

**LOCKHEED MARTIN**



*Transportation and Security Solutions*

## ***Applications using SWIM***

*2007 ICNS Conference*

*Plenary Session – System Wide Information Management*

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# Applications using SWIM



- **Several activities over the last year have focused on moving SWIM into the implementation phase**
  - *SWIM program activities*
  - *Establishing the Communities of Interest*
- **Lockheed Martin has focused on how key Applications can leverage the SWIM Core Services to provide End User benefits**
  - *Sharing Data (Flight Data, Aeronautical Data) and Application Services in the SWIM Environment*
  - *LM developed a SWIM Testbed to demonstrate benefits that can be gained by Airspace Users as well as the FAA*
- **The following applications will be discussed to illustrate the sharing of data and services using SWIM**
  - *Flight Data Input / Output (FDIO)*
  - *Flight Plan Pre-Processor (Fp<sup>3</sup>)*
  - *Tailored Arrivals*

# FDIO Overview

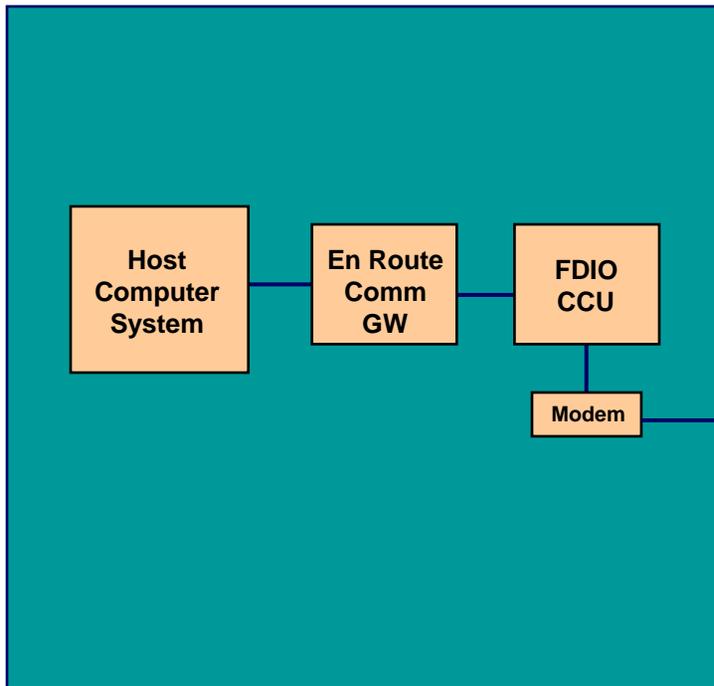


- ***The FDIO system is currently deployed in Terminal and Tower environments and provides entry and display of flight data from the Host Computer System***
- ***The current FDIO system uses '70s technology keyboard, display and flight strip printer to manage flight data and print strips***
  - *FDIO has sustainment issues and needs a technology refresh*
- ***There are a number of other En Route / Terminal systems that use the FDIO interface to access flight data (e.g., EFSTS, PDC/TDLS, DSP, San Juan D-position, etc.)***
  - *These systems all provide limited capabilities because their flight data access is restricted by the FDIO interface*
  - *There is a large infrastructure support cost required to maintain these because each was developed as a unique, stand-alone application*

