SMC/SCNG Satellite C2 Compatibility Study

2009 GSAW Briefing

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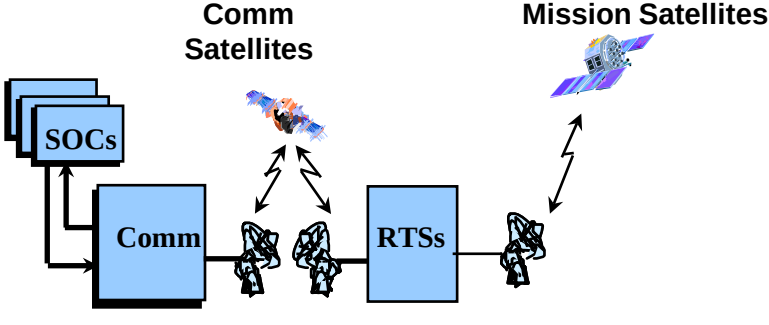
C^2 Evolution at SMC

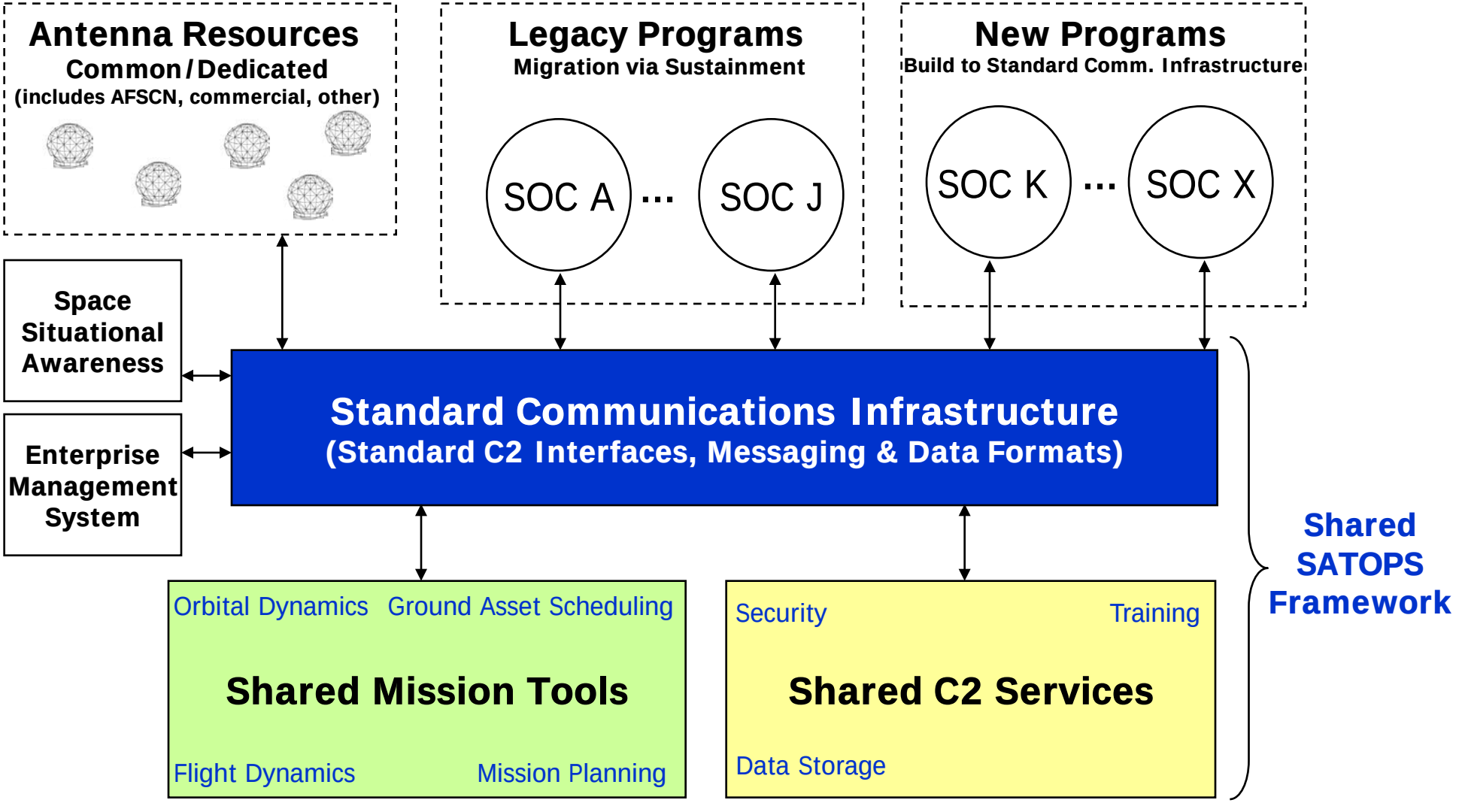
Common SOC Systems (1980-1996)	"Stovepiped" SOC Systems (1997-Present)	Compatible SOC Systems (Future)

