

Navy Multiband Terminal (NMT)

Executive Summary

- The Commander, Operational Test and Evaluation Force (COTF) conducted an operational assessment of the Navy Multiband Terminal (NMT) from March 8 to April 6, 2010 in support of a Milestone C decision in July 2010. The operational assessment used NMT Engineering Development Models (EDMs) installed on USS *Roosevelt* (DDG 80), the Naval Computer and Telecommunications Area Master Station Atlantic (NCTAMS LANT), Norfolk, Virginia, and shore-based test facilities.
- The NMT Milestone C decision authorized the procurement of NMT systems necessary to: (1) establish the initial NMT production base for the system and (2) permit an orderly increase in the production rate for the system sufficient to lead to full-rate production upon the successful completion of IOT&E scheduled for July 2011.

System

- The NMT system is the next generation maritime military satellite communications terminal for the Navy and coalition partners for enhancing protected and survivable satellite communications (SATCOM).
- The NMT, a system-of-systems program, is an integral part of the Navy's joint SATCOM terminal suite. The NMT is interoperable with the legacy service SATCOM terminals, including the Follow-on Terminal (FoT) and Navy Extremely High Frequency Satellite Program (NESP).
- The NMT has variants for surface ships, submarines, and shore sites. The NMT system variants have two major component groups: the Communications Group and the Antenna Group.
- The Communications Group includes the following:
 - Operator User Interface
 - Power Distribution Unit
 - Keyboard
 - Extremely High Frequency (EHF) and Wideband drawers
 - Prime Power Interface
- The Antenna Group varies across different platforms and includes new, reused, and modified antennas to support the required Q-, Ka-, and X-band with Global Broadcasting System (GBS) receive operations.



- The key features of the NMT system are:
 - Open system architecture
 - Full compatibility with legacy terminal components
 - High commonality, reliability, and effective fault isolation
 - Mission Planning capability

Mission

The Navy uses the NMT to provide secure, protected, and survivable connectivity across the spectrum of mission areas, including land, air, and naval warfare; special operations; strategic nuclear operations; strategic defense; theater missile defense; and space operations and intelligence.

Major Contractor

Raytheon Net-Centric Systems – Marlboro, Massachusetts

Activity

- DOT&E approved Revision A to the NMT Test and Evaluation Master Plan (TEMP) on March 4, 2010.
- COTF conducted an operational assessment on the NMT from March 8 to April 6, 2010. All testing was conducted in accordance with a DOT&E-approved TEMP and test

plan. The operational assessment used NMT Engineering Development Models (EDMs) installed on USS *Roosevelt* (DDG 80), the Naval Computer and Telecommunications Area Master Station Atlantic (NCTAMS LANT), Norfolk, Virginia, and shore-based test facilities.

NAVY PROGRAMS

- The operational assessment was conducted to inform a Milestone C and Low-Rate Initial Production (LRIP) decision in July 2010, which authorized the procurement of NMT systems necessary to: (1) establish the initial NMT production base for the system and (2) permit an orderly increase in the production rate for the system sufficient to lead to full-rate production upon the successful completion of IOT&E scheduled for July 2011. The Navy is updating the TEMP to provide greater detail on future test events in preparation for IOT&E to inform the full-rate production decision scheduled for FY12. The TEMP update will include a phase of integrated testing prior to IOT&E.
- Reliability growth testing is scheduled to begin in 2QFY11 at the contractor test lab. The program manager will use environmental chambers to replicate the stresses the terminal will experience in an operational environment.

Assessment

- The measured NMT reliability was significantly below threshold due to numerous software deficiencies and faults. However, the demonstrated operational availability exceeded the threshold requirement due to the short duration of many of the reliability failures. Raytheon Company has defined a reliability growth program, which is scheduled to be completed prior to the IOT&E.
- During the operational assessment, COTF reported an anomaly when NMT lost EHF communication on the DDG 80. The loss of communication occurred during ship maneuvers and resulted from a combination of antenna tracking issues, antenna hand-over problems, and improper antenna configuration settings. The root cause of this anomaly was an incorrectly installed software update to the NMT on the DDG 80.
- The NMT uses an interim process for communications planning that will later transition to the Advanced EHF (AEHF) Mission Planning Element (MPE) Increment 7. During the operational assessment, the NMT experienced one

outage that lasted over 16 hours while the units waited for a new communications plan to be delivered. The timeliness of delivery of communication plans is an area of concern.

- The operational assessment did not include a submarine platform due to the lack availability to install a NMT EDM for the scheduled test period. Similarly, a NMT EDM was not installed on a large deck surface ship, which reduced the ability to assess risk factors related to surface ships leading into IOT&E.
- Additional risks, other than those observed during this operational assessment, may not become apparent until IOT&E and FOT&E when new terminal modes of operation, including Q-band XDR, Wideband Global SATCOM (WGS) (Ka-band and GBS receive), and Defense Satellite Communications System (DSCS) X-band will be tested. These modes of operation were not assessed during this operational assessment because they depend on new capabilities being delivered by the NMT, AEHF, and WGS programs on different timelines.
- The operational assessment testing on the USS *Roosevelt* (DDG 80) did not include a production-representative unit. The permanent installation of the NMT EDM on DDG 80 increases operational risk during deployment due to the many significant capabilities that have yet to be demonstrated during operational testing.

Recommendations

- Status of Previous Recommendations. This is the first annual report for this program.
- FY10 Recommendations. The Navy should:
 1. Update the software installation procedures and test the antenna handover function prior to deployment of the DDG 80.
 2. Update the interim communications planning process to reduce avoidable downtime prior to operational deployment of the NMT.