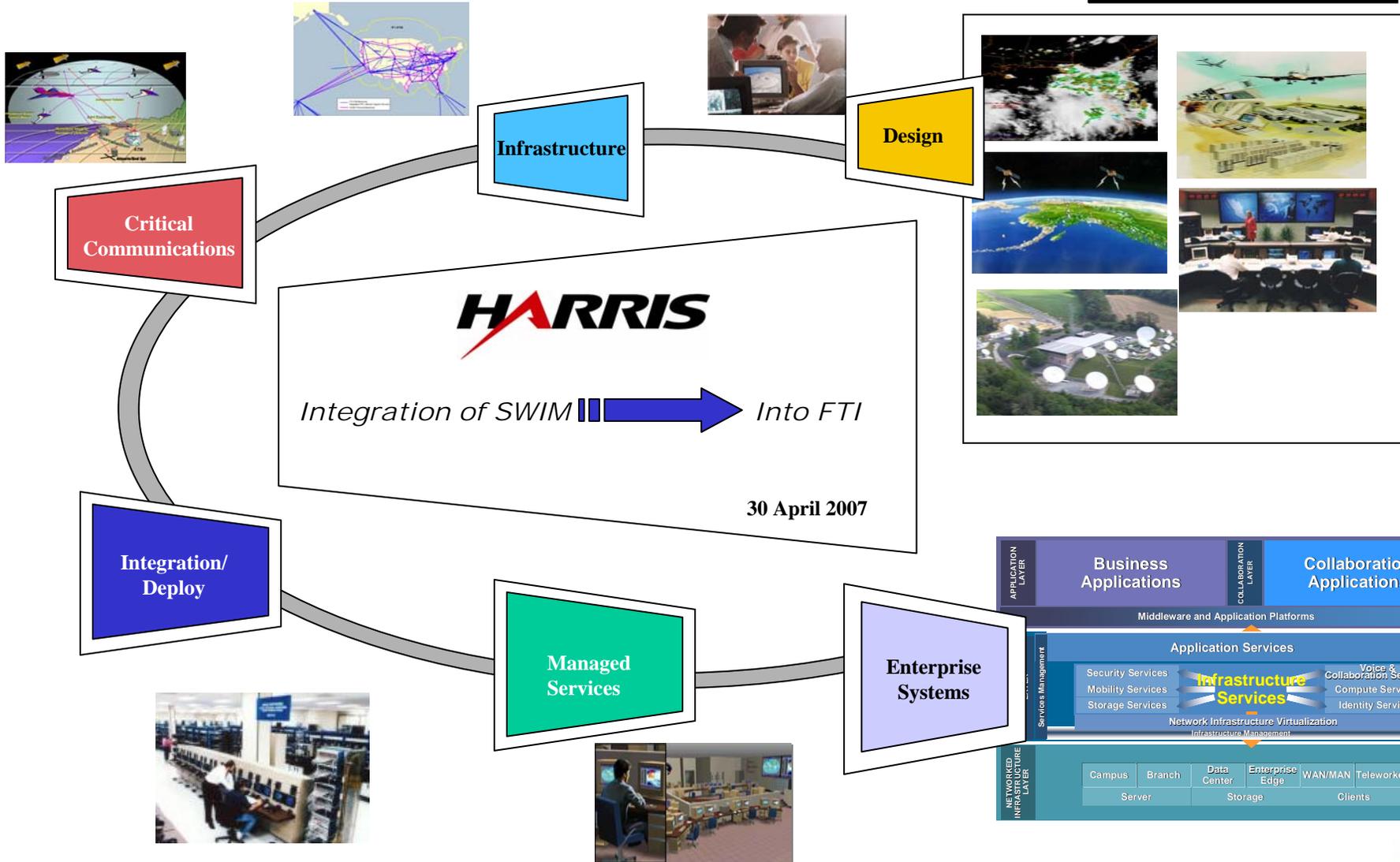


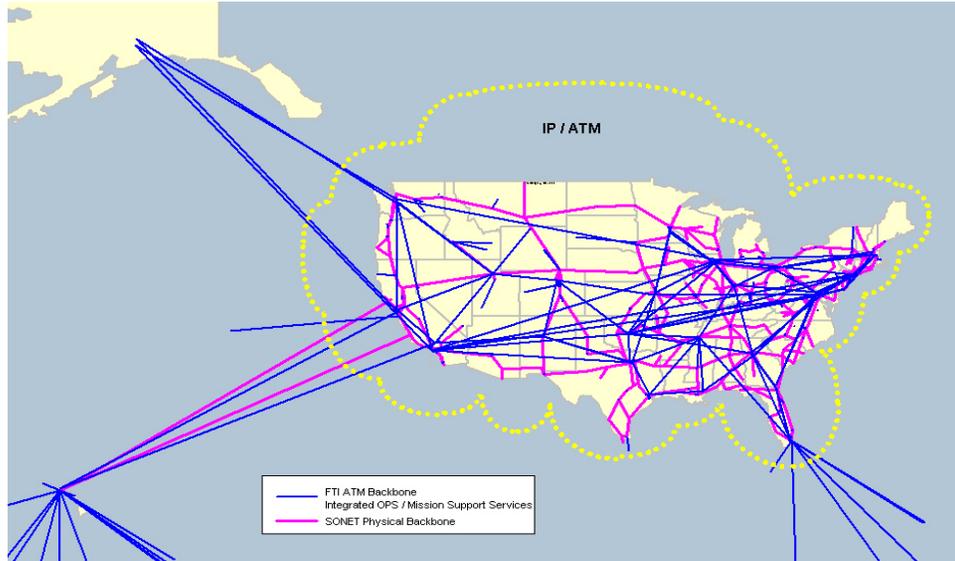
# Overview



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# Leveraging The FAA's FTI Investment



**FTI is an integrated voice and data network using IP over ATM VPN with Frame Relay Access (Point-to-Point and Point-to-Cloud network services)**

- More than 5,000 sites
- More than 20,000 services
- More than 200,000 managed devices
- More than 4,000,000 logical cross connects
- More than 8,000,000 physical cross connects
- More than 2,000,000 price CLINS

- **High Availability - .9999971, dual carrier backbone**
- **Low Latency (50 msec)**
- **Legacy and Proprietary Protocols**
- **Strong Authentication and Integrity**
- **FTI offers 75 classes of service**
- **Redundant Network Operations Control Centers manage network performance**

