Aegis Modernization Program

In FY24, the Navy's Operational Test and Evaluation Force (OPTEVFOR) conducted operational testing on ships with the Advanced Capability Build (ACB) 16, Baseline 9.2.0 and Capability Package (CP) 22-1 variants, of the Aegis Weapon System (AWS). DOT&E will publish an early fielding report for the CP 22-1 variant in 2QFY25. Operational testing continues to demonstrate hardware reliability and software stability concerns with the Aegis Display System (ADS) and the AN/SPY-1 radar. The Navy expects to complete operational assessment of ACB 16 variants (up to CP 22-1) in FY25. The Navy expects to submit a TEMP update for DOT&E approval in FY25 that will provide a test program for the recent CP 24 (Baseline 9.2.4) update of ACB 16.

In March 2024, a Flight III *Arleigh Burke* (DDG 51)-class destroyer with the Baseline 10.0 participated in a live fire test event to evaluate combined Ballistic Missile Defense and Anti-Air Warfare. The Navy expects to conduct operational assessment of Baseline 10.0 through FY28.

SYSTEM DESCRIPTION

The Aegis Combat System (ACS) is an advanced weapon control system comprised of sensors, control elements, and weapons to detect, track, engage, and destroy airborne, surface, and subsurface threats. The ACS's key components include: (1) AWS that comprises the hardware and software to integrate combat systems capabilities, as well as the legacy AN/SPY-1 (series) radar; (2) the AN/SPY-6(V)1 radar on Flight III DDGs; (3) a Phalanx

Close-In Weapon System; (4) a 5-inch diameter multipurpose gun system; (5) the Vertical Launch System that can launch Tomahawk missiles, SM-2, SM-3, and SM-6 Standard Missiles, Evolved Sea Sparrow Missiles (ESSM), and Vertical Launch Anti-Submarine Rockets; (6) AN/SPQ-9B or SPS-67 surface search radars; (7) Surface Electronic Warfare Improvement Program (AN/SLQ-32(V)(series)); (8) Cooperative Engagement Capability; and (9) the AN/SQQ-89(V)15 undersea warfare suite, which also integrates with the MH-60R helicopter when embarked. The Navy's Aegis Modernization Program updates the AWS to support improved integration and advancing capabilities on *Ticonderoga*-class (CG 47) guided missile cruisers and *Arleigh Burke*-class (DDG 51) guided missile destroyers.

MISSION

The Joint Force Commander/Strike Group Commander employs CG 47 ships and DDG 51 ships equipped with Aegis to conduct:

- Area and self-defense anti-air warfare in defense of the strike group.
- Anti-surface warfare.
- Anti-submarine warfare.
- Strike warfare, when armed with Tomahawk missiles.
- Integrated air and missile defense (IAMD).
- Operations independently or in concert with carrier or expeditionary strike groups and with other joint or coalition partners.

PROGRAM

The Aegis Modernization Program is a non-acquisition category program of record. The Navy intends five incremental deliveries within ACB 16: Baseline 9.2.0, Baseline 9.2.1, Baseline 9.2.2, Baseline 9.2.3 (referred to as CP 22-1), and Baseline 9.2.4 (referred to as CP 24). Each baseline update is intended to build on the previous baseline and improve capabilities through a combination of hardware and software upgrades. To support Navy testing, DOT&E approved the ACB 16 (Baseline 9.2) test plan in July 2023. DOT&E approved the TEMP for the test program of ACB 16 (Baseline 9 series) in September 2024. The TEMP requires an update to provide testing for CP 24.

The next Aegis variant, Baseline 10, will have an updated system design architecture from the Baseline 9 series and is required for ships with a SPY-6 variant radar, to include DDG 51 Flight III with the SPY-6(V)1 and FFG 62 class guided missile frigate with SPY-6(V)3F. DOT&E approved a TEMP for the combined test programs of DDG 51 Flight III, SPY-6(V)1, and Baseline 10.0 in September 2022. The Navy took delivery of the first DDG 51 Flight III guided missile destroyer with Baseline 10.0, USS *Jack H. Lucas* (DDG 125), in June 2023. The Navy commenced operational assessment of Baseline 10.0 in FY24 and expects to complete in FY28. The Navy is currently developing a TEMP update for the test program of Baseline 10.1.

