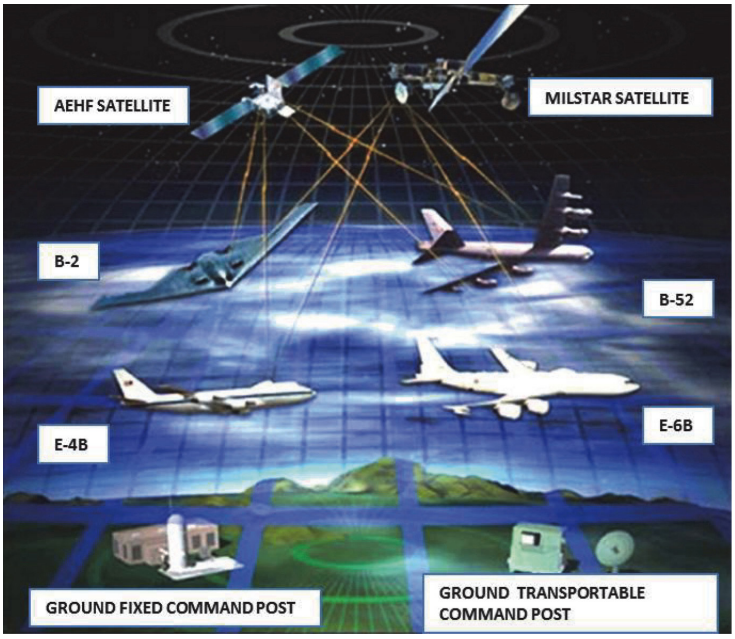
Family of Advanced Beyond Line-of-Sight Terminals (FAB-T)

Executive Summary

- On July 16, 2016, USD(AT&L) approved the procurement of 12 antenna modification kits for installation with the Family of Advanced Beyond Line-of-Sight Terminals (FAB-T) Command Post Terminals (CPTs). These modification kits are in addition to the 10 antenna modification kits USD(AT&L) authorized in September 2015 for low-rate initial production. The additional modification kits allow the program to keep in synchronization with airborne depot maintenance schedules and fielding of Initial Operational Capabilities.
- The Air Force's 46th Test Squadron (46 TS) conducted Nuclear Command, Control, and Communications (NC3) developmental testing from March 8 – 11, 2016, with 2 FAB-Ts and 13 cooperating Extremely High Frequency (EHF) terminals.
- The FAB-T Program Office conducted system-level functional qualification testing on the ground-transportable terminal antenna from February through March 2016. The program manager plans to conduct environmental qualification testing on the ground-transportable antenna from September through December 2016.
- The IOT&E has slipped from 4QFY17 to 1QFY18 due to delays in developmental testing and the lead time needed to integrate production-representative terminals required for the operational test at user ground-fixed sites and in ground-transportable platforms.
- The Airborne CPT (ACPT) demonstrated low reliability in the FY15 operational assessment (OA), and if not improved, increases risk to the DOD's Airborne Command Post ability to command and control strategic networks when needed. The program manager updated the reliability growth plan based on the FY15 OA results and OSD staff comments; however, the majority of reliability tracking hours occur after the planned IOT&E. Additionally, the preponderance of the planned hours for the ACPT originate from system integration labs that are not operationally representative of the dynamics experienced in an aircraft. The non-representative environment is unlikely to reveal additional terminal failure modes and may result in additional failure modes being discovered in the IOT&E or during operations.

System

- FAB-T consists of ground and aircraft communication terminals with two terminal types—CPTs and Force Element Terminals (FETs). FAB-T is part of the terminal and control segments of the Advanced EHF (AEHF) satellite system and is designed to operate with AEHF Low Data Rate (75 – 2,400 bits per second (bps)) and Extended Data Rate (up to 8.192 Megabits per second) waveforms.



- The CPT is intended to replace existing airborne (E-4B and E-6B), ground-fixed, and ground-transportable Milstar CPTs. The CPT will include satellite and network control functions, end-user telecommunication device interfaces, and the ability to operate the terminal from a distant location using a remote node.
- The FET is intended to be installed in airborne force elements (B-2, B-52, and RC-135). The FET is a program requirement but is currently neither funded nor on contract for development and production.

Mission

- The President, the SECDEF, Combatant Commanders, and supporting Air Force component forces will use FAB-T to provide strategic nuclear and non-nuclear command and control with EHF, wideband, protected, and survivable communications terminals for beyond line-of-sight communications.
- U.S. Strategic Command will use the FAB-T to perform satellite telemetry, tracking, and commanding functions for the AEHF constellation, including management of the satellites, communication networks, and cryptologic keys.