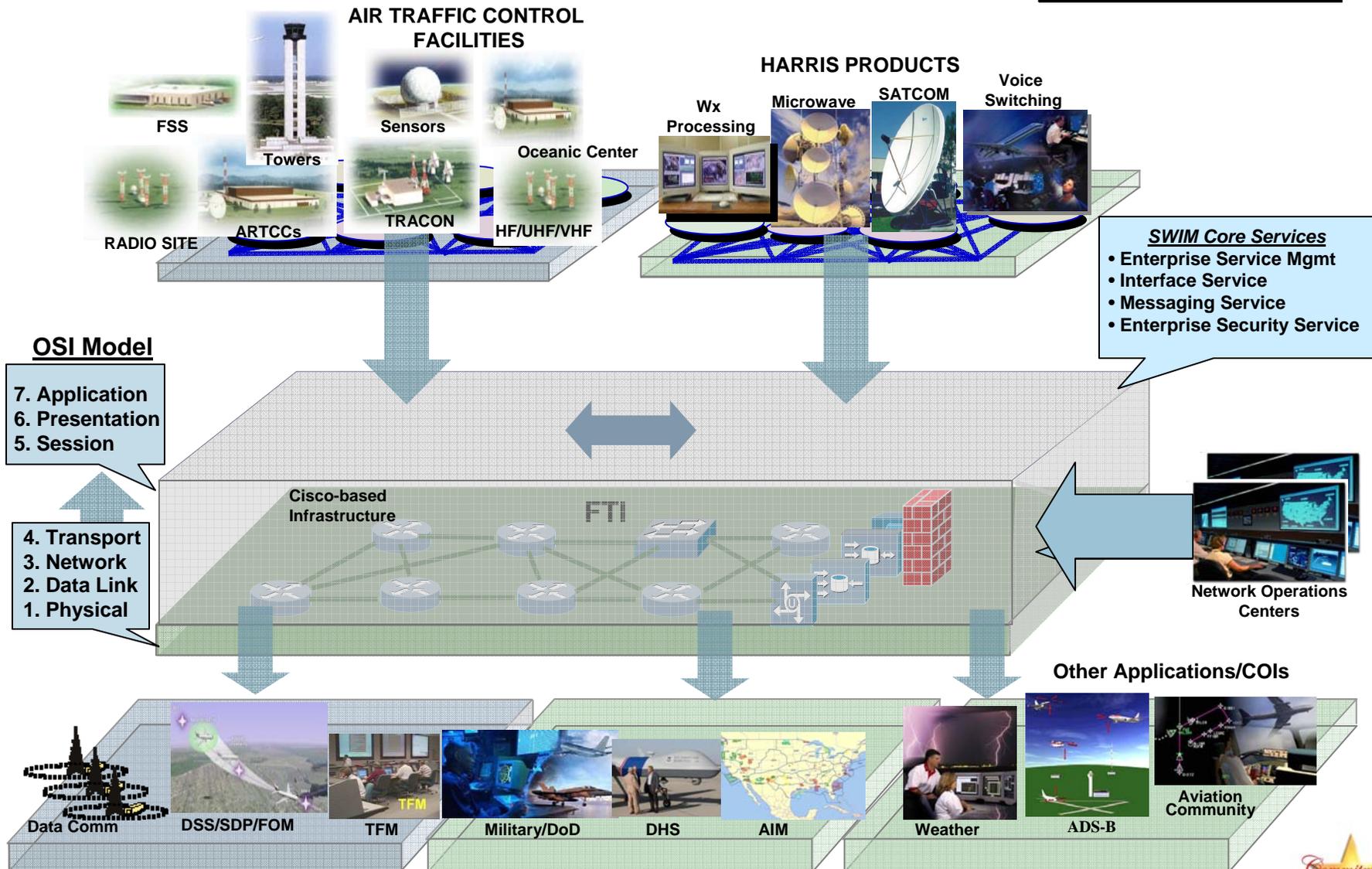
- **Easily expand FTI to include SWIM core services**
  - Add blades to existing servers
  - Add off-the-shelf software products
  - Use industry standard interfaces
  - Does not require a major FAA facilities investment
- **SWIM core elements can be located in existing primary and backup NOCCs**
- **Current system already provides network and security management**



