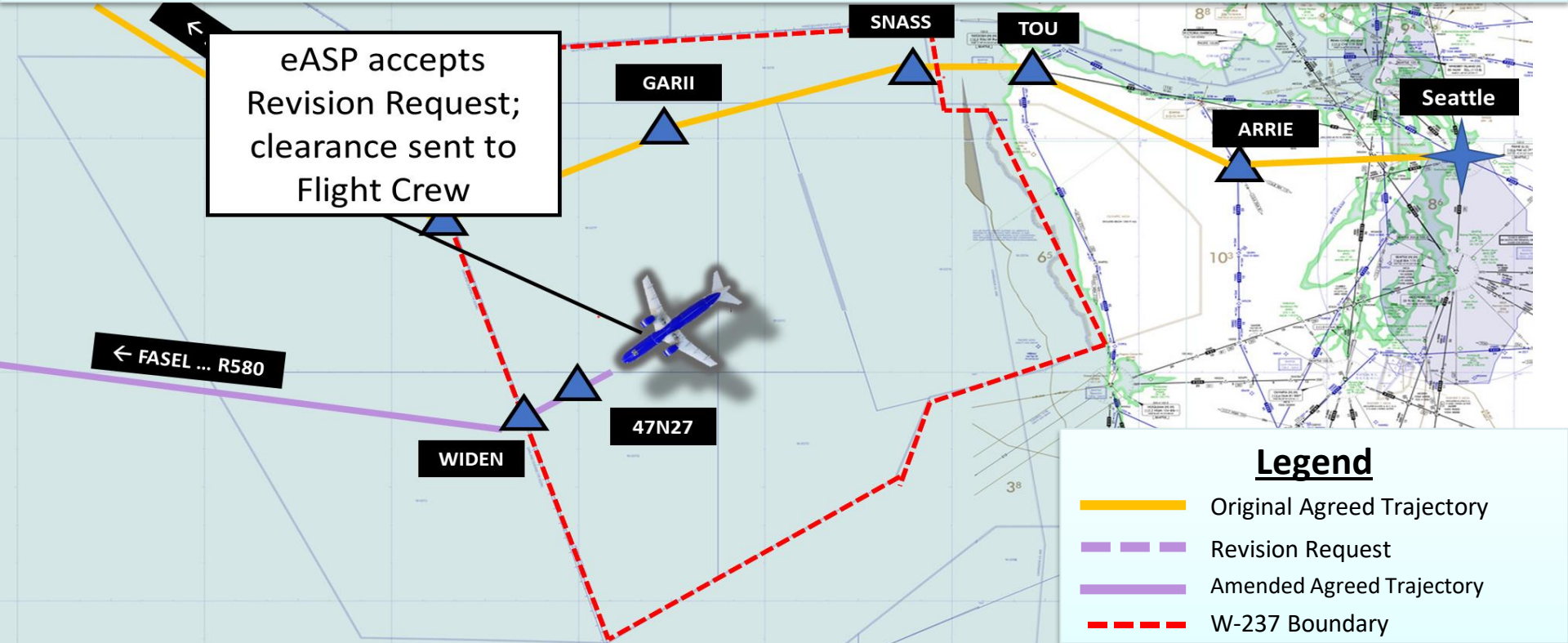
# Use Case 4: Route Amendment

- FOC sees a more optimal path and submits a Revision Request.
- FOC receives an ‘ACK’, followed by ‘Acceptable’ from ATM automation.

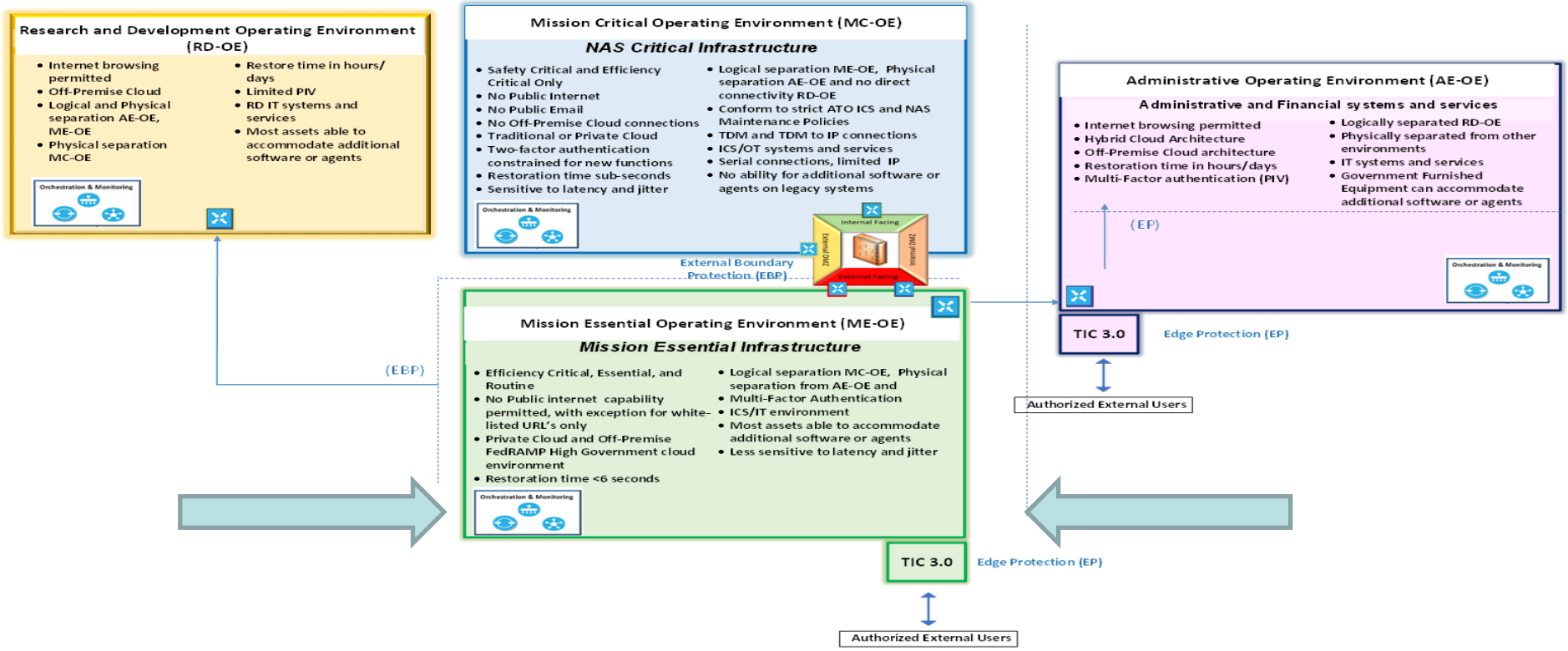


# Use Case 4: Route Amendment

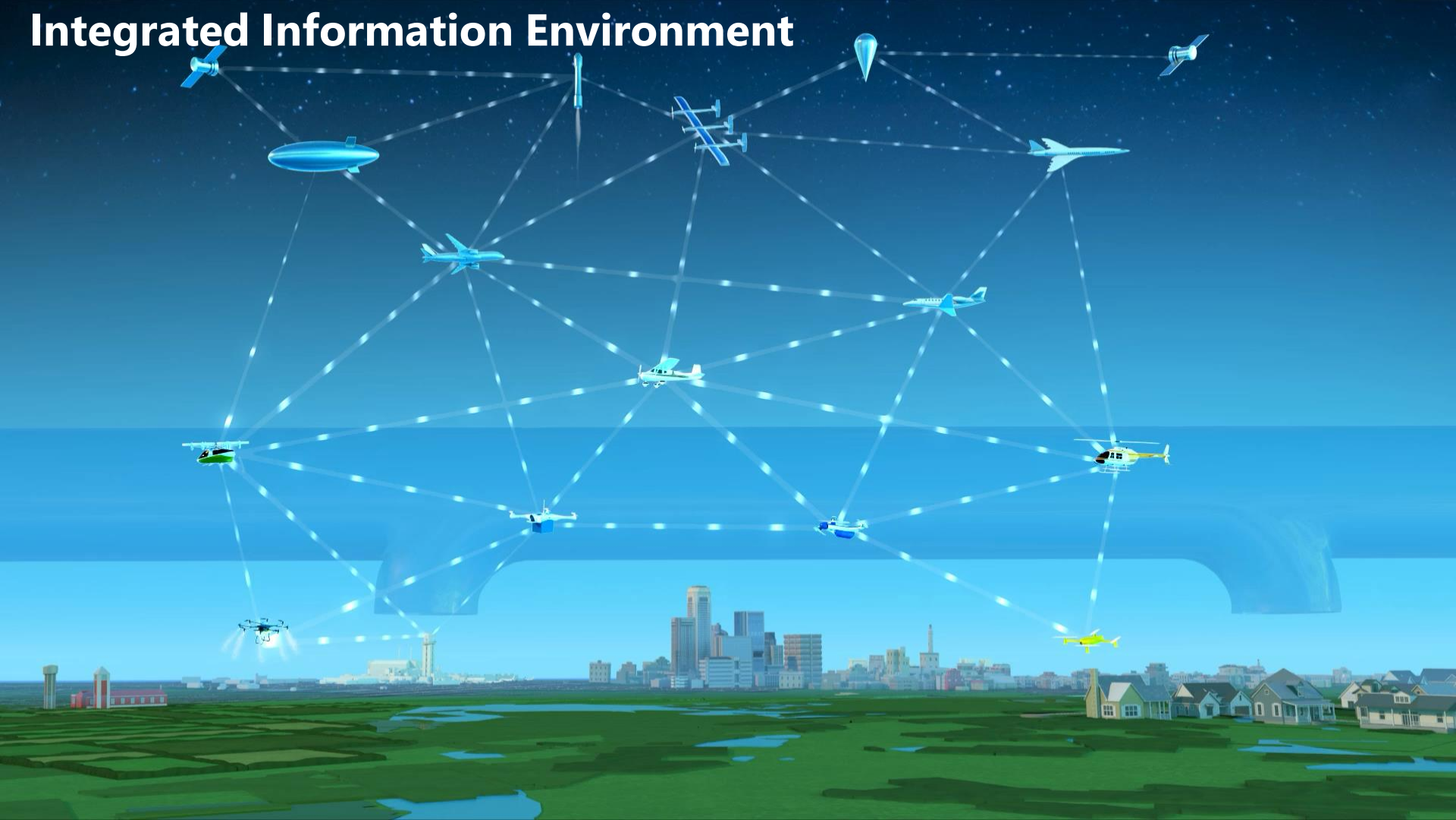
- Clearance is transmitted directly to the Flight Crew via CPDLC.
- The Flight Crew responds 'WILCO' and loads the new route into the aircraft's FMC.



# Robust Operating Environments



# Integrated Information Environment



# In-Time Safety Risk Management

**CONTINUOUS DATA EXCHANGE**

**MACHINE LEARNING**

**AUTOMATED MONITORING**

**PROGNOSTIC RISK MODELING**

**ALERTING AND RESPONSE**

# Thank You!

# Terminal Flight Data Manager (TFDM)

## SWIFT 21 Update

Presented to: SWIFT 21

By: TFDM PMO: Lidiya Gavrilenko, Sharon Ledgister-Reid

Date: November 9, 2023

Federal Aviation Administration

# Agenda

- TFDM Program Overview and Status
- TFDM Services Overview
- TFDM Demo
- Stakeholder Input on TFCS Permissions
- Next Steps
- Information Resources
- Questions

Note: *TFDM FOS Collaboration Service (TFCS)*
*Flight Operator Systems (FOS)*

# TFDM Program Overview and Status

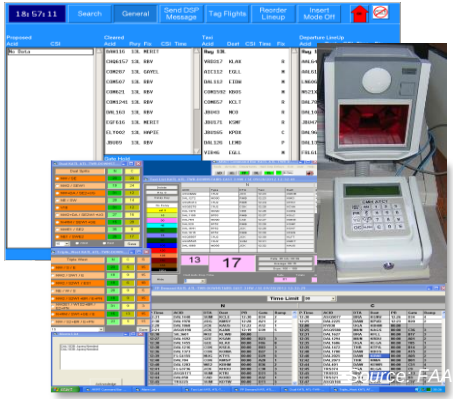
# Why TFDM?


Shared ATCT paper flight and other strips enable:

- Real-time flight data and airport resource updates
- Advance notice of flight movements between ATCT operational positions


Few tools exist to manage surface congestion. Most are:

*"First-come, First-serve"* taxi models



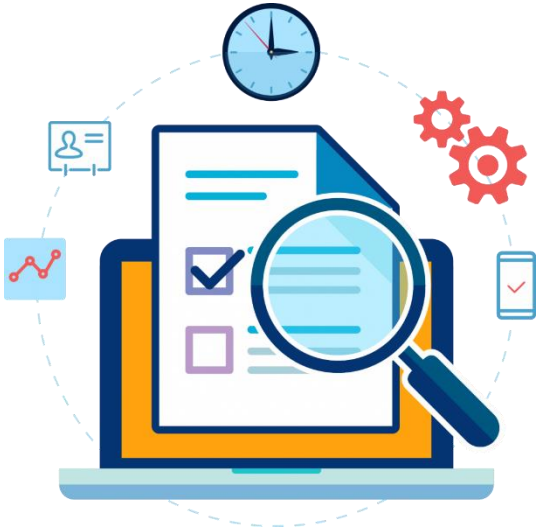

Legacy FAA systems are approaching end-of-life


Verbal coordination reduces operational efficiency and safety between:

- FAA operational personnel
- FAA & Non-FAA stakeholders

# What's industry's role?

Submit intent data to TFDM



Gain improved situational awareness from new data published by TFDM, TFMS, and TBFM

Gain time and money savings and many other benefits

# TFDM System Overview

•TFDM is the surface management solution for NextGen and iTBO.

• https://www.faa.gov/air_traffic/technology/tfdm/

**TFDM is a tower-based automation system that provides:**

– Integrated terminal data that improves common situational awareness within towers and between ATC facilities

– Data to support collaborative decision-making tools that improve efficiencies in airport surface and terminal airspace operations

## •Key Functions

- **Electronic Flight Strips in ATCTs**
- **Traffic Flow Management Integration**
- **Collaborative Decision Making for Surface Operations**
- **Systems Consolidation**

## •Key Benefits

- **Fuel Savings: 313M Gal.**
- **Carbon Emission Savings: 3M Metric Tons**
- **Improved Situational Awareness**
- **Expanded Data Access**

# TFDM Capabilities

## Electronic Flight Data

TFDM provides enhanced Electronic Flight Data (EFD) exchange and replaces printed flight strips with Electronic Flight Strip (EFS) displays. The displays are enhanced with additional terminal and flight data from other NAS systems and external stakeholders


## Collaborative Decision Making for Surface

TFDM provides a departure scheduler with live data provided by Air Traffic systems/controllers and Flight Service Providers. The system provides a departure metering capability, runway balancing and other surface management tools, improving surface traffic flow management.

