



SMDC/ARSTRAT

Future Warfare Center

MUGS

Multi-Use Ground Station



Summary

- Provides Theater Tactical Command, Control, and Communications Capability
- Tactical Ground Station Supporting the Joint Tactical Satellite (TacSat) Experiment
- Includes Tactical Ultra High Frequency (UHF) Radio Suite
- Utilize Commercial Off the Shelf/ Government Off the Shelf (COTS/ GOTS) Hardware and Software to Extend Internet Protocol (IP)-based Communications

The Multi Use Ground Station (MUGS) is a prototype tactical ground station testbed to test and demonstrate the operational utility of Theater Command and Control with Tactical Low-Earth Orbit (LEO) and high altitude long endurance assets and with sensor data downlink and dissemination to the Warfighter.

The MUGS capability prototype supports the Army's commitment to provide a tactical ground station in support of the Joint Tactical Satellite (TacSat) Experiment as directed by the Army TacSat Management Plan. This plan designates the U.S. Army Space and Missile Defense Command/ Army Forces Strategic Command (SMDC/ARSTRAT) Future Warfare Center (FWC) as the Army lead for TacSat experimentation and demonstration. Demonstrated MUGS capabilities will transition to programs of record, such as the Defense Common Ground Station-Army (DCGS-A). MUGS maximizes the use of existing Government Furnished Equipment (GFE) assets.

U.S. Army Space & Missile Defense Command/Army Forces Strategic Command

Experiment Objective

MUGS provides the Space and Missile Defense Battle Lab (SMDBL) a demonstration testbed prototype to develop and refine space and high altitude long endurance material and information requirements and tactics, techniques and procedures (TTP) for theater combat commanders command and control (C2) of theater tactical space and high altitude long endurance assets.

- Direct theater tasking of space and high altitude long endurance sensors
- Direct theater downlink of sensor data
- Net Centric planning, tasking & data dissemination to tactical users via Virtual Mission Operations Center (VMOC).

Experiment Description and Functions

United Kingdom Disaster Monitoring Constellation Satellite (UK-DMC):

- Demonstrate remote access by theater users to task a tactical satellite through MUGS via VMOC
- Demonstrate MUGS web-enabled publish and subscribe architecture for planning and tasking capability using the VMOC server at NASA Glenn Research Center (GRC) interfaced to open internet and linked to the UK-DMC satellite
 - Direct Telemetry Tasking & Command (TT&C) of operational UK-DMC environmental satellite
 - UK Surrey task their DMC satellite using MUGS via VMOC
- Demonstrate MUGS Tactical TT&C and direct downlink capability via trailer-mounted Air Force Space Command Space and Missile Systems Center (AFSPC/SMC) Phased Array TT&C S-Band antenna
- Demonstrate Web-enabled Internet Protocol (IP) routed with security controls and administration to access and operate a tactical LEO satellite

TacSat3

Demonstrate TT&C and downlink of the Advanced Responsive Tactically Effective Military Imaging Spectrometer (ARTEMIS) payload hyperspectral imagery products.

- Utilize existing COTS/GOTS hardware and software to extend IP-based communication
- Provide Hyper Spectral Imagery data to SMDC/ARSTRAT Spectral Operations Resource Center (SORC)

High Altitude Long Endurance

Demonstrate MUGS C2 of high altitude long endurance platforms such as the planned Global Observer Joint Concept Technology Demonstration (JCTD), Talon Topper experiment, and Combat SkySat.

- Command platform to maneuver

- Receive direct downlink of sensor data from Ultra High Frequency (UHF) radio
- MUGS carries tactical UHF radio suite

Technical Description

- Net-centric Command and Control (C2) of Low Earth Orbit (LEO) and high altitude long endurance assets
- Tactical Satellite (TacSat) telemetry, tracking and command (TT&C) using DoD Space Ground Link System (SGLS) via S-Band
- Mission downlink of on-board processed imagery products via UHF
- Integrated commercial satellite communications suite for Ku-band reach back
- Internet Protocol Version 6 (IPv6) compliant
- Internet-based command and control of LEO and high altitude long endurance assets using VMOC capability demonstrated at the US Strategic Command (USSTRATCOM) Joint Space Operations Center (JSpOC)
- Supports UHF link to high altitude long endurance assets, theater line of sight UHS assets, and experimental IP/UHF communications
- Provides for future support to Operationally Responsive Space (ORS) assets, including TacSats in LEO
- Spiral development achieved through experimentation and demonstration user feedback as well as Doctrine, Organization, Training, Material, Leaderships, Personnel, Facilities (DOTMLPF) analysis will ensure a capability solution
- Government Furnished Equipment (GFE) Air Force Space Command (AFSPC) Space and Missile Systems Center (SMC) Phased Array TT&C (PAT) S-Band antenna and radio frequency (RF) ground station components

Benefit to the Warfighter

- Dedicates timely and tactically relevant space and high altitude long endurance sensor information to the theater combat commander.
- Cooperative effort for Joint space capabilities between the FWC Army Space & Missile Defense Battle Lab (SMDBL), AF Space Command Space and Missile Systems Center (SMC), Air Force Research Lab (AFRL), Air Force Space Battle Lab (AFSB), NASA, University of Surrey (United Kingdom), US Geological Survey (USGS).



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