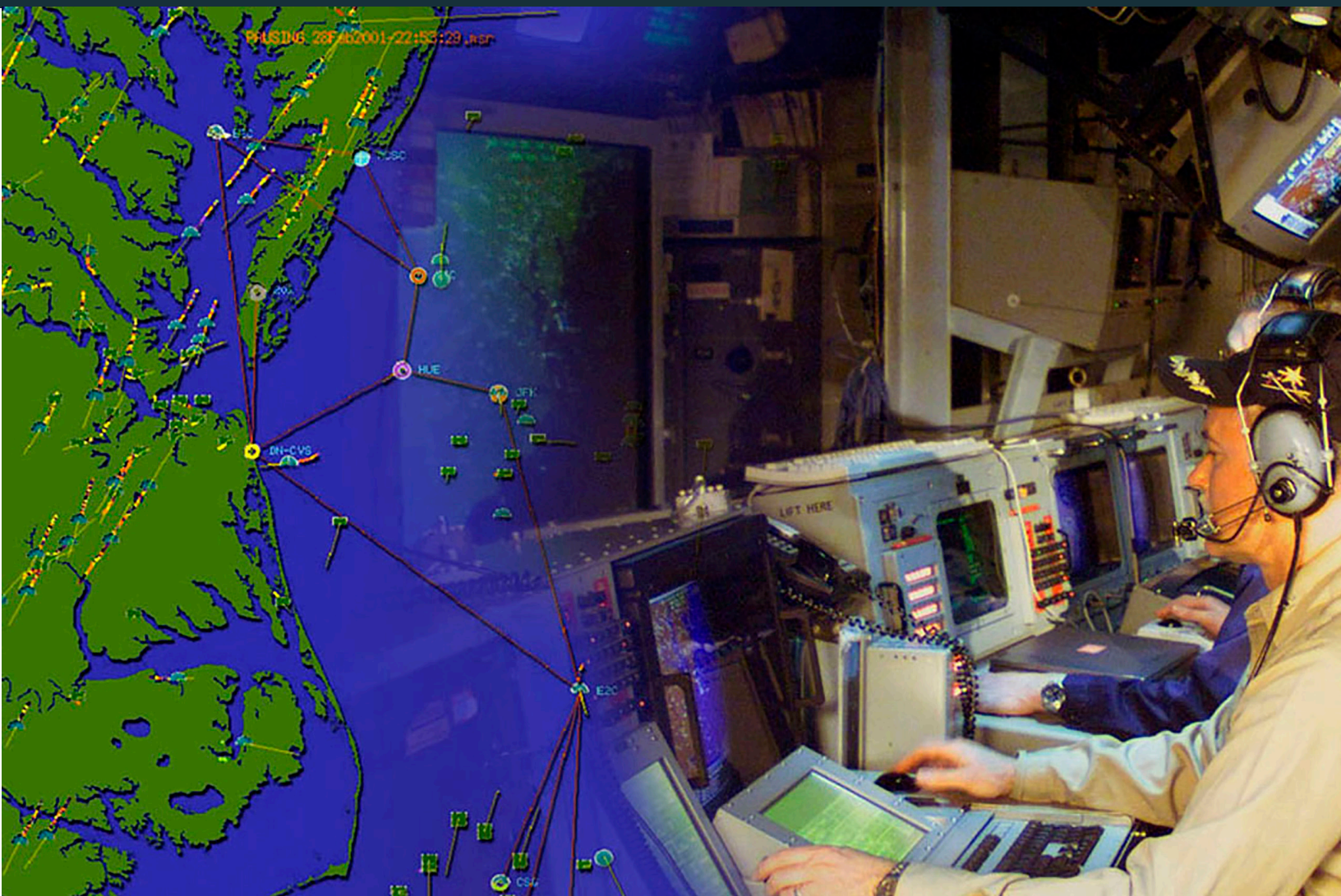


# Cooperative Engagement Capability (CEC)



In December 2023, the Navy's Operational Test and Evaluation Force (OPTEVFOR) conducted FOT&E of the Cooperative Engagement Capability (CEC) as integrated on the DDG 1000 *Zumwalt*-class destroyers. In March 2024, OPTEVFOR conducted cyber survivability evaluation of CEC as integrated on CVN 78 *Gerald R. Ford*-class nuclear aircraft carrier. The Navy expects to complete FOT&E on these two variants of CEC in FY25. OPTEVFOR conducted no operational test on CEC as integrated on Aegis-equipped ships and expects to complete FOT&E of this variant in FY26.