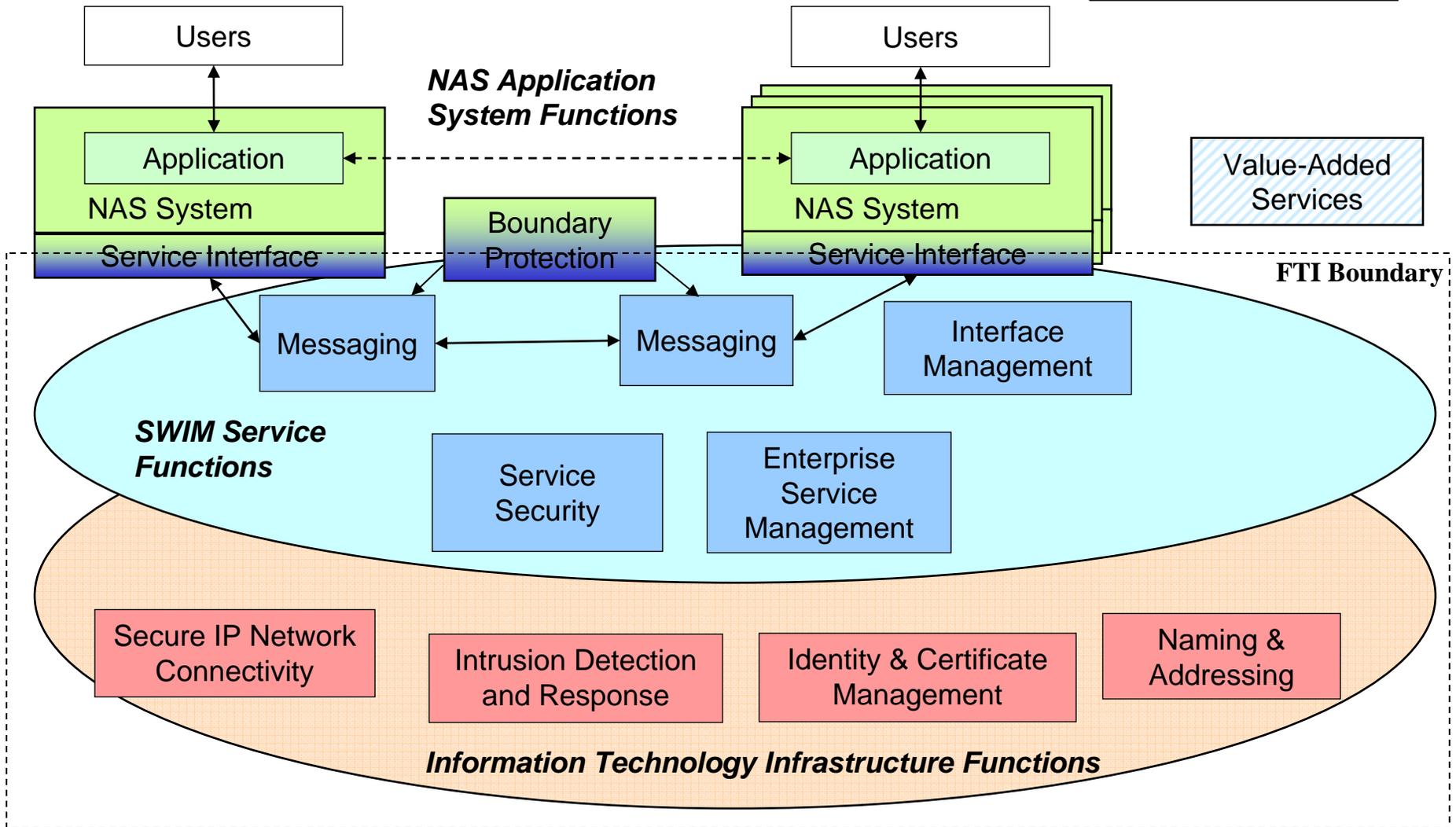
- Completed Services
  - AISR = Automated Information Systems Resource
  - ARMT = Airport Resource Mgmt Tool
  - ATOP = Advanced Technologies and Oceanic Procedures
  - CTAS/ TMA = Center TRACON Automation System/Traffic Management Advisory
  - DMN 9000 = Data Multiplexer Network management system
  - ECG = En Route Communications Gateway
  - ERIDS = En Route Information Display System
  - ETMS = Event Traffic Management System
  - HID NAS LAN = Host Information Display NAS Local Area Network
  - ITWS = Integrated Terminal Weather System
  - MILOPS = Military Operations
  - McTMA = Traffic Management Advisory (next generation)
  - MPS = Maintenance Processor System
  - NDP = National Defense Program
  - NAIMES = NAS Aeronautical Information Management Enterprise System
  - OFDPS (to ZHN) = Offshore Flight Data Processing System
  - SMA = Surface Management Advisor
  - URET= Surface Management Advisor
  - NIMS = NAS Infrastructure Management System
  - TFM-M = Traffic Flow Management Modernization
  - ERAM = En Route Automation Modernization
  - TDWR = Terminal Doppler Weather Radar
  - ASDE-X = Airport Surface Detection Equipment -X band
  - NOTAMS – NOTices to AirMen Systems
  - TDLS = Tower Data Link Services
  - NEXRAD-WARP = Next Generation Radar – Weather and Radar Processor
  - FS-21 = Flight Service 21<sup>st</sup> Century
  - CSIRC = Computer Security Incident Response Center
  - STARS = Standard terminal Automation Replacement System



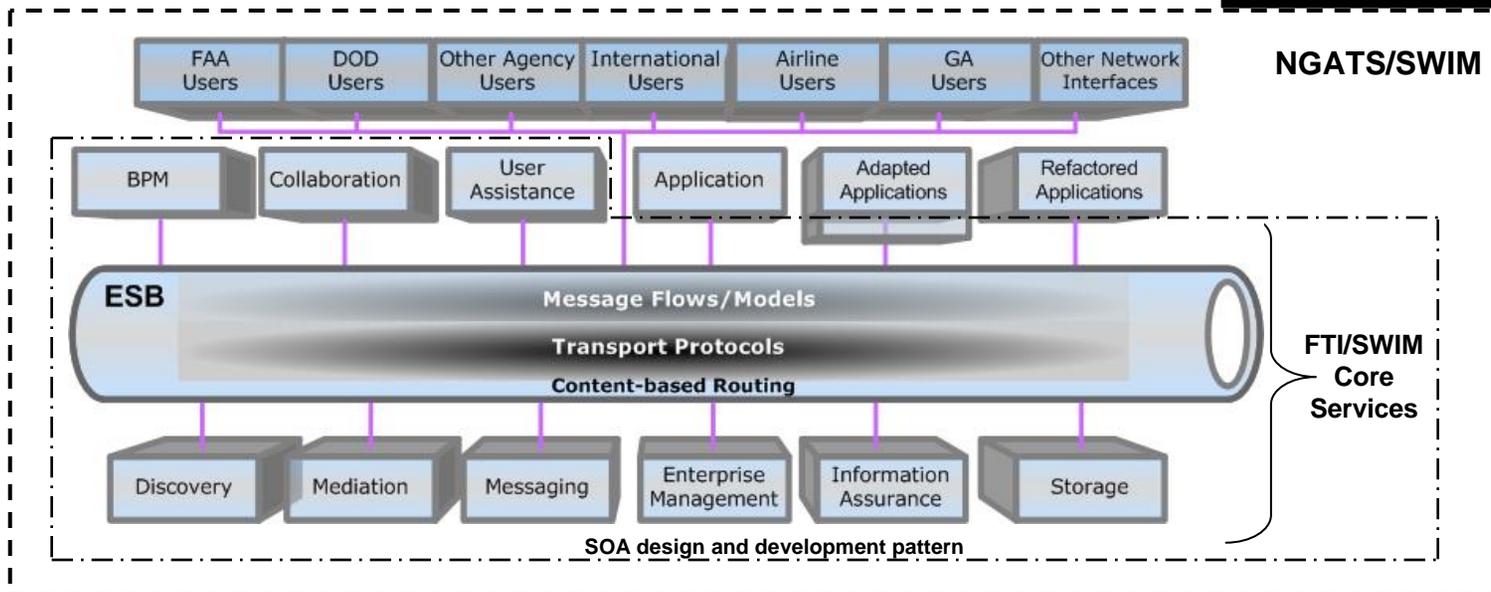
# SWIM Core Services Integration Concept



