

Advanced Extremely High Frequency Program (AEHF) Satellite Communications System

Executive Summary

- The Advanced Extremely High Frequency (AEHF) system continues to make progress on the four major technology risk areas of the program.
- Continued effort is required to achieve AEHF program performance and information assurance. Progress must be demonstrated to ensure the program is ready for Multi-Service Operational Test and Evaluation (MOT&E).
- The aggressive synchronization of the AEHF User Segment Terminals with the other segments of the program remains essential and vital for effective mission performance and MOT&E.

System

- The AEHF system will follow the Military Strategic, Tactical, and Relay (Milstar) program as the protected backbone of DoD's integrated military satellite communications architecture. The AEHF is expected to increase system throughput capacity by a factor of ten.
- The overall AEHF system has three segments:
 - Space segment
 - Mission Control segment
 - Terminal (or User) segment
- The first flight of the AEHF satellite, called "Pathfinder," is expected in FY08. Pathfinder will operate initially as a Milstar II satellite in order to complete the Milstar II constellation.
- The second flight will launch in FY09. It will operate on-orbit 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
 - Potential advanced procurement for two additional satellites within the Future Years Defense Program



Mission

- Combatant commanders and operational forces worldwide will use the AEHF system to provide secure, responsive, and survivable space-based military communications.
- AEHF represents the third generation of Extremely High Frequency Satellite Communications capability for strategic and tactical communications protected from nuclear effects and jamming activities.

Activity

- The Integrated Test Team continued development of the system test and evaluation strategy and drafted additional modifications to the Test and Evaluation Master Plan for the AEHF program.
- The Air Force successfully conducted initial pre-integration AEHF equipment testing for the anti-jam nulling antennas, helping to characterize this information assurance feature of the system.
- The Air Force continued developing the operational test strategy to evaluate the capability of AEHF to command and

control both the existing Milstar constellation and the new AEHF satellites.

- The Air Force is also developing an operational test strategy to evaluate the capability of the AEHF Mission Planning Element (MPE) to generate a combined Milstar and AEHF mission schedule. Additional objectives include verifying that legacy terminals are compatible with AEHF satellites and that AEHF will crosslink with existing Milstar satellites using MPE-generated materials.

Assessment

- The system is making satisfactory progress on the four major technology risk areas: nuclear hardening and shielding, performance of the nuller anti-jam spot beam for information assurance, performance of the phased array antenna, and electric propulsion.
- The AEHF program reduced risk to both the test program and the launch of Space Vehicle One by introducing an interim command and control system. This allows time for adequate and integrated operational testing of the capability to control both the Milstar and AEHF constellations.
- Aggressive synchronization of the AEHF Space, Mission Control, and User segment terminals remains essential for effective mission performance and successful MOT&E.
- The test agencies will need a more robust validation effort, using test data to reduce the information assurance risks associated with using current program modeling data. The

test community also needs to expand the direct evaluation of system features such as anti-jam nuller operational performance and visibility.

- The User segment terminals are experiencing increased difficulty in retaining standardized and consistent configurations with the operational system baseline. If unresolved, the new AEHF terminals risk a lack of compatibility with both the spacecraft payload and with each other.

Recommendations

- Status of Previous Recommendations. The Air Force has made progress on the FY05 DOT&E recommendations, resolving FY05 #1 and #2, with work continuing on FY05 #3 to #5.
- FY06 Recommendations. None.