

Advanced Systems & Development



Multi-Mission Satellite Operation Center (MMSOC) Overview

GSAW

1 Mar 16

SMC/ADG

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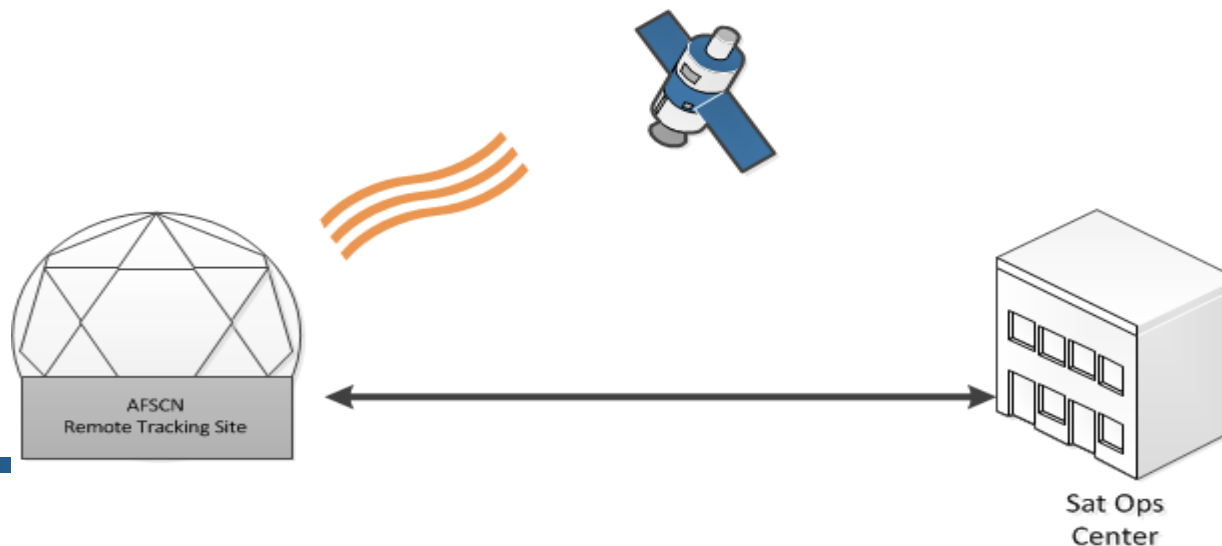
Envisioning and Shaping the Future of Space