# SWIM Functional Architecture



# SWIM Core Services Framework

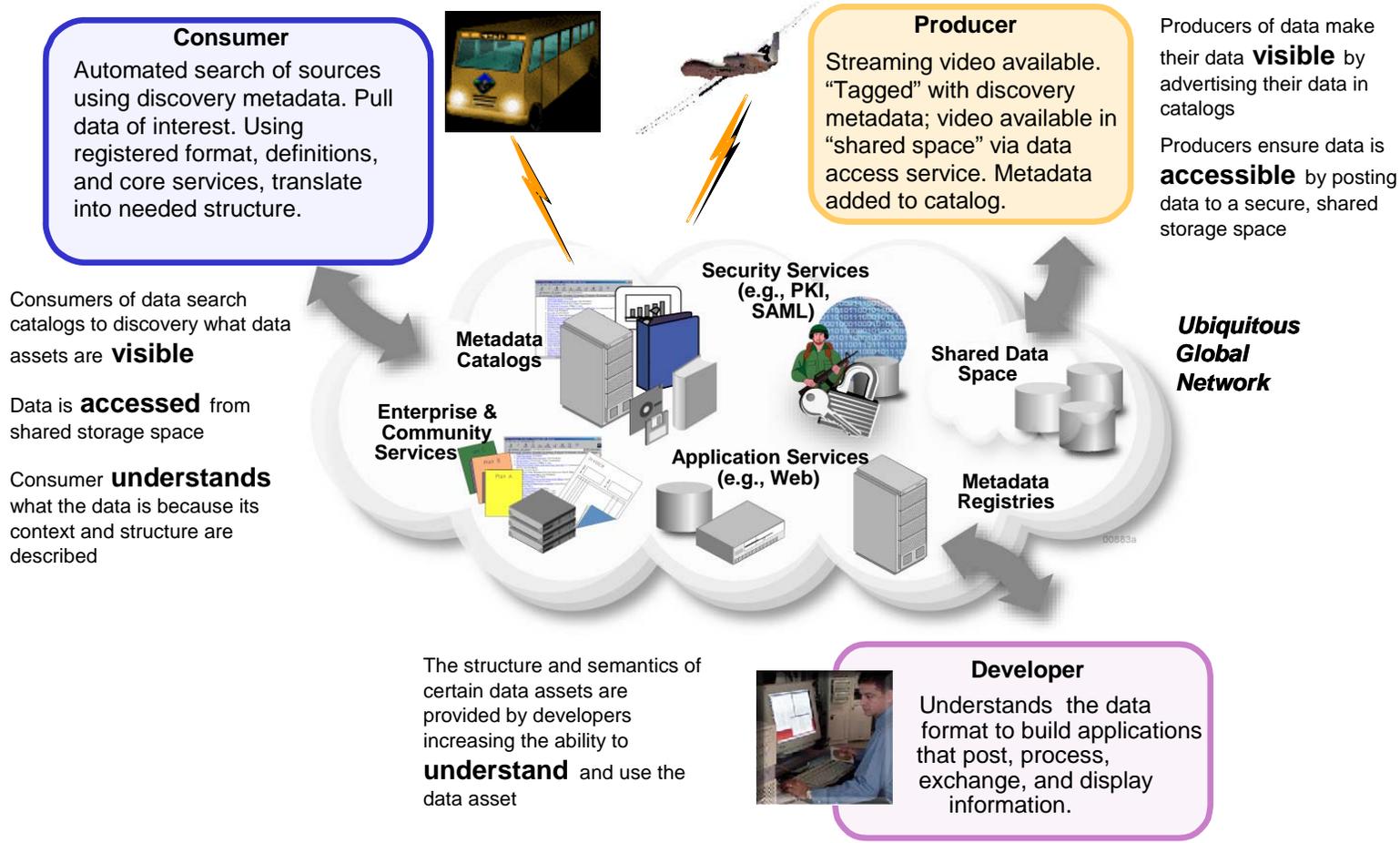


<b>Interface Management</b>	<ul style="list-style-type: none"> <li>• Adaptation, Mediation, Transformation</li> <li>• Performance/SLA monitoring &amp; Management</li> <li>• Discovery, Registry, Catalog/Description, Publication, Namespace</li> <li>• Federated Search</li> <li>• Naming &amp; Addressing, DNS</li> <li>• Interface Specification, Versioning</li> </ul>
<b>Messaging</b>	<ul style="list-style-type: none"> <li>• Communications (Synchronous, Asynchronous, Publish/Subscribe, Push/Pull)</li> <li>• Routing, Content-Based Routing</li> <li>• Brokering, Protocol, Conversion</li> <li>• Web Services, Point-to-Point, Native Messaging</li> <li>• Independent real-time busses</li> </ul>
<b>Enterprise Service Management</b>	<ul style="list-style-type: none"> <li>• Service Level Monitoring</li> <li>• Governance (Monitoring, Mgmt of Processes)</li> <li>• Enterprise Service Bus (ESB)</li> <li>• Network, System, Application</li> <li>• Extend FTI's NOCC Capability</li> <li>• Configuration Management</li> <li>• Storage (Content Mgmt, Archive &amp; Database)</li> </ul>

