

Net-Centric ATC Facilities for NextGen Operation

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Outline



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Introduction



- **Current Air Traffic Control (ATC) facilities were built in the proximity of the airspace sectors and domains, called domain-based approach**
- **Many facilities are required to support different sectors or domains**
 - There are approximately 500 ATCTs, 200 TRACONs, 21 ARTCCs in the NAS
- **The facilities are aging**
 - In 2008, the average age in years of service for FAA ARTCC, TRACON and ATCT facilities are 43, 26 and 29 years, respectively¹

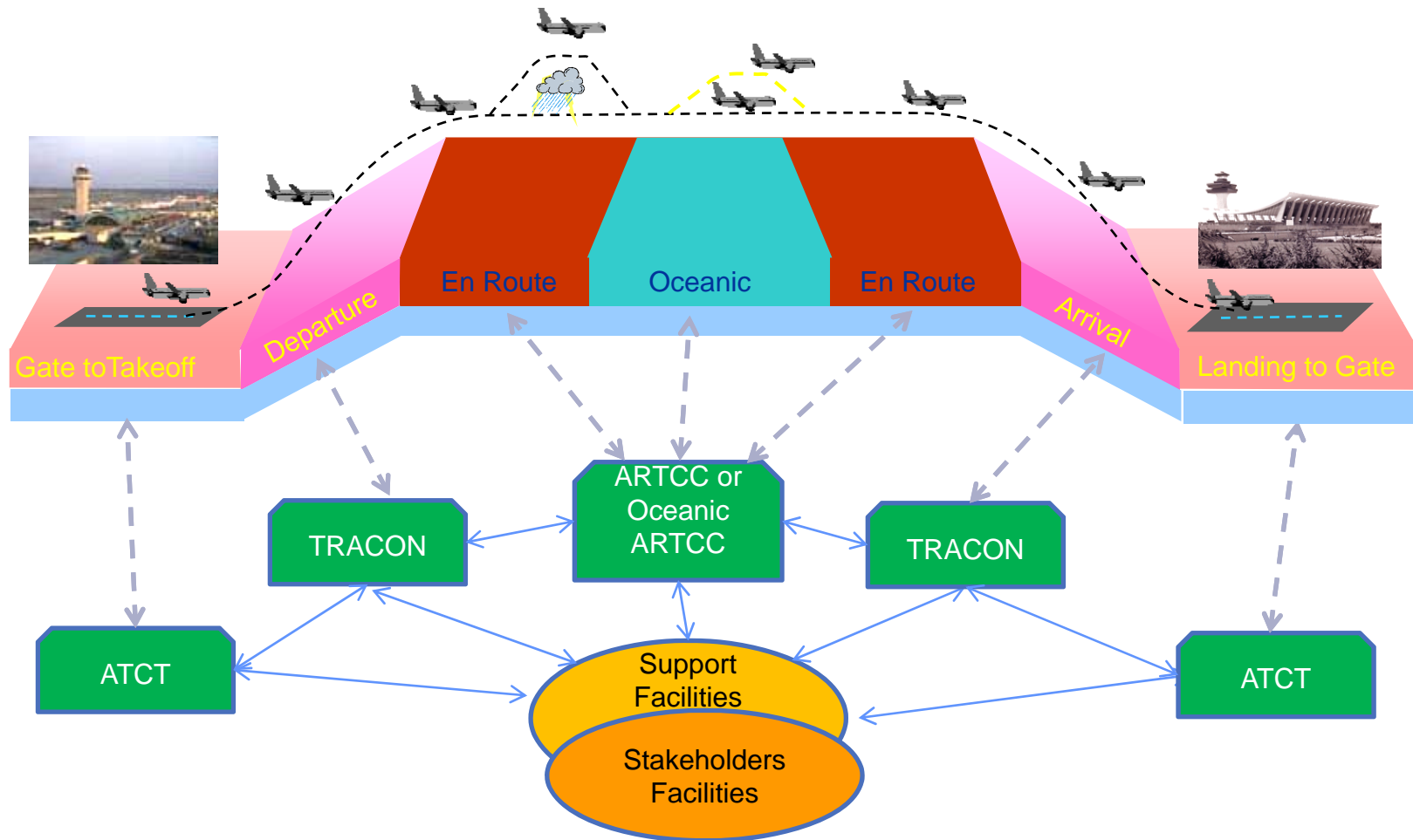
1. FAA, FAA's Management and Maintenance of Air Traffic Control Facilities, December 15, 2008, <http://www.oig.dot.gov/item.jsp?id=2405>

Introduction (cont.)