Major Contractor

Raytheon Net-Centric Systems – Marlborough, Massachusetts

Activity

- During the 2015 OA, the ACPT demonstrated a Mean Time Between Critical Failure of 131.2 hours against a threshold requirement of 665 hours.
- The program manager is executing the developmental test program in accordance with the DOT&E-approved Test and Evaluation Master Plan in preparation for the planned IOT&E.
- At the September 1, 2015, Milestone C decision review, USD(AT&L) directed the program manager to work with DOT&E, the Deputy Assistant Secretary of Defense for Developmental Test and Evaluation, and the Deputy Assistant Secretary of Defense for Systems Engineering to determine the appropriate amount of reliability growth testing for the next phase of the program. The October 26, 2015, Acquisition Decision Memorandum tasked the program manager to deliver a plan to USD(AT&L) within 60 days for achieving and verifying the stated reliability requirements.
- The contractor developed Block-2 software and completed software qualification testing in December 2015. Block-2 software is designed to provide FAB-T the capability to perform satellite control functions.
- The 46 TS conducted NC3 developmental testing from March 8 – 11, 2016, with 2 FAB-Ts and 13 cooperating EHF terminals. The NC3 developmental testing employed FAB-T Engineering Development Model terminals.
- The 46 TS conducted an initial satellite control developmental test dry run using an Engineering Development Model terminal from April 4 – 8, 2016, at 4th Satellite Operations Squadron (4 SOPS) on Schriever AFB, Colorado. The program manager discovered integration problems and terminal function anomalies when integrating the satellite control terminal at 4 SOPS in preparation for initial satellite control developmental testing. The program manager postponed the test event pending resolution of integration problems and system anomalies. The program manager resolved the problems and conducted the initial satellite control test from September 8 – 9, 2016.
- The FAB-T Program Office conducted system-level functional qualification testing on the new ground-transportable terminal antenna from February through March 2016. The program manager plans to conduct environmental qualification testing on the ground-transportable antenna from September through December 2016.
- The contractor is developing a new airborne terminal antenna to replace the modified legacy antenna to improve reliability. The program manager plans to conduct environmental qualification testing on the new airborne antenna from September through December 2016.
- On July 16, 2016, USD(AT&L) approved the procurement of 12 antenna modification kits for installation with FAB-T CPTs. These modification kits are in addition to the 10 antenna modification kits USD(AT&L) authorized in September 2015 for low-rate initial production. The additional modification kits allow the program to keep in synchronization with airborne depot maintenance schedules and fielding of Initial Operational Capabilities.

Assessment

- The ACPT demonstrated low reliability in the FY15 OA and, if not improved, increases risk to the DOD's Airborne Command Post ability to command and control strategic networks when needed. The program manager updated the reliability growth plan based on the FY15 OA results and OSD staff comments; however, the majority of reliability tracking hours occur after the planned IOT&E. Additionally, the preponderance of the planned hours for the ACPT originate from system integration labs that are not operationally representative of the dynamics experienced in high-performance aircraft. The non-representative environment is unlikely to reveal additional terminal failure modes and may result in additional failure modes being discovered in the IOT&E or during operations. An Air Force-approved FAB-T reliability plan is still in development and has not been submitted to USD(AT&L).
- The 46 TS's NC3 developmental testing used tester personnel as operators and FAB-T terminals that were not production representative. The testing emulated operational networks and demonstrated interoperability between EHF terminals anticipated to operate in NC3 networks. The NC3 developmental testing provided initial risk reduction and problem identification but needs to be more operationally realistic to provide data for operational test use. The Program Office plans additional NC3 developmental testing in 2QFY17 using production-representative terminals to further reduce the risk of poor IOT&E performance and to achieve U.S. Strategic Command certification.
- The 46 TS's satellite control developmental testing employed testers as operators and used a non-production-representative FAB-T terminal. The test had limited objectives but provided the program manager with good risk reduction for an initial test event. The program manager plans for additional, more operationally realistic satellite control testing in preparation for IOT&E.
- The contractor experienced problems developing the new airborne antenna and with ground-transportable antenna servo control system integration. Completion of developmental testing on the fixed-price development effort is taking longer than planned due to cost pressures that limit test personnel and test assets.
- The IOT&E has slipped from 4QFY17 to 1QFY18 due to delays in developmental testing and the lead time needed to integrate production-representative terminals required for the operational test at user ground-fixed sites and in ground-transportable platforms.

Recommendations

- Status of Previous Recommendations. The Air Force has addressed the previous three recommendations.
- FY16 Recommendation.
  1. The Air Force should continue to use reliability growth test periods to surface more failure modes and correct them to grow reliability and confidence in system performance prior to IOT&E.