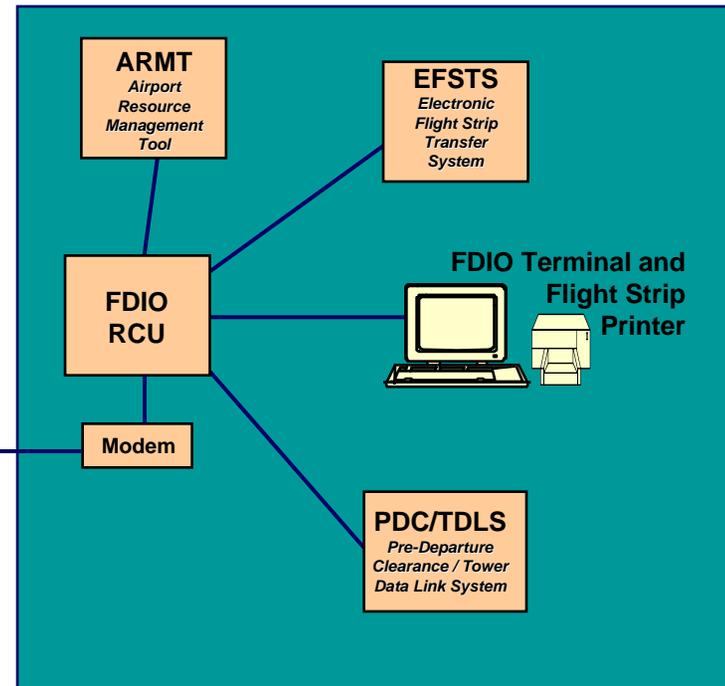
# Current FDIO Environment



## En Route - ARTCC



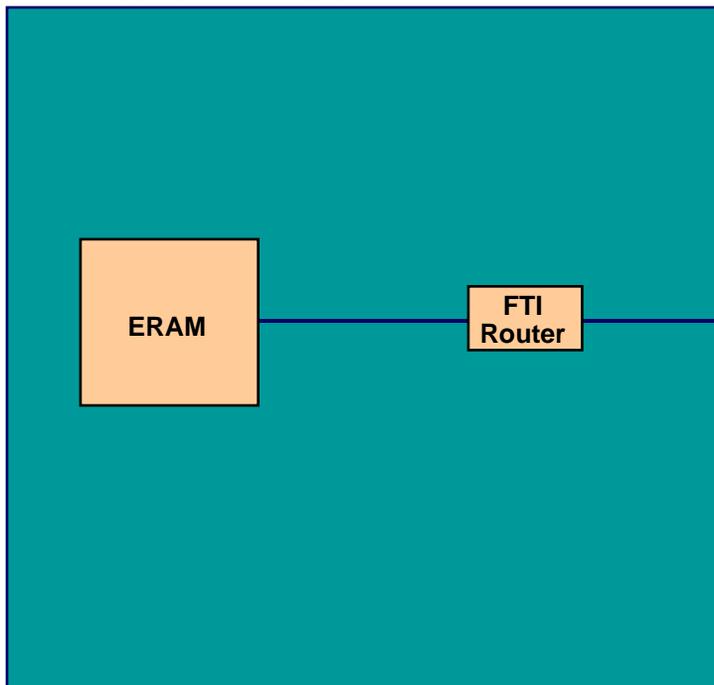
## Terminal / Tower



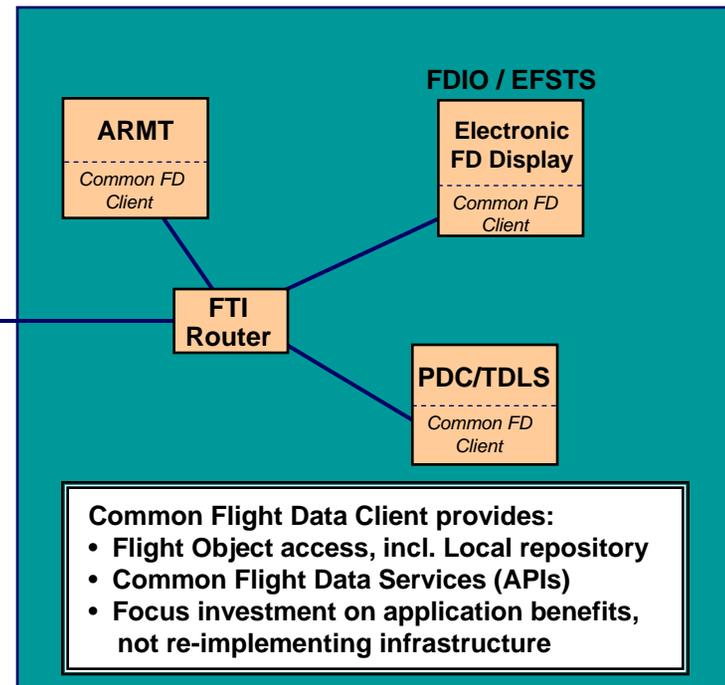
# SWIM Enabled FDIO Environment



## En Route - ARTCC



## Terminal / Tower



# Flight Plan Pre-Processor Overview



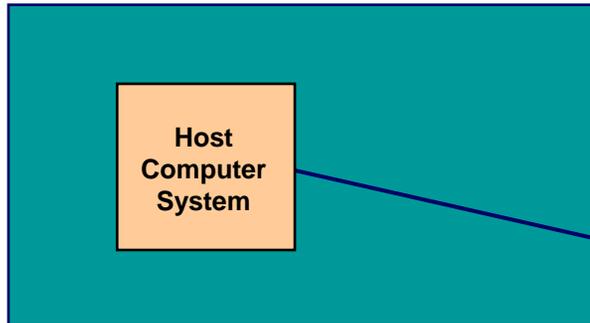
- **The Flight Plan Pre-Processor is a new capability for Airspace Users (e.g., Airlines, Business Jets, GA, Military) to optimize pre-flight (and in-flight) collaboration**
- **Provides Airspace Users with a flight plan trial capability that uses the operational FDP algorithms and airspace adaptation**
  - *Processes submitted flight plans exactly as the operational ATC system will and provides feedback to the Airspace Users*
