*International Civil Aviation Organization*

**THE TWELFTH WORKING GROUP MEETING OF AERONAUTICAL TELECOMMUNICATION NETWORK (ATN) IMPLEMENTATION CO-ORDINATION GROUP OF APANPIRG (ATNICG WG/12)**

5 – 8 August, Renton, WA, USA

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**Agenda Item 5:**     **SWIM**

### SWIM PROGRAMME OVERVIEW

(U.S.A./Federal Aviation Administration (FAA))

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**SUMMARY**

This presentation presents FAA's SWIM Program overview.

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**ACTION BY THE MEETING**

The meeting is invited to:

a)     the meeting is invited to provide feedback on the information contained presented in this presentation; and
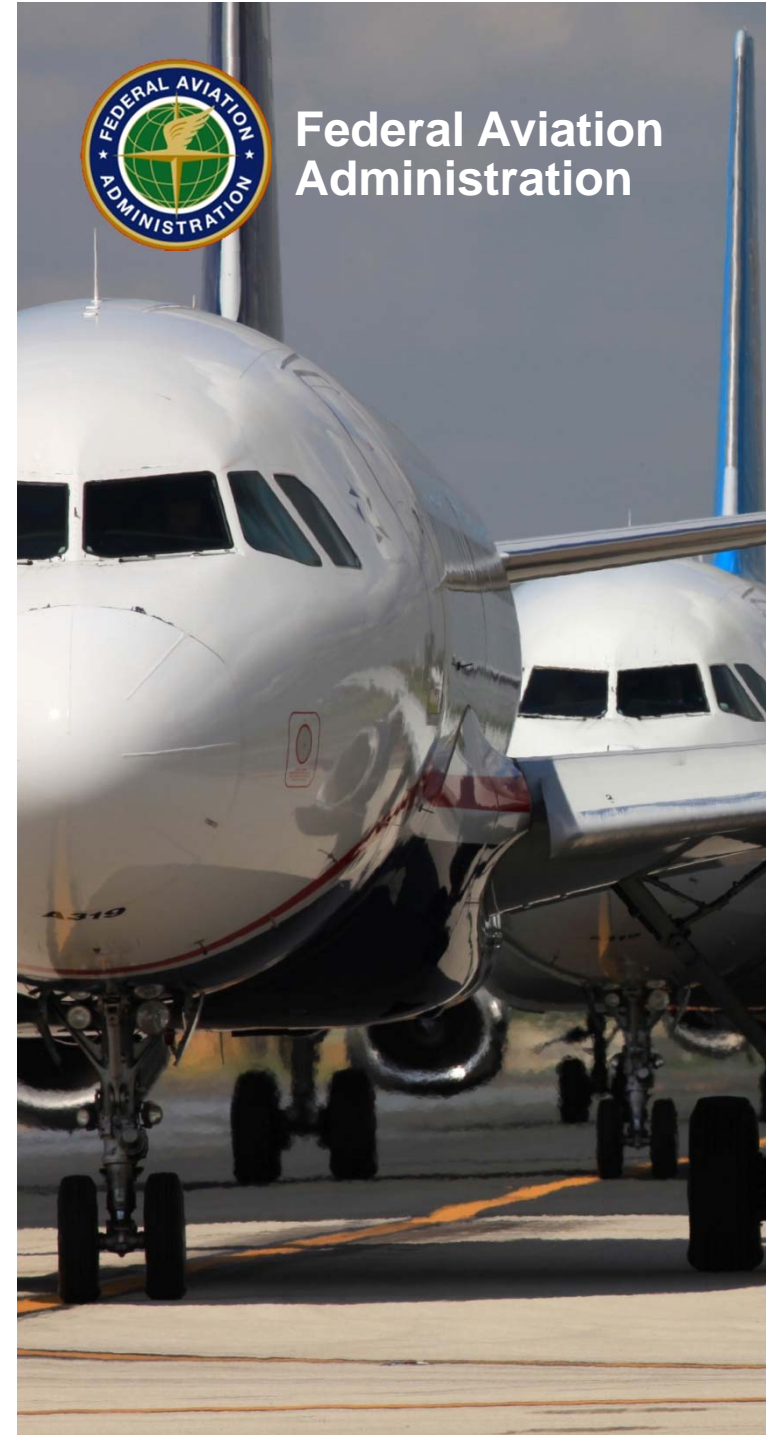
b)     discuss any relevant matters as appropriate.

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# System Wide Information Management (SWIM)

## *Program Overview*

**Federal Aviation Administration**

**Prepared for: 12th Meeting of the Aeronautical Telecommunication Network Implementation and Coordination Group (ATNICG WG/12)**

**By: SWIM Program Office**

**Date: August 2013**

# Topics

- **What is SWIM?**

- **How does SWIM support NextGen?**

- **Program status / ongoing activities**

# *What is SWIM?*

- **SWIM = System-Wide Information Management**
- **SWIM implements an enterprise messaging capability for the exchange of NAS data**
  - Based on what is referred to as *Service-Oriented Architecture* (SOA) technologies
    - SOA allows for a "loose coupling" of the messaging infrastructure and the underlying applications
    - Standards-based data exchange
      - Publisher / Subscriber Model
      - Web Services Request / Response Model
  - Allows the FAA to create reusable system interfaces more quickly and cost effectively
    - Enhanced information assurance and access control for NAS data
  - Facilitates data consolidation and cloud computing

