What is CSOC?

- Consolidated Space Operations Contract
- Contract started January 1st 1999
- Consolidates seventeen different contracts across five NASA centers for Ground Operations
- $3.44B over 10 years
  - Savings of over $1.4 B over 10 years, 40% attributed to Commercialization
- Industry team led by Lockheed Martin
CSOC Goals

- Reduce cost of operations and management of NASA’s ground systems and communications infrastructure
- Privatize and commercialize NASA infrastructure
- Increase the level of service to NASA

*To help NASA focus on Space, not on Space Infrastructure*

CSOC Office of Commercialization
www.commercializespace.com
Commercialization Focus

- Space Network
- Ground Network/Deep Space Network
- Wide Area Network

Near Term Emphasis on GN/DSN/WAN Commercialization
Strategic Vision

• ID/IQ Contract (By 5 to 6/00)
  – All potential providers priced for services in GSA-like schedule
  – NASA buys capacity - deep discounts
    • Price per pass/price per minute
  – Available for other users
    • Access to all providers
    • NASA and users reap price breaks
    • Contracts and interfaces in place
    • Enable load management across diverse customer base
      – Overall management of demand
  – Streamlined acquisition and management process
Architectural Challenge

- **Unified Ops Concept**
  - CSOC Integrated Operational Architecture developing unified ops concept for asset management
  - “Behavior Modification”
    - ID/IQ development of “Standard Services”
      - Migration towards commercially-driven standards
        » Integrated Systems End-to-End (User to Spacecraft) around Internet protocol suite and WWW
        » Maximize use of standardized S/W - COTS
      - Commercial relationships drive towards interoperability
      - Market determines pricing and standards
      - Special/mission-unique services available--at higher cost
    - Migration towards globally dispersed network of networks accessible through single interface
  - Driven by industry standards (WWW and evolving protocols)
IOA Interfaces

- Systems and Interfaces have different responsible organizations
  - The vehicles and on-board systems (NON-CSOC)
  - The link from the vehicles to the ground (NON-CSOC)
  - RF/IF/Antennas (CSOC)
  - The ground system (CSOC)
  - The terrestrial network extension from the ground system (CSOC)
  - The control center (CSOC)
  - Compatibility and interoperability across the system (CSOC and NON-CSOC)
  - Compatibility with Ground Systems (CSOC and NON-CSOC)
  - IP and Other Users and Partners (NON-CSOC)
- Work to apply Standards to Major External and Internal interfaces
  - Internet 5 Layer model provides a standards based approach to apply to interfaces
Ground Communications Standards

Layer

WWW Application Layer 5+

Internet Application Layer 5

Transport Layer 4

Network Layer 3

Data Link Layer 2

Physical Layers 1

Define & Implement

HTTP, HTML, XML, ETC.

TCP

UDP

IPSec

IP

ATM

WAN Adaptation and Framing

WAN Modulation

Fiber

Copper

Terrestrial Internet

WWW Layer 5 is defined by World Wide Web Standards Bodies.

Implemented by Application Vendors and Developers

Protocols for: HTTPS, XML, Security, Video, Audio, Data, Multicasting, Storage Systems

Standard internet Layer 5 is defined by Internet Engineering standards bodies

Implemented by OS Vendors

Layers 3 are 4 defined by Network engineering standard bodies

Implemented by OS Vendors

IPv4, IPv6, IPSEC

Standards Layer 1 and 2 are defined by hardware engineering standards bodies

Implemented by Hardware Vendors

ATM O/Cxx, Routing, Security, Ethernet xxx/xxx, Wireless

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Summary

• Commercialization is Happening!
  – GN and WAN are linked

• IOA is Moving to Internet and Commercially-Driven Standards

• IOA will Support Heritaged Systems
  – Behavior modification under way to incentivize migration towards standard, standardized services