• Common systems (DSM, CCS) for TT&C
  • Evolved to multiple program-specific baselines
  • Mission unique functions difficult to maintain/upgrade and deploy across programs
• Dedicated ground systems used for payload mission data processing
• Replacement for DSM/CCS (SSCS) terminated
  • Not supported by business case
  • System too slow for mission timelines
	• Each satellite program procures own TT&C system to replace CCS
	  • Braxton based systems-GPS
	  • ISI/Epoch based systems --MilSatComm
	  • R&D missions on common systems ($2-5M/ sat for MUE/S)
	  • R&D stand alone ($1.5-7M/ sat for MUE/S)
	  • OS Comet based systems-OE, STPSat-1, STSS
	• Other systems are fully custom
		• Shared TT&C services for compatible systems
		• Technological/Architectural advances enables more compatibility across programs
		  • Use modern IT and commercial practices



Opportunity for "middle ground" – Compatible SOC for reduced life-cycle cost and risk

SATOPS Architecture – Vision for Sat C2
"Compatible C2 Framework"

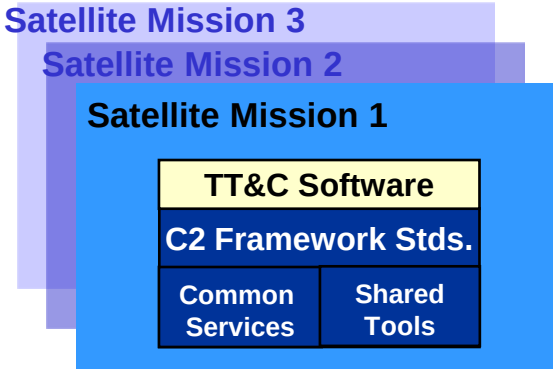


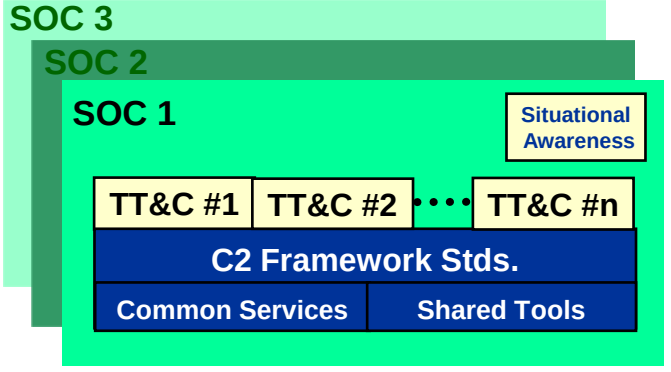
Compatible C2 Framework

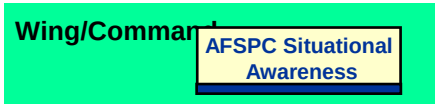
- **Technical Features**
  - Standardized Interfaces
  - Standardized Message Formats
  - Standardized Data Formats (CCSDS)
  - Standard Infrastructure
  - Publish and Subscribe
  - Shared Services
  - Increased Vendor Independence
- **Potential Benefits**
  - Reduced life cycle cost to develop and sustain new services (via reuse and standardization)
  - Capability for situational awareness at SOC

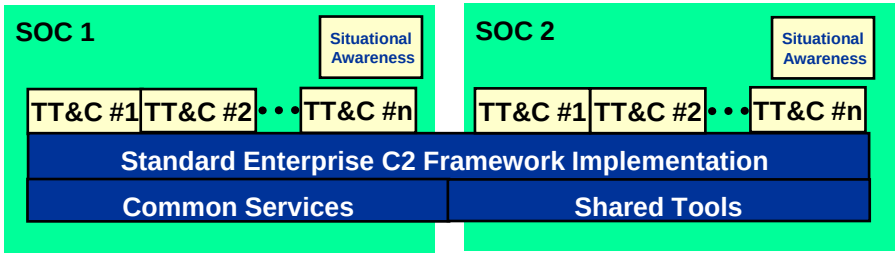
SAT C2 CONOPS

- **Single Satellite Mission**
  - Common Tools Reused at Initial Acquisition and Recapitalization
  - Focus is on reuse vice integration
- **Multi-Mission SOC**
  - Common Services & Tools
  - Simplified training and maintenance
  - SOC Situational Awareness
- **Wing/Command Enterprise**
  - Enterprise-wide Implementation & Integration
  - AFSPC Situational Awareness
  - Simplified training and maintenance









