



meshONE-Terrestrial (meshONE-T): The USSF Data Transport Highway

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Overview

- Background
- BLUF
- meshONE-T for the Enterprise
- Approaches: Pathfinder & MVP
- Services
- Network Management
- Future Development
- Summary
- Questions?



Background

Technologically
obsolete, high
maintenance, low-
capacity



Lack resiliency and
cyber protections



Inefficient, costly,
and excessive time
to field



Existing space
systems rely on
a patchwork of
aging,
stovepipe
mission-area
data transport
solutions

USSF systems
require a
modern
network
architecture to
satisfy mission
demands



A growing number
of space and ground
assets



Exponential
quantities of data



An increasingly
interconnected
producer &
consumer
community

Need an enterprise data transport network to provide US Space and associated tactical and C2 users immediate access to USSF Space products (e.g., SSA. Sensor Data, ...)



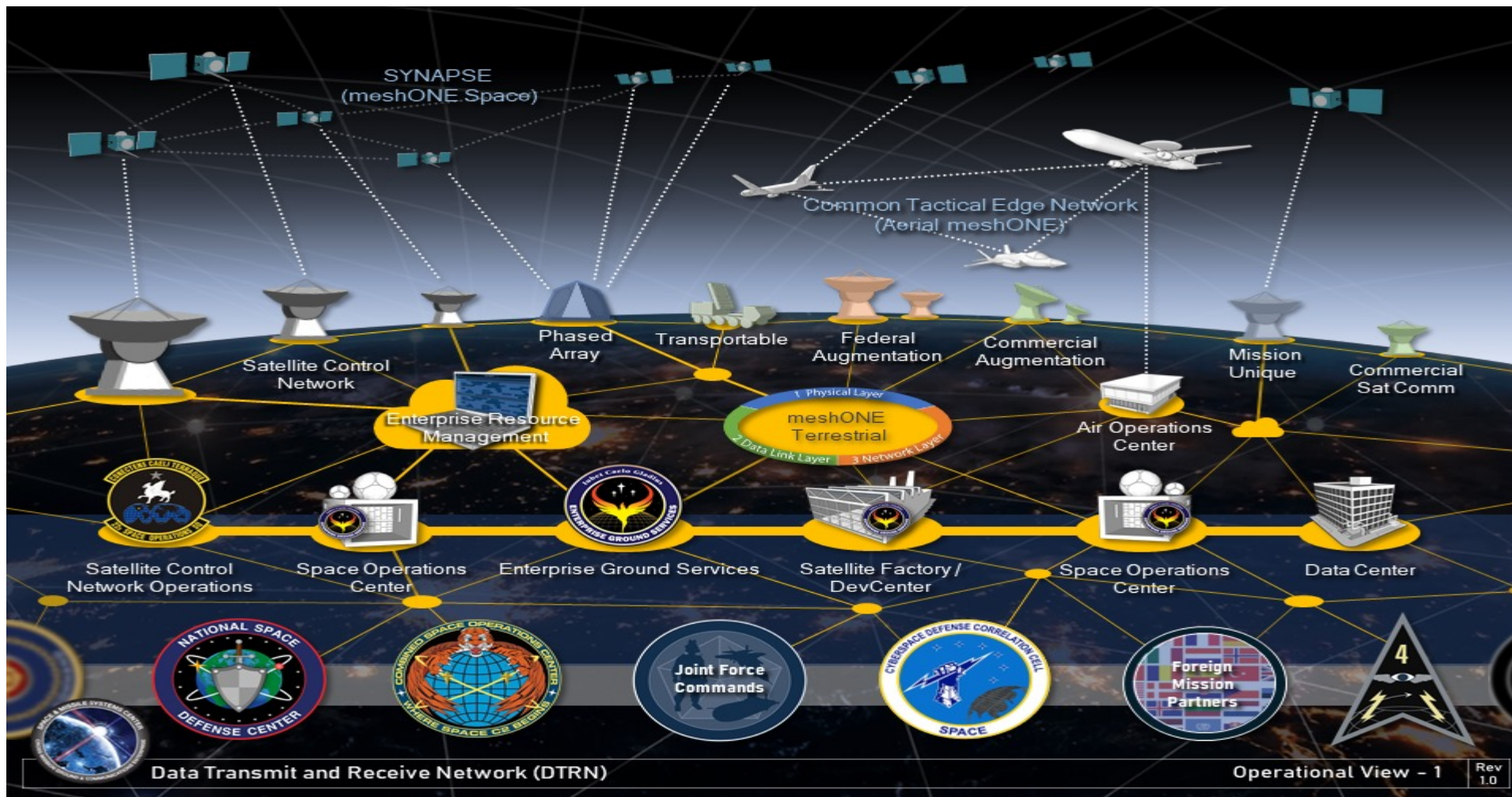
meshONE-T BLUF

- meshONE-T (m1T) is a scalable, resilient, and cyber-secure long haul data transport architecture built on modern technologies and industry standards featuring:
 - A multi-user, multi-classification, high speed, IP-based network
 - Diversified, “self-healing” comm paths
 - Robustness against cyber, jamming & other threats
 - Secure movement of data quickly and reliably across a range of locations, environments and conflict conditions