- **The conditions of the facilities limit the handling of projected traffic increases**
- **High cost for improvement and expansion of the facilities**
- **NextGen net-centric architecture provides opportunities to consolidate or reconfigure the facilities and transition them to net-centric facilities**

Traditional ATC Facility Architecture



Current ATC Facilities Are Organized By Sectors and Domains

Traditional ATC Facility Issues



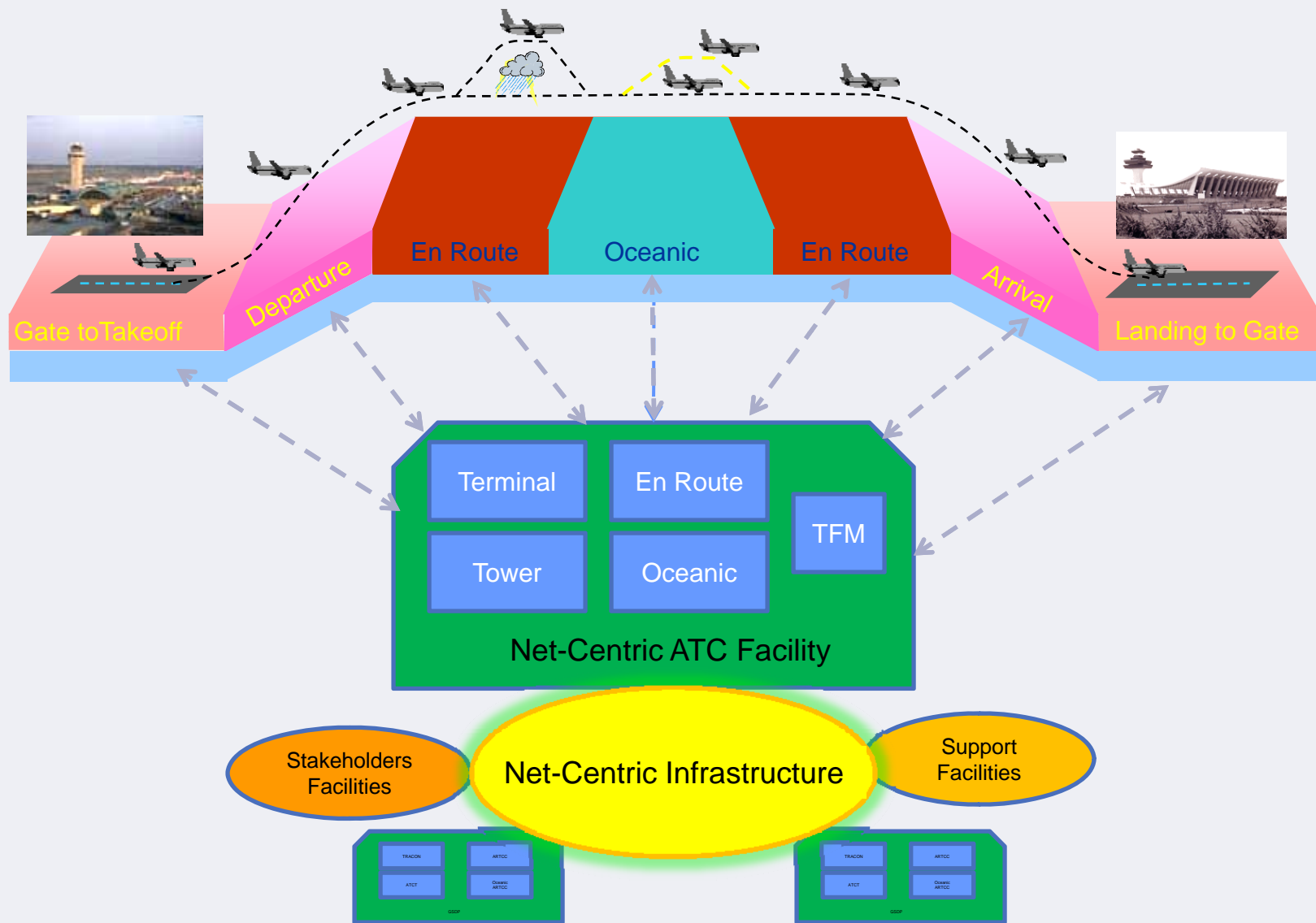
- **Many ATC facilities were built for different sectors and domains**
- **Separate systems were created for domains**
- **Workforce reallocation is limited by the quantity of facilities and systems**
- **NAS system resources are inefficiently used**
- **High cost to provide continuity of operation and contingency services in NAS**