# Net-Centric Infrastructure: Trusted Information Sharing
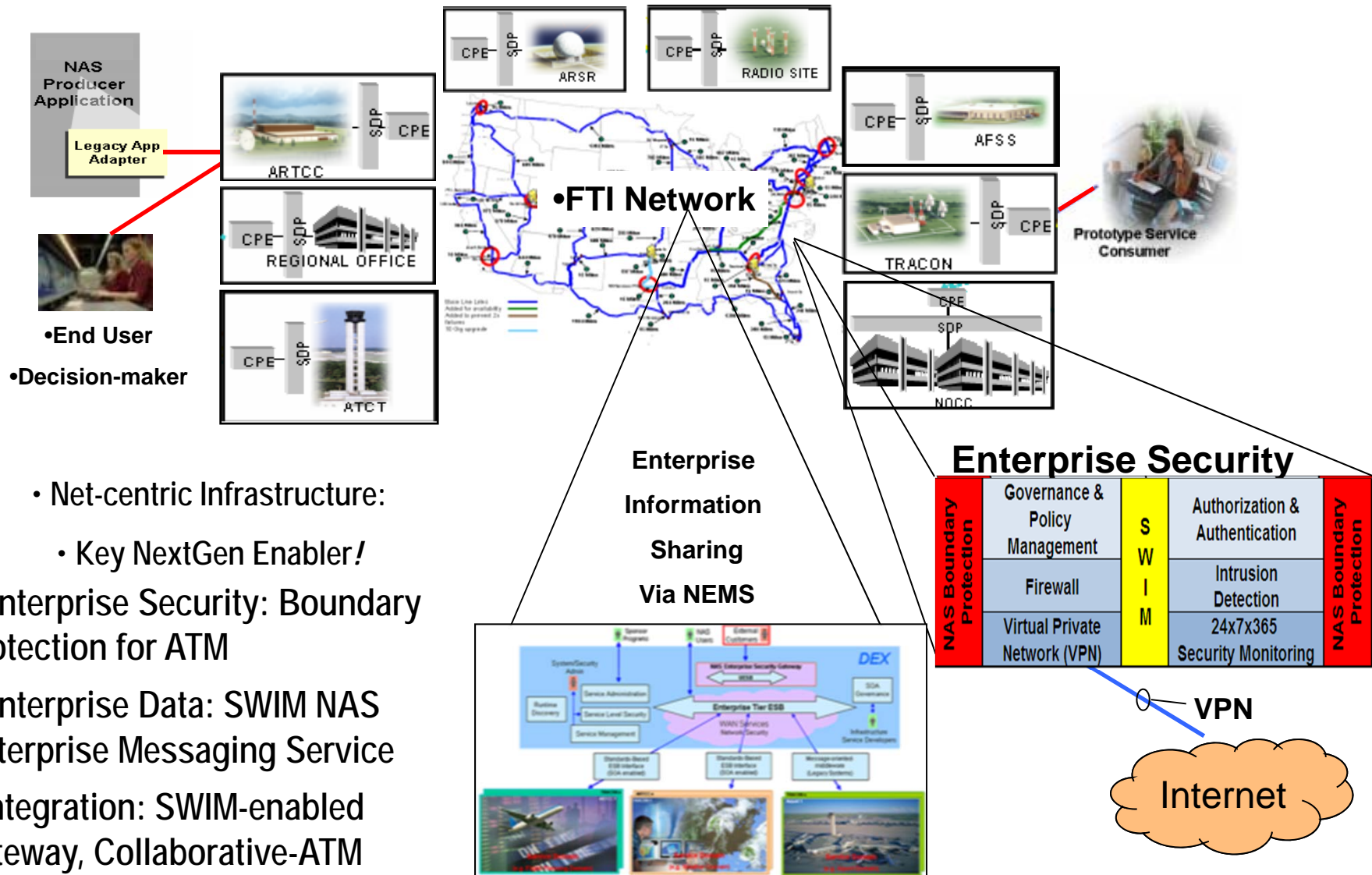


- Net-centric Infrastructure:
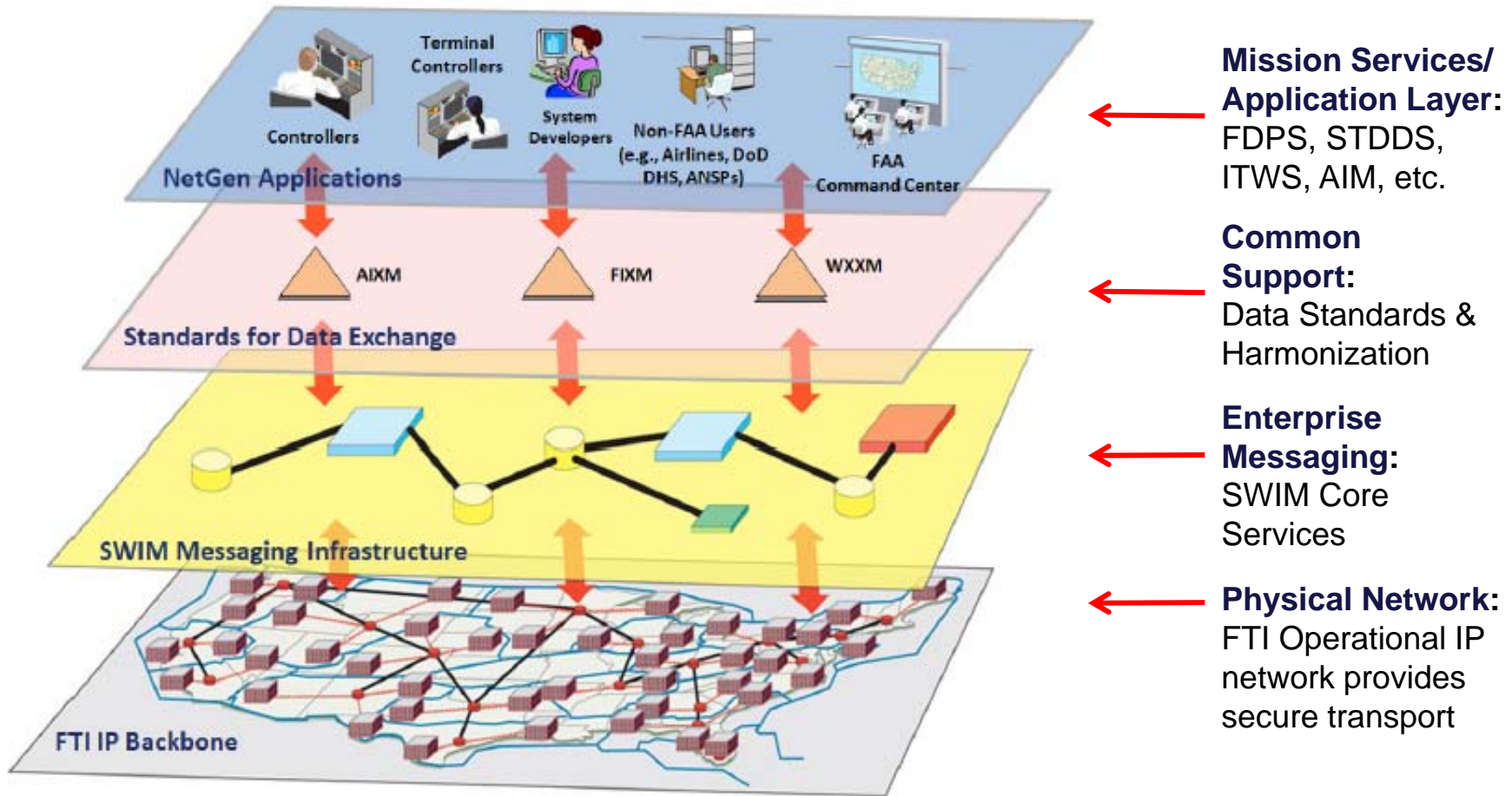  - Key NextGen Enabler!