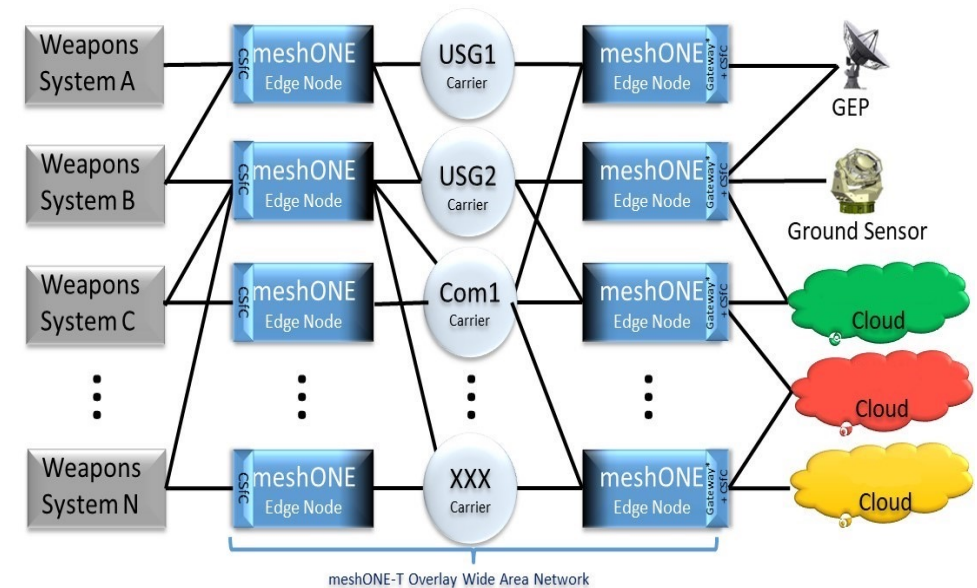
meshONE-T for the Enterprise





meshONE-T Pathfinder

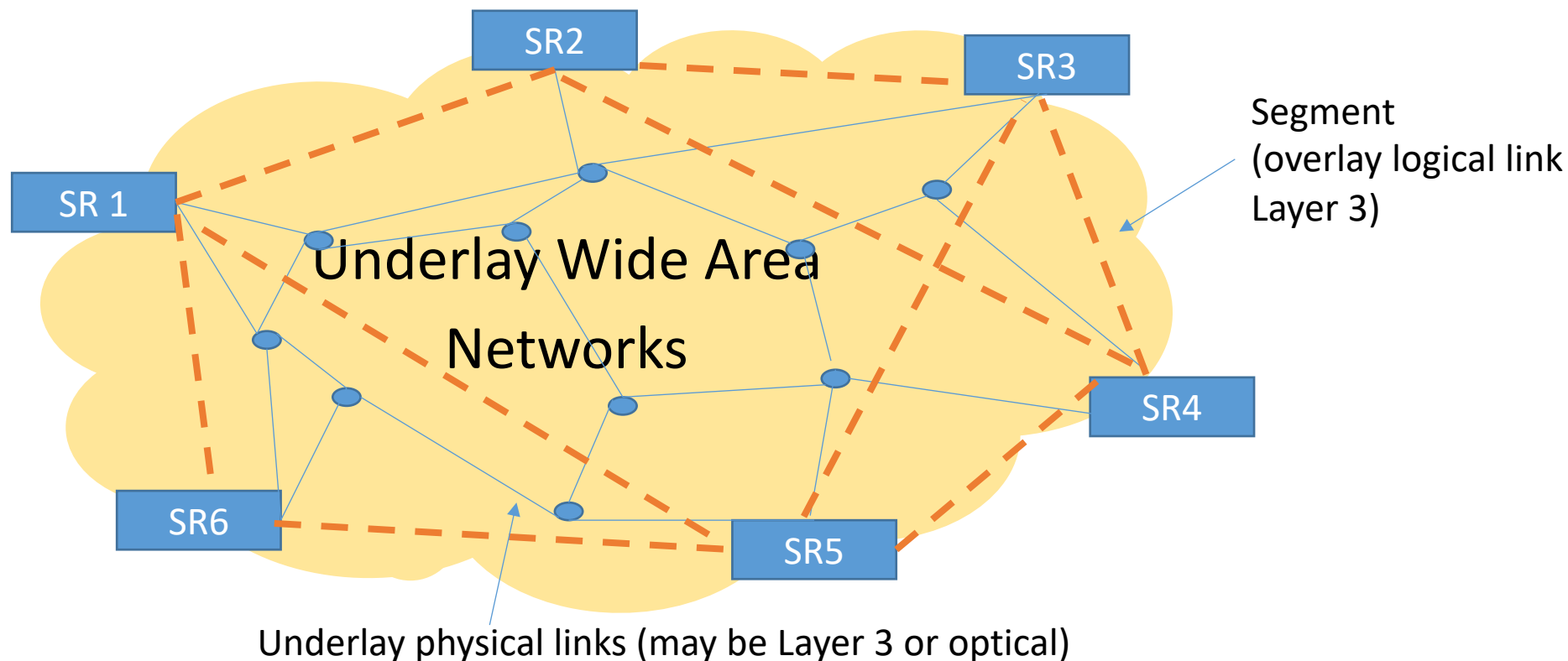
- ECXTD is developing a meshONE-T pathfinder through FY24
- Addresses near-term user needs for Next-Gen OPIR and Defensive Cyber Ops-Space (DCO-S)
- Prototypes Data Transport as a Service (DTaaS) solutions to meet current and future operational demands
- Fields foundational elements and solutions scalable into a larger, more comprehensive Enterprise objective architecture
 - Comms via DISA, existing long haul provider networks & new providers (e.g., commercial LEO SATCOM, 5G)
- Each node affords multiple local users:
 - Ability to efficiently connect to the network
 - Availability to all data on the network (as allowed by classification and the data owner)
 - Inherent network benefit of multi-path resiliency