SMC/ADG

ADVANCED SYSTEMS AND DEVELOPMENT DIRECTORATE

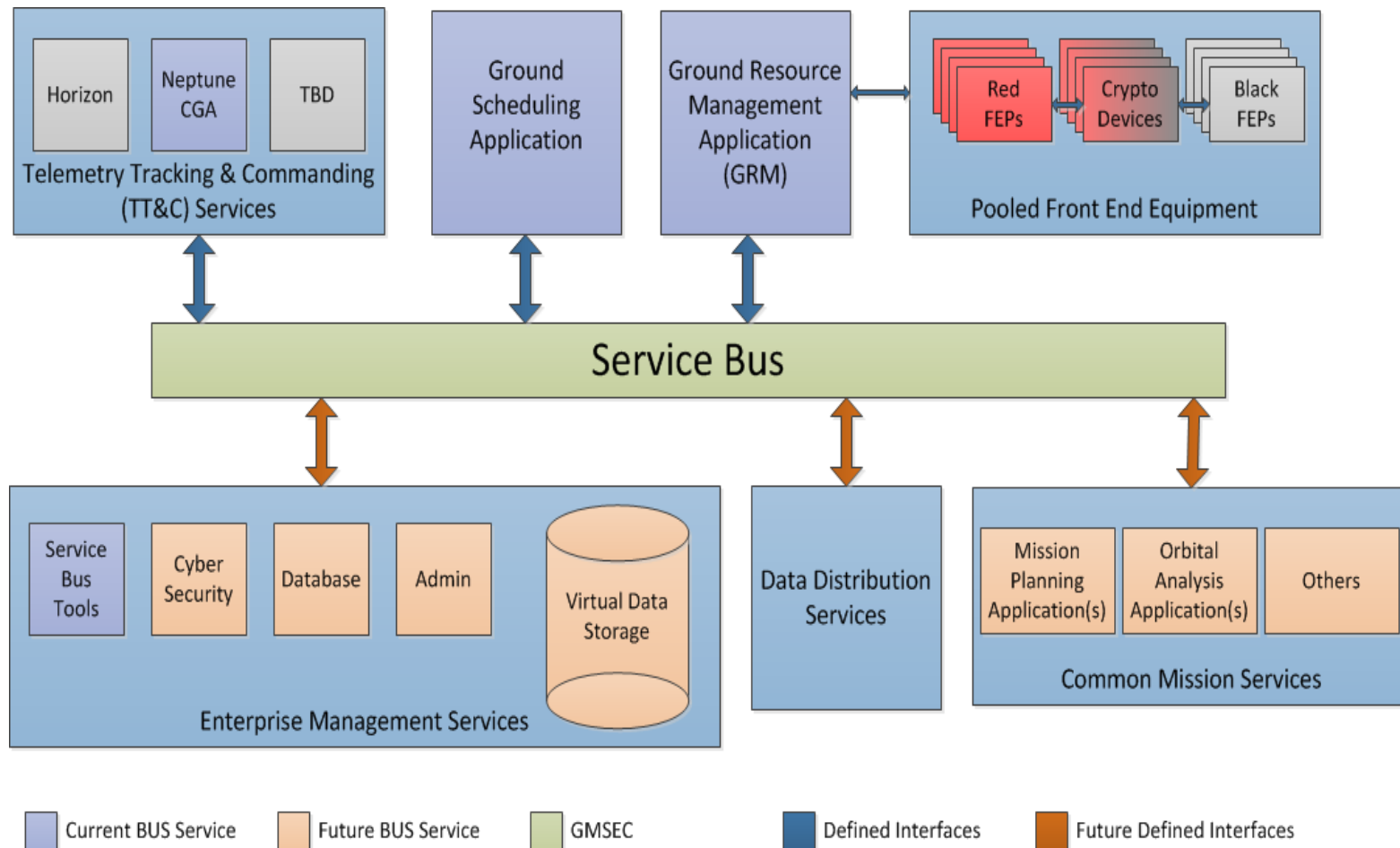
- **Research and Development Space and Missile Operations (RDSMO) Program Element:** ... develop and rapidly field new capabilities, standardize SATOPS, and exploit core competencies/strengths in support of MMSOC and other DoD activities
- **Mission:** ADG operates and sustains an affordable Ground System Enterprise (GSE) for R&D and demo missions; develops innovative solutions to reduce O&M costs; provides a test bed to prove out emerging concepts; and remains a viable choice for all new ground C2 programs





MMSOC

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MMSOC will be the foundation Enterprise Ground Services (EGS) builds upon