Current Mission Planning CONOPS

AFSCN Planning & Scheduling

3 Schedule Requests/Alloc.

Disk

Mission Scheduling Functions

Resource Allocation
Contact Planning
Crew Scheduling

RTS Visibility 2

4 Contact Schedules

AFSCN Communications

Telemetry & Commanding Functions

Crew Procedures
T&C Processing
Front-End Processors

Orbit Management Functions

Orbit Determination

Tracking Station Visibility Predictions

Maneuver Planning

1 Tracking Data

Framework Mission Planning CONOPS

Example

AFSCN
Planning &
Scheduling

SOC

MILSATCOM
T&C Function

SOC

GPS
T&C Function

AFSCN Communications

1

3

4

4'

Standard Communications Infrastructure

2

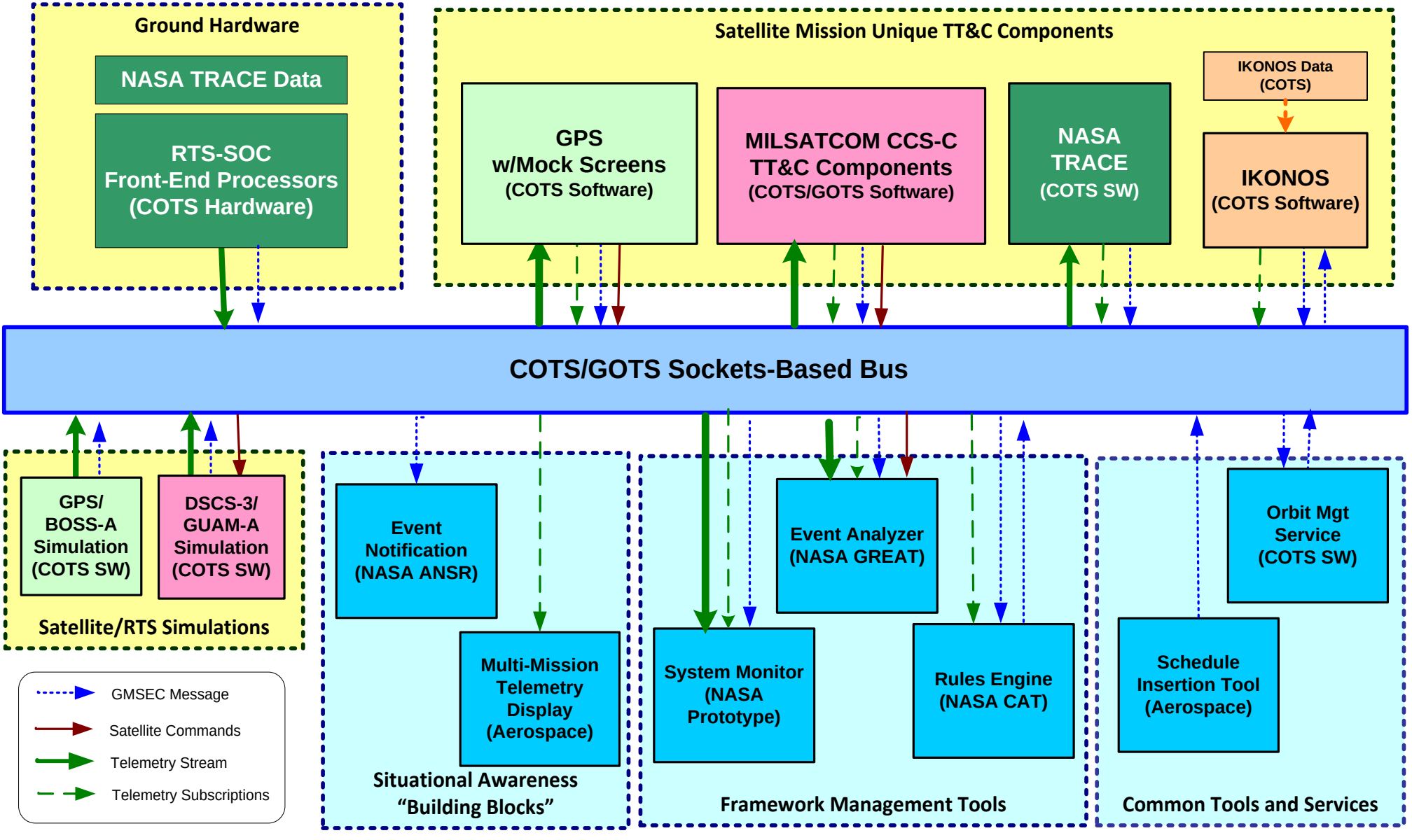
Orbit
Management
Service

Mission
Scheduling
Service

Situational
Awareness

1 Tracking Data
2 RTS Visibility/Ephemeris
3 Resource Requests/Allocation
4 Contact Schedules

Phase 1 Test Bed – Logical View



SMC/SCNG Phase 1 Summary

- ***A more "compatible" C2 architecture is technically viable and offers potential efficiencies in C2 acquisition and O&M for SMC***
  - *Also enables greater Situational Awareness across ground and space assets*

- ***C2 Standards to describe data for Government systems are needed to improve interoperability***