## Traffic Flow Management

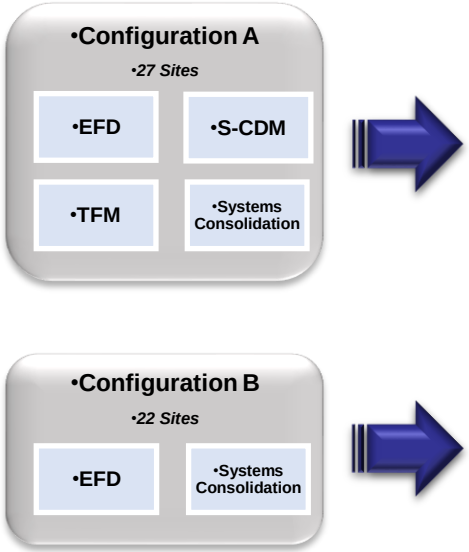
TFDM enhances the traffic flow management data integration with Time Based Flow Management (TBFM) and Traffic Flow Management System (TFMS) to enable airlines, controllers and airports to share and exchange real-time data. This results in improved surface traffic management as well as improves the products produced by TFMS and TBFM.

## Systems Consolidation

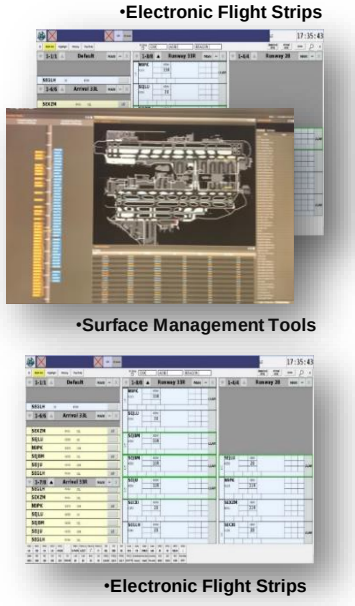
TFDM replaces multiple unsupportable systems in the National Airspace System through integration of their functionality into TFDM. This achieves technology modernization, improved data sharing and lower maintenance costs. The systems to be consolidated include ARMT, EFSTS, and AEFS.

# TFDM Configurations

TFDM's 49 airports receive Configuration A or B based on projected return-on-investment



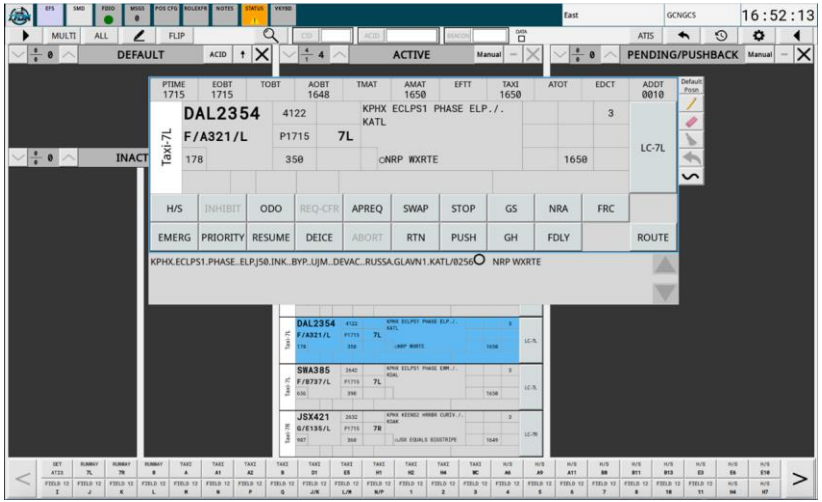

- **TFDM - Full Functionality (Configuration A)**
  - Electronic Flight Data (EFD) exchange with Electronic Flight Strip (EFS) displays in towers
  - Surface surveillance data integration
  - Full surface scheduling and decision support tools (including surface metering)
  - Traffic flow management data exchange and integration
- **•TFDM - Most Functionality (Configuration B)**
  - EFD exchange
  - EFS displays in towers
  - Some Surface and TFM data
  - Same system consolidation, if present




# Electronic Flight Data (EFD)

***Benefit: Improves digital data sharing and common awareness***

- TFDM Electronic Flight Data (EFD) services receive, process, and display data at ATCT operational positions, as well as publishing data to NAS and non-NAS stakeholder systems
- TFDM replaces printed flight strips with Electronic Flight Strips (EFS) on controller workstations
- TFDM EFD and EFS integration provides simultaneous data updates to all tower operational positions

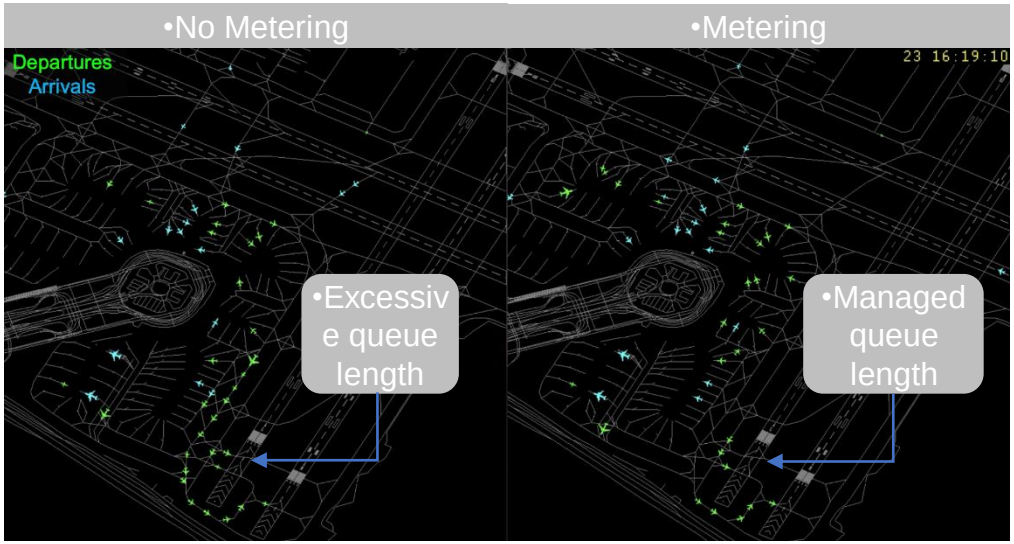


# Surface Scheduling and Surface Metering

***Benefit: Improves Traffic Management***

**•Minimizes excess taxi delay and maximizes surface efficiency:**

- Improves efficiency of surface operations
- Improves access to additional surface data
- Provides ATC better forecasting of and planning for peak demand periods
- Improves surface scheduling which improves scheduling and traffic management initiatives(TMIs) across the NAS
- Reduces taxiing which:
  - Reduces fuel usage
  - Reduces emissions



# TFDM System Roll-Out Overview

***Benefit: Improves digital data sharing and common situational awareness***

**Build 1** **Key Site - CLE**

- Full hardware configuration supports deployment of either Build 1 or 2
- Improved Electronic Flight Data Exchange and Electronic Flight Strips
- Runway Assignment Predictions
- Basic Load Balancing
- Maintenance tools for life cycle support

- **Initial Operating Capability:** October 2022
  - Declared IOC October 24, 2022
- **In-Service Decision:** July 2023
- - Declared ISD March 1, 2023

**Build 2** **Key Site - CLT**

- In addition to TFDM Build 1 capabilities, Build 2 includes:
  - Surface Scheduling
  - Surface Metering
  - Advanced Runway Load Balancing
  - Metric Reporting & Analysis (MRA)

- **Initial Operating Capability:** March 2024
- **In-Service Decision:** January 2025

# TFDM Build 1 Status

## IOC

- TFDM achieved Build 1 IOC at CLE on October 24, 2022!

## IOA

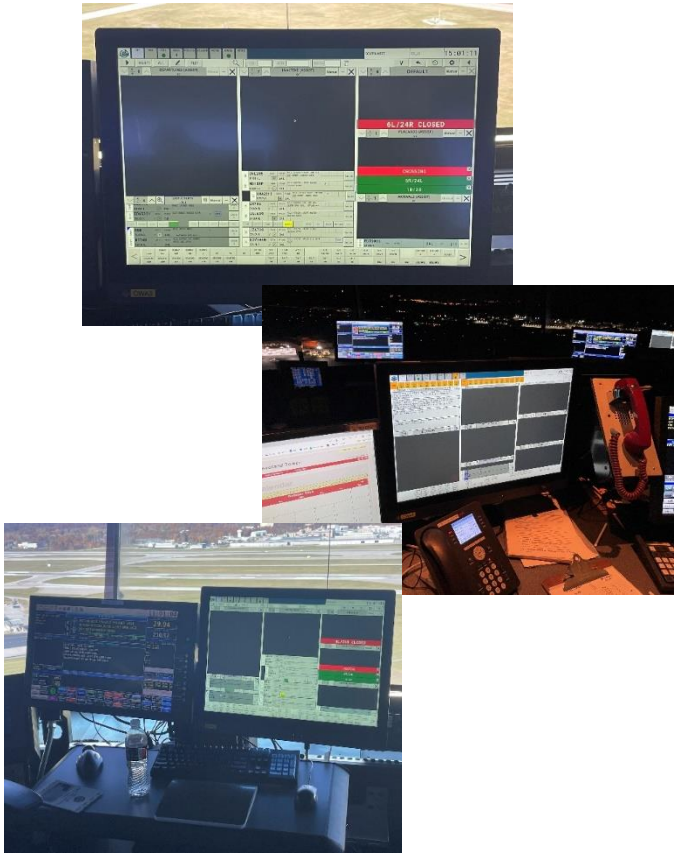
- TFDM Independent Operational Assessment (IOA) began on October 31, 2022.
- IOA recommends “Nationally Deploy” TFDM Build 1 on December 30, 2022.

## ISD

- TFDM ISD approved on March 1, 2023.

## Near Term Build 1 Sites

- Cleveland (CLE) declared on 10/24/2022
- Indianapolis (IND) declared IOC on 5/15/2023
- Phoenix (PHX) declared IOC on 6/5/2023
- Raleigh Durham (RDU) declared IOC on 7/24/2023
- Columbus (CMH) declared IOC on 9/11/2023
- Las Vegas (LAS) declared IOC on 10/23/2023
- San Jose (SJC) projected IOC on 2/27/2024
- Los Angeles (LAX) projected IOC on 4/30/2024
- Tampa (TPA) projected IOC on 7/23/2024



# TFDM Build 2 Near-term Waterfall

| Airport | Airport ID | City, State | Initial Operating Capability |
|---|---|---|---|
| Charlotte Douglas International Airport | CLT | Charlotte, North Carolina | March 2024 |
| Phoenix Sky Harbor International Airport | PHX | Phoenix, Arizona | December 2024 |
| McCarren International Airport | LAS | Las Vegas, Nevada | February 2025 |
| Los Angeles International Airport | LAX | Los Angeles, California | April 2025 |
| Seattle–Tacoma International Airport | SEA | Seattle, Washington | March 2025 |
| San Francisco International Airport | SFO | San Francisco, California | April 2025 |

TFDM Implementation Map and Timeline | Federal Aviation Administration (faa.gov)

# TFDM Services Overview

# TFDM Terminal Publication (TTP) Service

**TFDM Terminal Publication Service (TTP) is a collection of 6 SWIM business functions:**

| Business Function | Explanation | Data Examples | Intended Users |
|---|---|---|---|
| Airport Information (AI) | TFDM derived airport data | Active Runway Configuration, Rates, Airport Delays, Runway Closures | FAA & Flight / Ramp / Airport Operators |
| Flight Data | TFDM flight data | Block Times, Takeoff Times, ATC Flight State, Runway Assignments | FAA & Flight / Ramp / Airport Operators |
| Traffic Management Restrictions (TMR) | Airport specific traffic management restrictions and impacted flights | MIT, MINIT, Departure Stop | FAA & Flight / Ramp / Airport Operators |
| Flight Delay | Airport specific flights in delays with delay information | Flight ID info, delay duration, reason | FAA and CDM participants |
| Operational Metrics (OM) | Airport based operational metrics | Data Quality, Off Block Accuracy, TMAT Compliance, Emissions | FAA and CDM participants |
| Surface Metering Program (SMP) | SMP information (only 27 Configuration A sites) | SMP information (e.g. start/stop time), lists of impacted flights | FAA and CDM participants |

***TFDM TTP service will be available to consumers when TFDM sites reach Build 2. The first TFDM Build 2 site will be CLT in April 2024. Testing in FNTB is only mandatory if the consumer has never SWIM tested their Solace Client. Otherwise, consumer testing in the WJHTC FNTB lab is optional.***

# TFDM FOS Collaboration Service (TFCS)

- **TFDM FOS Collaboration Service (TFCS)**
  - Consists of 2 SWIM Request/Reply Business Functions for CDM members
  - Flight Substitution
    - Can submit *Surface Metering Program (SMP) Flight Substitution Requests*
  - Airport Data
    - Can submit status on airport resources such as ramps, non-movement areas, etc.
    - Can submit Gridlock status

| Business Function | Explanation | Data Examples | Intended Users |
|---|---|---|---|
| **Flight Substitution** | TFDM flight substitution service (only 27 Configuration A sites) | Substitution requests / responses | FAA & Flight / Ramp / Airport Operators |
| **Airport Data** | Submission of Gridlock, ramp status (only 27 Configuration A sites) | Ramp closure(s), Gridlock status | FAA & Flight / Ramp / Airport Operators |

***TFDM TFCS SWIM service requires testing with the TFDM program in the WJHTC lab. The testing is mandatory before Ops on-ramping and use.***

# TFDM VLab Demo

# Demo of TFDM

- Scheduling
- Airport Configurations (ACs)
- Traffic Management Initiatives (TMIs)
- Surface Metering Programs (SMPs)

# Pre-NAS Deployment Testing

- FOS Testbed *(Optional)*
  - Non-FAA test facility
  - Leidos support
  - Does not require a SWIM subscription
  - Opportunity to exchange TFDM messages in a lab environment
  - Recorded data is available for repeatable result
  - Currently, CLT airport adapted, but other sites will be available in the future
  - Live, public data available for real-time data flow (CLT, PHX, others to follow)
- FTI National Test Bed (FNTB) *(Mandatory for TFCS; Optional for TTP)*
  - FAA WJHTC test facility
  - FAA and Leidos support
  - Requires Lab SWIM subscription
  - Lab duplicates NAS Ops environment to high extent
  - Scenarios cover a wide range of test cases and include CDM data
  - Must complete SWIM Request/Reply testing in FNTB prior to onboarding TFCS in Ops
  - Currently, CLT airport adapted, but other sites will be available in the future