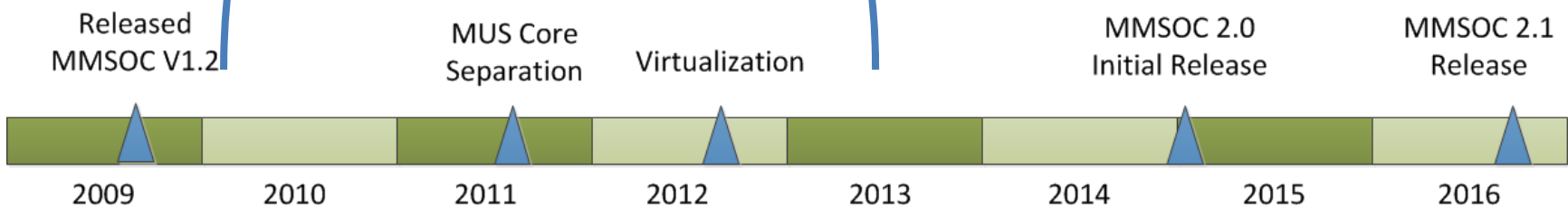
Timeline

ADVANCED SYSTEMS AND DEVELOPMENT DIRECTORATE

Common Telemetry, Tracking, & Control (TT&C) “Core” With Mission Unique Software

Continued to add missions and gather lessons learned

- Learned customers want options in TT&C and other services
- Identified the potential Virtualization offers





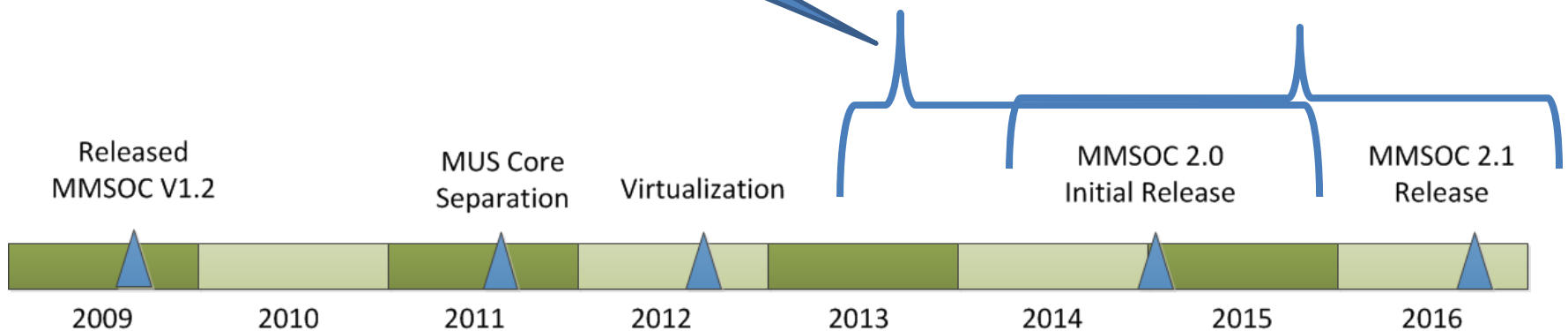
Timeline

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Integrated a Service Bus with Goddard Mission Services Evolution Center (GMSEC) APIs

- Define Interfaces
- Provide Ground Resource Management and Scheduler services
- Offer another TT&C

Collaboration with NRL to configure Neptune Common Ground Architecture (CGA) for common ground services








