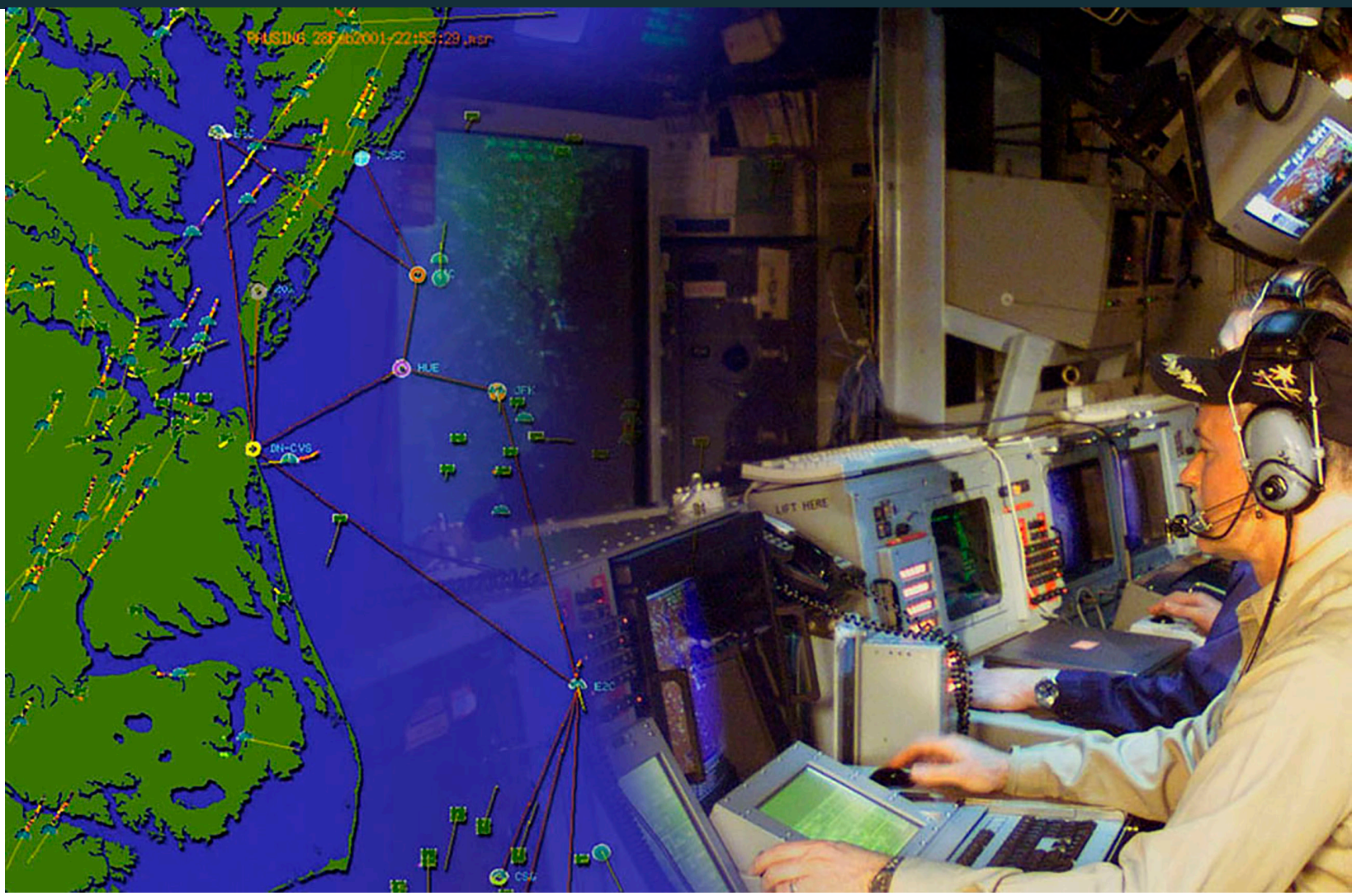
Cooperative Engagement Capability (CEC)



In FY23, the Navy commenced cyber survivability evaluation of the Cooperative Engagement Capability (CEC) variant used by the CVN 78 *Gerald R. Ford*-class nuclear aircraft carrier and commenced OT&E of CEC as integrated on Aegis Advanced Capability Build (ACB) 16 guided missile cruisers and destroyers. The Navy is developing CEC Increment II variants and creating the Test and Evaluation Master Plan (TEMP) for the associated test strategy.

SYSTEM DESCRIPTION

CEC is a real-time sensor fusion and netting system intended to enhance the situational awareness of equipped units and provide integrated fire control capability. CEC is comprised of a Cooperative Engagement Processor (CEP) and Data Distribution System (DDS). The CEP fuses data from the organic sensors of the employing platform/unit with data from remote sensors of other platforms/units within the net to construct target tracks. The CEP integrates with the employing platform/unit combat systems to display these tracks. DDS exchanges sensor data (e.g., radar and identification, friend or foe (IFF) measurements) between CEC-equipped platforms/units within line-of-sight.

CEC uniquely integrates the sensors and combat system of the host platform/unit. U.S. variants of CEC have three numeric designators. The "B" designator represents a capability upgrade that occurred within the legacy CEC program.