- ✓ Enterprise Security: Boundary protection for ATM
- ✓ Enterprise Data: SWIM NAS Enterprise Messaging Service
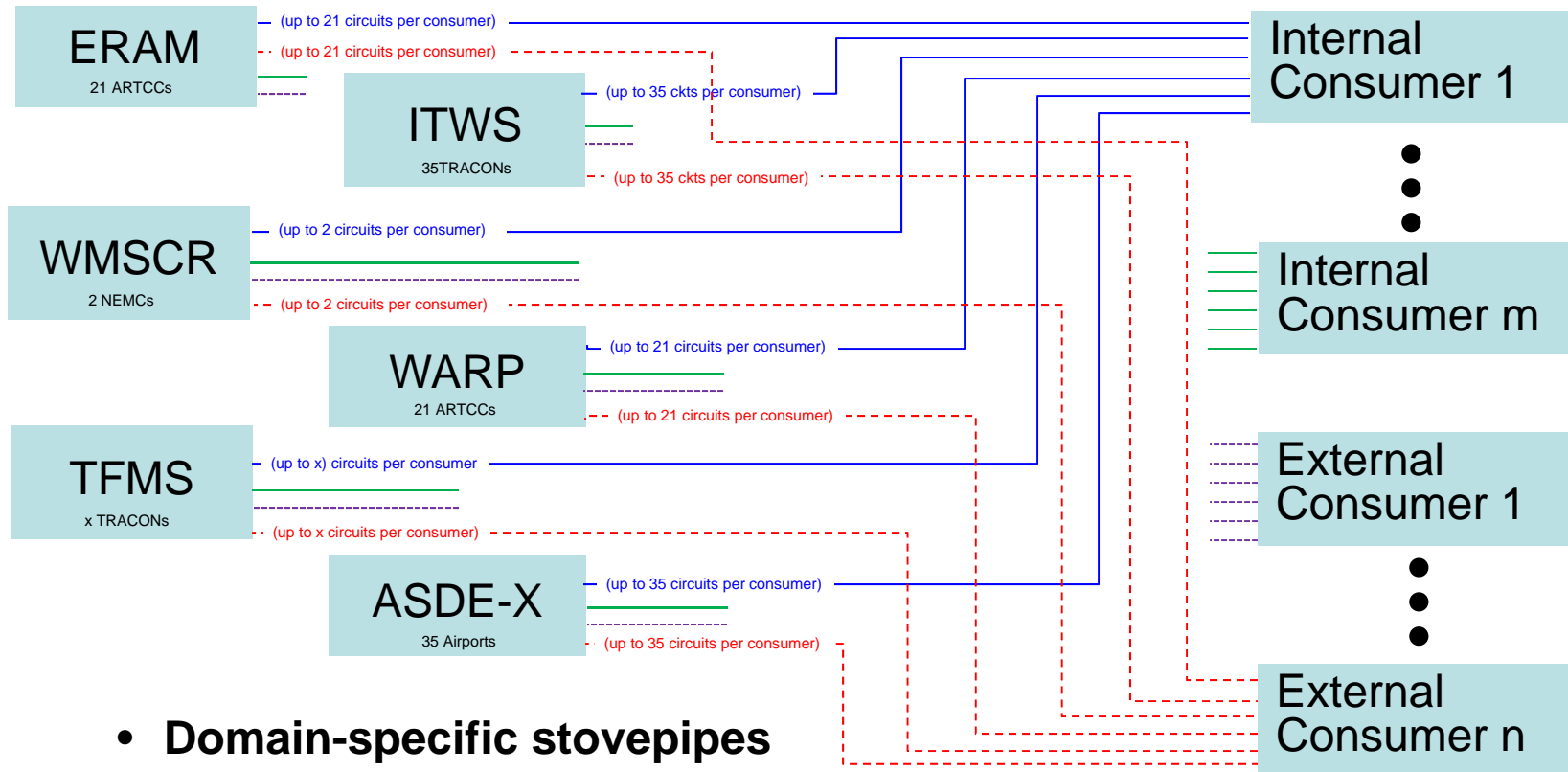- ✓ Integration: SWIM-enabled gateway, Collaborative-ATM