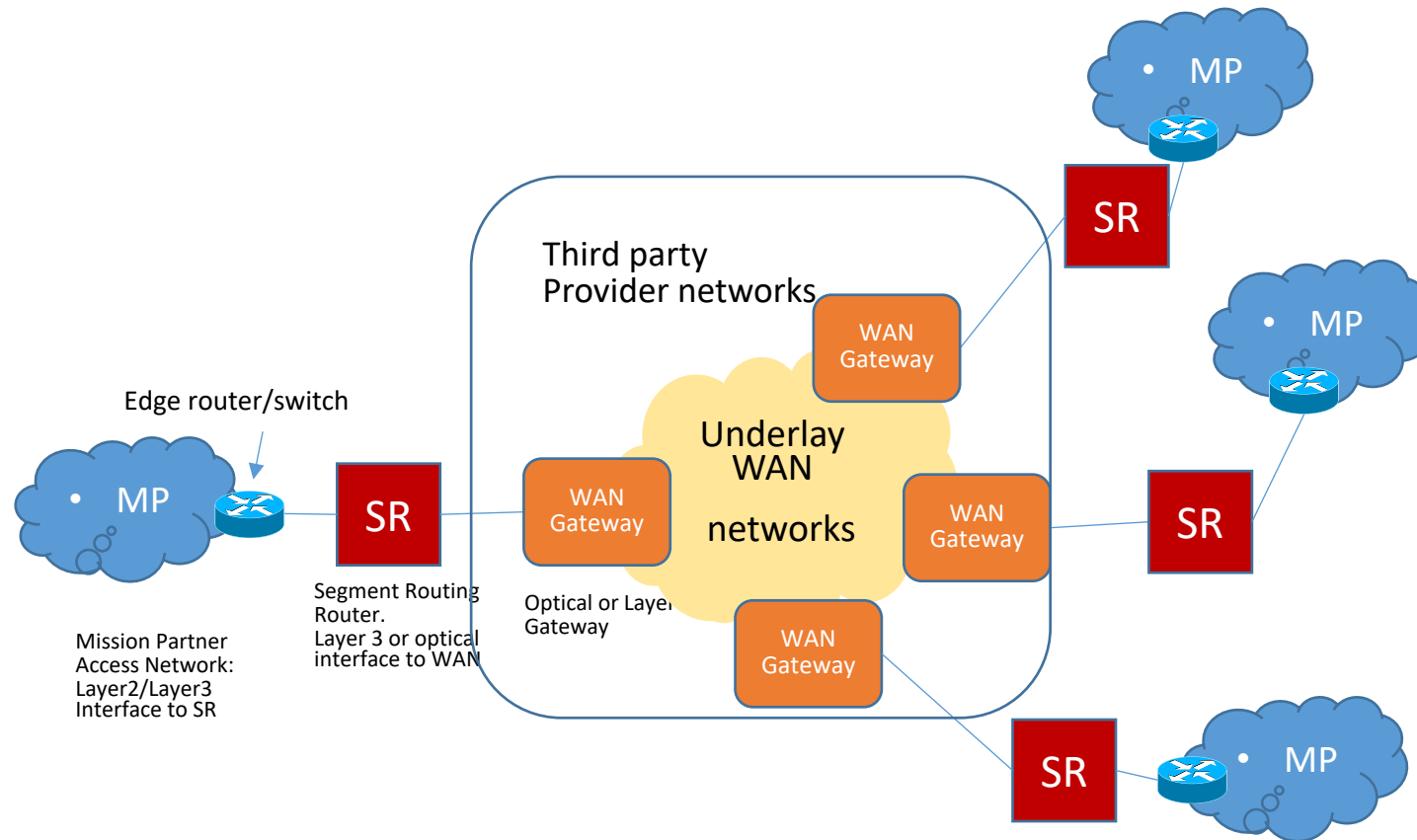
meshONE-T Approach

- meshONE-T is an overlay long haul network implemented via Edge routers, called Segment Routers (SR), that provides SR-MPLS service
- Segment Routers (SR) are connected via other providers' Underlay Wide Area Networks (WAN).
- Many underlay links may constitute a segment (a logical link in the SR)





End-to-End Path



Mission Partners (MP) are connected via meshONE-T long haul network. Routing in this network is from one SR to SR over the logical links, as specified by source-routing (SR-MPLS or SRv6).