Incremental Development

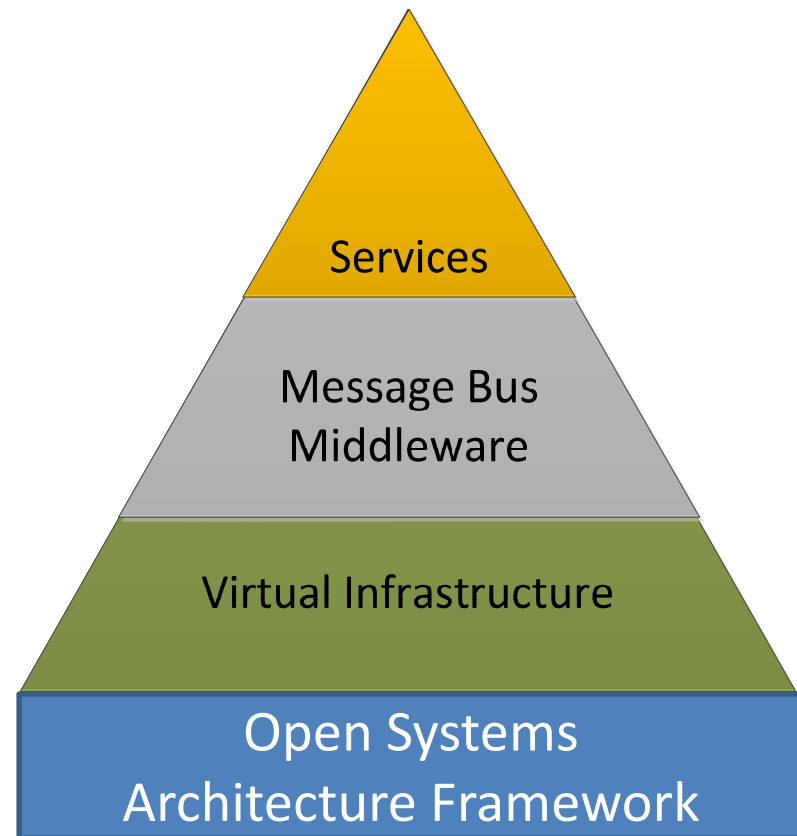
ADVANCED SYSTEMS AND DEVELOPMENT DIRECTORATE

- **Constraints**
 - Limited personnel
 - Small budget
 - Backward compatibility for missions
- **Constraints limit R&D**
- **Employ an Incremental Development Approach**

 **MMSOC 1.8** => Operates with Virtual Machines

 **MMSOC 2.0** => Integrated a Service Bus with GMSEC messaging

 **MMSOC 2.1** => Introduces Service Applications

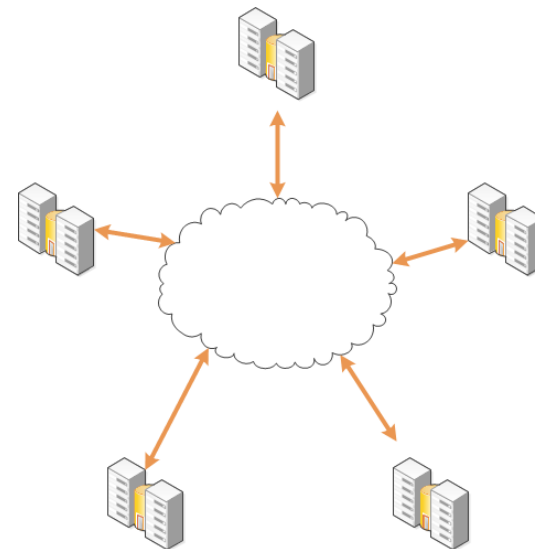
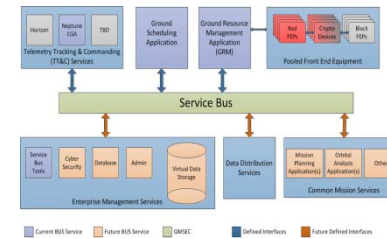




Future MMSOC

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- **Improve the Infrastructure:**
 - Interoperable across multiple locations
 - A common Network & Security Configuration
 - Standardized Servers
 - Defined Interfaces
 - Virtualization
- **Common set of ground services**
 - Mission Planning
 - Orbital Analysis
 - Telemetry, Tracking & Commanding (TT&C)
 - Virtual Data Storage
- **Reliable/Maintainable set of components**
- **Service Oriented Architecture (SOA)**
- **Built in redundancy**





Applying Lessons Learned

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Emphasis 2. Elasticity with Virtualization

- Data Layers
- Virtual LANs
- Standardized VMs
- Virtual Data Storage

Common User Interfaces

Common Services

Interface Standards

Emphasis 1. Scalable Infrastructure
HW, Servers, Network



Summary

ADVANCED SYSTEMS AND DEVELOPMENT DIRECTORATE

- **MMSOC is an R&D and Operational system**
- **Incremental system development has allowed innovative solutions**
- **Constraints limit evolution, but making progress**
- **Vision is to deliver a scalable and elastic system for future Enterprise Ground Service (EGS) capabilities**