    - *Identical airspace adaptation, restrictions, route status for ANSPs and Airspace Users = Common Situational Awareness*
- **Provide Airspace Users with a mechanism to express their intent earlier and more accurately**

**Benefits – Enhances the ability to file efficient routes, avoid restrictions, enhances economic performance of the Users and the efficiency of the NAS**

# Current AOC Flight Data Interface

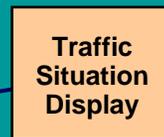


## En Route - ARTCC

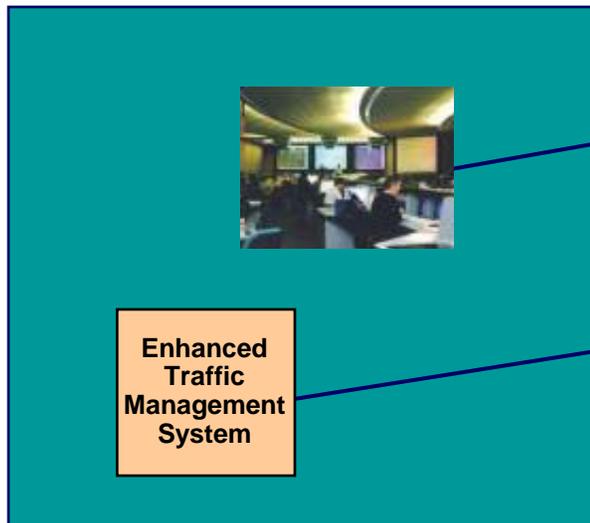


Flight Filing Service-B

## Flight Operations Center



Phoneline



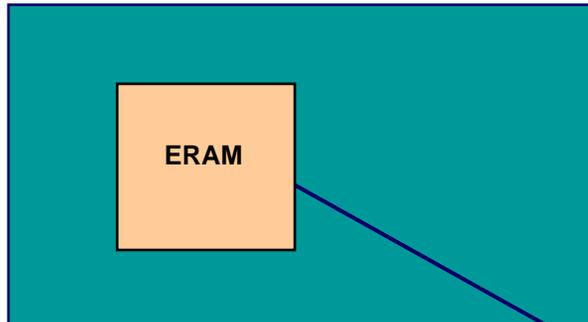
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## Traffic Flow Management