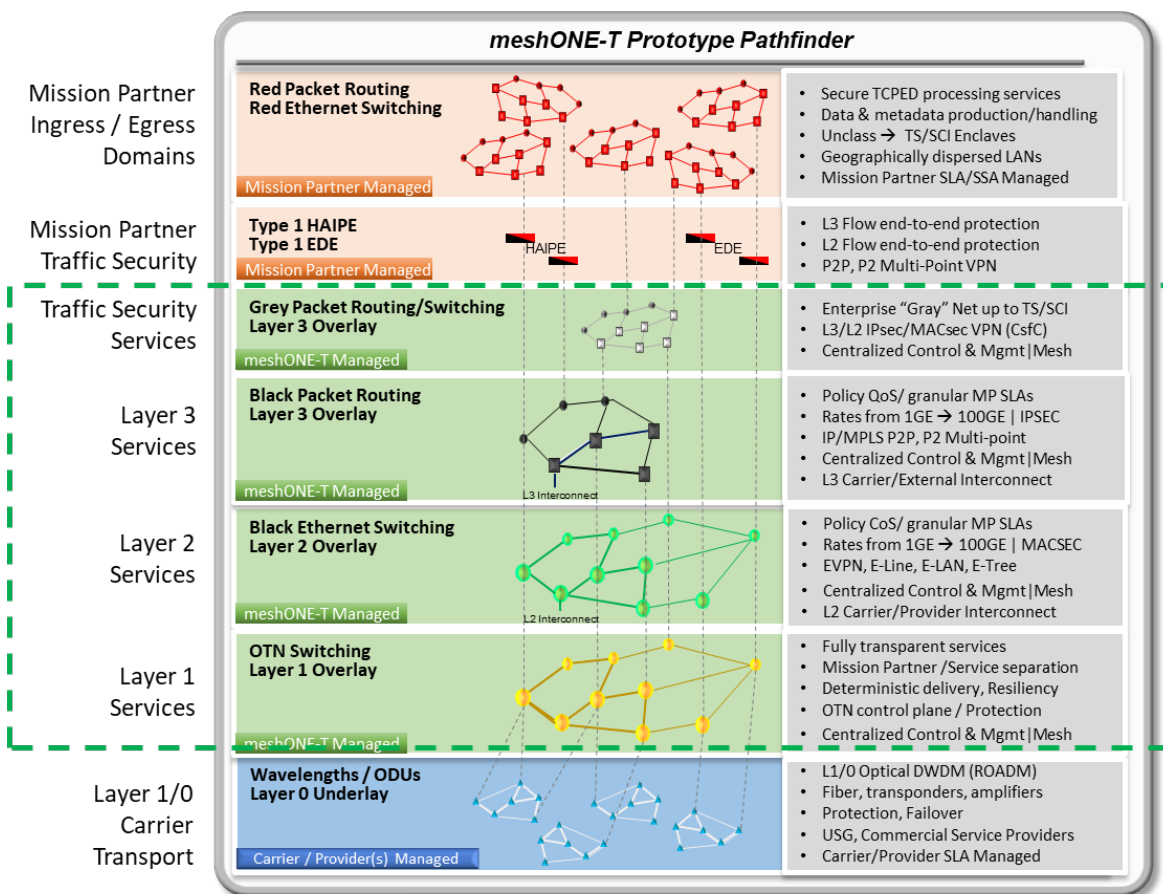


Roles & Protocols

- Mission Partner may be
 - An edge cloud network
 - An antenna network
 - Its NOCs
 - User sites
 - Server farms
 - Cloud or tenants in a cloud
- Interface may be
 - Layer 2 (E-LAN, E-Lane, E-tree, ...)
 - Layer 3
 - IPv6 & IPv4 dual stack support
- m1T is an overlay network made of
 - Edge devices
 - May be physical routers
 - May be Software defined,
 - cloud based
 - Interconnected via another provider WAN
 - Layer 3 segment routing
 - IGP routing (IS-IS)
 - SR-MPLS using label stack
 - Future
 - SRv6 (Segment routing stack) or,
 - SD-WAN with controllers