# How does SWIM Support NextGen?

- **SWIM provides for the broader sharing of data that the NextGen conops is based upon**
  - Simplifies interfaces and facilitates interoperability
- **SWIM creates an environment where data is readily available to NAS systems or external stakeholders**
  - Enables the FAA to leverage the most value out of NAS information assets

# NextGen Information Sharing Architecture
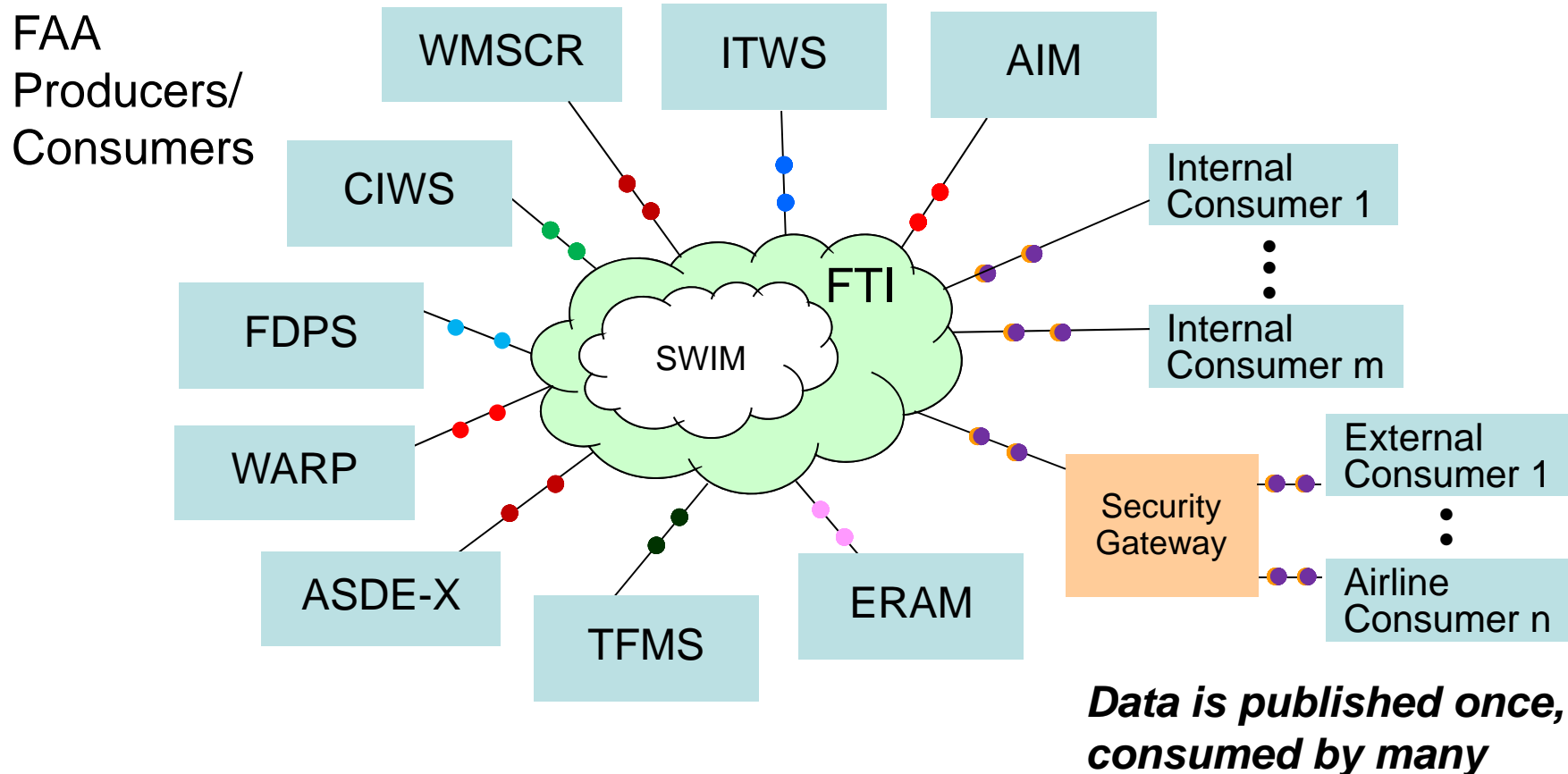


**Mission Services/ Application Layer:** FDPS, STDDS, ITWS, AIM, etc.

**Common Support:** Data Standards & Harmonization

**Enterprise Messaging:** SWIM Core Services

**Physical Network:** FTI Operational IP network provides secure transport

# Where we were: Connection Management



ERAM
21 ARTCCs

(up to 21 circuits per consumer)
(up to 21 circuits per consumer)

ITWS
35TRACONs

(up to 35 ckts per consumer)
(up to 35 ckts per consumer)

WMSCR
2 NEMCs

(up to 2 circuits per consumer)
(up to 2 circuits per consumer)

WARP
21 ARTCCs

(up to 21 circuits per consumer)
(up to 21 circuits per consumer)

TFMS
x TRACONs

(up to x) circuits per consumer
(up to x circuits per consumer)

ASDE-X
35 Airports

(up to 35 circuits per consumer)
(up to 35 circuits per consumer)

Internal Consumer 1

Internal Consumer m

External Consumer 1

External Consumer n

- **Domain-specific stovepipes**
- **Endpoints are fixed**
- **Security configured per external connection**
- **Growth limited by configuration of individual NAS systems**
- **Local facilities manage and control access**

# SWIM Data Exchange Marketplace

FAA Producers/ Consumers

WMSCR

ITWS

AIM

CIWS

Internal Consumer 1

Internal Consumer m

FDPS

FTI

SWIM

WARP

ASDE-X

TFMS

ERAM

Security Gateway

External Consumer 1

Airline Consumer n

*Data is published once, consumed by many*

*Moves the FAA away from Connection Management toward Information Management*

# SWIM Services and Product Portfolio

## SWIM Products

| SWIM Services | | | |
|---|---|---|---|
| **AIM SAA Data Exchange** | • SAA data, dynamically via an improved ATC GUI | • SAA data, dynamically provided in the AIXM standard | • AIXM SAA definitions |