# Stakeholder Input on TFCS Permissions

# Initial TFCS Permissions

- TFCS permissions are specified in TFDM National adaptation
  - Any authorization for a flight substitution would apply to all TFDM airports
    - Example: If AAL is allowed to act for DAL at CLT, AAL could act for DAL at DEN
  - Interim approach to restrict global permissions
    - Restrict to per-airport using airport specific SWIM user-ids for each airline or third party vendor
      - May not accommodate all the complexity of stakeholder and third-party relationships
      - Not scalable as TFDM or SWIM final solution
- TFCS resource status reporting has similar permission granularity challenges

# Stakeholder Input on Permissions

- Stakeholder input is needed
  - To support the range of stakeholder relationships that have evolved in the NAS over time
  - To support planned, future stakeholder relationships
- TFDM Interface Team is requesting individual meetings with stakeholders
  - To develop use cases that support the range of stakeholder relationships
  - To specify those relationships in on-boarding for FNTB and Ops
  - To test permissions in mandatory TFCS Request/Reply testing in FNTB
- TFDM will help stakeholders document/formalize permission relationships
  - Agreements between stakeholders is required to instantiate permissions in TFDM local/national adaptation
  - For example - authority to act for another party for a specified resource at a specified site, etc.
- Gathering feedback from airlines/airports
  - Initially, TFDM Interface Team collects permission use cases for TFDM design from individual stakeholders
  - SCT will collect national/local adaptation data as specified by TFDM resulting design over TFDM waterfall

# Next Steps

- Stakeholder Permission Development
  - Identify technical resources to collaborate on permission use cases
  - Setup appt with TFDM Interface Team to discuss stakeholder needs
  - TFDM Contacts:
    - Sharon Ledgister-Reid, FAA, TFDM Interface Lead, Sharon.Ledgister-Reid@faa.gov
    - Kathleen Venemon, Wydah, TFDM Interface Support Lead, kvenemon@wydah.com
- Stakeholder On-Boarding
  - SWIM Contact for FNTB and Ops On-Boarding
    - David Wickes, SWIM External User Support, David.CTR.Wickes@faa.gov
  - TFDM supports SWIM office in developing On-Ramping Forms (ORFs) for TFDM for TTP consumers and TFCS participants in FNTB and Ops

# Information Resources

- TFDM Familiarization
  - Video
    - TFDM Overview
  - EFS and SMN
    - Animated Storyboard
  - CDM Website
    - Data Operational User Guide
    - Surface Working Group Guide
    - CSIT Tech Talks
- TFDM Tech Resources
  - SWIM Portal (SWIFT)
    - https://portal.swim.faa.gov/
  - NAS Service Repository and Registry (NSRR )
    - https://nsrr.faa.gov/
    - TTP and TFCS JMSDDs

# Questions?

# Lunch

**(We'll return at 1:10pm EST)**

# SCDS Updates

## SWIFT 21 Update

Presented to: SWIFT 21

By: Waldo Ford, FAA - SCDS Lead

Date: November 9, 2023

Federal Aviation Administration

# Operational Cost Management

# Keeping SCDS Free

- **SCDS provides robust SWIM data for public users that is free to consume, but the FAA pays for data egress, storage, maintenance, portal support, etc.**
- **SCDS costs are increasing, while the FAA has new budget constraints. Continued quality of service requires cost reduction.**
- **A sizeable cost-saving measure is to get users on board with ways of accessing data that help save us money.**
- **In early 2024, all SCDS users will be required to sign new Service Access Agreements (SAAs) that contain new SCDS Policy.**

# Cost-Saving Measures

**Three new data access policies that save the FAA money:**

- **Data Compression**
- **Messaging APIs that support compression**
- **Internal Redistribution (High Data Consumer)**

# Community Engagement

- **Has your organization successfully implemented internal data redistribution?**
- **Share your technical/architectural ideas with the SCDS community!**
  - Email scds@faa.gov, subject line “SCDS Internal Redistribution Solutions”, to join the effort.
- **Stay tuned for further communications.**

# SWIFT Portal Version 4 Demo

# SWIFT Portal Update

**SWIFT Portal v4 provides a streamlined and modern user experience by providing expedient subscription approvals.**

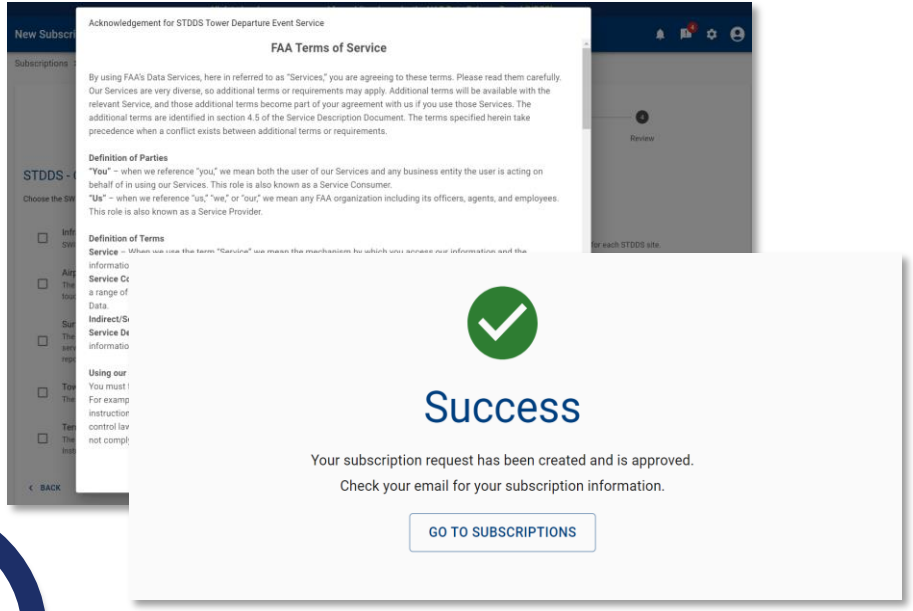
- **Service Access Agreements (SAAs) have been migrated directly into the SWIFT Portal, and we can now provide automatic subscription approval.**
- **Users no longer need to visit a separate SAA portal.**

SWIFT Portal
(SWIM Industry-FAA Team)

portal.swim.faa.gov

# Version 4 Demo

- **SAA signing is built into the subscription wizard now to ensure you can find and sign them easily.**
- **Subscriptions are automatically created and approved, providing a true self-service experience.**




**For More Information**

# SWIFT Ops Context Documents & SWIM Information Services Roadmap

## SWIFT 21 Update

**Presenter:** Xavier Pratt – LS Technologies

**Date:** November 9, 2023

# NAS Service Registry Repository (NSRR)

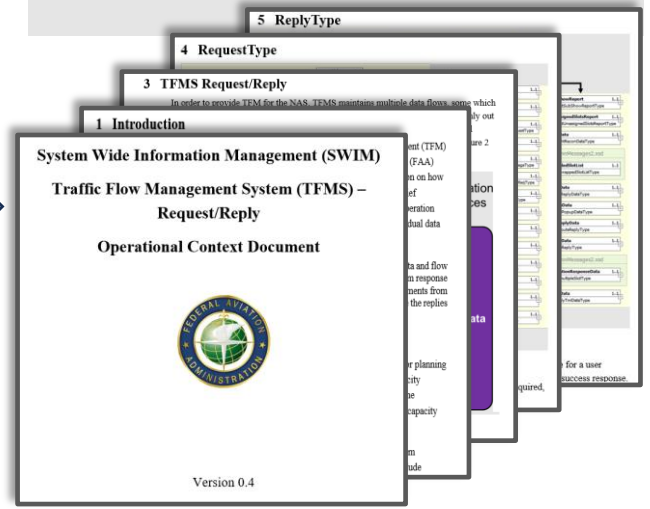
- **SWIM-enabled services registered in the [NAS Service Registry & Repository (NSRR)](https://nsrr.faa.gov/).**

- **Here, you can find information on SWIM services - including Ops Context Documents for each service**

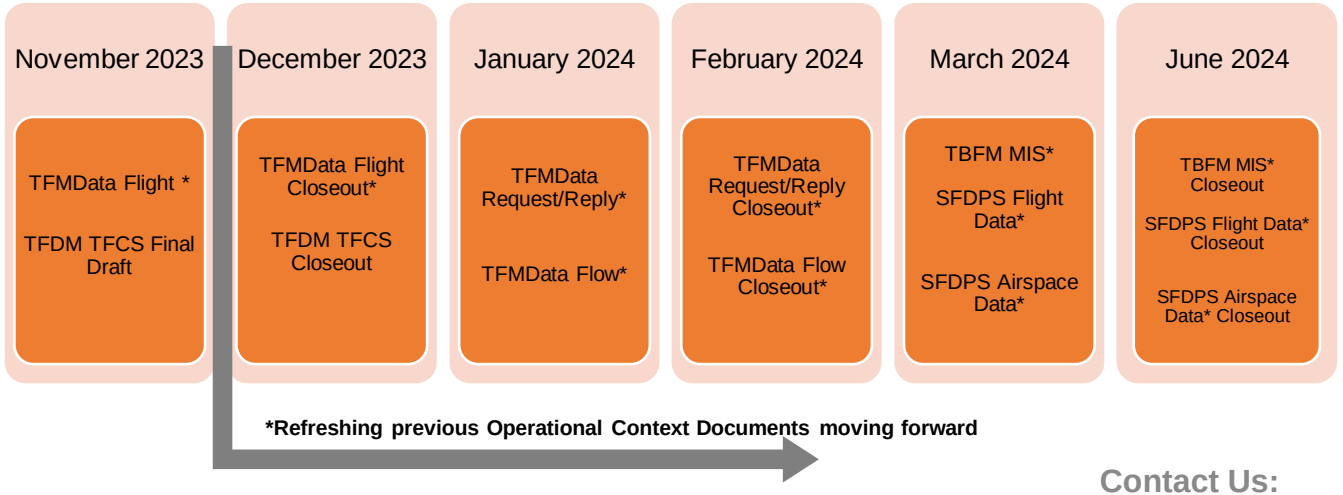

**NSRR**

https://nsrr.faa.gov/

1. **Introduction**
2. **TFMS & TFMData Service Overview**– Includes References
3. **Request Type**
4. **Reply Type**
5. **Appendix – Acronyms & Definitions**



# Document Re-release Schedule




- Will begin document refresh TFMData Flight and Flow Nov and Dec 2023.
- Targeting document refresh for TFMData Request/Reply Jan 24
- Schedule subject to change if service updates are released and existing Operational Context documents need to be updated
- Coordinating with service's producer program to finalize drafts and get documents uploaded to NSR,

**Contact Us:**

Xavier.Pratt@lstechllc.com

Ray.Mitchell@lstechllc.com

SWIFT

**Past documents available on NSRR site: https://nsrr.faa.gov/**

# Information Services on SWIM

**WEATHER**
Radar, PIREPS, windshear, microburst predictions, storm cell, and lightning information

**FLIGHT/FLOW**
Aircraft scheduling, routing, and positional information

**AERONAUTICAL**
NOTAMS, Airport reference and configuration data, Special Activity Airspace (SAA), Temporary Flight Restriction (TFR)

**SURVEILLANCE**
En Route: aircraft position, beacon codes, handoff status

Surface: movement, approach radar, departure event data

# FENS/SWIM Program Overview

## SWIFT 21 Update

Presented to: SWIM Industry-FAA Team (SWIFT 21) Meeting

By: Jamie Greene, FENS Program Manager, Vik Chokshi, S2D/IMS Lead, SWIM

Date: November 9, 2023

Federal Aviation Administration

# Agenda

- **Program Descriptions/Status**
- **FENS/IMS Relationship**
- **Program Schedule**
- **Transition Strategy**
- **Operational Environment**
- **User Community Expectations**
- **Questions**

# Definition of Program

## FENS Program Overview

- **Replaces 21+ year old FAA Telecommunications Infrastructure (FTI) leased services contract (~30,000 services at over 4,600 sites)**
  - 15-year performance-based leased services contract with vendor incentives for performance and collaboration
  - Offers price stability and predictability through negotiated fixed prices with built-in technology refresh

- **Provides highly-available and secure communications, information services and networking capabilities featuring requirements developed with extensive industry input**
  - Meets FAA telecommunications requirements
  - Supports new operating environments, added security and government mandates
  - Enables faster provisioning with modern industry methods/tools for ordering based on a simplified managed services contract structure
- **Enables the FAA to adopt advances in the commercial telecommunications market – enables innovation and competition and insulates FAA from industry sunsetting**

# Definition of Program

## SWIM Segment 2 (S2D) Program Overview

- **Provides funding for Information Management Services (IMS) on the FAA Enterprise Network Services (FENS) contract**

- **Develops IMS on FENS to replace NEMS on FTI, with a fully service-based contract**
  - Resulting in newer technologies and greater capabilities at lower cost

- **Expands SWIM's operational capabilities into the FAA's cloud**
  - Planned ESCS capabilities will be met and enhanced in S2D
  - Reduces dependency and costs of VPNs through ability to exchange data from external partners over the internet
  - Enables international Air Navigation Service Providers (ANSPs) exchanges with NAS systems

- **Supports Efficiency Critical RMA messaging infrastructure**
  - Required by systems such as TBFM, TFDM, FMDS, CSS-FD, and SWIM Segment 3
  - Supports the Mission Essential Operating Environment (ME-OE)

- **Provides internal FAA and external user portals**
  - Easier on-boarding

# FENS Addresses a Changing Landscape

***An Unparalleled Shift in the Commercial Telecommunications Industry from older TDM technology to modern IP networks***

**Evolution of Commercial Telecom Services**

- Broadband access – high-speed last-mile
- Emergence of wireless services – 4G/LTE, 5G, SATCOM
- Zero-Trust security architecture
- “Smart Networks” – Software Defined Networking, Machine Learning, Analytics
- Proactive management – predictive analytics, Operations Support System/Business Support System (OSS/BSS)
- Network Function Virtualization
- Continuous diagnostics and mitigation

**New and Evolving Missions Supported by the NAS**

- Increasing demands – air traffic volume, bandwidth, resiliency
- Information Management System (IMS)/System Wide Information Management (SWIM)
- FAA Cloud Services
- UAS/UAV
- Commercial Space

# FENS Will Meet Existing Requirements

**All Services that operate on FTI will be available on FENS**

- The number of NAS services and proportions that are TDM will change
- Security controls will evolve

**Existing user requirements will not change from a performance standpoint, e.g., availability, latency, etc. will be supported**

- Bandwidth for those services may increase
- High-availability and other services requiring diversity will be supported
- TDM and other legacy interfaces will be supported

**Systems need to be native IP to take advantage of all FENS operational benefits and avoid future transition costs (FAA side TDM-IP Migration)**

**Existing Enterprise Service requirements for SWIM, DNS, NTP, etc. will be supported on FENS**

# IMS - More Robust and Accessible SWIM Infrastructure

**IMS infrastructure to support Efficiency Critical level of messaging**

- Required by systems such as TBFM, TFDM, FMDS, CSS-FD, and SWIM Segment 3
- Efficiency-critical messaging to be available both on-premise and in cloud

**IMS-in-the-Cloud (IMS-C) expands FAA's cloud messaging capability to include**

- Web Services as well as JMS
- Ingestion of content external Producers
  e.g., international Air Navigation Service Providers (ANSPs)

**Enhanced IMS user portal capabilities**

- Expanded external IMS user portal capabilities supporting enhanced cloud messaging
- New internal portal providing NAS IMS users with similar self-management capabilities

# FENS Program Status

FENS will modernize the FAA's network architecture and technology, enabling the innovation needed to support NextGen operations and meet evolving security and resiliency needs while addressing the impacts of industry TDM discontinuances to the NAS.