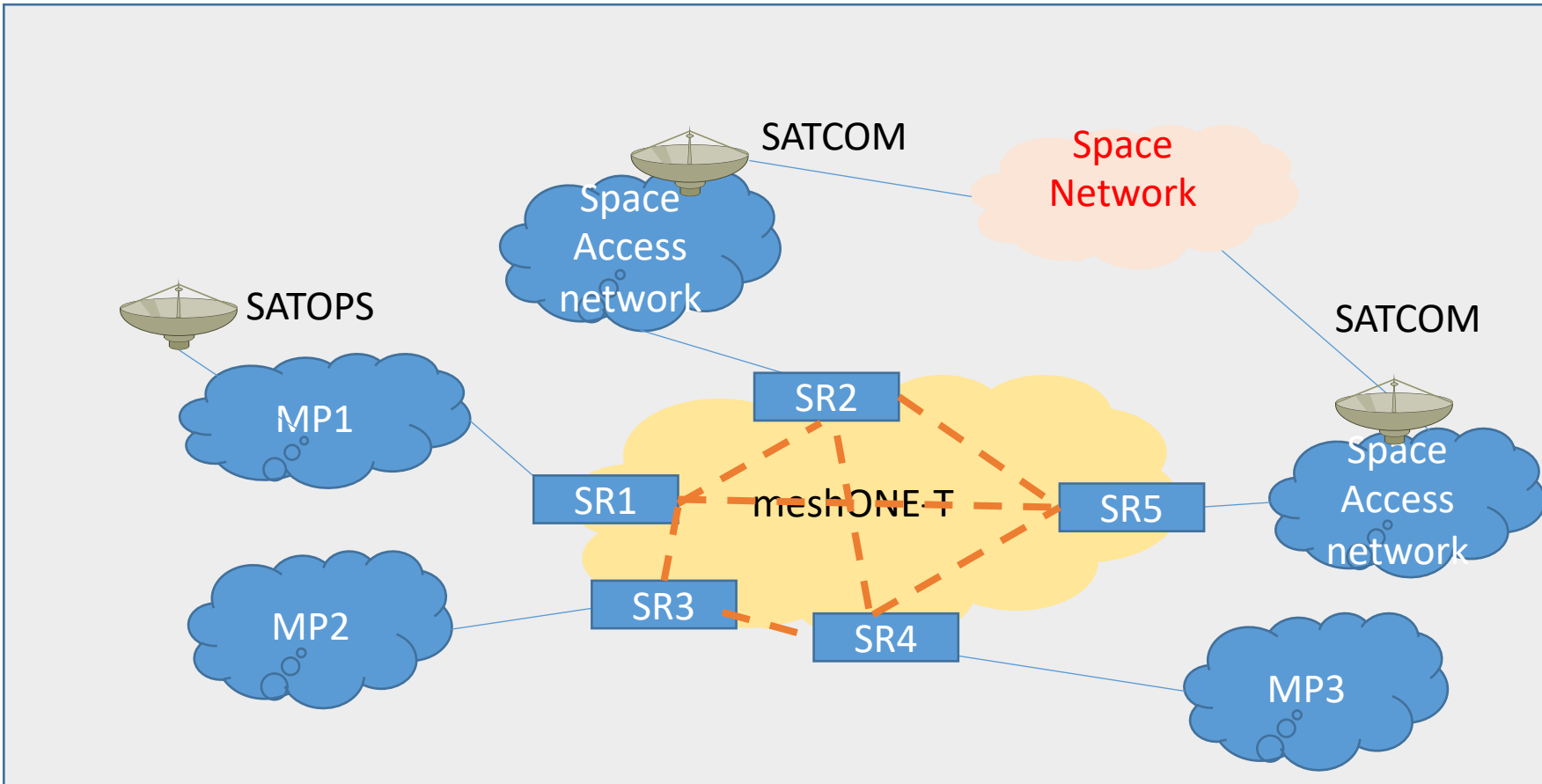
meshONE-T Services



- Segment Routing & Extensibility
 - Overlay network interfaces at Layers 2 and 3; Segment Routing can be readily deployed at edge nodes
 - Can be extended to software defined centralized orchestrated SD-WAN architecture
 - Software provides additional features such as application-aware path optimization, service provisioning orchestration, and zero touch deployment
 - Underlay network interfaces at Layers 1, 2 and 3, allow for diverse media (e.g., 5G, SATCOM, RF) to be incorporated without design changes
- Additional/redundant communication links, combined with policy-based routing, further increase network reach and resiliency



Minimum Viable Product (MVP) Design



MVP is an initial deployment scheduled for FY21-22 consisting of 7 nodes. It is an SR-MPLS based overlay network traversing over multiple provider underlay WAN. WAN may be a packet or optical network.



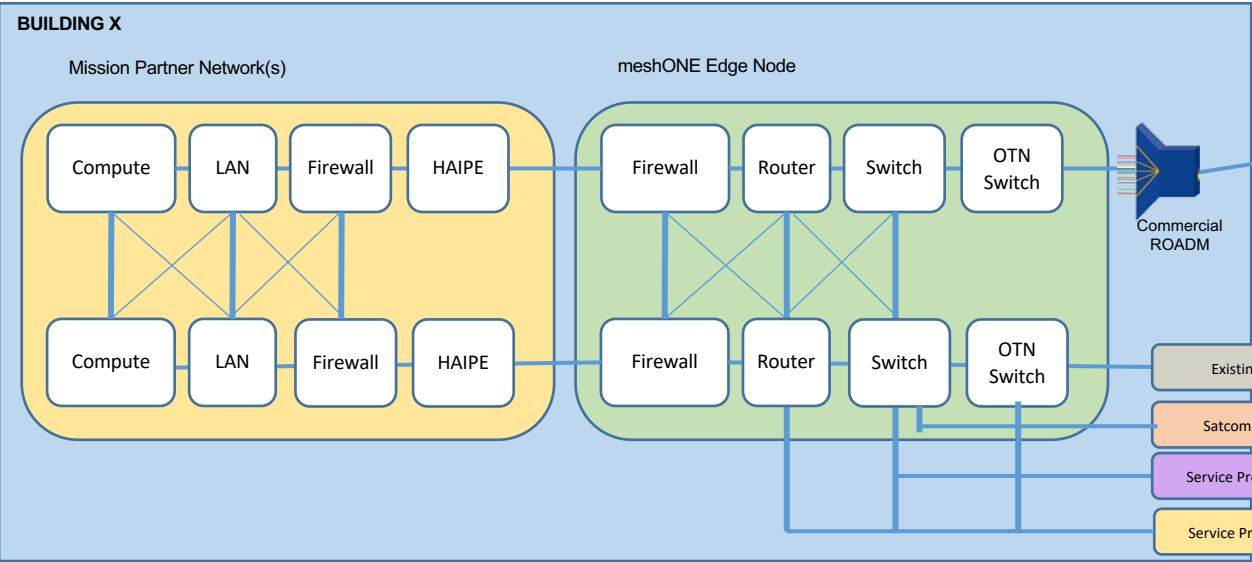
MVP Node Types & Services

- Node Types
 - Mission Partner access node types are categorized into Tiers based on the redundancy requirements for the edge nodes and the paths
- Services
 - SR-MPLS overlay black network over multiple provider underlay WAN
 - Source Routing using MPLS stack
 - Initial services include Layer 2 and Layer 3 transport
 - Layer 2 includes E-LAN, E-Lane, & E-Tree
 - L3-VPNs via VRF are used to separate user traffic
 - IPSec encrypted at the source
 - MPLS paths enable QoS & priorities, and failover
 - IGP (IS-IS) protocol finds the optimal paths
- Network Management
 - Network Operation center is included in the MVP
 - Out of band management of the network
 - Network monitoring
 - Cyber security
 - Zero Trust architecture