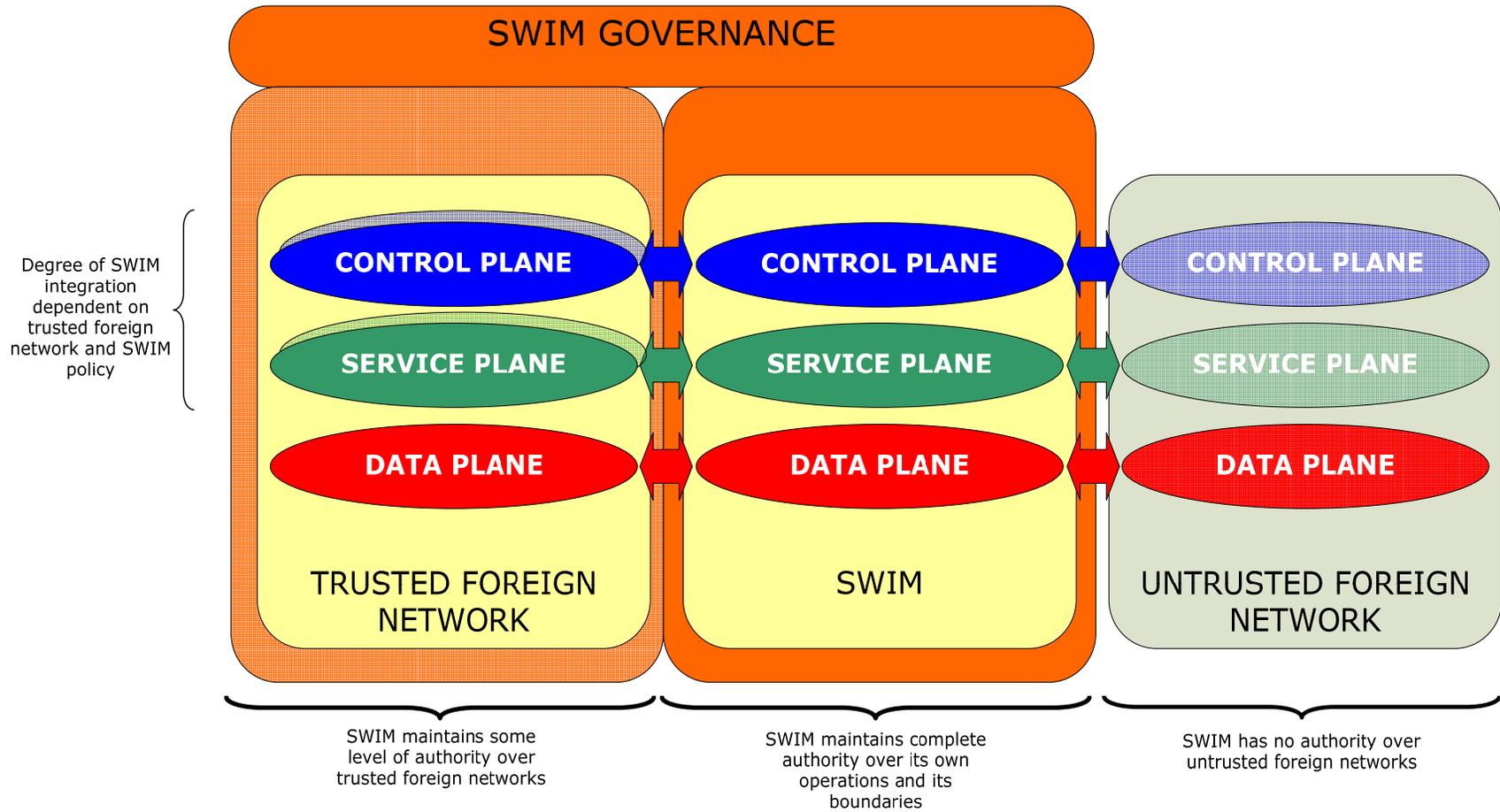
<b>Security</b>	<ul style="list-style-type: none"> <li>• Boundary Protection, Intrusion Monitoring &amp; Response</li> <li>• Identity &amp; Certification Management</li> <li>• Service Authorization, Authentication, and Access Management</li> <li>• Encryption Management</li> <li>• Information Assurance</li> <li>• Operational Capability (e.g., incident response, vulnerability, scanning patch management, standard base)</li> <li>• Configuration (device images, etc.)</li> <li>• Asset Inventory</li> <li>• Annual C&amp;A</li> </ul>
<b>Value Added Services</b>	<ul style="list-style-type: none"> <li>• Optional services including capabilities like archiving, persistence (i.e., repository), and information transformation (e.g., data structure, context and semantics-aware operations on information)</li> </ul>