**•Delivers 30,000+ Services across 4,600+ sites featuring:**

**•Modern Network Connectivity Solutions**

**•Advanced Network Management**

**•Zero Trust Security Solutions**

## Current Status (as of November 6, 2023)

- **Final Investment Decision (FID) to proceed with tailored FENS Alternative and approve initial spending through December 2023 was approved on February 28, 2023.**
- **FENS contract was awarded on March 27, 2023, to Verizon Business Network Services, LLC.**
- **Over the first 18 months, the FAA is:**
  - Validating and testing the vendor's solutions
  - Preparing FAA sites for new services
  - Preparing for transition activities, and
  - Establishing schedule and implementation/operations processes between FAA and selected vendor
- **The FAA has established key sites in the Indianapolis airspace to test a representative sample of operations services to support an In-Service Decision (ISD) in the fall of 2024.**
- **FENS is segmenting our test approach to prioritize FAA TDM services in the test plan to achieve ISD and provide a solution for future TDM discontinuances in the near term.**

# IMS Program Status

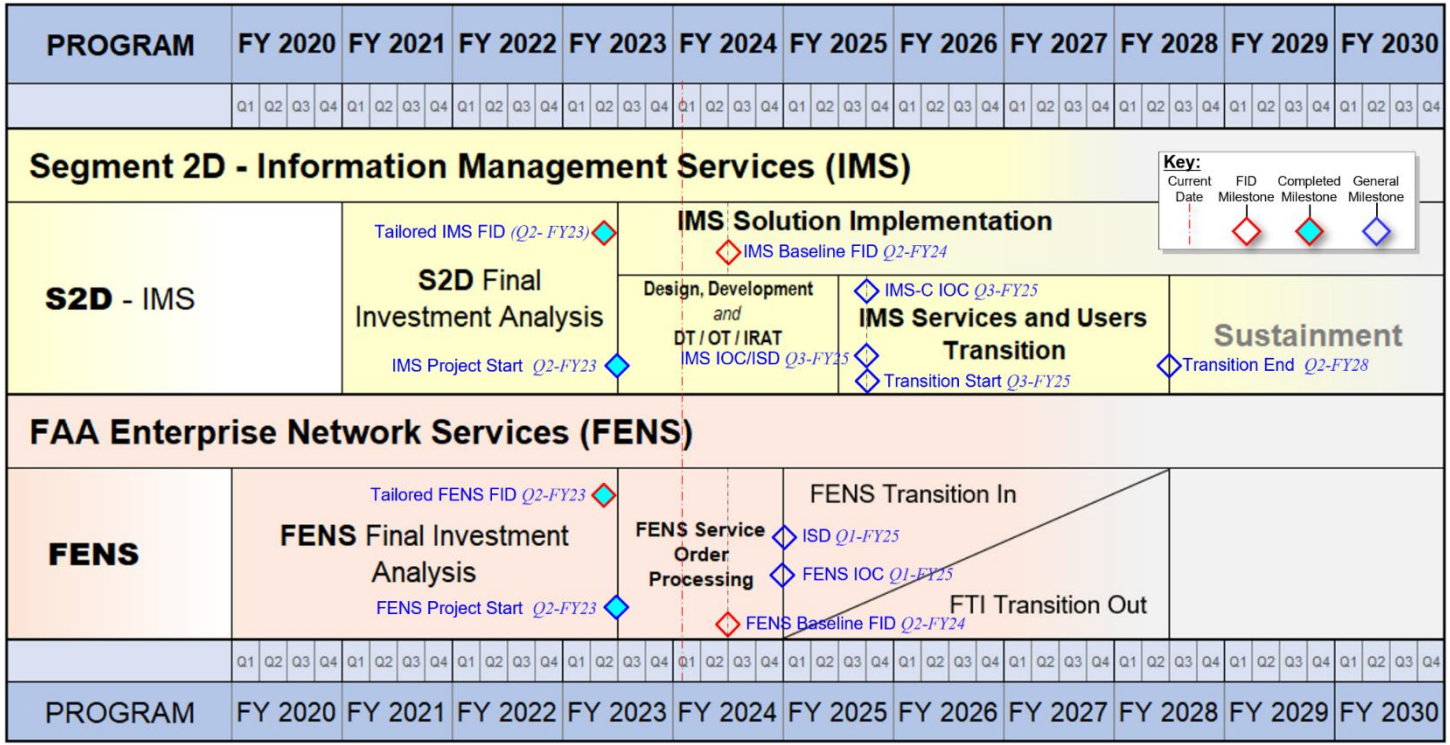
•IMS supports Efficiency Critical RMA messaging infrastructure and provides internal FAA and external user portals. Includes two-way communication functionality and sensitive data.


**Current Status**

- **Solution Review with vendor (in progress)**
- **Next Steps:**
  - Finalize implementation and transition schedule
  - Communicate transition planning:
    - User impacts
    - Anticipated changes for uninterrupted service
    - Timeframe programs will need to be ready to move over to the new system

# Program on a Page – S2D and FENS

***Pending final implementation approach****




S2D & FENS-2023-10-30 V19.5 VC

***Dates are notional**

# FENS/IMS Relationship

- **FENS/IMS Relationship**
  - FENS is an investment that replaces FAA Telecommunications Infrastructure (FTI) capabilities with FENS networking and enterprise services capabilities.
  - FTI NAS Enterprise Messaging Service (NEMS) infrastructure and associated services will be replaced by FENS Information Management Services (IMS).
  - SWIM Segment 2D acquisition appropriates funding for IMS, IMS-related portions of FENS, and transition of SWIM users.
- **IMS Implementation**
  - IMS will be developed and deployed by the vendor (Saab/Verizon).
  - IMS uses commercial appliances, tools and new software with significant development, configuration management and testing phases.
  - IMS in the cloud (IMS-C) includes two-way communication functionality and sensitive data.

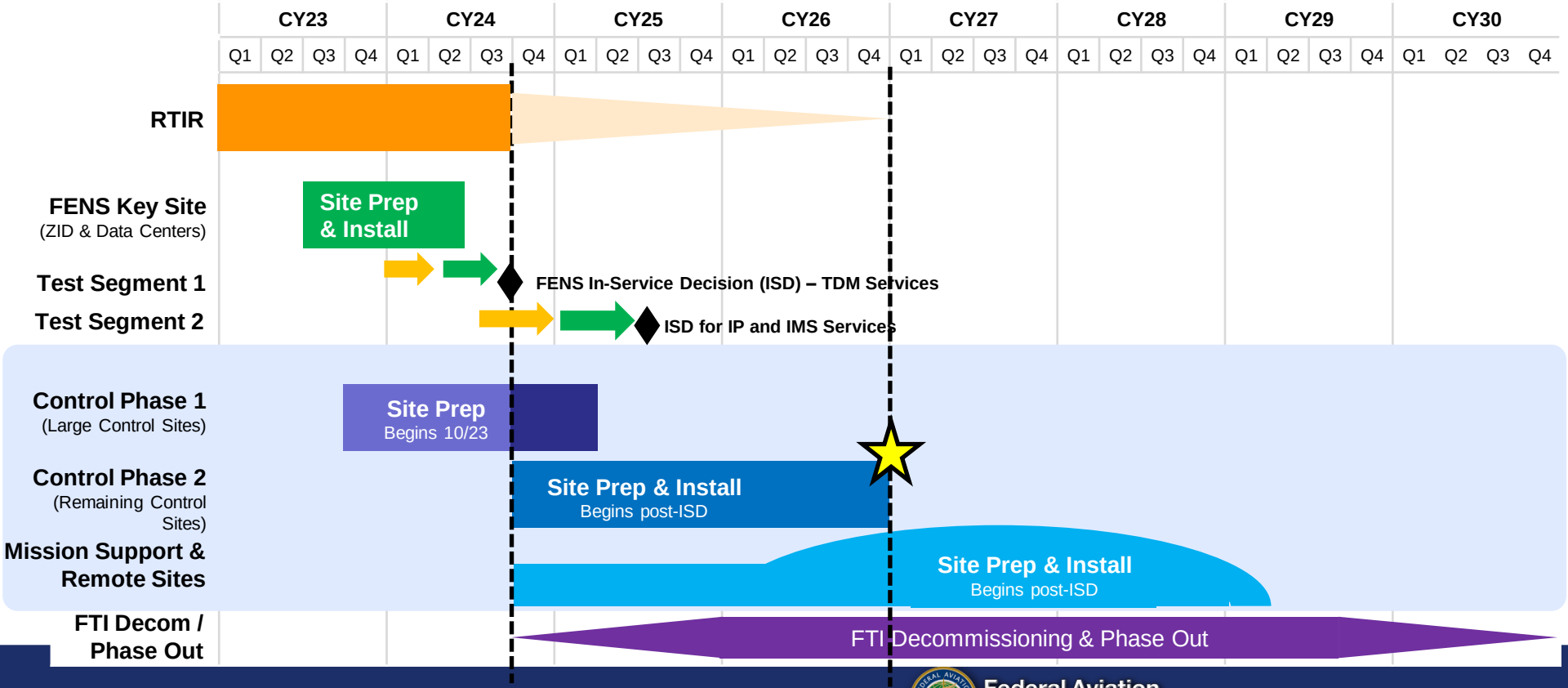
# Transition Planning Objectives (Goals)

**Design a FENS deployment strategy to address NAS-wide TDM discontinuance**

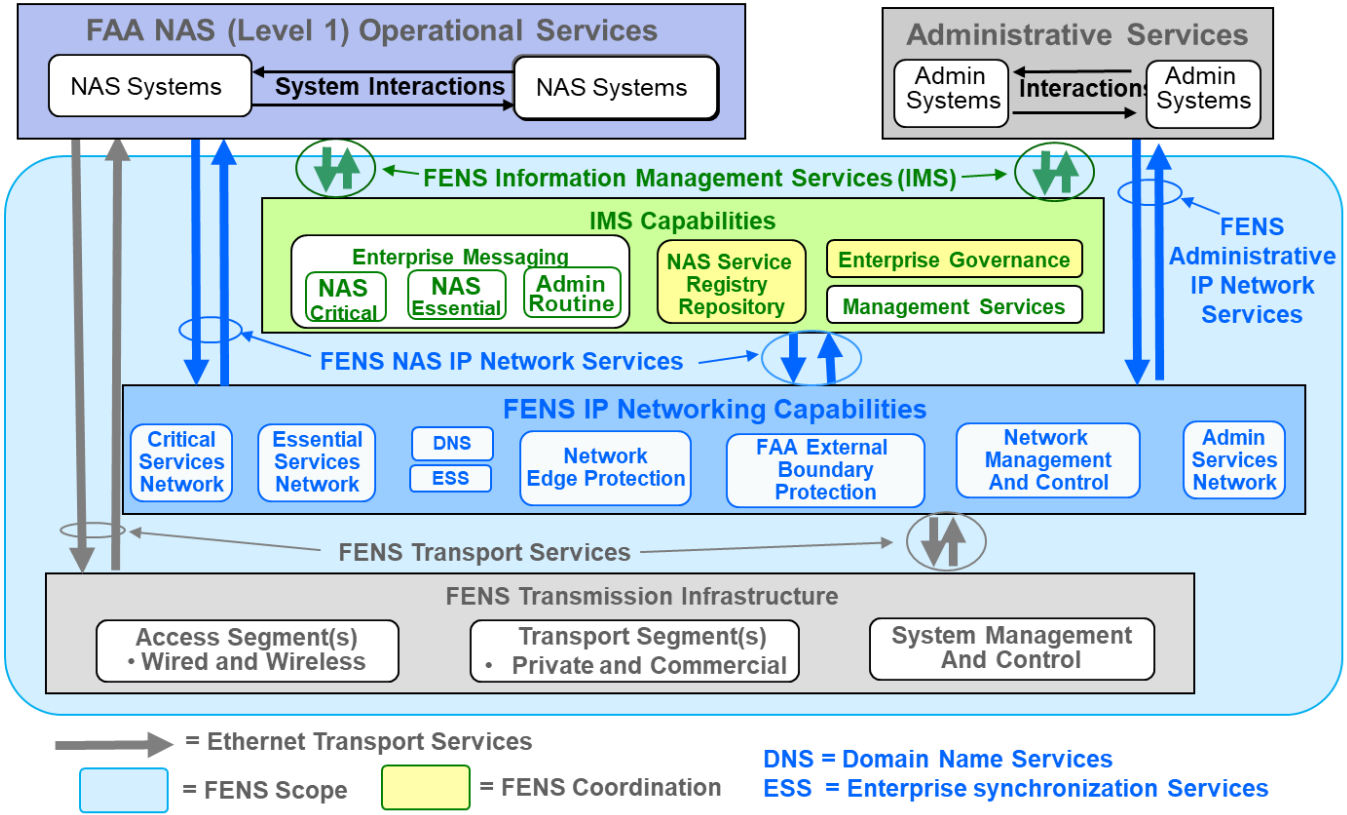
- Deploy FENS as safely and quickly as possible
- Manage and minimize operational risk, both NAS and Mission Support
- Avoid additional investments in FTI as much as possible
- Minimize dual operations costs of maintaining two telco infrastructures simultaneously
- Leverage lessons learned from the FTI transition (i.e., expected site transition rate, personnel resource constraints, etc.)
- Maximize the use of currently available Tech Ops personnel resources

Note: Bars in timeline are not intended to reflect effort (actual or relative)

# FENS Testing & Transition Plan Timeline



# FENS Operational Environment



# User Community Expectations

- **IMS users will be expected to…**
  - Keep their contact information up-to-date in the SWIFT Portal or with their SWIM POC (depending on how they receive data today)
  - Anticipate changes to client libraries to be used, potential minimal code changes in their client code, authentication mechanism changes/credential information changes, etc.
    - Some work may be required on the user's end to integrate with the new messaging infrastructure.
  - Anticipate potential re-testing in a test environment for users who provide data to the FAA
  - Look out for notices of future forums/meetings on user transition