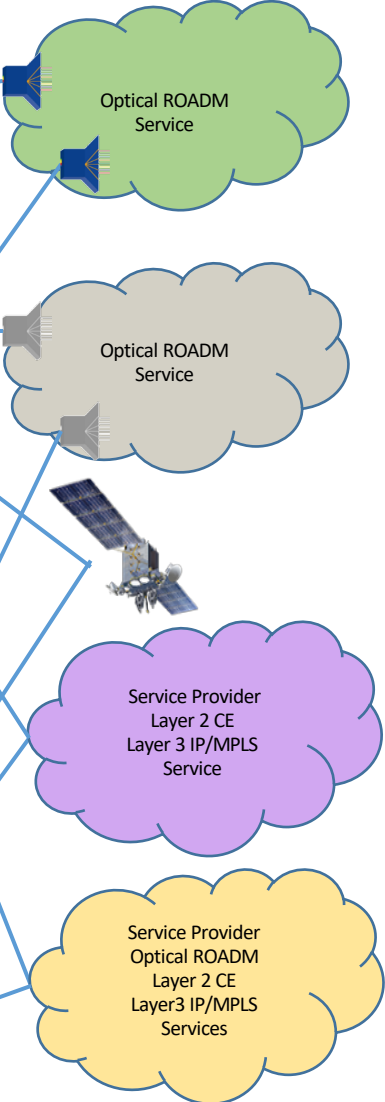
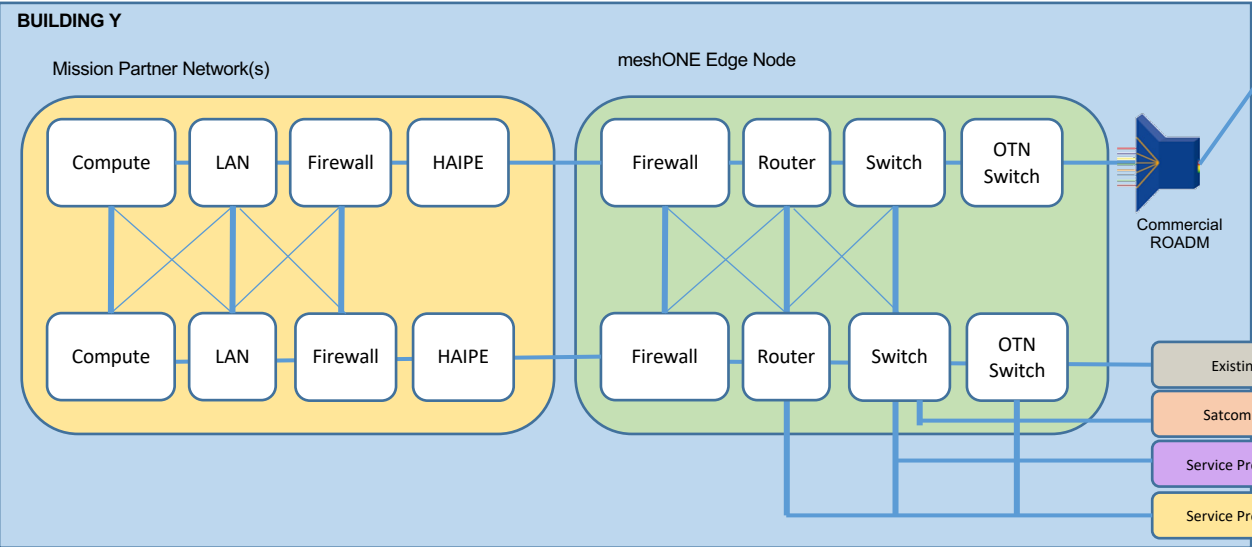