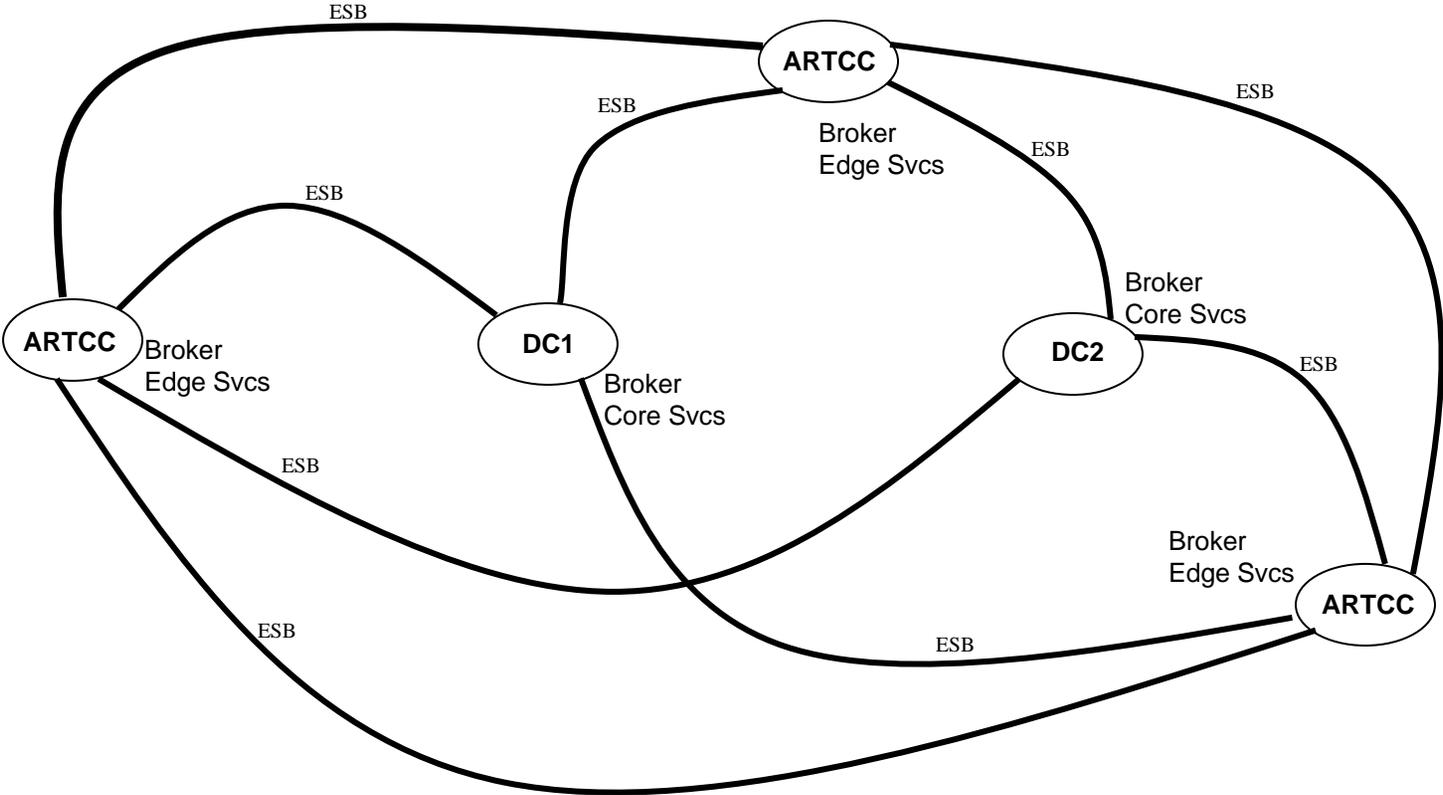
# The SWIM NAS



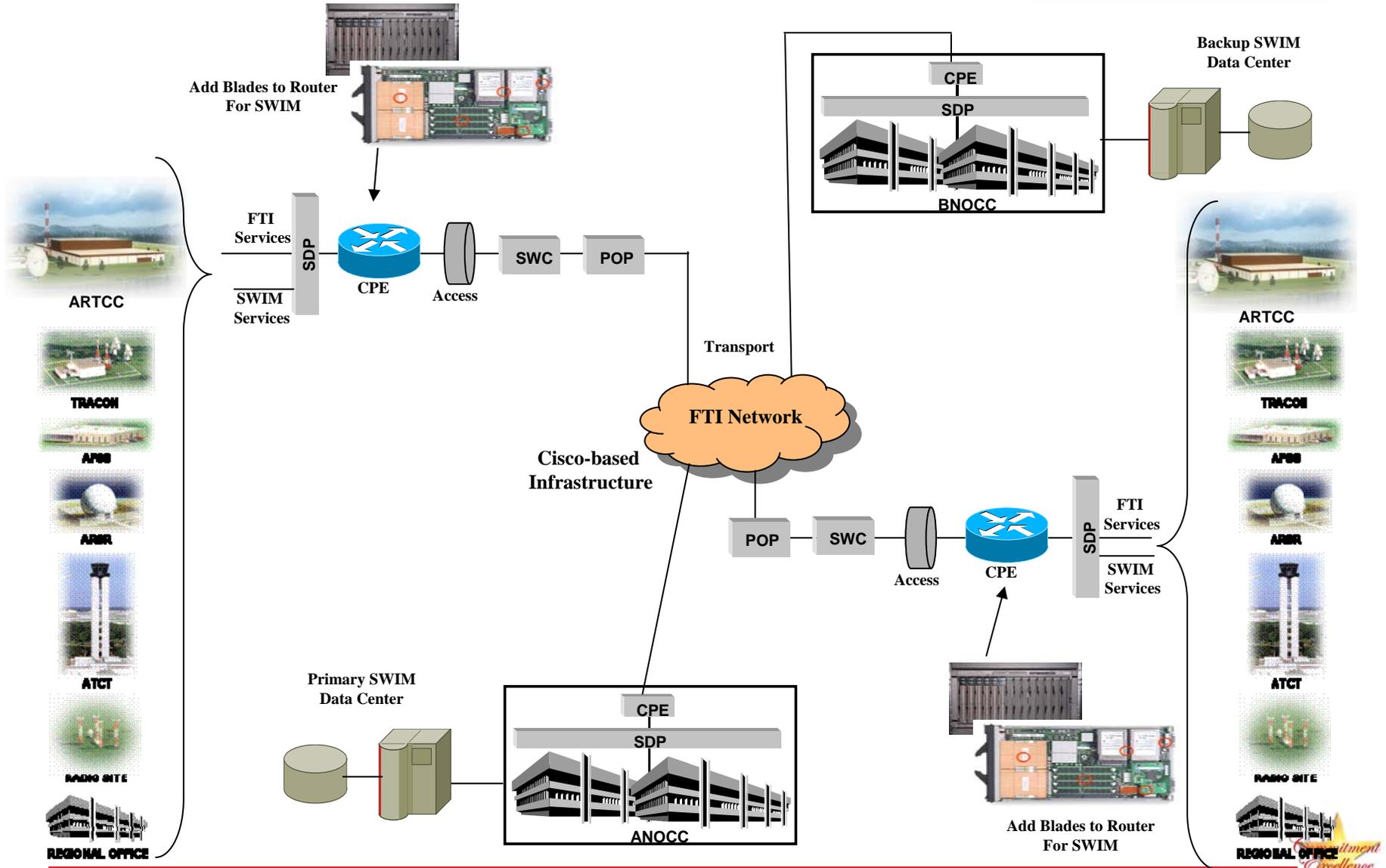
# SWIM Planes