| **ITWS Data Publication** | • Airport Lightning Warning<br>• Configured Alerts<br>• Forecast Accuracy<br>• Forecast Contour<br>• Forecast Image<br>• Gust Front TRACON Map<br>• Microburst TRACON Map<br>• Precipitation 5nm<br>• Precipitation Long Range<br>• Precipitation TRACON | • SM SEP 5nm<br>• SM SEP Long Range<br>• SM SEP TRACON<br>• Terminal Weather Text Normal<br>• Tornado Alert<br>• Tornado Detections Wind Profile<br>• AP Indicated Precipitation<br>• AP Status<br>• Gust Front ETI<br>• Hazard Text 5nm | • Hazard Text Long Range<br>• Hazard Text TRACON<br>• ITWS Status Information<br>• Microburst ATIS<br>• Runway Configuration<br>• Storm Motion 5NM<br>• Storm Motion TRACON<br>• Terminal Weather Text Special<br>• Wind Shear ATIS |
| **CIWS Data Publication** | • VIL Mosaic (1km resolution)<br>• VIL 2-hr. Forecast<br>• Echo Tops Mosaic (1 km resolution)<br>• Echo Tops 2-hr. Forecast<br>• Satellite Mosaic | • Storm Info: Echo Top Tags<br>• Storm Info: Leading Edges<br>• Storm Info: Motion Vectors<br>• VIL Forecast Contours (Std. Mode)<br>• VIL Forecast Contours (Winter Mode) | • Echo Tops Forecast Contours<br>• Growth & Decay Contours<br>• Forecast Accuracy: Echo Tops<br>• Forecast Accuracy: Std. Precip<br>• Forecast Accuracy: Winter Precip |
| **WARP Publications** | • Harris Weather Data Service Product Set | • WMSS NEXRAD | |
| **WMSCR Publications** | • Transmission of voice PIREPs to WMSCR | • Stored PIREPs | • Altimeter settings |
| **STDDS** | • ASDE-X streaming data service and Runway visibility data | • Surface Movement Events (SME) RVR Data | • Tower Departure Events (TDE)* |
| **Flow Information Publication and Aircraft Situational Display to Industry (ASDI)*** | • Flow Constrained Area (FCA)<br>• Airspace Flow Program (AFP) | • Ground Delay Program (GDP)<br>• Ground Stops (GSs) | • Reroutes<br>• Advisories |
| **Flight Data Publication*** | • Flight data | | |
| **Federal NOTAM System*** | • NOTAM Distribution Service | | |
| **Time Based Flow Management (TBFM)*** | • TBFM Information Service | | |