MVP Node Types & Services

High Availability
Site 1

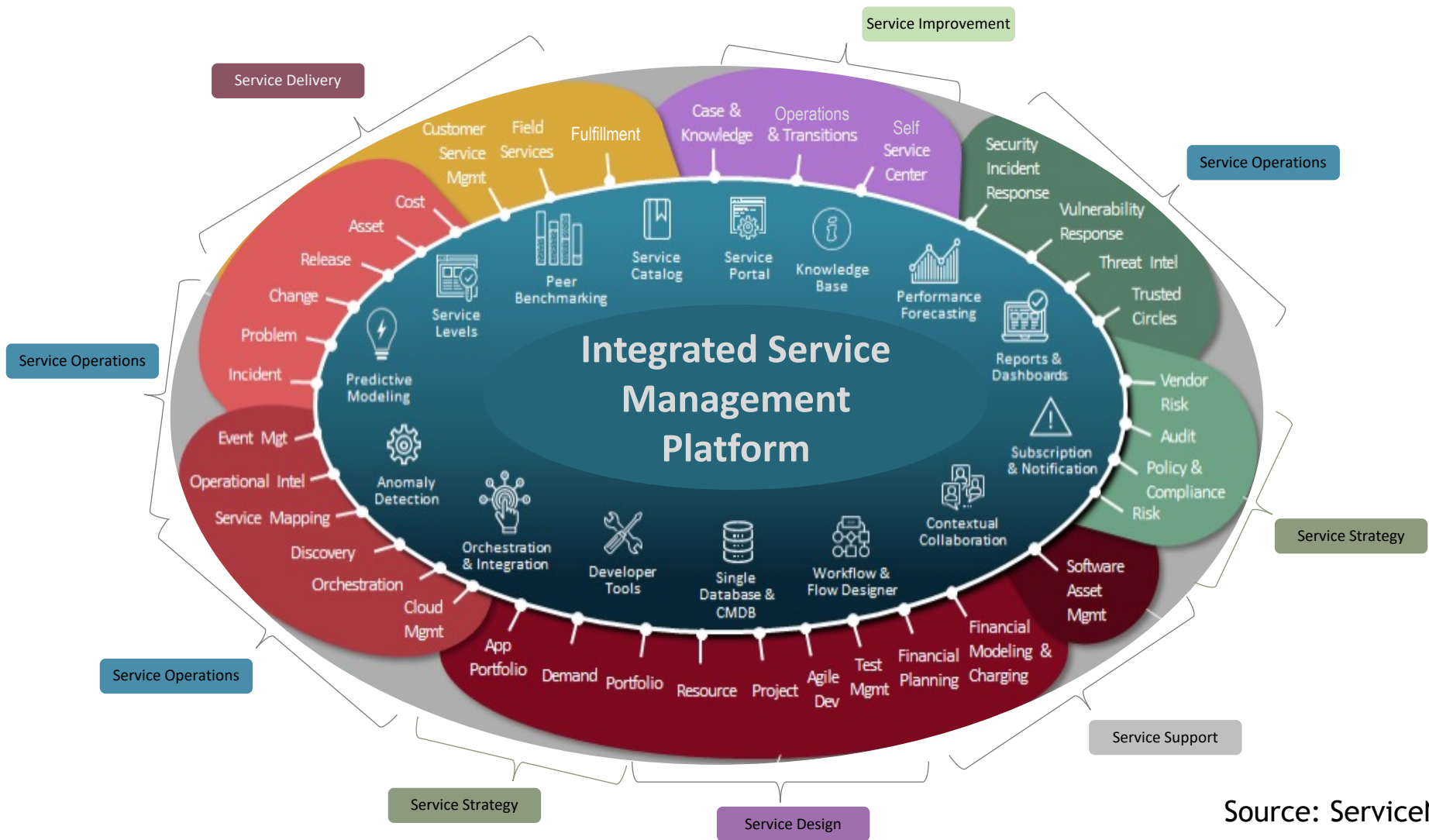


High Availability
Site 2



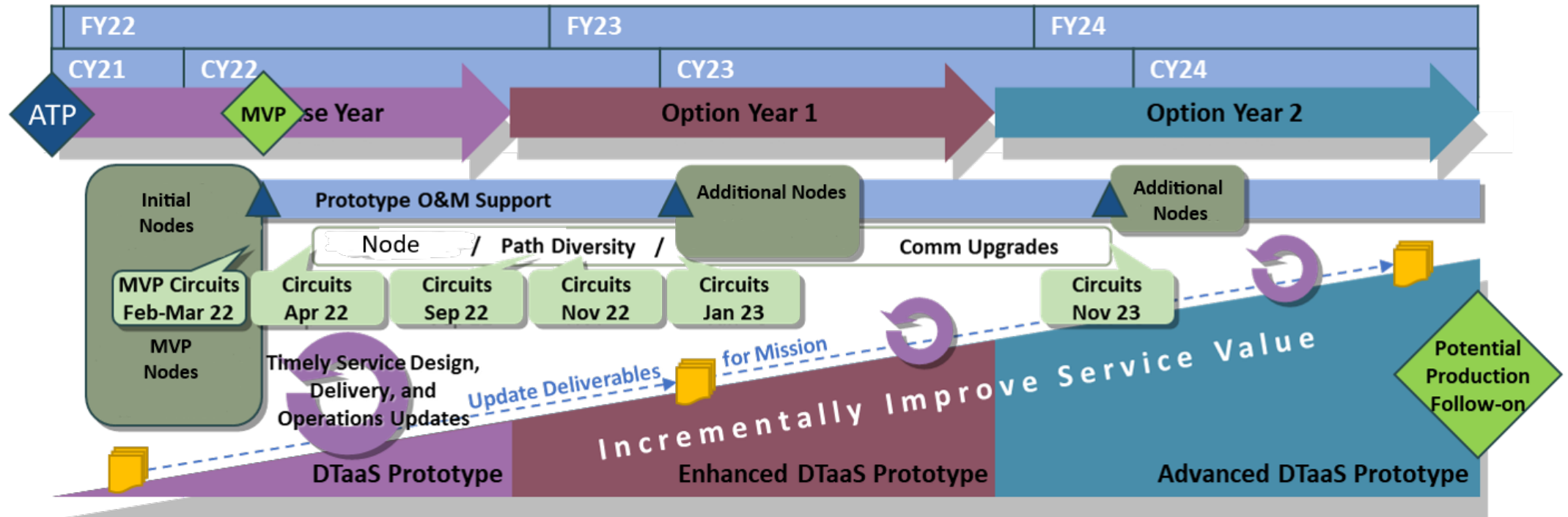


Network Management





Pathfinder Summary Schedule



6 Node / 1 NOC MVP Design & Delivery (no redundancies, SR-MPLS)
Platform Study
Digital Network Modeling

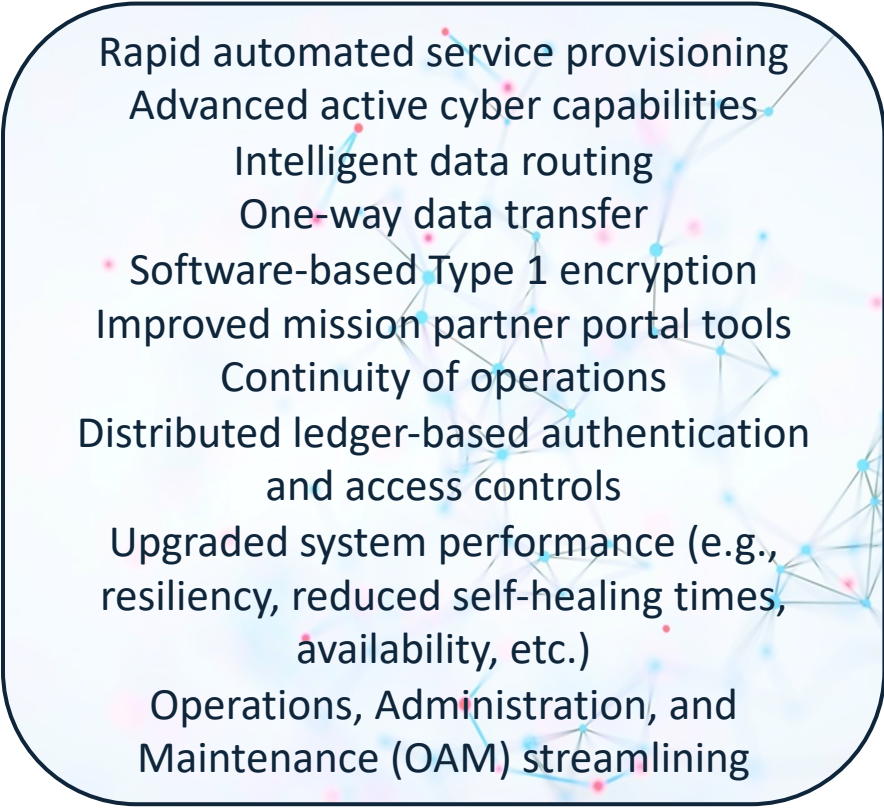
Encryption / Decryption Study
Migrate to Govt Platform
Deploy NOC at Govt Facility

Encryption / Decryption Service
Mission Partner Service Portal
Automatic Maintenance Ticketing



Follow-on Development

- Continue developing* an Enterprise approach to provide a more responsive, cohesive, and affordable data transport service
 - Annual deployment of approximately 6-7 new nodes and associated comm links for locations informed by evolving Force Design and Warfighter priorities
 - Enterprise Service Desk (ESD) and Network Operations Center (NOC) deployments & support
 - System upgrades and new capabilities

A background diagram for the right-hand box showing a network of blue and red nodes connected by lines, representing data transport and connectivity.

Rapid automated service provisioning
Advanced active cyber capabilities
Intelligent data routing
One-way data transfer
• Software-based Type 1 encryption