# Questions

# SWIFT Focus Group Update

## SWIFT 21

**Presenter:** Mark Hopkins – LS Technologies
John Kelley – LS Technologies
Xavier Pratt – LS Technologies

**Date:** November 9, 2023

# Purpose of SWIM Widgets

- Subscribed SWIM data may be leveraged for general visualizations but may not be the most functional based on the specific operational need. For example:
  - A moving map of en route aircraft
  - Weather map of CONUS
- In the past, widgets have been developed to visualize SWIM data in operationally-actionable ways
  - Enable faster, more accurate decisions based on useful visualizations of data
- Widgets are lightweight web-based applications that can be scaled to user desktop or mobile devices to address user operations

***In practice…***

- Widget applications offer a means to leverage SWIM Information Services and related lessons learned with the community
- Community-driven solutions to solve real-world operational problems via relevant SWIM data / NAS systems

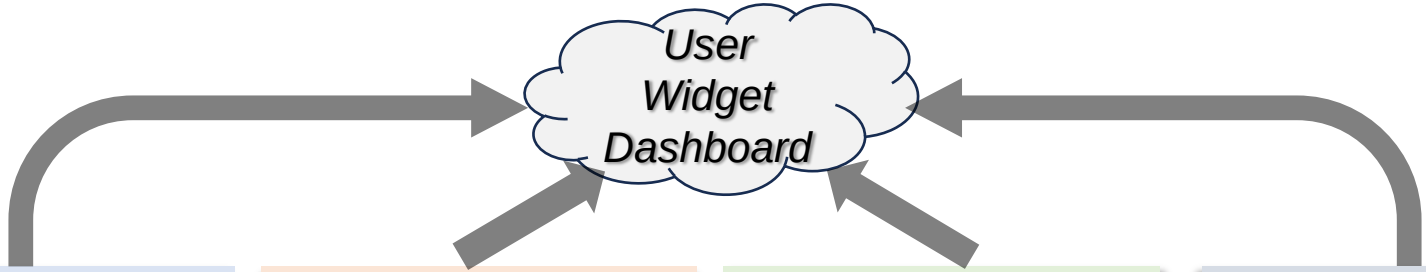
# Case Study Recap

- **Scenario Summary**
  - **JFK – MIA Flight Ops**
    - How best to adjust operations to adapt to dynamic environment
    - Each user and flight may have different priorities. TOS are submitted to allow for collaborative solutions including the abilities to prioritize options on individual flight basis
    - Constraints
      - *Planned Space Launch operations near JAX; airspace resource impacted*
      - *TMIs implemented as WAVEY and RBV resources become congested*
      - *Ground and departure congestion at JFK*
- **Problem Statement**
  - Timely awareness of changes to en route and arrival environments. Airspace Users/Operators need access to rich, timely data to efficiently plan, execute and deliver operations which support more predictable 4D-trajectory outcomes.

## *Proposed Problem Mitigation*

- Aggregated view of data to correlate time elements with physical elements from DEPT to ARR
- View should permit users to correlate how TOS routes / user submitted preferences are impacted by constraints

# Case Study Notional Widget




## TBFM MIS

Widget should consider user critical meter reference elements (MRE) as listed below

- ACID
- Meter points (MRE)
- Meter Fixes (MRE)
- Runway threshold (MRE)
- Scheduled time of arrival (time)
- Estimated time of arrival (time)

## TFMData

Widget should consider constraint impacts from traffic volume and events such as Space launch Ops

- ACID
- Flow Constrained Area (FCA)
- Flow Evaluation Area (FEA)
- TMI / Control Times Information

## SFDPS

Widget should data relevant to user flights or enroute airspace of interest.

- ACID
- Flight Plan Information
- Expected Departure Information
- Sector Assignment
- Adapted ARR/DEP Routes/Route Status

## STDDS

Widget should consider user arrival airport traffic information and departure events.

- ACID
- Airport Traffic
- Track and Flight Plan Data
- Surveillance Data for Traffic Insight

# TBM Widget Mockup Example

•Flight / Time-Based Ribbon View

•<< Select ACID to toggle views >>

•Constraints Dashboard View

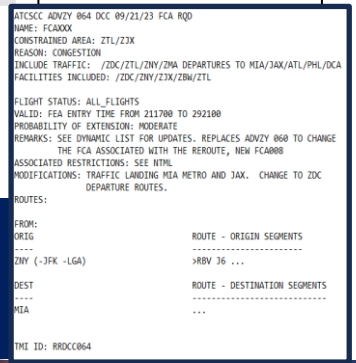
•**Meter Reference Elements** comes from *TBFM MIS* message "air" message category. Airport arrival configuration and runway information is also available in the "con" message category.

| Departure Airport | Arrival Airport | ACID | Meter Point | Arrival Meter Fix | STA | ETA |
|---|---|---|---|---|---|---|
| KJFK | KMIA | SWF123 | FLL | PRCHE | 2023-09-21 12:23 | 2023-09-21 12:34 |
| KLGA | KMIA | SWF456 | FLL | PRCHE | 2023-09-21 12:48 | 2023-09-21 12:57 |
| KJFK | KJAX | SWF789 | CRG | LUNNI | 2023-09-21 12:31 | 2023-09-21 12:40 |

•Evaluate constraint delay based on TOS Option/OOI times

| Flight ID | Trajectory | Block Time Calc. | Assigned Enroute Delay Change |
|---|---|---|---|
| *SWF123* | *TOS A* | - | *-7 mins* |
| | *TOS B* | - | *+12 min* |
| | *TOS C* | - | *- 4 mins* |

•View raw SWIM data such as advisory messages for FCAs



```
ATCSCC ADVZY 064 DCC 09/21/23 FCA RQD
NAME: FCAXXX
CONSTRAINED AREA: ZTL/ZJX
REASON: CONGESTION
INCLUDE TRAFFIC:  /ZDC/ZTL/ZNY/ZMA DEPARTURES TO MIA/JAX/ATL/PHL/DCA
FACILITIES INCLUDED: /ZDC/ZNY/ZJX/ZBW/ZTL

FLIGHT STATUS: ALL_FLIGHTS
VALID: FEA ENTRY TIME FROM 211700 TO 292100
PROBABILITY OF EXTENSION: MODERATE
REMARKS: SEE DYNAMIC LIST FOR UPDATES. REPLACES ADVZY 060 TO CHANGE
         THE FCA ASSOCIATED WITH THE REROUTE, NEW FCA008
ASSOCIATED RESTRICTIONS: SEE NTML
MODIFICATIONS: TRAFFIC LANDING MIA METRO AND JAX.  CHANGE TO ZDC
               DEPARTURE ROUTES.
ROUTES:

FROM:
ORIG                              ROUTE - ORIGIN SEGMENTS
----                              -----------------------
ZNY (-JFK -LGA)                   >RBV J6 ...

DEST                              ROUTE - DESTINATION SEGMENTS
----                              ----------------------------
MIA                               ...


TMI ID: RRDCC064
```

***Widget Key Takeaways:***

- An API that allow users to consume data for analysis of benefits and delays
- Users would likely make their own determination on how best to utilize the raw data

# Discussion

- The TBM widget is an example of a widget that may be applied to address information gaps related to the JFK-MIA case study.
- Other SWIM services can be leveraged to enhance widgets, depending on user needs for this case study. For example:
  - ARR/DEP fix status?
  - Airport resource status?
- What other desired information/topics would you like to see covered?

*•Note: In lieu of upcoming TFDM SWIM services (TTP and TFCS), STDDS data can currently be used to supplement ground/surface Ops information*

# Next Steps

- **Latest session held September 28, 2023. Next tag-up TBD.**
- **In the interim, the Flight Data & TBO Microsoft Teams channel is active. Volunteers are encouraged to use this space for:**
  - Announcements and General Discussions
  - Document Sharing (background information, technical exchange, presentations)
  - Stakeholder Feedback and Engagement
- **Contacts:**
  - Mark Hopkins / Mark.Hopkins_NLST@lstechllc.com
  - John Kelley / John.Kelley@lstechllc.com
  - David Almeida / David.Almeida@lstechllc.com
  - Xavier Pratt / Xavier.Pratt@lstechllc.com
  - Stefanie Calabrese / Stefanie.C.Calabrese@faa.gov

# Time Based Flow Management (TBFM)

## Release 4.15

Presented to: **SWIFT**

By: **Shakeela Bader**

Date: **November 9, 2023**

Federal Aviation Administration

# Agenda

- **TBFM MIS Overview**
- **MIS 4.15 Data Enhancements**
- **MIS Mediation for Consumers**
- **Current Status of Consumers**
- **Testing R4.15 in FNTB**

# TBFM MIS Overview

- **The Time Based Flow Management (TBFM) Metering Information Service (MIS) provides the following data products via SWIM:**
  - Scheduled Times of Arrival (STAs) to the runway threshold, meter fix and all arcs,
  - Estimated Times of Arrival (ETAs) to the runway threshold, meter fix and all arcs,
  - Airport Configurations presently in effect at every ARTCC
  - Airport Acceptance Rates and flow settings (e.g. runway buffer) in effect at every ARTCC
  - En Route Departure Capability (EDC) aircraft departure times When and where Adjacent Center Metering (ACM) is occurring and at which sites
- **TBFM MIS 4.3.2 is the current version**
- **TBFM MIS 4.15  is the updated version**

# MIS 4.15 Data Enhancements

- **TBFM Release 4.15 provides new JMSDD properties for enhanced filtering, additional flight data, and additional documentation fixes including:**
  - Departure Airport and Destination Airports information
  - Heartbeat messages
  - Identification information (Computer Identifier (CID), Global Unique Flight Identifier (GUFI))
  - Versioning information

# MIS 4.15 Deployment Schedule

- **4.15 Key Site –** ZTL 5/1
- **4.15 Key Site –** ZAB 5/8
- **4.15 Phase 2 Mediation –** mid-June
- **Mediation sunset for all consumers** – TBD

# Current Status of Consumers

- **NAS Enterprise Service Gateway (NESG) users had their subscriptions updated to receive an automated mediated feed for the current version of R4.3.2 if they didn't update to R4.15**
- **SWIM Cloud Distribution Service (SCDS) users will need to update to R4.15, as they aren't being auto-mediated to R4.15**
- **The automated mediated feed will be sunset in TBD.**

# Consumer Testing of R4.15

- **24/7 4.15 MIS Publisher in the FAA National Test Bed (FNTB)**
  - 1-hour of data available via the NAS Service Registry and Repository (NSRR) to support consumer testing of R4.15 MIS

# Contact Info


**Samantha Witt**
TBFM Program Manager
samantha.j.witt@faa.gov

**Yong Li**
TBFM Project Lead
yong.li@faa.gov


# Common Support Services - Flight Data (CSS-FD)

## SWIFT 21 Update

Presented to: **SWIFT 21**

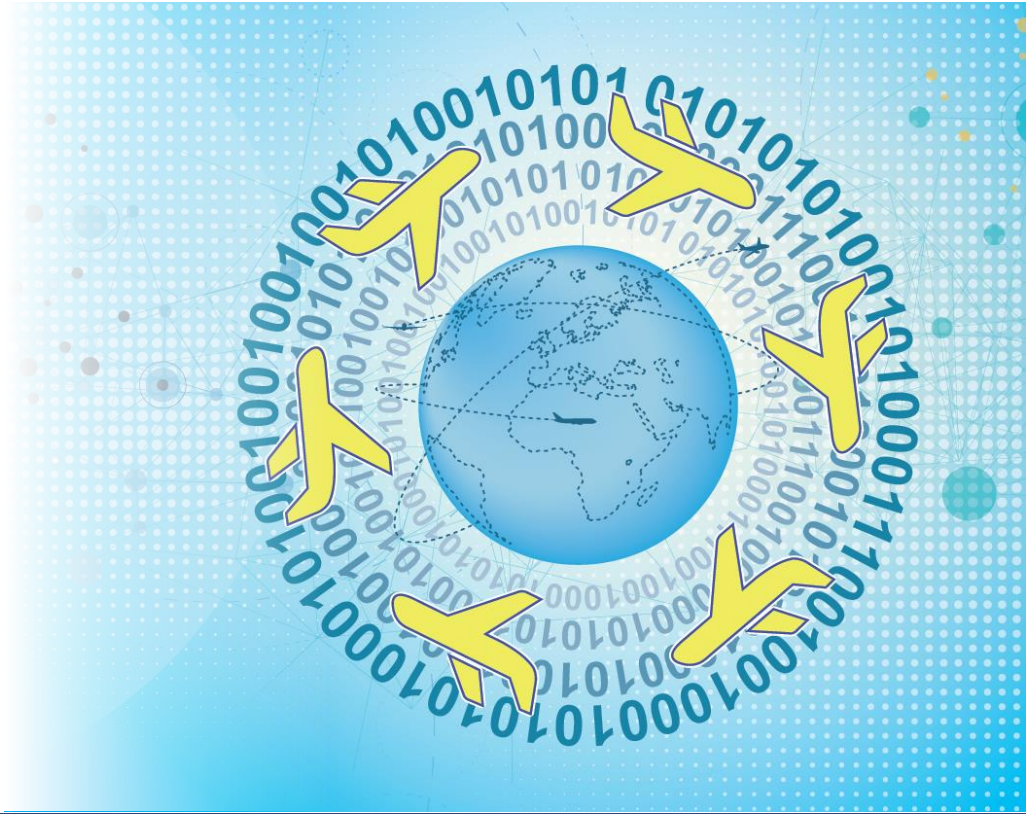
By: **Lucas Curns**

Date: **November 9, 2023**

Federal Aviation Administration

# Agenda

- **Common Support Services – Flight Data (CSS-FD) Overview & Status Update**



# CSS-FD

Common Support Services - Flight Data

***CSS-FD is the set of services that will deliver modern flight information management and facilitate the transition to the new FF-ICE information exchange environment***

- Establishes standards-based flight planning and filing environment
- Allows for early constraint evaluation and flight specific feedback through trial requests and preliminary flight plans
- Provides single common reference for flight data sharing and management
- Supports international data exchange standards
- Enhances collaborative decision making

# ICAO FF-ICE (R1) Services

Mandatory

**Filing Service**

- Related Messages: (Filed Flight Plan, Flight Plan Update, Flight Cancellation, Submission Response, Filing Status)

**Flight Data Request Service**

- Related Messages: (Flight Data Request, Submission Response, Flight Data Response)

Optional

**Trial Service**

- Related Messages: (Trial Request, Submission Response, Trial Response)