# Benefits to the FAA and NAS Stakeholders

- **More data available**

- **Easier access to data –** *"Provide once, consume many"*
  - Eliminates time consuming and costly development of custom interfaces
  - Eliminates need for separate point-to-point connections for individual consumers
  - Provides evolutionary path for NAS services and data
  - Simplifies configuration control

- **Enterprise-level security**

- **Consistency of policy enforcement**

- **Consumer empowered to create value-added products**

*Access to the FAA's universe of data through a single connection*

# External Consumer Example: ASDE-X

## Before SWIM

- Individual connection required per airport
- Separate MoA required for each airport
- Security distributed among ASDE-X sites
- # of consumers limited by available ports
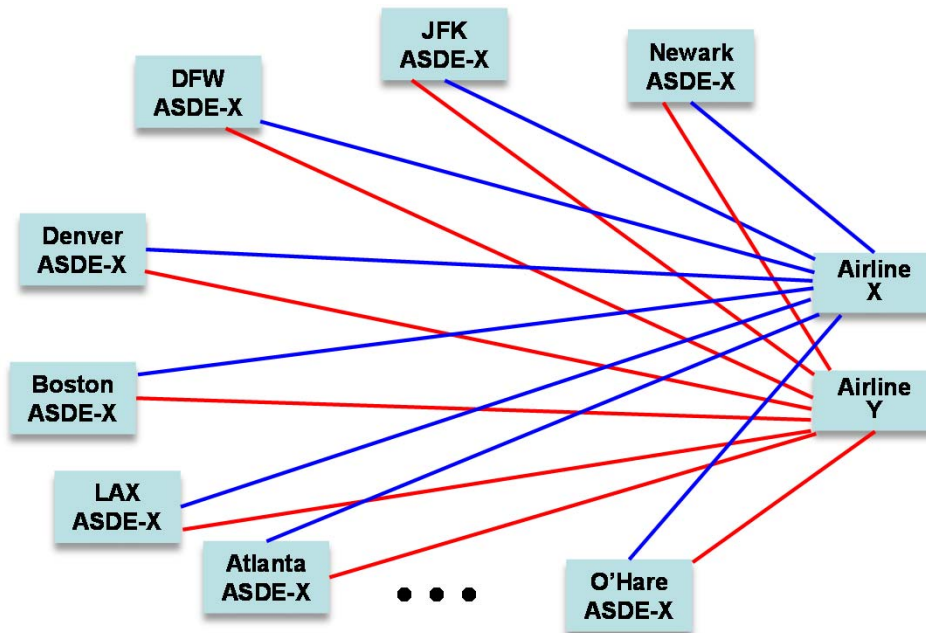
## SWIM Enterprise Messaging Capability

- Single connection provides access to all airport locations
- Single MoA covers all ASDE-X sites simplifies Data Policy release
- Centralized security management provided by Enterprise Security Gateway
- No limit to number of consumers
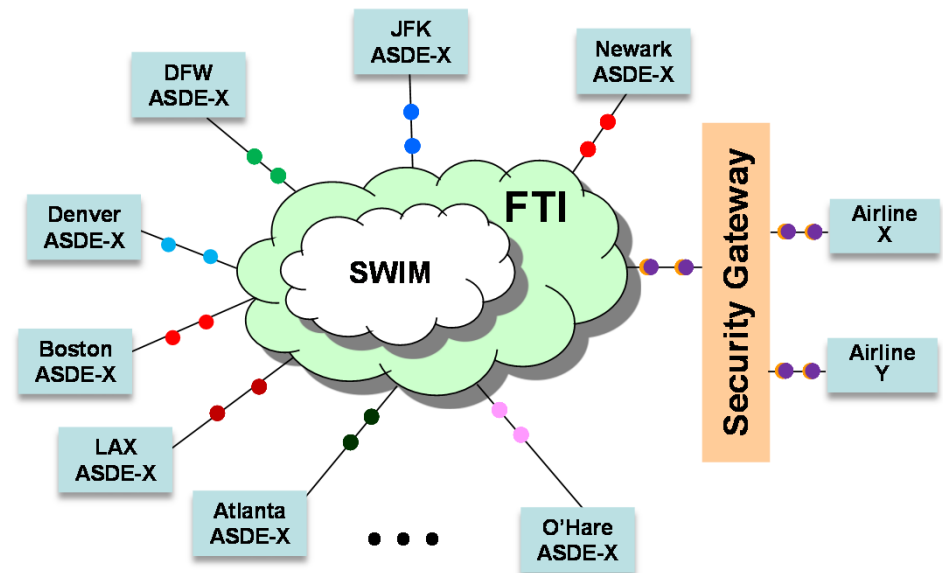
# NAS Registry Repository (NSRR)

