

## Mobile User Objective System (MUOS)

### Executive Summary

- The Mobile User Objective System (MUOS) continues to realize schedule and technical risks due to the technical complexity of the spacecraft, ground and software elements, and programmatic interdependencies with the Joint Tactical Radio System (JTRS) and Teleport system.
- Delays in the launch of MUOS Space Vehicle 1 increase the risk of an Ultra High Frequency (UHF) satellite communications gap as the earlier generation of operational UHF follow-on system satellites become unavailable for service.

### System

- MUOS is a satellite-based communications network designed to provide worldwide, narrowband, beyond line-of-sight point-to-point and netted communication services to multi-Service organizations of fixed and mobile terminal users. MUOS is designed to provide 10 times the throughput capacity from current narrowband satellite communications (SATCOM). MUOS intends to provide increased levels of system availability over the current constellation of UHF follow-on satellites, as well as, improved availability for small, disadvantaged, terminals.
- MUOS consists of six segments:
  - The space transport segment consists of four operational satellites and one on-orbit spare. Each satellite hosts two payloads: a legacy communications payload that mimics the capabilities of a single UHF follow-on satellite, and a MUOS communications payload.
  - The ground transport segment is designed to manage MUOS communication services and allocation of radio resources.
  - The network management segment is designed to manage MUOS ground resources and allow for government-controlled precedence based communication planning.
  - The ground infrastructure segment is designed to provide transport of both communications and command and



control traffic between MUOS facilities and other communication facilities.

- The satellite control segment consists of MUOS Telemetry, Tracking, and Commanding facilities at Naval Satellite Operations Center (NAVSOC) Headquarters and Detachment Delta.
- The user entry segment is intended to provide a definition of the Common Air Interface (CAI) and protocols, formats, and physical layer characteristics for MUOS compatible communication services. The JTRS is responsible for developing and fielding MUOS compatible terminals.

### Mission

Combatant Commanders and U.S. military forces deployed worldwide will use the integrated MUOS SATCOM system to accomplish globally assigned operational and joint force component missions with increased operational space-based narrowband, beyond line-of-sight throughput, and point-to-point and netted communications services

### Prime Contractor

- Lockheed Martin Space Systems, Sunnyvale, California

### Activity

- MUOS Space Vehicle 1 is in production and the program manager is working to resolve technical challenges of integrating components onto the spacecraft bus and payload.
- The program manager completed satellite control hardware installation and initial satellite control software integration testing in December 2008 at the NAVSOC Headquarters, Point Mugu, California, and at the NAVSOC Detachment Delta facility, Schriever AFB, Colorado.
- The Program Office conducted a satellite control segment failover testing between the NAVSOC Headquarters, Pt. Mugu, California, and the Detachment Delta facility, Schriever AFB, Colorado, to exercise the ability to handover satellite control functions between the primary and backup sites.
- The program manager successfully conducted the Preliminary Design Review for the CAI waveform application software

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necessary for interfacing with the JTRS mobile terminal in March 2009.

- The program manager is installing the ground infrastructure hardware in Hawaii, Virginia, Sicily, and Australia.
- The Commander, Operational Test and Evaluation Force (COTF) has participated in the integrated test program in accordance with the DOT&E-approved operational assessment plan. The integrated test team has executed a series of developmental tests that will lead to a COTF Operational Assessment in early FY10. These test events have been instrumental in finding deficiencies in the system prior to full operational testing.

## Assessment

- The MUOS program is making progress; however, schedule and technical risks continue to emerge due to the complexity of spacecraft payload, control and software elements, the challenge of increasing operational system throughput capacity, and information assurance.
- Unanticipated technical challenges developing and integrating the legacy payload have contributed to delays and the program manager has reduced the scope of developmental testing to maintain the development schedule.

- The technical challenges with MUOS Space Vehicle 1 are adversely impacting the schedule for MUOS Space Vehicle 2.
- The delay of the launch of MUOS spacecraft beyond FY09 increases the risk of an UHF satellite communications gap as the earlier generation of operational UHF follow-on system satellites become unavailable for service.
- COTF cannot adequately test the MUOS capacity requirements in the IOT&E due to an insufficient number of JTRS-equipped mobile users. COTF will need to supplement IOT&E data with validated modeling and simulation or other data to evaluate the system's ability to operate at its planned capacity levels.

## Recommendations

- Status of Previous Recommendations. There are no outstanding recommendations for the program.
- FY09 Recommendations. The Navy should:
  1. Explore a means to operationally load the system to adequately test and evaluate MUOS capacity during the IOT&E.
  2. Incorporate rigorous integrated test and evaluation of the legacy communications capabilities in its IOT&E plan.