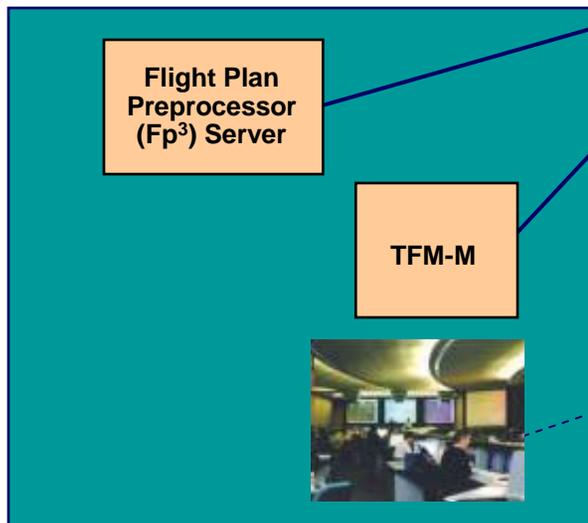
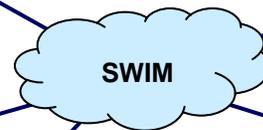
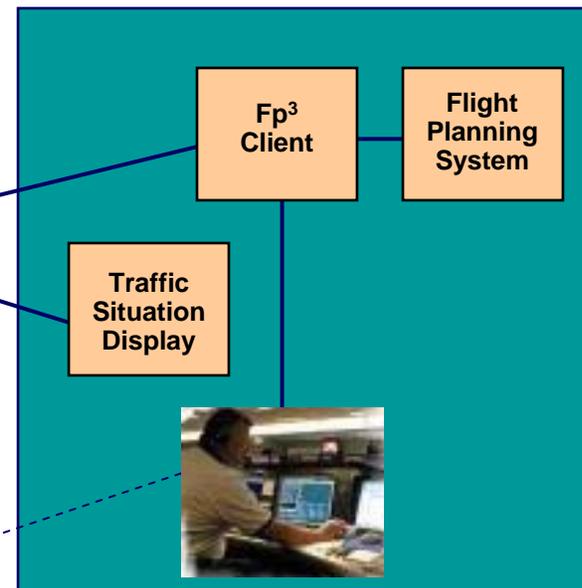
# SWIM Enabled AOC Flight Data Interface



## En Route - ARTCC



## Flight Operations Center



## Traffic Flow Management

Phoneline

# Tailored Arrivals



- **Tailored Arrivals and Continuous Descent Approach (CDA) Trials have been conducted world-wide in low traffic density airspace**
  - Fuel savings
  - Reduced Environmental impact (e.g., Noise, CO<sub>2</sub>)
  - Integration with ATC and Flight Operations
- **However, significant work needs to be performed for these concepts to work in medium to high traffic density airspace**
  - Provide Conflict free clearances
    - Throughout Oceanic, En Route and Terminal airspace
  - Meet Airport sequencing and scheduling constraints
    - No impact to Airport Arrival Rate
  - Avoid Weather, Terrain, and Restricted Airspace
  - Must be coordinated across Traffic Flow Management, Oceanic, En Route, and Terminal