» MAJOR CONTRACTORS

- Lockheed Martin Rotary and Mission Systems – Bethesda, Maryland
- Raytheon, a subsidiary of RTX – Arlington, Virginia

TEST ADEQUACY

In October 2023, OPTEVFOR conducted operational testing of ACB 16 (Baseline 9.2.0) on USS *Carl M. Levin* (DDG 120). The testing consisted of an integrated air and missile defense event involving Ballistic Missile Defense and Anti-Air Warfare threat surrogate targets and tracking exercises with simulated engagements against a submarine. The test was conducted in conjunction with the Missile Defense Agency Flight Test Aegis Weapon System (FTM)-48 event. In December 2023, OPTEVFOR conducted operational testing of CP 22-1 on USS *Winston S. Churchill* (DDG 81). The testing consisted of tracking exercises with simulated missile engagements against a surface combatant. Both tests were conducted in accordance with DOT&E-approved test plans and with DOT&E observation.

OPTEVFOR plans to complete operational testing of Baselines 9.2.1 and CP 22-1 in FY25 in accordance with a DOT&E-approved test plan.

OPTEVFOR plans to submit a cyber survivability test plan to DOT&E for approval in FY25 and complete cyber survivability testing of CP 22-1 in FY25.

In March 2024, the Missile Defense Agency, in collaboration with OPTEVFOR, conducted FTM-32 as an integrated test to demonstrate the capability to detect, track, engage, and intercept a Medium Range Ballistic Missile target utilizing a simulated Standard Missile (SM-6). FTM-32 was conducted in accordance with a DOT&E-approved test plan and with DOT&E observation. USS *Jack H. Lucas* (DDG 125) equipped with Baseline 10, participated in the flight test as part of its operational assessment. Significant intended data collection on Baseline 10.0 performance were not attained due to SPY-6(V)1 radar system and AWS challenges during test execution. As a result, insufficient data are available to assess Baseline 10.0 operational effectiveness from this flight test. This event is detailed in the classified DOT&E FY24 Missile Defense System Annual Assessment, to be published in FY25.

The Navy is developing a Combat System Test Bed (CSTB) modeling and simulation suite to support the test strategy for Baseline 10.0. The Navy is developing the CSTB in incremental stages that align with planned operational testing within the Baseline 9 series and Baseline 10.0. The Navy expects to verify, validate, and accredit the CSTB for operational assessment of Baseline 10.0 in FY28.

PERFORMANCE

» EFFECTIVENESS

Insufficient data are available to determine AWS ACB 16, the Baseline 9 series, operational effectiveness. DOT&E will publish a classified IOT&E report after the completion of operational testing that the Navy expects to occur in FY25.

The AWS integration with active missiles including ESSM Block 2, SM-2 Block IIIC, and SM-6, which are intended for close-in air warfare self-defense and area-air defense, could enhance weapon system performance against threat ASCMs. Details are available in the DOT&E classified early fielding reports for ESSM Block 2 utilizing Baseline 9.2.1 (September 2022) and SM-2 Block IIIC utilizing Baseline CP 22-1 (March 2024).

Insufficient data are available to determine Baseline 10.0 operational effectiveness. DOT&E will publish a classified IOT&E report after completion of operational testing that the Navy expects to occur in FY28.

» SUITABILITY

Insufficient data are available to determine AWS ACB 16 operational suitability. However, testing continues to demonstrate hardware reliability and software stability concerns with the ADS and the AN/ SPY-1 radar. DOT&E will publish a classified IOT&E report after the completion of operational testing that the Navy expects to occur in FY25.

Insufficient data are available to determine Baseline 10.0 operational suitability. DOT&E will publish a classified IOT&E report after completion of operational testing that the Navy expects to occur in FY28.

» SURVIVABILITY

Insufficient data are available to assess the cyber survivability of AWS ACB 16. DOT&E will publish a classified IOT&E report after the completion of a cyber survivability evaluation that the Navy expects to occur in FY25.

Insufficient data are available to assess cyber survivability of Baseline 10.0. DOT&E will publish a classified IOT&E report after the completion of IOT&E that the Navy expects to occur in FY28.

RECOMMENDATIONS

The Navy should:

1. Continue to update and correct hardware reliability and software stability issues with the ADS and AN/SPY- 1 radar.
2. Complete development, verification, and validation of the CSTB by FY28 to support operational assessment of Baseline 10 and subsequent upgrades to AWS.
3. Schedule and conduct remaining test requirements for the ACB 16 test program, Baseline 9.2.1 and CP 22-1, in FY25.
4. Provide for DOT&E approval in FY25, a CP 22-1 cyber survivability test plan.

5. Provide for DOT&E approval in FY25, an ACB 16 TEMP update for CP-24.
6. Develop and provide for DOT&E approval, a TEMP update for Baseline 10.1 and Baseline 10.0 updates for DDGs being back-fit with SPY-6(V)4.