- AN/USG-2/2B for Navy surface ships
- AN/USG-3/3B for Navy E-2C Hawkeye 2000 and E-2D Advanced Hawkeye
- AN/USG-4B for U.S. Marine Corps Composite Tracking Network units

CEC Increment II will provide updates to both hardware and software from the legacy CEC and is intended to provide advanced capabilities and address more stressing threats. The Navy intends a phased delivery of CEC Increment II with the first phase designated as CEC Block 2.

MISSION

Navy commanders use units equipped with CEC to improve battle force air and missile defense capability by combining participating units' sensor data into a single, real-time, composite track picture. Combined data increases units' situational awareness, improves air picture quality, expands the battlespace, increases depth-of-fire, and enables integrated fire control. On aircraft carriers and select amphibious ships, CEC provides accurate air and surface tracking data for the Ship Self Defense System combat system.

CEC Increment II is intended to expand the use of CEC to support surface warfare and electronic warfare.

PROGRAM

CEC is an Acquisition Category IC program that achieved full operational capability in 2005. The draft CEC TEMP 1415 Revision 6 Change 1, dated April 2022, provides the test strategy for CVN 78, E-2D, DDG 1000, and Aegis ACB 16.

CEC Increment II is a separate Acquisition Category II program. The Navy intends to deliver CEC Increment II in a series of phases with the first phase designated as CEC Block 2. The Navy started development of an Increment II TEMP that will document the CEC Block 2 test strategy.

» MAJOR CONTRACTOR

- Collins Aerospace, a subsidiary of RTX (formerly Raytheon Technologies) – St. Petersburg, Florida

TEST ADEQUACY

From November 2022 to February 2023, the Navy conducted a cyber survivability evaluation of the DDG 1000 *Zumwalt*-class destroyer as part of the DDG 1000 IOT&E. Testing was conducted in accordance with a DOT&E-approved test plan and observed by DOT&E. The Navy intended for this test to simultaneously support a cyber survivability evaluation of the DDG 1000 variant of AN/USG-2B CEC. However, the DDG 1000 cyber survivability evaluation did not sufficiently investigate the AN/USG-2B CEC during the platform test. The Navy can still take advantage of platform-level testing to assess specific variants of CEC but must fully account for CEC test objectives and identify system expertise to support these objectives in associated test plans.

In July 2023, the Navy commenced the cyber survivability evaluation of the CVN 78 variant of AN/USG-2B CEC in conjunction with the CVN 78 IOT&E. The Navy conducted a cooperative vulnerability and penetration assessment (CVPA) and an adversarial assessment

(AA) at the land-based test facility at the Surface Combat System Center (SCSC), Wallops Island, Virginia. The Navy conducted testing in accordance with a DOT&E-approved test plan and with observation by DOT&E. Data collected are not yet adequate to assess cyber survivability of the CVN 78 variant of AN/USG-2B CEC because final assessment depends on remaining shipboard evaluation that the Navy plans to conduct in 2QFY24.

In July 2023, the Navy began FOT&E of the AN/USG-2B CEC as integrated with the ACB 16 of the Aegis Combat System used by guided missile cruisers and destroyers. This FOT&E is being conducted in conjunction with the Aegis ACB 16 FOT&E. The Navy conducted the test in accordance with the DOT&E-approved test plan and with observation by DOT&E. However, the test was not adequate to assess operational effectiveness and suitability of this version of CEC due to issues with SM-6 availability and E-2D reliability that prevented several planned test events from being conducted. The Navy conducted a subset of aircraft tracking, missile tracking, and missile firing events. The Navy expects to complete remaining test events in FY24. Further, the Navy plans to conduct cyber survivability evaluation of this variant of AN/USG-2B CEC during Aegis ACB 16 cyber survivability evaluation in FY24.

The Navy intends to conduct testing to support evaluation of operational effectiveness and suitability of the DDG 1000 and CVN 78 variants of AN/USG-2B CEC during platform IOT&Es in 1QFY24.

The Navy has taken no action on DOT&E's recommendations provided in the FY20 Annual Report that pertain to the AN/USG-3B variant of CEC on E-2D.

PERFORMANCE

» EFFECTIVENESS AND SUITABILITY

Insufficient data are available to determine operational effectiveness and suitability of the DDG 1000 or CVN 78 variants of AN/USG-2B CEC, or integration of AN/USG-2B CEC with Aegis ACB 16, due to tests remaining in progress.

» SURVIVABILITY

Insufficient data are available to determine the cyber survivability of the DDG 1000 variant of the AN/USG-2B due to failure to attain sufficient data related to CEC during the DDG 1000 cyber survivability evaluation.

Insufficient data are available to determine the cyber survivability of the CVN 78 variant of AN/USG-2B CEC, or integration of AN/USG-2B CEC with Aegis ACB 16, due to tests not completing in FY23.

RECOMMENDATIONS

The Navy should:

1. Complete FOT&E on the DDG 1000 and CVN 78 variants of AN/USG-2B CEC, and integration of AN/USG-2B CEC with Aegis ACB 16.
2. Provide a CEC Increment II TEMP for DOT&E approval.
3. Address the DOT&E recommendations provided in the FY20 Annual Report that pertain to the AN/USG-3B variant of CEC on E2D.
4. Define a cyber survivability evaluation strategy to efficiently evaluate CEC across its supported platforms and comprehensively include CEC test requirements within any test plan that is intended to attain evaluation of a CEC variant.