Improved mission partner portal tools
Continuity of operations
Distributed ledger-based authentication and access controls
Upgraded system performance (e.g., resiliency, reduced self-healing times, availability, etc.)
• Operations, Administration, and Maintenance (OAM) streamlining

**Pending funding*



Summary

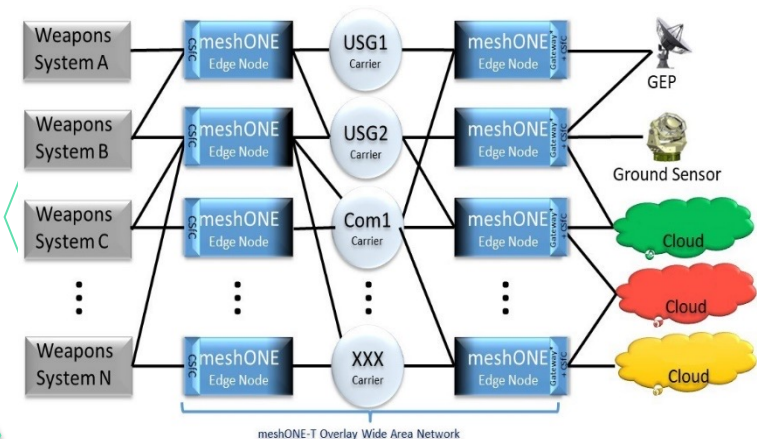


FY21-22
Initiate DTaaS prototype
Deploy MVP solution
& initial nodes/comms

Global, enterprise,
multi-tenant
ground transport
for Service, IC and
Foreign Mission
Partners

Data Transport as
a Service (DTaaS)
prototype –
scalable, resilient,
and cyber-secure
WAN-like
architecture

FY22-23
New node/comms, path
diversity, enhanced service
design, ops improvements



Supports Joint All-
Domain Command
and Control and
Advanced Battle
Management
System

FY23-24
New node/comms,
advanced service design,
ops improvements,
production decision

Dynamic self-healing
Devices join & leave
w/ease
Network scales to execute
warfighting functions
Low data latency
Robust against cyber,
jamming & other threats
Rapid upgrade cycles
Commercial standards
Multi-level security

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Contact Information

Thank you!

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