**Data Publication Service**

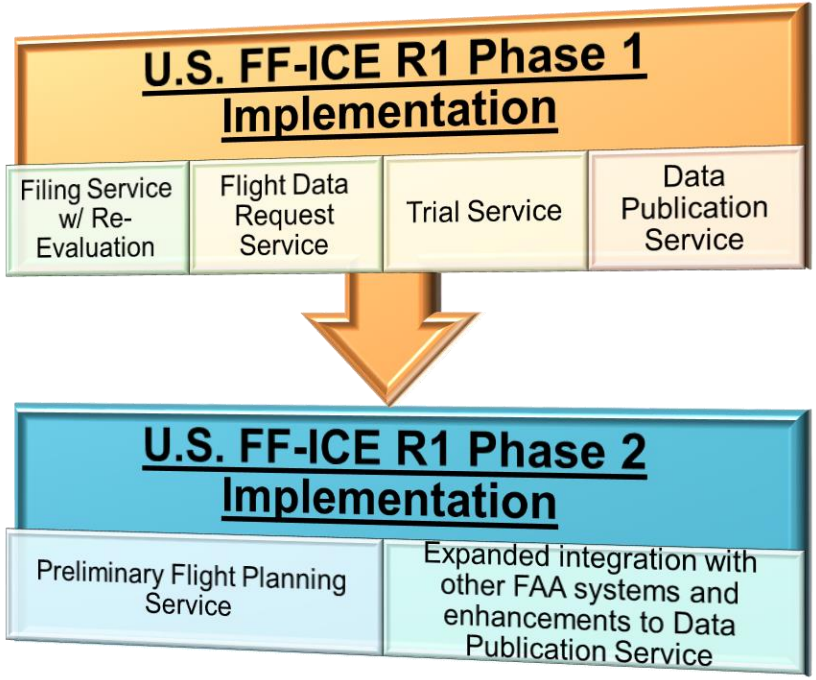
- eASP will indicate the events and/or criteria to which a subscriber can subscribe

**Planning Service**

- Related Messages: (Preliminary Flight Plan, Flight Plan Update, Flight Cancellation, Submission Response, Planning Status)

**Notification Service: (not in current CSS-FD scope)**

# CSS-FD FF-ICE (R1) Services (Planned)




**CSS-FD Scope being finalized and may be adjusted before implementation*

# CSS-FD Phase 1: Key NAS Benefits

- **CSS-FD is a cornerstone for the Info-Centric NAS and on the critical path for Performance Based Operations**
  - Reduces duplicate/multiple flight plans, improves safety and increases productivity
  - Improves flight planning through sharing of flight data
  - Enables richer flight information exchanges amongst stakeholders
  - Supports a Collaborative Decision Making (CDM) Environment
- **Benefits realized with CSS-FD**
  - More accurate and robust Flight Plans to create better trajectories
  - More efficient flow planning (Additional data elements, 4DT and Performance Models)
  - Trial Requests allow for improved planning

**Richer Flight Information**

**Improved Planning**

**More Informed Decision Making**

**4DT for Improved Flow Management**

# Where is CSS-FD now?

**CSS-FD Risk Reduction Activity (prototype)**

Feb 2023

Present

Through Q3 CY25

2026

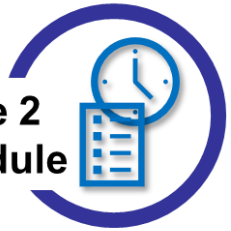
2029

**Phase 1 Final Investment Decision**

- Defining Architecture and Functionality/Services
- Continuing Collaboration and Outreach
- Finalizing scope and schedule
- Writing acquisition documents and conducting proposal evaluation

**Phase 1 Design, Development, and Implementation**

**Determine Phase 2 scope and schedule**



# Outreach & Collaboration

## Call to Action!


- **Stakeholder input is critical to understanding your needs and concerns**
  - Received feedback from FIXMCCB-CFSP Round table and from the CSS-FD RRA continues to drive discussions regarding harmonization between EUROCONTROL and the FAA
- **Please continue to help us understand how FF-ICE implementation will impact you**
  - We will need data to quantify these benefits
  - We would like to understand what is most important to you
- **There will be multiple ways to communicate/collaborate with us**
  - SWIFT – User Forums / Focus Groups
  - Small group / one on one meetings
  - CSS-FD Web page (coming soon)
  - Emails & Surveys

# Contact

**Kristin Cropf**
SWIM Program Manager
kristin.m.cropf@faa.gov

**Lucas Curns**
CSS-FD Lead
lucas.a.curns@faa.gov

**Cora Buck**
CSS-FD RRA Lead
cora.buck@faa.gov

# TFMS, TBFM and TBFM Listening Session

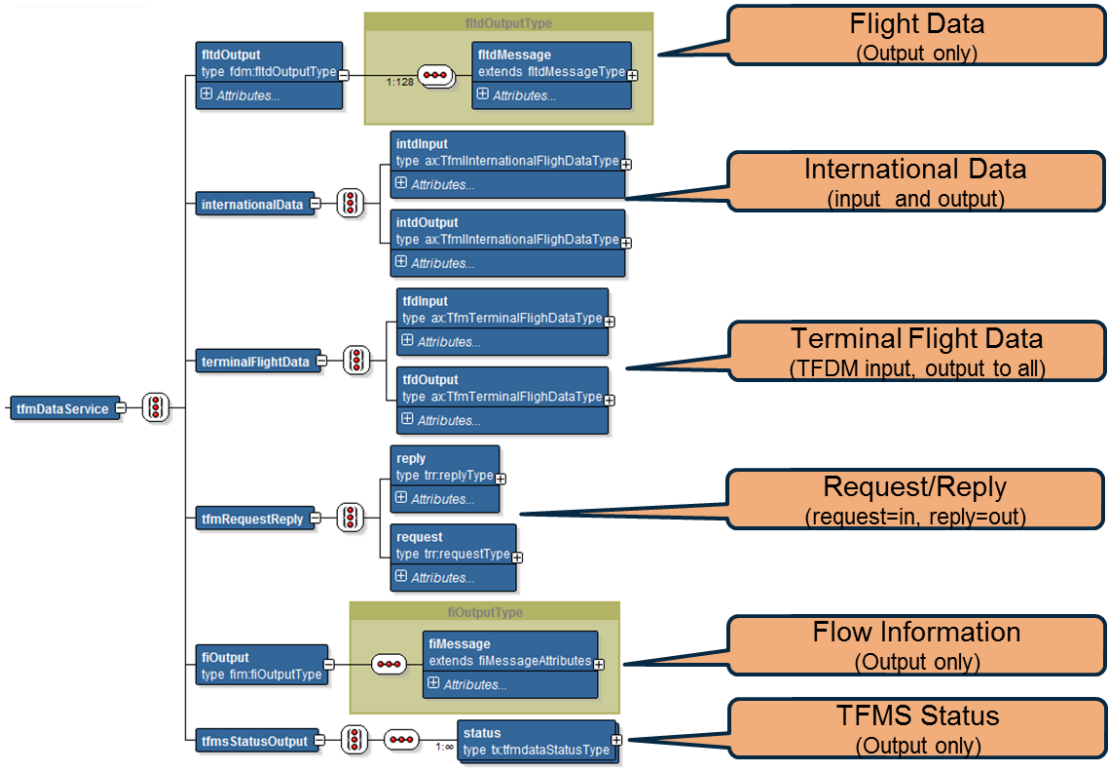
- *ATC Perspective on Flight Data and Trajectory Management*
- *NAS User Perspective on Flight Data and Trajectory Management*

# Meet the Panel!

- **ATO Program Management Office**
  - Joshua Gustin – *Director, Telecommunications Integrated Services Office (AJM-5)*
- **TFMS Program**
  - Tracy Coleman - *FAA Traffic Flow Management System Sustainment (FAA ATCSCC Desk)*
- **TBFM Program**
  - Shakeela Bader – *Systems Engineer, TBFM Program Office (JMA Solutions)*
- **TFDM Program**
  - Lidiya Gavrilenko – *Terminal Flight Data Manager Program System Engineer (AJM-224)*
- **Airline ATM & Advanced Operations**
  - Mark Hopkins – *CDM / ATM & Advanced Operations Specialist (LS Technologies)*

# TFMData Operational Context

- **TFMData is composed of six Business Functions**
  - TFMS includes multiple messages with large data sets, sent through the TFMData service
  - TFMData sends/receives data from multiple SWIM services, which impact the information that TFMS produces
  - TFMData Status business function provides status of all of the data flows that directly or indirectly contribute to TFMS, this includes both TFMS and non-TFMS data flows:



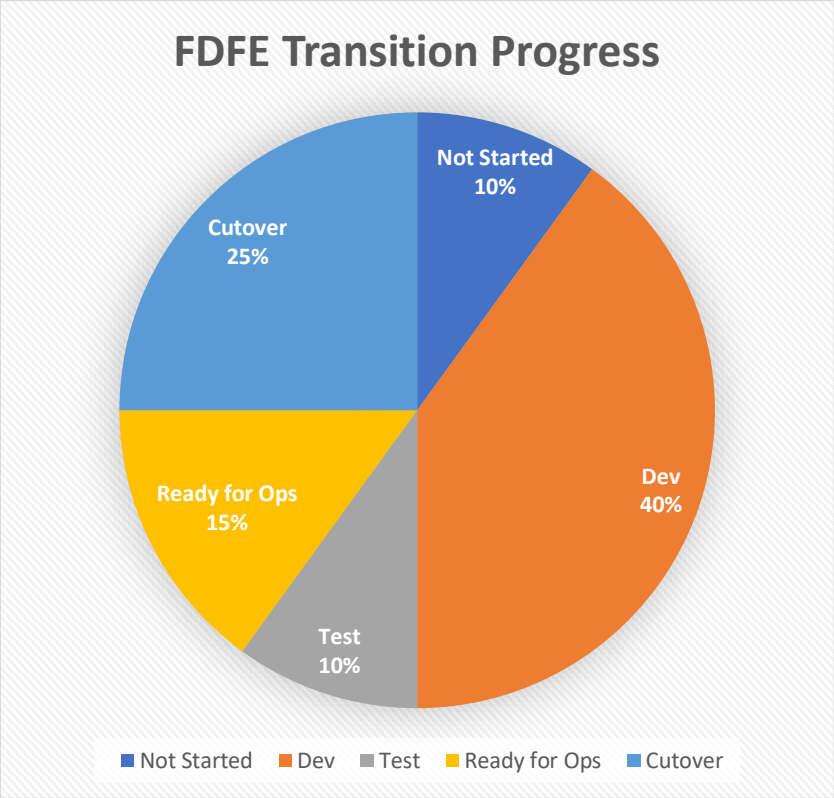
# TFMS FDFE Decommission

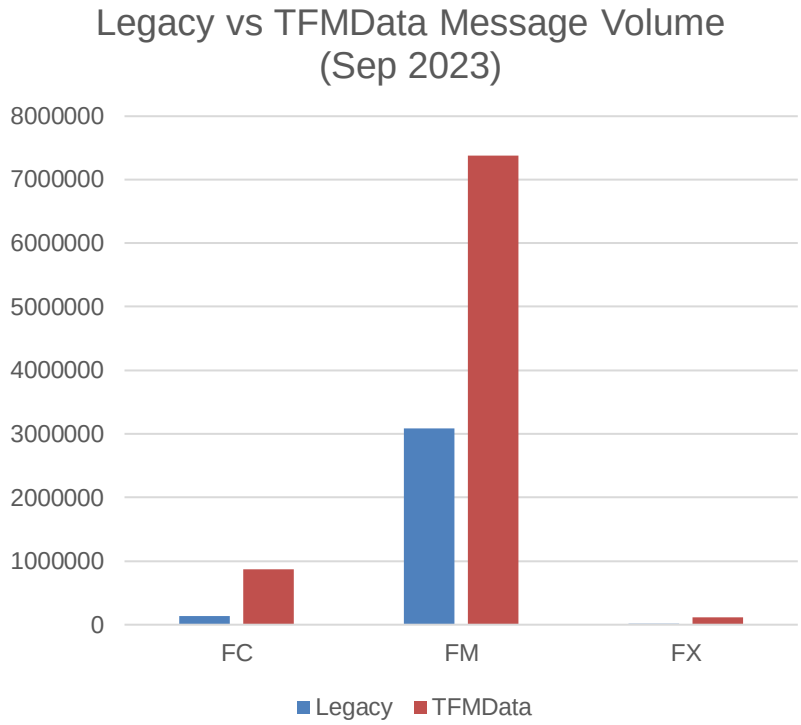
## SWIFT 21

# Retirement of the FDFE TFMS Direct Service (Legacy)

- **FAA is planning a new investment to replace the TFMS system and interfaces**
- **Retirement of the FDFE/ADLFE legacy (direct services) interface will be a critical dependency**
  - TFMdata Request/Reply was initially deployed in 2016 as part of Release 13
  - All FDFE data exchange capabilities are replicated in the TFMData Request/Reply FDBlock for submission of Flight Create (FC), Flight Modify (FM) and Flight Cancel (FX)
    - **FDFE to TFMData FDBlock transition deadline is 12/31/2023**
    - FDFE to TFMData SSBlock is the next transition target (TBD)
    - CTOP (legacy) to TFMData (TBD)
  - FSM/ADL is currently in solution discovery phase (TBD)

# Retirement of the FDFE TFMS Direct Service (Legacy)



# CDM Questions & Concerns

- **FAA Documentation**
  - Noted lack of best practice (playbook).
    - TFMS has presented at various Industry days, SWIFT meetings and workshops going back to ~2017 to give CDM members context and direction on the various R/R functions. Additionally, FAA has provided Ops Context documents, sample messages and test cases/procedures to airlines to assist with development.
  - Message/Function not aligned as expected within documentation.
    - There have been a small number of deficiencies that have been documented and addressed with updates to the JMSDD or temporary workarounds – please provide examples of issues impacting members transition to FDBlock
  - Is a common algorithm possible so all carriers are using same similar data?
    - We understand that this question is not directed towards the FDBlock transition but the greater set of available TFMData service codes. The FAA has taken this under advisement and will be looking to provide guidance on additional services provided through TFMData. ADL/FSM does not presently have a transition date.

# CDM Questions & Concerns

- **FTI National Testbed (FNTB)**
  - Ease of carrier access to FNTB to test and follow on access to FTNB is noted as challenging and difficult.
    - Please provide details on what is difficult with regard to connectivity and testing. Most CDM members have had access to FNTB prior to Nov 2021, when the FDFE decommission date was first announced. The TFMS testing schedule still contains many openings between now and the decommission date.
  - Suitable number of staff to support the number of carriers in the testing process to meet the FAA's 12/31/23 timeline.
    - R14 FNTB queue requests submitted to SWIM have all been completed.
    - R14 Ops queue requests are in process.
    - FAA is working with L3H to fill staffing vacancies in FNTB, and L3H is leveraging their Melbourne staff to help in FNTB.
    - If carriers are not able to make the deadline, please notify TFMS as soon as possible.