# Tailored Arrivals – Automation

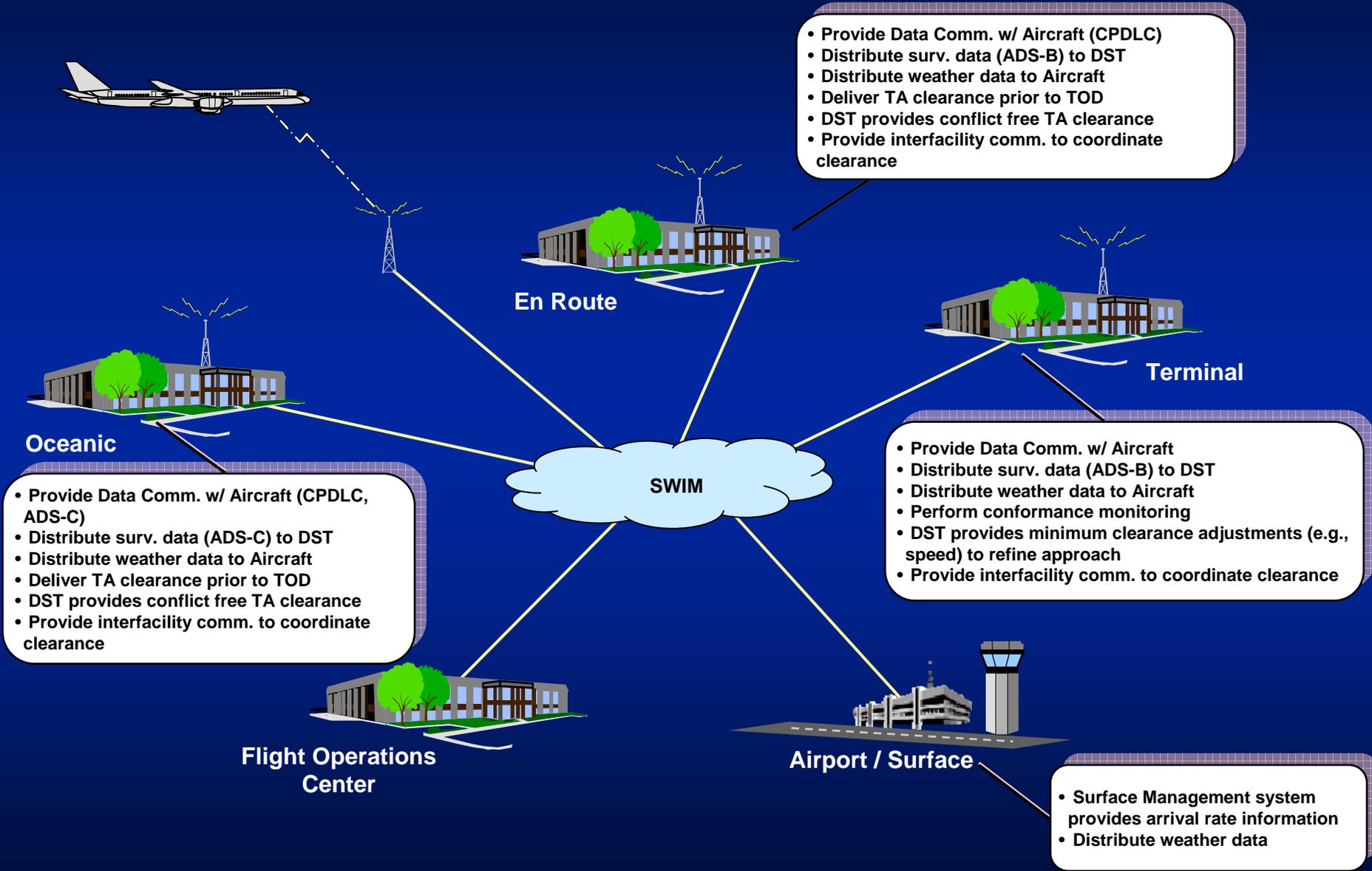


- ***In order for Tailored Arrivals to operate in the U.S. airspace in medium to high traffic density environments, several key capabilities need to be provided in the Automation***
  - *Air-Ground Data Communications (FANS, ATN)*
  - *(System Wide) Time Based Metering, Sequencing and Scheduling*
  - *Weather data dissemination and prediction*
  - *System Wide Information Sharing*