Net-Centric Facility Approach



- **Transform the ATC facilities to net-centric facilities that can provide the flexible mixture of different type of facilities across NAS regardless of the physical locations by using NextGen architecture**
- **The net-centric facility approach includes:**
 - Consolidate or reconfigure the different types of facilities
 - Implement the NextGen net-centric infrastructure and platforms for automation, communication, NextGen Network Enabled Weather (NNEW), and surveillance to support the operation of ATC services to any airspace without the constraints of location and time
 - Use more cost-effective and flexible systems for information sharing and back-up support, plus optimization of human resources and growth

Net-Centric Facility Architecture



Key Enablers for Net-Centric Facility Approach



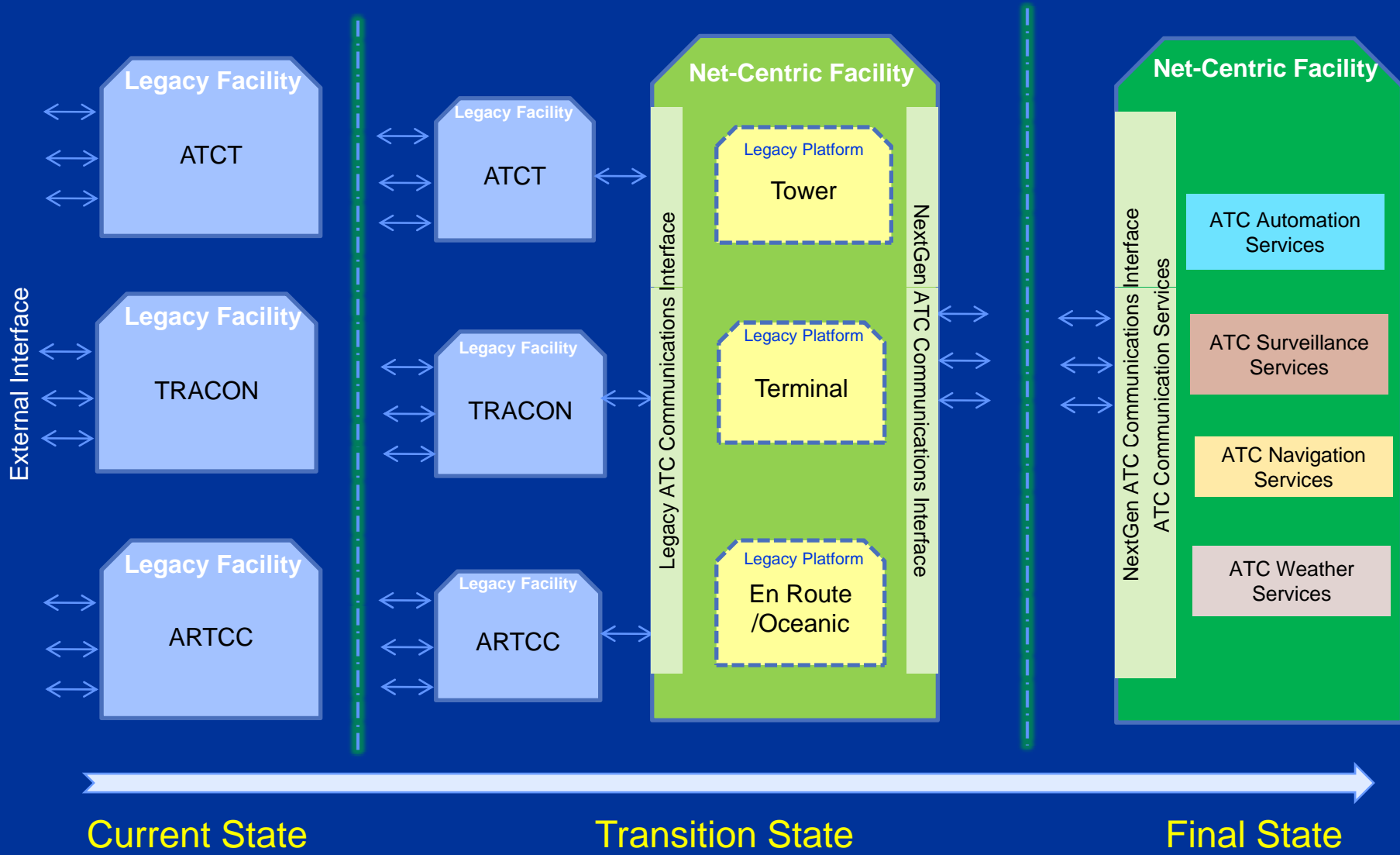
- **Network-enabled Operations**
 - Provide net-centric infrastructure that can ensure the service providers and the information (e.g., flight data, surveillance, weather) are readily available when and where needed
- **Dynamic Infrastructure Management**
 - Provide infrastructure resource management in dynamic way for resource allocation and continuity of operations
- **Real-Time Situation Awareness Environment**
 - Provide cost-effective and flexible systems for information sharing and real-time performance measurement
- **Workforce Resource Management**
 - Provide proactively adjusted and assigned based on projections of shifting demand
- **Safety and Security**
 - Provide safe and secure net-centric facilities to manage ATC services across the NAS

Technical Dependencies



- **NAS Voice Switch**
 - Provide common voice switch platform for all NAS domains with modularity and scalability to meet communications connectivity requirements
