Transformational Communications Architecture and the Global Information Grid (GIG)

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DOD Transformational SATCOM Planning: An Overview

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Current SATCOM Systems

- **Goal**: MILSATCOM systems are essential to provide assured communications. Commercial systems augment military systems.

**Current SATCOM Systems**
- **UHF**
  - Low data rates
  - Large number of mobile terminals
  - Demand assigns Multiple Access increases user access
  - Future: Mobile User Objective System (MUOS)
- **C & Ku Bands**
  - Low & Medium data
  - Fixed, transportable, & mobile terminals
  - Supports tactical & strategic users
  - Nuclear & Anti Jam Cross-links
  - Future: Advanced EHF (AEHF) and TSAT
- **UHF Follow-On (UFO)**
  - Mostly FDMA users
  - Limited Anti-Jam protection
  - Future: Gapfiller System (WGS)
- **Milstar and Translational Satellites (TSAT)**
  - Mix of fixed & mobile services
  - Mix of data rates
  - Users pay for service
  - No protection
  - Future: Growing use

**Commercial SATCOM Support to DOD**

- **Historical Operations**
- **Recent Peak Requirements**

**Transformational Communications Vision**

- **Goal**: Remove Communications as a constraint to the user

- **Build an internet-like transport architecture between space, air and ground nodes**
  - Integrated and interoperable Space, Air and Ground Networks across domains and enclaves
  - Global access to deployed / mobile Users (COTM)
  - Timely and assured delivery of air and space data to Theater and CONUS (AISR, SISR support)
  - Increased capacity with a more robust and dynamic RF and laser communications network
  - End-to-end integrated acquisition and operation (Terrestrial, terrestrial, & Space)
Transformation Communications–Key to Network Centric Operations

Raytheon Company, Space Systems
Robert L. Renner
October 26, 2004

Networked Battlespace

Global Information Grid Is the Backbone of DOD Communications
Transformational Communications Architecture (TCA)

• The TSAT Program is a key component of TCA.
• Transformational Communications Mission Operations System (TMOS)
• Commercial satellite communications will also continue to play an important role in now and in the future.
  – There will always be an insatiable demand for bandwidth from the user because of continuing innovation in the way bandwidth issued.

TSAT: An Architecture of Internet-like “Comm Pipes” Between Space, Air, and Ground Nodes

The Vision
  • Forward Extension of the GIG
  • Greatly Improved Comm-on-the-Move ... Worldwide
  • Dynamic Bandwidth Allocation
  • Network Policy-Driven Architecture

• Efficient bandwidth allocation via operations management consolidation
• Bandwidth via laser communications
• Interoperability and situational awareness among networks
• Scalable, evolvable via leveraging commercial best practices
• Users: DoD, IC, and Agencies

TMOS–Network Centricity Now

• Available and Affordable Today
  – Not a technological leap
  – System Engineering challenge
• TMOS Will Drive a Cultural Change in the Way the DoD Uses Information
  – Pull vs. Push – web access for the warfighter

• Provides significant near-term advantage for network-enabled operations
• Preserves existing capital investments in Communication Infrastructure
  – Controllable Quality of Service with legacy and new capability
• Forms early standards; uses best available COTS/GOTS technology
• Allows full integration with next generation warfighter nodes
• Enables Network Centric Operations today

The Warrior of Tomorrow Is the Web User of Today
DoD Teleport Program
A Vital Element of the GIG
SATCON 2004

Arrowhead Global Solutions, Inc.
Mary Ann Elliott
October 2004

What the GIG Means

Hon. Donald Rumsfeld:

“The two truly transforming things, conceivably, might be in information technology and information operations by networking and connecting things in ways that they function totally differently than they had previously.”
Why Teleport?

- Current Standard Tactical Entry Point or STEP (DSCS X Band Earth Station) and other MILSAT networks cannot support current and future bandwidth requirements
- DOD Teleport capability is high-priority for SPACECOM, CENTCOM, PACOM, EUCOM, SOUTHCOM, SOCOM, TRANSCOM
- DOD Teleport Operational Requirements Document (ORD) approved by Joint Requirements Oversight Council (JROC) Memorandum 140-00 (Aug. 28, 2000)
  - "Addresses the warfighter’s growing requirements for emerging deployed military and commercial SATCOM systems interfaces into key DISN and legacy C4I services"

DoD Teleport Purpose

“Teleport is Relevant to the Warfighter”

- Provide Critical Support for the Deployed Warfighter
  - Global Information Grid (GIG) Compliant Network Solutions
  - Enhanced Seamless Access to Critical Information Sources
- Provide High Bandwidth, Multiband, Multimode Telecommunications Transport
  - Enhanced Interoperability
- Serve as a Media "Junction" for Space and Terrestrial Information Distribution
  - Cornerstone of GIG Expansion
- Serve as a Technology Insertion Point

Types of SATCOM

SATCOM systems are essential to provide assured communications for force projection.
Commercial systems augmentation for surge requirements.
Global Information Grid: **Seamless Integration**

Teleport is key to worldwide high-bandwidth DISN connectivity for our deployed forces. Sites will be interfaced into the GIG.

Defensive Information System: Network (DISN) services:
- Personal communications service (PCS)
- Deployed forces (DF)
- Fixed forces (FF)
- C4I (legacy)
- Commercial

**DoD Teleport Evolution: (2000-2010)**

- Major theater war
- DISN services
- Teleport
- Legacy C4I
- Initial Teleport
- Advanced wideband system

Increasing requirements exceed DOD’s willingness to invest in DOD owned & operated MILSATCOM systems.

- DOD in-depth commercial SATCOM is a part of its Global Information Grid (GIG) infrastructure.
- DOD should expend finite dollars wisely to obtain the most commercial capacity for the funds expended.

**Commercial SATCOM Support to DoD -- A Part of our GIG infrastructure --**

- WGS, AEHF, ANS

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DOD TELEPORT IS A SYSTEM COMPRISED OF SITES AND CONNECTIVITY SATISFYING THE OPERATIONAL REQUIREMENTS OF THE WARFIGHTER.

**Teleport Sites**

**Generation Two**

Configuration FY04-05

- Gen 2 will install:
  - 4 C Band Terminals
  - 4 Ku Band Terminals
  - 4 UHF Band Terminals
  - 21 EHF FOT Terminals
  - 7 Ka Band Terminals (6 WGS, 1 TPO)
  - 12 T-1 Links connecting to 6 INMARSAT Land Earth Stations
  - Associated Baseband (Modems, Muxes, Management and Control, Info Assurance)

- Gen 3 will install
  - Advanced Terminals

**Torri Station**

Okinawa, Japan
Teleport Support to the Warfighter: FOC “2010”

Enabling the Integrated Battlespace

Enabling Network Centric Operations

OBJECTIVES:
- Robustly network all GIG elements
- Share, access and protect information
- Assure information dominance through improved, shared battlefield awareness
- Enable and exploit time critical targeting

TCS ISSUES:
- Synchronization with force structure and doctrine
- Information, architecture and network management
- Regulatory and spectrum coordination
- Technology readiness
- System constraints, transition and interoperability
- Cost vs benefit

Effective network architecture addresses communications capability shortfalls
**Summary**

- DoD Teleport Program is a vital element of the GIG and a historical leap forward in supporting Combatant Commanders and deployed forces.
- Seamless communications POP for all elements; fiber, wireless, MILSAT and COMSAT mediums
- GIG...spanning the globe with reach back communications supporting integrated battle space awareness. Thus, assuring information dominance for the United States of America