- NSRR - an authoritative source of information regarding Services available through NEMS
  - Includes a description of the data products available by subscription to the Service, the Service lifecycle stage and supporting documents (WSDL, XML schema, ConOps, SLA, etc)
  - Contains service information for non-NAS services electing to register
- NSRR can be used to discover deployed Services and Services in development
  - Provides Consumers visibility into which data products are going to be available via a SOA interface, and the associated timeframes
- To access the NSRR, use the following URL to create an account:

  http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/atc_comms_services/swim/nsrr_form/
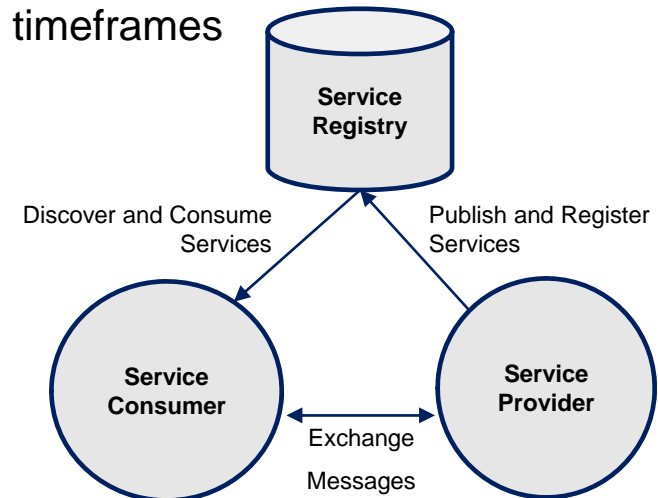
# Capability/Service Groups

## Base Capabilities

**Basic**

B1: Run-time Subscription*

B2: Message Reliability QoS*

B3: Mediation*

B4: Availability and Performance*

B5: Security Services*

B6: Web Services

B12: Dynamic Subscriptions

**Optional**

B7: Run-time Registry

B8: Interoperability

B9: Service Orchestration

B10: Producer/Consumer SLAs*

B11: Enterprise Repository

B13: Global Load Balancers*

B14: Local Load Balancers*
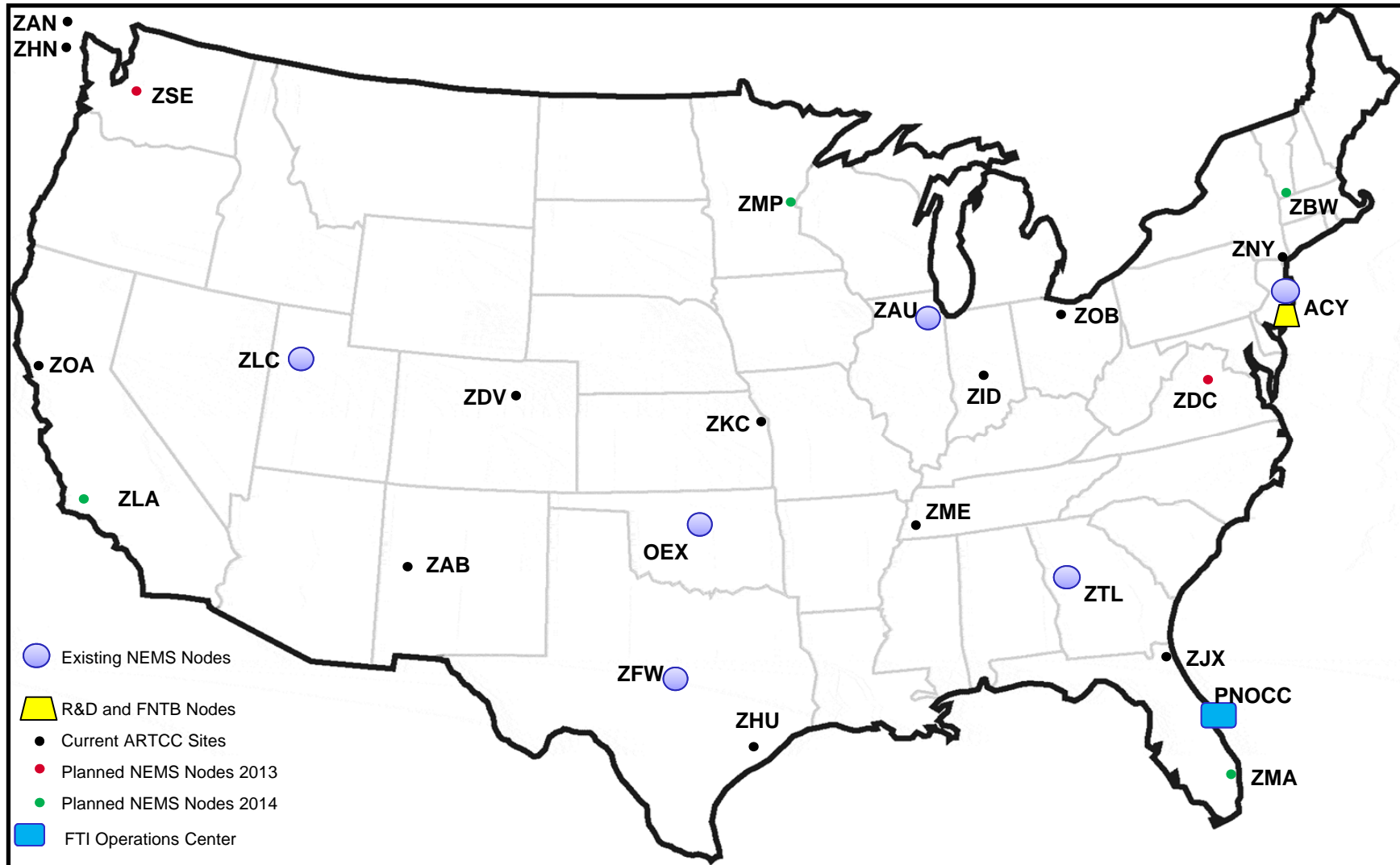
In development/deployment