# CDM Questions & Concerns

- **FAA Moratorium**
  - How will testing and transition will be affected?
    - Testing will not be impacted, but Ops cutovers will not be possible during the moratorium periods. If any airlines have concerns that they will be unable to complete the transition in time, they should reach out to the FAA.
- **Looking into 2024**
  - Do members need to sustain their Legacy connection(s) to FDFE Legacy services once established on the SWIM feed.
    - No, the expectation is that CDM members disable their legacy services when they begin publishing on SWIM. Publishing data via both legacy and TFMData may result in ‘race conditions’ with undesirable results.
  - What will the expected contingency plan be if the SWIM feed fails?
    - The legacy system will be available for fallback should the user have issues with their SWIM client. Note that the SWIM system has more redundancy and a quicker failover than the legacy FDFE.

# FAA Focus Areas

- **What lessons learned can we apply to better facilitate two-way communication of transition plans and status moving forward?**
  - The FAA is mindful that CDM members require sufficient lead times to make interface changes
  - The FAA will avoid yead-end transition dates to avoid impacts from holiday moratoriums

# Support Contact Information

| TFMS Direct Services | | |
|---|---|---|
| | Operations | Test or General Support |
| Contact | TFMS Help Desk | TFMS Second Level Engineering |
| Email | 9-ACT-TPC@faa.gov | 9-AWA-ATCSCC-SLE-Support@faa.gov |
| Phone | 609-485-9601 | 540-422-4171 |
| **SWIM TFMData** | | |
| | Operations | Test or General Support |
| Contact | NEMC – Enterprise Services | SWIM POC (your individually assigned contact) |
| Email | NEO-ES@faa.gov | Data-To-Industry@faa.gov |
| Phone | 855-322-NEMC (6362) Option 3 then Option 1 | |

# TBFM Operational Context

- **TBFM MIS publishes five categories of messages**
  - TBFM MIS publishes metering information to allow the TBFM system, FAA systems (e.g. TFMS), and industry to collaborate, share TBFM data and be informed of TBFM STAs that are in effect during metering events.

| Message Name | Description |
|---|---|
| **Aircraft Information <air>** | **Provides metering information about an aircraft; specifically: flight plan (relevant subset), STAs, ETAs, Meter Reference Elements (MREs) Assignments, and scheduling group information** |
| **Configuration Information <con>** | **Provides metering information about the configuration of the system; specifically: airport configurations, airport acceptance rates, TRACON acceptance rates, gate acceptance rates, Meter Point acceptance rates, runway acceptances rates, super stream class configurations, and satellite airport configurations** |
| **Other Information <oth>** | **Provides metering information about the status of metering and the status of system interfaces** |
| **Adaptation Information <adp>** | **Provides information about applicable system adaptation to include TRACON names, gate names, configuration names, Meter Reference Point names, and stream class names** |
| **Synchronization Information** | **Sent only to indicate an impending refresh of all TBFM data, either as a result of system startup or a periodic synchronization event.** |

# TBFM Metering Information Service

## SWIFT 21

Presented to: **SWIFT 21**

By: **Shakeela Bader**

Date: **November 9, 2023**

Federal Aviation Administration

# TBFM MIS Overview

- **The Time Based Flow Management (TBFM) Metering Publication Service (MIS) provides the following data products via SWIM:**
  - Scheduled Times of Arrival (STAs) to the runway threshold, meter fix and all arcs,
  - Estimated Times of Arrival (ETAs) to the runway threshold, meter fix and all arcs,
  - Airport Configurations presently in effect at every ARTCC
  - Airport Acceptance Rates and flow settings (e.g. runway buffer) in effect at every ARTCC
  - En Route Departure Capability (EDC) aircraft departure times When and where Adjacent Center Metering (ACM) is occurring and at which sites
- **TBFM MIS 4.3.2 is the current version**
- **TBFM MIS 4.15  is the updated version**

# TBFM MIS Overview Cont…

| Message Category | Message Group | Message |
|---|---|---|
| "air" (Aircraft Information) | <flt> | Flight Plan Information |
| | <trk> | Tracking Information |
| | <mrp> | Meter Reference Element (MRE) Assignments |
| | <eta> | Estimated Time of Arrival (ETA)s |
| | <sta> | Scheduled Time of Arrival (STA)s |
| | <sch> | Scheduling Information |
| "con" (Configuration Information) | <aac> | Arrival Airport Configuration Information |
| | <mar> | Meter Point Acceptance Rate |
| | <sac> | Satellite Airport Configuration |
| | <rar> | Runway Acceptance Rate |
| | <aar> | Airport Acceptance Rate |
| | <scc> | Super Stream Class Configuration |
| | <tar> | TRACON Acceptance Rate |
| | <gar> | Gate Acceptance Rate |
| "oth" (Other Information) | <int> | TBFM Interface Status Information Group |
| | <tmg> | TBFM Metering Status Information Group |
| "adp" (Adaptation Information) | <trn> | TRACON Name Group |
| | <gans> | Gate Names |
| | <apns> | Airport/Runway/Configuration Names |
| | <mrns> | MRE Names |
| | <scns> | Stream Class Names |
| "sync" Synchronization Information | <system_start> | System Sync Start |
| | <periodic_start> | Periodic Sync Start |
| | <periodic_end> | Periodic Sync End |

# Contact Info


**Samantha Witt**
TBFM Program Manager
samantha.j.witt@faa.gov

**Yong Li**
TBFM Project Lead
yong.li@faa.gov


# TFDM TTP Operational Context

- **TFDM Terminal Publication Service is a collection of TFDM related SWIM Services (pub/sub)**
  - ***Airport Information***
    - *Active Runway Configuration, Rates, Airport Delays, Runway Closures*
  - ***Flight Data***
    - *Block Times, Takeoff Times, ATC Flight State, Runway Assignments*
  - ***Flight Delay***
    - *Flight ID info, delay duration, reason*
  - ***Operational Metrics***
    - *Data Quality, Off Block Accuracy, TMAT Compliance, Emissions*
  - ***Traffic Management Restrictions***
    - *MIT, MINIT, Departure Stop*
  - ***Surface Management Programs***
    - *SMP information (e.g. start/stop time), lists of impacted flights*
- **The TFDM FOS Collaboration Services (TFCS) handles requests submitted by the Flight Operator System group of users. Functionality categorized into Airport Data requests and Surface Metering Program (SMP) Flight Substitution Requests**
  - ***Flight Substitution***
    - *Substitution requests / responses*
  - ***Airport Data***
    - *Ramp closure(s), Gridlock status*
  - ***Data Exchange (Request/Reply)***

# TFDM Management of Flight Trajectory Data

## SWIFT 21

Presented to: **SWIFT 21**

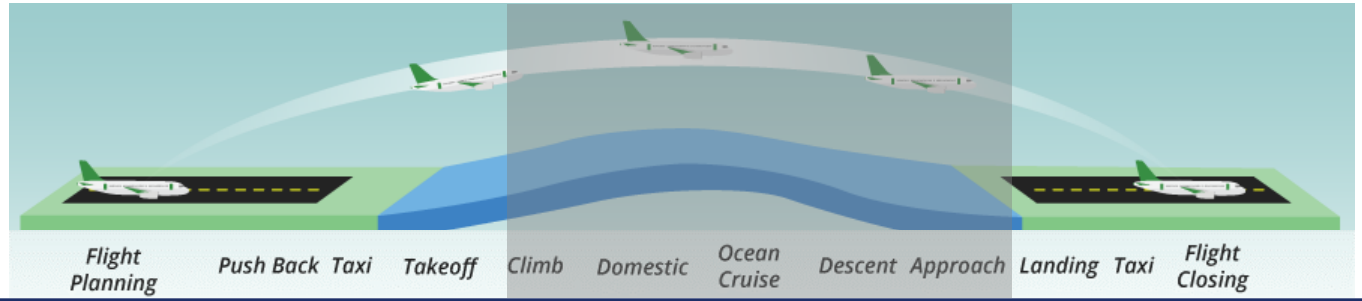
By: **Lidiya Gavrilenko**

Date: **November 9, 2023**

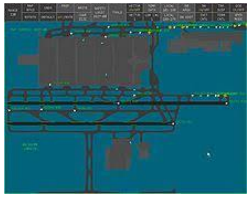
Federal Aviation Administration

# TFDM Management of Flight Trajectory Data

- **TFDM is the new FAA system dedicated to surface management, a key component of a gate-to-gate operations**
- **Creating and maintaining a surface schedule and integration with other FAA systems are some of the key TFDM capabilities**
- **TFDM will leverage key data from the users (operators) submitted to TFMS via SWIM to support surface scheduling and metering**
  - TFDM predicts and assigns departure times to get from gate to spot to runway to fit into the overhead stream
  - TFDM predicts ETA to assigned runway and provides shared situational awareness of arrival intent



# TFDM Data Exchange: Key Interfaces



Airport Surface Detection Equipment, Model X (ASDE-X)

TFDM

TFDM Terminal Publication (TTP)

**Surface Data Providers**

Operations Center/Airport Authority/Ramp Operations

TFDM FOS Collaboration Services (TFCS)

Standard Terminal Automation Replacement System (STARS)

En Route Automation Modernization (ERAM) (via FDIO / TDLS systems)


Time-Based Flow Management (TBFM)

TFMS Traffic Flow Management Data (TFMData)

# TFDM Data Exchange: Key Interfaces

**TFCS SWIM Service**
(NMA closures, surface metering substitutions)

ATCT Users

EOBT, AOBT, Gate,
Flight Intent, etc.

**Flight Operators /
Airport Operators**

TFMS

TBFM

ASDE-X

STARS

ERAM
(FDIO / TDLS)

**TTP SWIM Service**

**Surface
Stakeholders**

- Airport Configuration
- Runway assignment
- TMIs with affected flight lists
- Flight state
- Predicted runway schedule (ETD / ETA)*
- Surface metering programs*
- TOBTs / TMATs*
- Airport resource closures

*Config A sites

# Final Announcements


**SWIFT 22:**

- **TBD**

# SWIFT Site Information

**SWIFT@faa.gov**

- Any SWIFT-related questions
- Sign up for SWIFT mailing list

**https://www.faa.gov/air_traffic/technology/swim/swift**

- Register for future SWIFT meetings
- Stay up to date with SWIFT
- Past meeting slides

# SWIFT Contact Information

SCAN ME

## Joshua Gustin, Deputy Director Air Traffic Systems (Acting)

- Email: Joshua.Gustin@faa.gov

## Stefanie Calabrese, SWIFT Chair & FAA Lead

- Email: Stefanie.C.Calabrese@faa.gov
- Email: SWIFT@faa.gov

## David Almeida, SWIFT Community Moderator

- Phone: (321) 735-2774
- Email: David.Almeida@LSTechLLC.com

# Back Up Slides

# Ops Issues Focus Group

**Leads:** Chris Gottlieb (JBU) and Xavier Pratt (LST) (Contract Support)

## Background & Purpose Recap:

Ops Analysis

- Address NAS-wide operational issues that might benefit from information sharing between organizations
- Identify SWIM services, messages and data elements to resolve NAS user challenges

SWIM Data Use Cases

- Explore Ops issues through use case studies
- Leverage SWIM Operational Context documents and SWIM Info-services Roadmap to inform user investment decisions

**Want to join us? Contact Us:**

Chris Gottlieb - Christopher.Gottlieb@jetblue.com

Xavier Pratt - Xavier.Pratt@lstechllc.com

**Current Prioritized Ops Issues:**

- **Flight Planning over IP (SWA)**
  - Status: CSS-FD Engineering Team finalizing requirements to support user FP filing, planning and data sharing needs through SWIM
  - Outreach to SWIFT Community encouraged to join discussion and activities
- **Early Planning for Disruptions**
  - ***Early Detection of Deviations over a Fix (JBU)***
  - ***Early Detection of Airport Surface Delays (JBU)***
  - *Taxi Out Return to Gate tracking / visibility (DAL)*
  - *Long taxi issues at JFK (JBU)*
    - Status: NY/North TX Prediction Model developed to apply SWIM data context to assess arrival deviation impacts on ground taxi times, during convective weather
- **Flight Data & Trajectory Based Operations (NEW!)**
  - Status: Introduce Operational Context Study at SWIFT #20
  - Socialize study through OIFG to promote discussion and collaboration
- TBFM delay (UAL) who, what, why it matters
  - Status: TBD

Bolded Issues – actively engaged

# Development & Analytics Focus Group (DAFG)

**Leads:** Erin Cobbett (DAL), Mike Jagmin (UAL) and Xavier Pratt (LST) (Contract Support)

**Background & Purpose Recap:**

Data Analytics

- Identify smaller scale data, operational, and analytical problems that already exist in the community
- Identify services, messages, data elements, logical transformations to solve problems

Development

- Create logical software design to solve problems
- Develop physical representations of data as designed by group

**Current Prioritized Ops Issues:**

- **Flight Data & Trajectory Based Operations (NEW!)**
  - Status: Introduce Operational Context Study at SWIFT #20
  - Socialize study through Focus Groups to promote discussion and collaboration
- **TBFM "Best" Estimated Times**
  - Status: TBFM Program incorporating Focus Group/Airline feedback into planned changes for TBFM MIS next release version schema
- Developers Webinars & Workshop
  - Status: Completed Developers Workshop Webinar Series and Developers Workshop
  - Future events TBD

**Want to join us? Contact Us:**

Erin Cobbett - erin.cobbett@delta.com

Mike Jagmin - michael.jagmin@united.com or Xavier Pratt – xavier.pratt@lstechllc.com