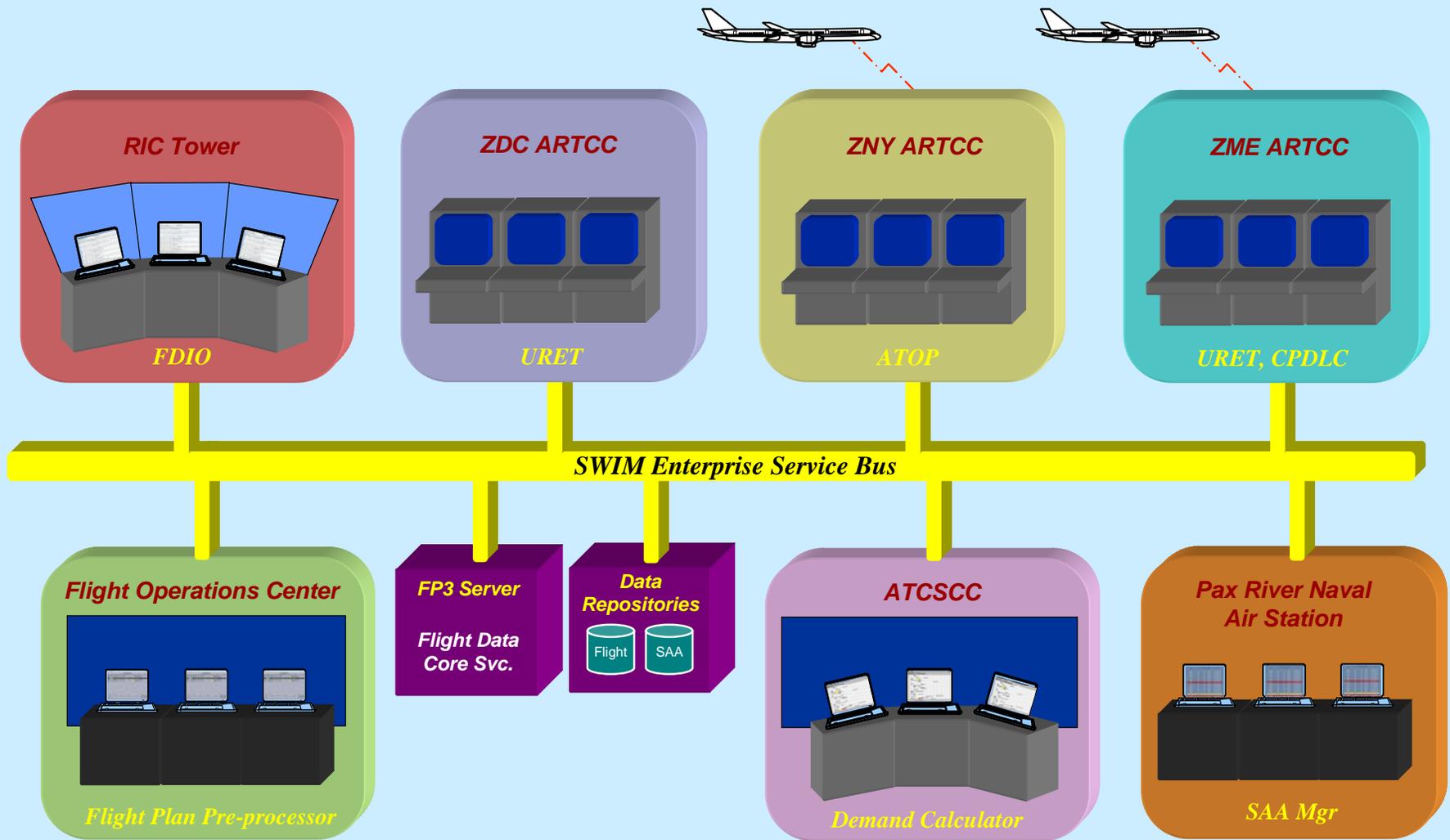


***Trajectory Based Operations  
Integrated Aircraft and Ground System***

# Tailored Arrivals – Future Automation View



# LM SWIM Testbed



*LM's SWIM Testbed implements a Service Oriented Architecture (SOA) that is built on an open, Java Messaging Services (JMS) Enterprise Service Bus*