- **NextGen Automation Platform**
 - Provides a common platform and display system for En Route/Oceanic, Terminal, Tower domains
- **SWIM**
 - Provide system wide information sharing
- **Safety Management System Processes**
 - Provide safe transition

Net-Centric Facility Transition Model





Major Transition Issues and Considerations

- **Determine the type and number of facilities, and where the new facilities should be located, in order to support NextGen effectively**
 - Air traffic density and flow
 - Workload capacity
 - Redundancy
 - Workforce training and allocation
- **Align the deployment of net-centric facility with other key-enablers:**
 - NextGen Voice Switch
 - SWIM
 - NextGen Automation Platform

Major Transition Issues and Consideration (cont.)



- **Transition or coexist with legacy systems and facilities**
 - Dual operations
 - System interoperability
 - Workforce training and assignment
- **Ensure the safety, security and performance of the NextGen ATC operation with net-centric facilities**
 - No single point of failure
 - Continuity of operation
 - Highly secure networked system

Summary



- **The legacy domain-based facility approach resulted in lower flexibility, higher cost-of-service delivery and continuity of operations**
- **The net-centric facility approach eliminates the limitation of locating facilities within the proximity of the physical airspace**
 - Net-centric facilities can be scaled according to the need of service demands for different airspaces.
 - It can also provide ATC services to any airspace without the constraints of location and time
- **Many transition issues need to be studied and resolved in order to have a smooth transition to NextGen facilities**