

Active Electronically Scanned Array (AESA)

Executive Summary

- Active Electronically Scanned Array (AESA) software development is behind schedule due to software instability.
- In order to conduct the operational evaluation of AESA in the spring of 2006 and support the first AESA equipped squadron transition schedule, the Navy has deferred some functionality from the initial software build to the second software build.
- When the software is stable AESA radar performance is as good as or better than modeling and engineering predictions.

System

- The APG-79 AESA Radar System is an upgrade to the F/A-18E/F Super Hornet and replaces the APG-73 mechanically scanned array.
- The antenna is a fixed array of transmit/receive modules and does not rotate back and forth like a conventional radar antenna. The beam is “steered” electronically through the aircraft mission computers. Because the antenna has no moving parts, reliability is significantly better than older radars.
- There are hundreds of transmit/receive modules in the antenna array so total radiated power is much greater than a conventional radar and failure of several modules does not significantly degrade overall system performance.



Mission

- The operational commander whose force uses the F/A-18E/F fitted with AESA will detect and track enemy air and ground targets at longer ranges than current systems, increasing effectiveness and survivability.
- The radar simultaneously tracks targets and provides data link information to missiles in flight.
- Allows near simultaneous air-to-air and air-to-ground target tracking and engagement. Current radars can only do one mission at a time.

Activity

- The Navy completed the third operational assessment of AESA, Operational Test (OT) - C1 Phase 1, in October 2004. During this test, the system flew 11 flights for a total of 19.9 hours. Synthetic aperture radar mapping performance was rated as mature and ready for operational test. Reliability and air-to-air performance were poor and the test team recommended continued development.
- The Navy conducted OT-C1 Phase 2 in September–November 2005. Due to inconsistent performance that was a result of software instability, this assessment period was delayed from the summer of 2005. Results of the fourth operational assessment of AESA are pending.
- Developmental and operational test aircrew flew approximately 330 AESA flight hours with Engineering and Manufacturing Development and low-rate initial production hardware this year. Each time the development team introduced new radar functionality and software they experienced multiple radar shutdowns that necessitated airborne radar re-starts. The development team has aggressively pursued solutions to these software instabilities. Software instability has forced delays in testing and deferral of some radar functionality that the Navy had originally

planned to incorporate in the first fleet-release version of the radar software tape (H3E System Configuration Set (SCS)). This radar software tape will now be used for training only. The deferred functionality will be in the second fleet-release software tape (SCS H4E). The second tape will be used for the first AESA equipped squadron’s first deployment, currently scheduled for the end of FY07.

- The Test and Evaluation Master Plan (TEMP) was approved in September 2004 and is adequate to complete OT-C1 Phase 2. The Navy is revising the TEMP to support integrated testing and operational evaluation in the spring of 2006.

Assessment

AESA development has been slowed by software immaturity. Radar performance with the developmental software loads to date can best be characterized as inconsistent. On one flight it will dazzle the aircrew with its target detection range and resolution, and on the next it will frustrate them with multiple shutdowns and re-starts. When the radar is operating consistently, its performance is as good as or better than modeling and engineering predictions. Based on performance to date the development team’s plan to fix software stability prior to

NAVY PROGRAMS

Operational Evaluation (OPEVAL) is optimistic, but if successful will result in a stable configuration for OPEVAL in the spring of 2006.

Recommendations

1. OPEVAL should not start until the AESA program demonstrates stable software performance.
2. As the Navy revises the TEMP, it should ensure that the revision supports both the OPEVAL period and the follow-on operational test and evaluation period that incorporates deferred functionality.