## On-Ramping Services

**Basic**

U1:  WS-C: Web Service - Consumer

U2:  WS-P: Web Service - Producer

U3:  JMS-C: JMS Subscription - Consumer

U4:  JMS-P: JMS Publishing- Producer

U5:  R&D
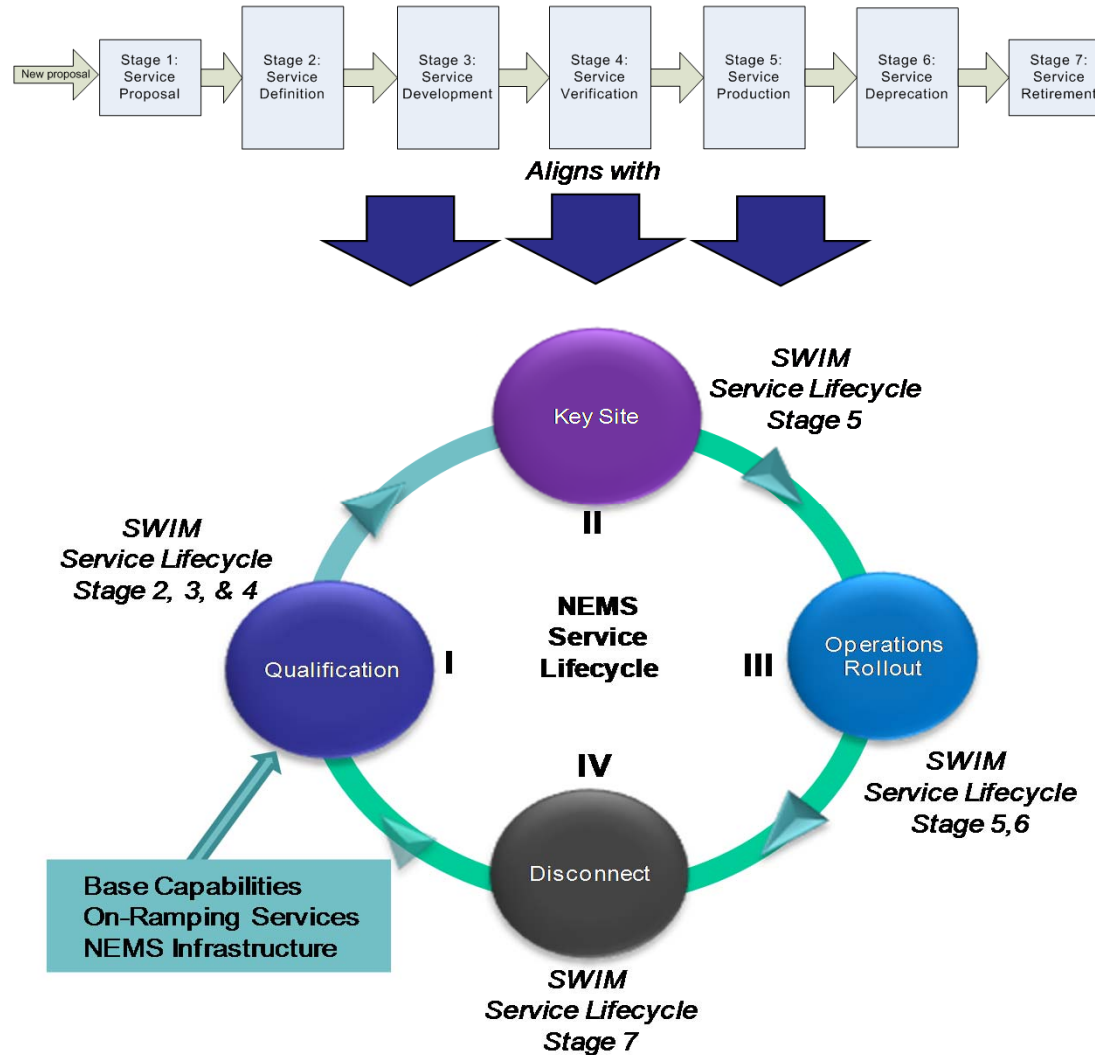
**Enhanced**

E1: Mediation

E2: Performance

E3: Service Orchestration

E4: SLAs

E5: Security

E6: Interoperability

E7: Reports

E8: Dynamic Subscriptions

E9:  Publication to R&D

# NEMS Systems Footprint



Legend:
- Existing NEMS Nodes
- R&D and FNTB Nodes
- Current ARTCC Sites
- Planned NEMS Nodes 2013
- Planned NEMS Nodes 2014
- FTI Operations Center

Map labels: ZAN, ZHN, ZSE, ZMP, ZBW, ZNY, ZAU, ZOB, ACY, ZOA, ZLC, ZDV, ZID, ZDC, ZKC, ZLA, ZME, OEX, ZAB, ZTL, ZFW, ZJX, PNOCC, ZHU, ZMA

# NEMS Service Life Cycle

# Summary

- **SWIM is a key enterprise-level capability required to support the broader sharing of information required to support the NextGen concept of operations**

- **Standards and Governance in place to ensure consistent implementation and operation**

- **Over 60 products with 22 different consumers**

- **SWIM creates a data exchange marketplace that fosters innovation by internal and external stakeholders**

- **All programs now go through a "SOA Suitability Assessment"**

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