

Advanced Extremely High Frequency (AEHF) Satellite Communications System

Executive Summary

- Test planning activities continue for the upcoming Operational Utility Evaluation (OUE) in the fall of 2009. The OUE will focus on the Mission Control Segment, which will be fielded to assume control of the Military Strategic, Tactical, and Relay (Milstar) constellation prior to launch of the first Advanced Extremely High Frequency (AEHF) satellite.
- Recent schedule slips of the space vehicles have allowed the Navy and Air Force terminal programs to substantially reduce the degree to which their programs lag the satellite program.
- The operational test agencies have been actively planning for operationally relevant testing of anti-jam capabilities.

System

- AEHF represents the third generation of Extremely High Frequency Satellite Communications capability protected from nuclear effects and jamming activities.
- The AEHF system will follow the Milstar program as the protected backbone of the DoD's integrated military satellite communications architecture. The AEHF is expected to increase system throughput capacity by a factor of 10.
- The overall AEHF system has three segments:
 - Space segment: The space segment comprises an integrated constellation of Milstar and AEHF satellites.
 - Mission Control segment: The control segment includes fixed and mobile telemetry, tracking, and commanding sites; fixed and transportable communication planning elements; and the common user interface with the Space Ground-Link Subsystem and the Unified S-Band capability.
 - Terminal (or User) segment: The terminal segment includes ground-fixed, ground-mobile, man-portable, transportable, airborne, submarine, and shipboard configurations.



- The first AEHF satellite will have the capabilities of a Milstar II satellite at launch, but the software will be upgraded to full AEHF capability after the launch of the second satellite, which will be launched as a fully capable AEHF satellite.
- The Defense Acquisition Board authorized fabrication and assembly of the first three satellites and development of the Control and User segments. The exact number of satellites in the AEHF constellation is yet to be determined.

Mission

Combatant commanders and operational forces worldwide intend to use the AEHF system to provide secure, responsive, and survivable space-based, strategic, and tactical military communications.

Prime Contractor

- Lockheed Martin

Activity

- Government integrated testing successfully demonstrated extended data rate (XDR) communications between the payload simulator and XDR-capable Army terminals. Testing demonstrated compatibility between terminals and payload in both XDR mode and in backward compatible modes.
- Test planning activities continue for the upcoming OUE in the fall of 2009. The OUE will focus on the Mission Control Segment, which will be fielded to assume control of the Milstar constellation prior to launch of the first AEHF satellite.
- An extensive rewrite of the Test and Evaluation Master Plan (TEMP) is nearing completion. This update accommodates

- substantial program changes since the original TEMP in 2001 and incorporates additional pre-launch operational test opportunities.
- In response to interference between the XDR and low data rate (LDR) waveforms, future Army and Navy terminals will be modified to correct the interference. However, current Army and Navy terminals will accept the degradation and will not be compatible with the XDR waveform.
- The Air Force did not have adequate test resources to evaluate AEHF capabilities in a threat environment; therefore, OSD funded a jamming simulator for the Air Force through the Resource Enhancement Program. The Air Force Operational

AIR FORCE PROGRAMS

Test and Evaluation Center has identified the need for additional test tools to assess AEHF performance in a scintillated high demand/low capacity environment.

- The AEHF program is currently undergoing Nunn-McCurdy certification following a breach based on Average Per Unit Cost.

Assessment

- The test community is making solid progress in planning the upcoming operational test of the Mission Control Segment and long-range planning for the Multi-Service Operational Test and Evaluation. The Air Force has made significant progress in pursuing early test involvement. Good cooperation exists between the developmental and operational test communities.
- Developmental testing has been extremely thorough. Although many of the problems identified have led to significant

schedule slips, the developmental testing has effectively identified the issues prior to launch.

- Recent schedule slips of the space vehicles have allowed the Navy and Air Force terminal programs to substantially reduce the degree to which their programs lag the satellite program.
- The operational test agencies have been actively planning for operationally relevant testing of anti-jam capabilities.

Recommendations

- Status of Previous Recommendations. The Air Force has made satisfactory progress on all but one of the previous recommendations.
- FY08 Recommendation.
 1. The operational test organizations should continue their early involvement in upcoming test events while maintaining a well-defined, dedicated phase of OT&E.