# Notional Data Center Approach



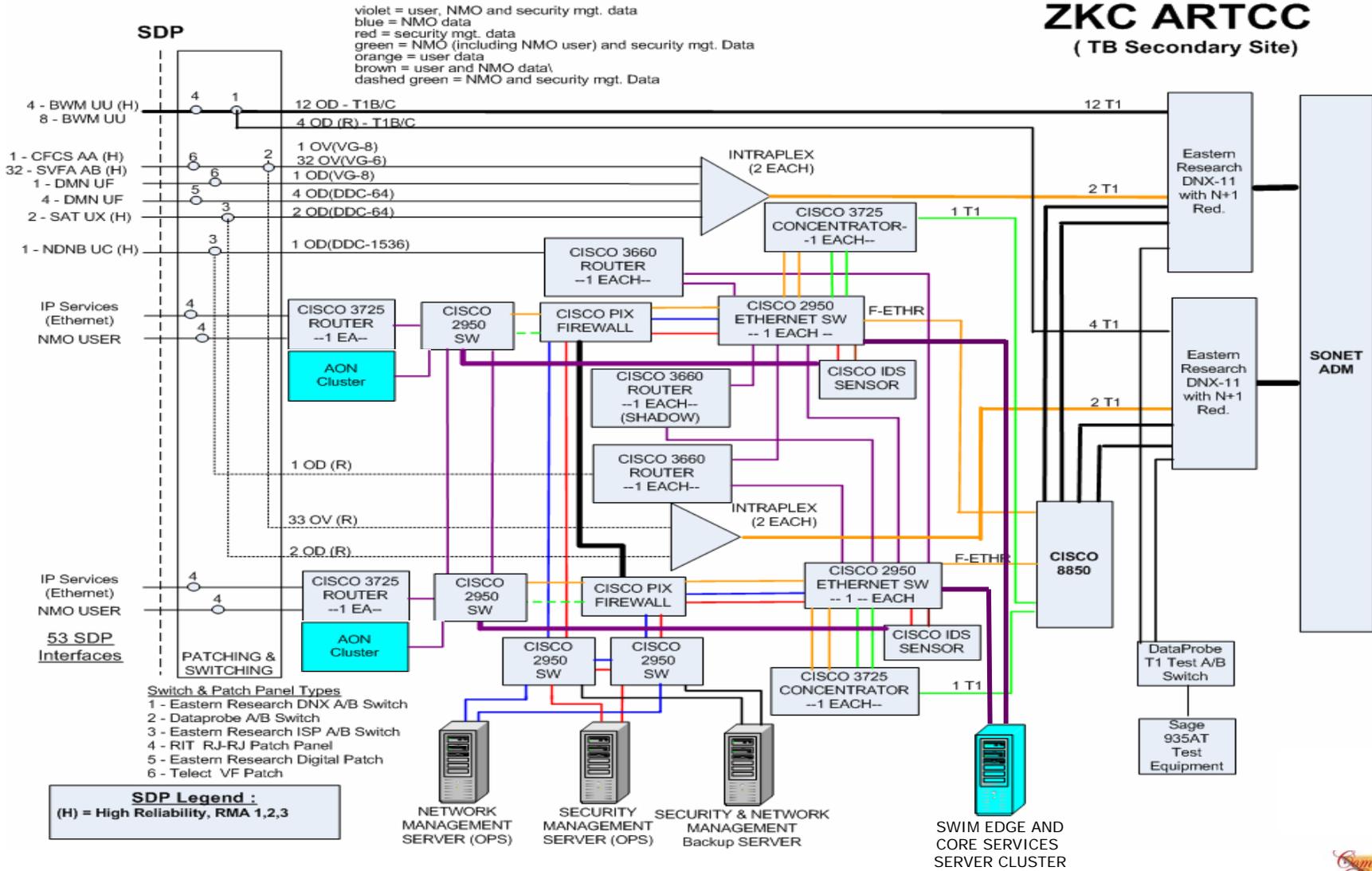
# SWIM Integrated Into FTI Infrastructure