# MIS 4.3.2 Data

| Message Category | Message Group | Message |
|---|---|---|
| "air" (Aircraft Information) | <flt> | Flight Plan Information |
| | <trk> | Tracking Information |
| | <mrp> | Meter Reference Element (MRE) Assignments |
| | <eta> | Estimated Time of Arrival (ETA)s |
| | <sta> | Scheduled Time of Arrival (STA)s |
| | <sch> | Scheduling Information |
| "con" (Configuration Information) | <aac> | Arrival Airport Configuration Information |
| | <mar> | Meter Point Acceptance Rate |
| | <sac> | Satellite Airport Configuration |
| | <rar> | Runway Acceptance Rate |
| | <aar> | Airport Acceptance Rate |
| | <scc> | Super Stream Class Configuration |
| | <tar> | TRACON Acceptance Rate |
| | <gar> | Gate Acceptance Rate |
| "oth" (Other Information) | <int> | TBFM Interface Status Information Group |
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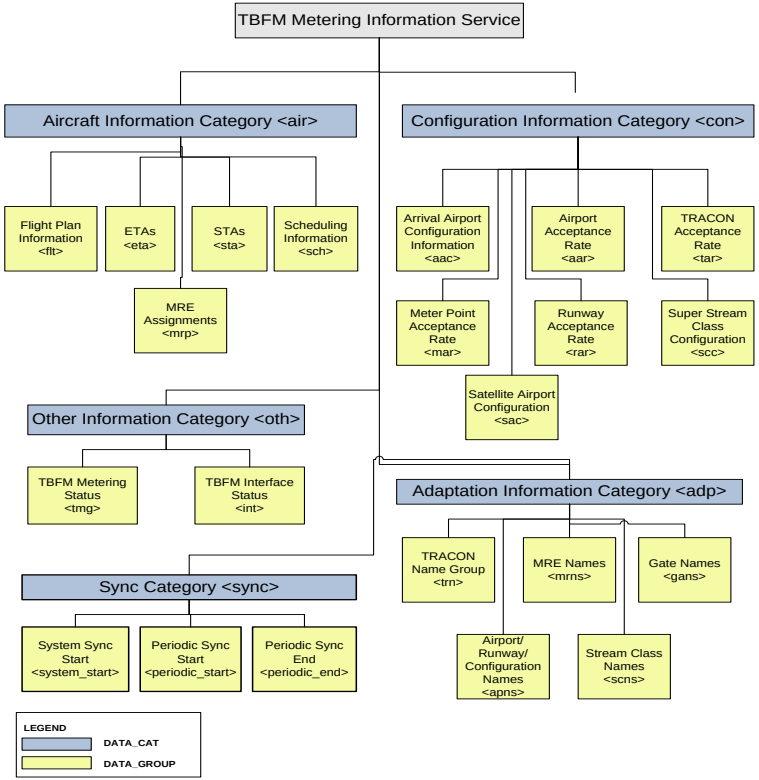
| "adp" (Adaptation Information) | <trn> | TRACON Name Group |
| | <gans> | Gate Names |
| | <apns> | Airport/Runway/Configuration Names |
| | <mrns> | MRE Names |
| | <scns> | Stream Class Names |
| "sync" (Synchronization) | <system_start> | System Sync Start |
| | <periodic_start> | Periodic Sync Start |
| | <periodic_end> | Periodic Sync End |

# MIS 4.15 Data Enhancements

| Update | Message Group | Nature of the Update | Message Type | Data Format/Range |
|---|---|---|---|---|
| Versioning | | MIS JMS Header Update | All Message Types | N.N.N, where each N can range from 0-99 |
| Departure Airport Information | <dap> | MIS JMS Header Update | Air Information (all); Configuration Information (subset of messages) | 3-4 characters |
| Destination Airport Information | <apt> | MIS JMS Header Update | Air Information (all); Configuration Information (subset of messages) | 3-4 characters |
| Computer ID (CID) | <cid> | New Aircraft Information Data | Aircraft Information Data | 3 alphanumeric ASCII Character |
| GUFI (Global Unique Flight Indicator) | <gufi> | New Aircraft Information Data | Aircraft Information Data | 10 character ASCII string with 10 characters: A-Z or 0-9 |
| Heartbeat Message | <hb> | New Message for MIS Info | Heartbeat Data | Not Applicable |
| DEX_SOURCE_TYPE | | Identifier used to group messages for a SWIM service utilizing the value of 'TBFM' | | |

# MIS 4.3.2 Taxonomy



# MIS Data Category

| MIS Data Category (Message Types) | MIS Messages |
|---|---|
| Aircraft information | Flight Plan Information, ETAs, STAs, Meter Reference Element (MRE) information, and Scheduling information |
| Configuration information | Arrival Airport Configuration Information, Airport Acceptance Rate Group, TRACON Acceptance Rate Group, Meter Point Acceptance Rate Group, Runway Acceptance Rate Group, Super Stream Class Configuration Group, and Satellite Airport Configuration Group |
| Status Group/Other | TBFM Metering Status, TBFM Interface Status |
| Adaptation Information | TRACON Name, Gate Name, Arrival Airport Information, Airport Configuration, and MRE Information |
| Synchronization | System Sync Start, Periodic Sync Start, Periodic Sync End |
| Heartbeat Message | Sync message body |

*Image taken from ATCA newsletter

# MIS Mediation for SCDS & NESG Consumers

- **To mitigate impact of MIS 4.15 deployment, the FAA is in the process of implementing a Mediation capability, that will transform MIS 4.15 taxonomy to the 4.3.2 format**
- **MIS 4.15/ 4.3.2 Mediation deployment will consist of two phases:**
  - Phase 1:
    - Application of XML stylesheets to mediate 4.15 message payload to 4.3.2 taxonomy
    - FAA has already updated Consumer subscriptions to consume Mediated 4.15
    - Already deployed for SCDS and NESG Consumers
  - Phase 2:
    - Mediate JMS Properties from 4.15 taxonomy to the 4.3.2 format
    - Will be deployed Mid-June 2023
    - No further Consumer subscription updates are required to receive Phase 2 of the MIS Mediation

| 4.15 JMS Property | 4.15-to-4.3.2 Mediation Logic Phase 1 (May 2nd 2023 – June 14th 2023) |
|---|---|
| DEX_SOURCE_TYPE | Not specified by 4.3.2 JMSDD, Mediation converts to TBFM432 |
| SEC_LEVEL | If value is "NAS_Only", convert to "NAS Only", else pass-thru. |
| DATA_CAT | If value is not hb, Pass-thru. Drop hb messages. |
| DATA_GROUP | Pass-thru. hb messages dropped. |
| STDCHG | DATA_CAT: air - STDCHG = TRUE, FALSE (only in <flt> data group), STDCHG (in all data groups except <flt>)<br>DATA_CAT: con, oth, adp, sync, hb - STDCHG = STDCHG |
| ARTCC | Pass-thru |
| SYNC | DATA_CAT: sync – SYNC = SYS (only for DATA_GROUP=system_start) PER, RTM (for DATA_GROUP other than system_start)<br>DATA_CAT: air, con, oth, adp – SYNC = PER, RTM<br>DATA_CAT: hb – SYNC = RTM |
| VERSION | Pass-thru (New Property) |
| DEPART_APT | Pass-thru (New Property) |
| DEST_APT | Pass-thru (New Property) |

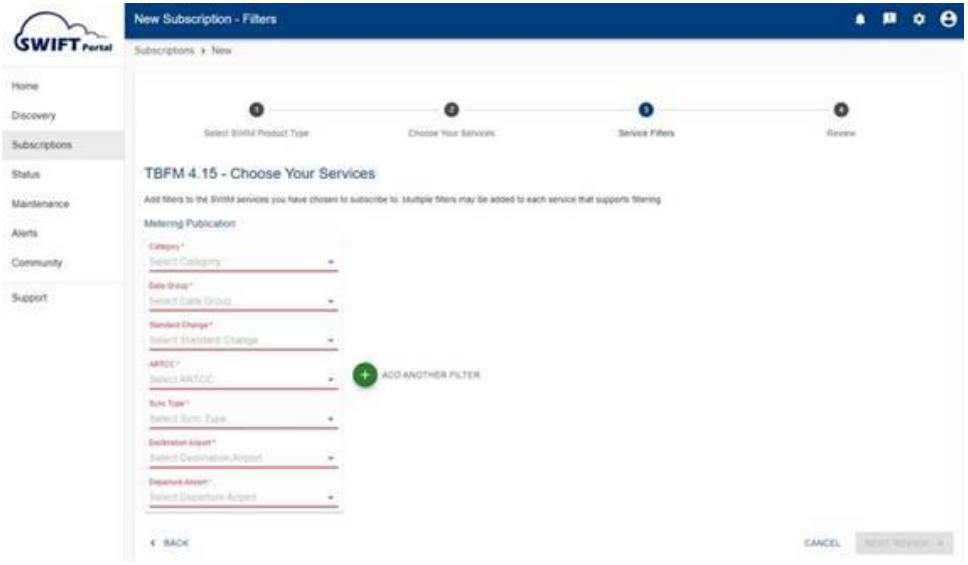
| 4.15 JMS Property | 4.15-to-4.3.2 Mediation Logic Phase 2 (Starting June 15th 2023) |
|---|---|
| DEX_SOURCE_TYPE | Not specified by 4.3.2 JMSDD, Mediation converts to TBFM432 |
| SEC_LEVEL | If value is "NAS_Only", convert to "NAS Only", else pass-thru. |
| DATA_CAT | If value is not hb, Pass-thru. Drop hb messages. |
| DATA_GROUP | Pass-thru. hb messages dropped. |
| STDCHG | DATA_CAT: air - STDCHG = TRUE, FALSE (only in <flt> data group), STDCHG convert to “null” (in all data groups except <flt>)<br>DATA_CAT: con, oth, adp, sync, hb - STDCHG = STDCHG convert to “null” |
| ARTCC | Pass-thru |
| SYNC | DATA_CAT: sync – SYNC = SYS (only for DATA_GROUP=system_start) PER, RTM convert to “null” (for DATA_GROUP other than system_start)<br>DATA_CAT: air, con, oth, adp – SYNC = PER, RTM convert to “null”<br>DATA_CAT: hb – SYNC = RTM convert to “null” |
| VERSION | Pass-thru (New Property) |
| DEPART_APT | Pass-thru (New Property) |
| DEST_APT | Pass-thru (New Property) |

# TBFM MIS 4.15 Deployment Impacts

- **On May 2 and May 8, when ZTL and ZAB ARTCCs switch to MIS 4.15, there will be several minutes of service interruption for both NESG and SCDS Consumers**
- **Additionally, during the three-day testing window at each site, and while on Phase 1 of MIS Mediation, there will be taxonomy differences in JMS properties between 4.15 and 4.3.2, as depicted in the first table on the previous slide**

# MIS 4.15 SCDS Updates

- **MIS 4.15/ 4.3.2 Mediation has been deployed by default to ALL SCDS Consumers**
  - Phase 1 of MIS 4.15/ 4.3.2 Mediation has already been deployed, with Phase 2 scheduled for mid-June
- **At the end of the summer, exact date to be announced later, SWIM will update the SCDS self-provisioning portal to allow Consumers to select whether they want to consume Mediated 4.15 or native 4.15**



# NAS Service Registry Repository (NSRR)

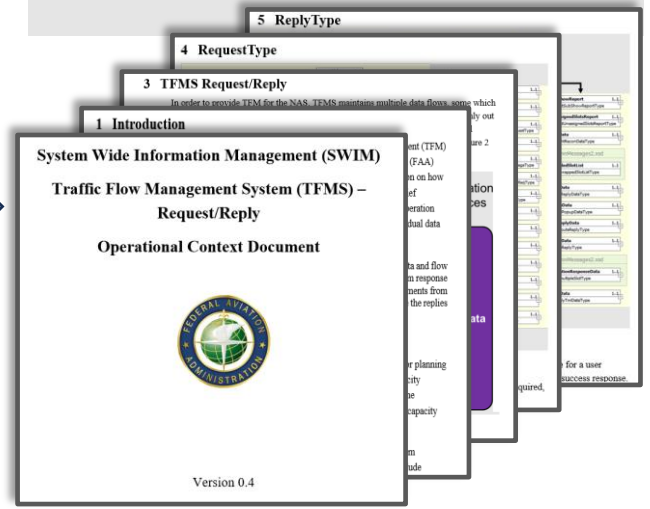
- **SWIM-enabled services registered in the [NAS Service Registry & Repository (NSRR)](https://nsrr.faa.gov/).**

- **Here, you can find information on SWIM services - including Ops Context Documents for each service**


**NSRR**

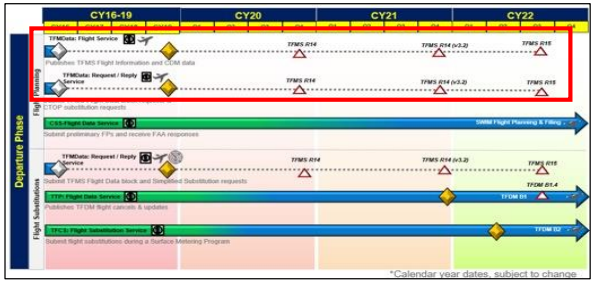
https://nsrr.faa.gov/

1. **Introduction**
2. **TFMS & TFMData Service Overview**– Includes References
3. **Request Type**
4. **Reply Type**
5. **Appendix – Acronyms & Definitions**



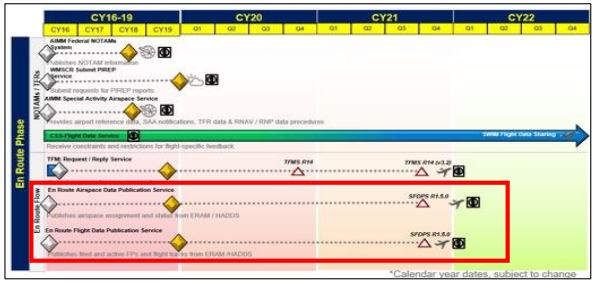
# SWIM Information Services Roadmap

## TFMS Information Service



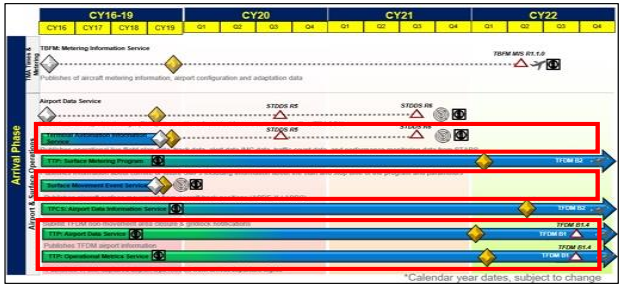

- Flow Service: Publishes TFMS TFM initiatives and definitions. Correlate ZNY-bound traffic deviations with changes in restriction times in N90 environment
- Flight Service: Publishes TFMS Flight Information and CDM data for LGA,TEB, JFK bound flights to observe ZNY *traffic flow*

## SFDPS Information Service




- *Airspace Data: En Route Airspace Data Publication (ERADP) provides Airspace Assignment from ERAM /HADDS. Examine ZNY-bound flights impacts in N90 environment*
- *Flight Data: En Route Flight Data Publication (ERFDP) publishes filed and active FPs and flight tracks from ERAM/HADDS. Identify ZNY-bound flight deviations at ZOB-ZNY boundary:*

## STDDS Information Service




- *Airport Flight Tracks: Terminal Automation Information Service (TAIS) publishes live FP, track data and traffic count data from STARS*
- *Airport Movement: Surface movement Event Service (SMES) publishes aircraft movement from JFK, LGA, and TEB aircraft track positions (ASDE-X/ASSC)*
- *Airport Departures: Tower Departure Event Service (TDES) publishes EFSTS & D-ATIS N90 departure events*

**TFDM – TTP (Case Study Enhancement)**

- *Surface Management: TTP Build 1 will enhance the prediction model by providing N90 Airport and Flight Information along with specific demand/delay information and airport-initiated departure stop restrictions*