# SWIM Integration into FTI Tier 2 - ARTCCs

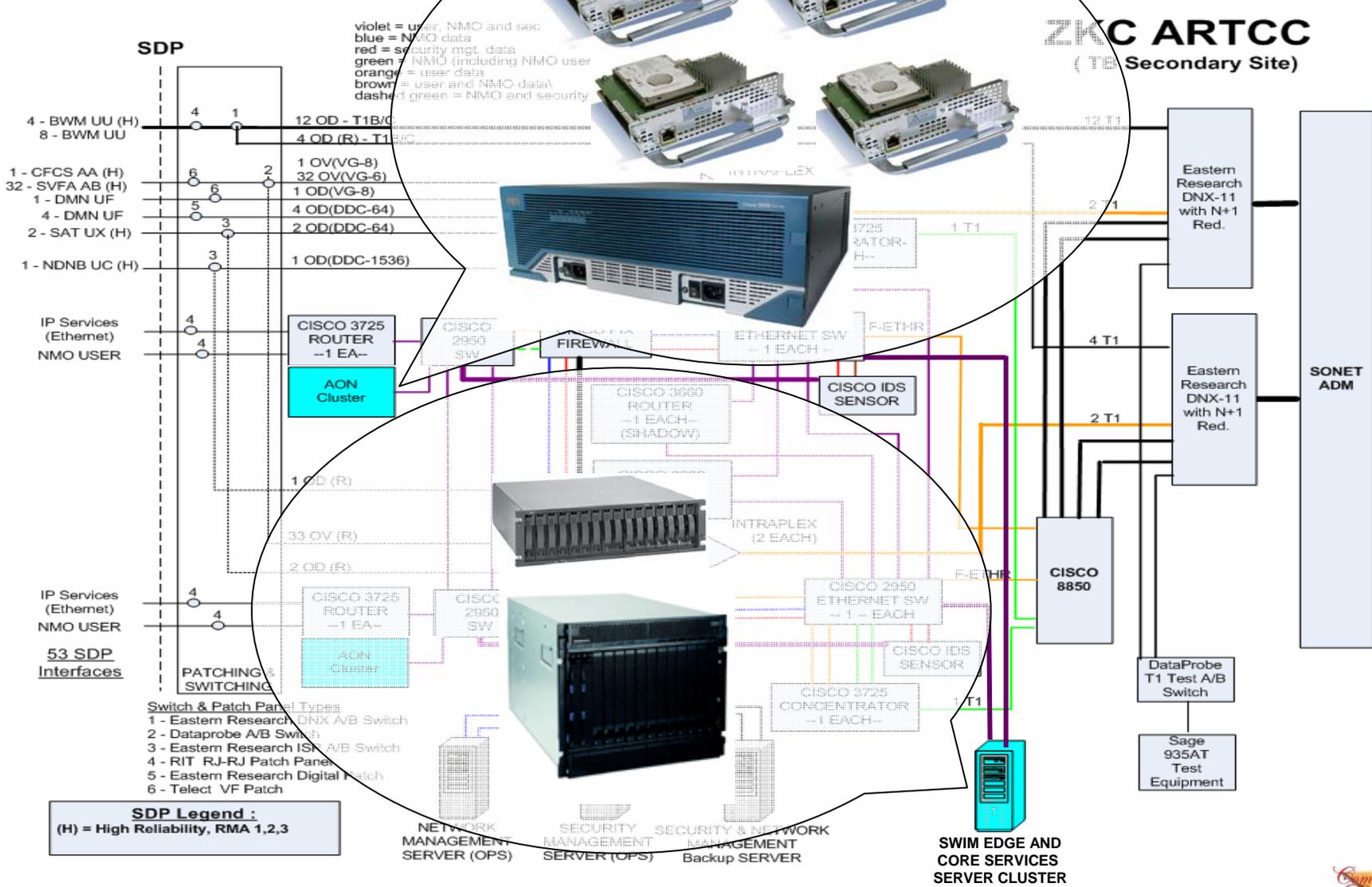


## ZKC ARTCC (TB Secondary Site)



# SWIM Integration into FTI

## Tier 2 - ARTCCs



*Backup Slides*

# Core Capabilities Mapping



SWIM Core Services (MITRE)	NCES Functionality Supported	Function Description
Interface Mgmt	Discovery	Service discovery provides dynamic publishing and discovery of service definitions. This service supports the Universal Description Discovery Integration (UDDI) standard. The registry provides a service directory for all applications and users, and a dynamic publishing and discovery of service definitions.
	Mediation	Allows different applications to work together across the enterprise by supporting the transformation of information from one format to another. Data and services in an enterprise environment are represented in a variety of formats. Mediation services help bridge information exchange between data producers and consumers. Mediation services include data transformation, aggregation, service orchestration and adaptation. Data transformation changes data from one form to another. Service orchestration works on behalf of a consumer to coordinate a workflow. Service adaptation solves the problem of converting between the rules used by one service into that required by another while maintaining the integrity of the message being sent through the SOA.
	Metadata	Metadata services allow Enterprise systems to discover and manage (publish, make visible, and access) various metadata artifacts critical to a system and/or person's ability to exchange and understand data components within the enterprise. Metadata is data used to describe other data. Metadata Services provide the tools and resources necessary to adequately describe, publish, advertise, access, manage metadata and promote interoperability across the Enterprise. The net-centric enterprise services rely on Metadata Services in order to standardize retrieval of information.
Messaging	Messaging	The messaging service component provides a federated, distributed and fault-tolerant enterprise messaging service. The Messaging Service delivers high performance, scalable and interoperable asynchronous event notifications to both applications and end-users. The Messaging service leverages multiple messaging paradigms including publish and subscribe, peer-to-peer and queuing. It supports the configuration of Quality of Service (QoS) parameters for a published message including the priority, precedence, and time-to-live (TTL). In addition, it provides guaranteed delivery to disconnected users or applications. Messages are queued for delivery when the recipient reconnects to the network.
Security	IA/Security	Information Assurance (IA)/Security is a set of services for an integrated and extensible privilege model that allows applications to use a single-identity environment and enforce role-based access control to distributed services. This provides protection mechanisms to a SOA by supporting authentication and authorization processes for exposed Web Services. Capabilities include a Service Security interface and design specification, as well as functional components that enforce Role Based Access Control (RBAC), other capabilities will include increased Attribute Based Access Control (ABAC) mechanisms, cross-Communities of Interest (COI) support, enterprise security logging and auditing.
Enterprise Service Mgmt	Enterprise Service Mgmt	Enterprise Service Management (ESM) is a continuous and closed-loop process of managing, measuring, reporting and improving the Quality of Service (QoS). ESM is the component that provides Web service management. As the number of Web services deployed increase, the ability to effectively manage them becomes critical. Monitoring enterprise Web services allows service providers and service management administrators to collect and evaluate mission critical, service vital signs such as service performance metrics and QoS data. ESM will integrate with several other service management components to provide extensive situational awareness.
	Application	A set of capabilities and resources necessary to provision, operate, and maintain the net-centric enterprise services applications and assured computing functions available to users and administrators.
	Storage	Three types of storage fall under this category 1) Content Management, 2) Archive, and 3) Database. Consumers or providers will determine the storage type and availability.



# Definitions



- Broker: A broker consists of software which mediates between two objects: typically between a client and a server or between a repository and a requestor or caller. For example a Message Broker is an intermediary program that translates a message from the formal messaging protocol of the sender to the formal messaging protocol of the receiver in a telecommunications network where programs communicate by exchanging formally-defined messages.
- Web service: A software system designed to support interoperable Machine-to-Machine interaction over a network. Web services are frequently just Web APIs that can be accessed over a network, such as the Internet, and executed on a remote system hosting the requested services.
- Domain Name Service (DNS): An network service that translates domain names into IP addresses. Because domain names are alphabetic, they are easier to remember.
- Publish/Subscribe (or pub/sub): An asynchronous messaging paradigm where senders (publishers) of messages are not programmed to send their messages to specific receivers (subscribers). Rather, published messages are characterized into classes, without knowledge of what (if any) subscribers there may be. Subscribers express interest in one or more classes, and only receive messages that are of interest, without knowledge of what (if any) publishers there are. The decoupling of publishers and subscribers can allow for greater scalability and a more dynamic network topology. In a *topic-based* system, messages are published to “topics” or named logical channels. Subscribers will receive all messages published to the topics to which they subscribe. In a *content-based* system, messages are only delivered to a subscriber if the attributes or content of those messages match constraints defined by the subscriber. Some systems support a hybrid of the two.
- Peer-to-Peer: A peer-to-peer system is a distributed system whose component nodes participate in similar roles, and are therefore peers to each other. Peer-to-peer can be viewed as decentralized network architecture. In contrast a client-server architecture implies a sharp distinction between clients which request and consume services, and servers which provide access.



# Definitions (continued)



- Proxy Server: A server that offers a computer network service to allow clients to make indirect network connections to other network services. A client connects to the proxy server, then requests a connection, file, or other resource available on a different server. The proxy provides the resource either by connecting to the specified server or by serving it from a cache. In some cases, the proxy may alter the client's request or the server's response for various purposes. Proxies may be used to block offensive web content, others reformat web pages for a specific purpose or audience. Proxies can also be used to intercept computer viruses and other hostile content served from remote web pages.
- Content-based routing: The ability to use the content of a network packet or message to take some sort of action. This typically takes place at layer 7 of the OSI stack.
- Namespace: A context in which a group of one or more identifiers might exist. An identifier defined in a namespace is associated with that namespace. The same identifier can be independently defined in multiple namespaces, that is, the meaning associated with an identifier defined in one namespace is independent of the same identifier declared in any other namespace. Languages that support namespaces specify the rules that determine which namespace an occurrence of an identifier (i.e., not its definition) belongs to.
- Federated Search: Federated search implements a computer program that allows users to access multiple data sources with a single query string located within a single interface. The user enters a search query in the portal interface's search box and the search string is sent to every individual database that is incorporated into the portal or federated search list.
- Federation of Core Services: No data center containing a single instance of the core services can meet the SWIM scalability, availability, or performance requirements. A federated architecture allows multiple instances of SWIM core services to be logically joined/distributed, as required, to meet initial and future requirements. The federation of core services work together and appear to users as a single integrated system. This approach makes SWIM core services highly responsive and eliminates any single point of failure.



# SWIM Functional Architecture