## SYSTEM DESCRIPTION

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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 network to construct target tracks. CEC integrates with the employing platform/unit combat systems to display these tracks and provide target track data the host combat system can use for target engagement. The 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

AN/USG-2B has variations due to distinct differences in Navy surface ship combat systems. These variations include the *Gerald R. Ford*-class with the Ship Self-Defense System, the *Zumwalt*-class with the Total Ship Computing Environment Infrastructure, and Aegis Advanced Capability Build (ACB) 16-equipped ships.

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 II.

## MISSION

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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. Combining 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 and to support larger

numbers of CEC participant platforms in the DDS network.

## PROGRAM

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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 CEC as integrated with *Gerald R. Ford*-class and *Zumwalt*-class ships, Aegis ACB 16-equipped ships, and E-2Ds. DOT&E did not approve TEMP 1415 Revision 6 Change 1 due to inconsistencies between the TEMP and the resources required to execute the documented test strategy. DOT&E will continue to review and approve, as appropriate, related operational test plans to complete the legacy CEC test program. DOT&E approval of the *Zumwalt*-class IOT&E test plan in January 2024 supported operational test of the AN/USG-2B *Zumwalt*-class variant in FY24. DOT&E approval of the *Gerald R. Ford*-class cyber survivability test plan in February 2024 supported cyber security evaluation of the AN/USG-2B *Gerald R. Ford*-class variant in FY24.

CEC Increment II is a separate Acquisition Category II program from the legacy CEC program. In FY24, the Navy began development of the TEMP for CEC Block II, the first phase of CEC Increment II.

### » MAJOR CONTRACTOR

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- Raytheon, a subsidiary of RTX – Arlington, Virginia



## TEST ADEQUACY

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In December 2023, OPTEVFOR conducted FOT&E of the AN/USG-2B *Zumwalt*-class variant, in conjunction with the *Zumwalt*-class IOT&E. Testing was conducted in accordance with a DOT&E-approved test plan and was observed by DOT&E. However, a supporting CEC unit experienced equipment failure and could not participate in the test. As a result, testing did not achieve a primary objective to evaluate CEC data distribution capabilities. The Navy intends to collect on CEC data distribution during USS *Michael Monsoor* (DDG 1001) pre-deployment workup and conclude evaluation of the AN/USG-2B *Zumwalt*-class variant in FY25. OPTEVFOR completed cyber survivability evaluation of AN/USG-2B *Zumwalt*-class variant in FY24.

Between February and March 2024, OPTEVFOR conducted cyber survivability testing of the AN/USG-2B *Gerald R. Ford*-class variant aboard USS *Gerald R. Ford* (CVN 78), in accordance with a DOT&E-approved test plan and with DOT&E observation. The test occurred with CVN 78 pierside and was informed by the land-based test site evaluation detailed in the FY23 Annual Report. OPTEVFOR intends to complete cyber survivability testing of the AN/USG-2B *Gerald R. Ford*-class variant from the CVN 78 when it is underway in FY25. OPTEVFOR intends to conclude FOT&E of the AN/USG-2B *Gerald R. Ford*-class variant in FY25, in conjunction with the platform's remaining IOT&E

that includes operationally relevant scenarios for CEC employment.

OPTEVFOR conducted no evaluation of the AN/USG-2B Aegis variant in FY24. The Navy intends to complete FOT&E of this variant of legacy CEC in conjunction with Aegis ACB 16 operational testing on a guided missile cruiser in FY26.

In FY24, the Navy took no action on DOT&E's recommendation in the FY20 Annual Report to conduct testing on the AN/USG-3B variant of CEC as employed by E-2D.

## PERFORMANCE

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### » EFFECTIVENESS AND SUITABILITY

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Insufficient data are available to determine the operational effectiveness and suitability of the AN/USG-2B *Zumwalt*-class, *Gerald R. Ford*-class, or Aegis variants. DOT&E will submit FOT&E reports, or a combined report, for the AN/USG-2B *Zumwalt*-class and *Gerald R. Ford*-class variants after completion of their respective FOT&Es that the Navy expects to occur in FY25. DOT&E will submit an FOT&E report for the AN/USG-2B Aegis variant after completion of FOT&E that the Navy expects to occur in FY26.

### » SURVIVABILITY

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Cyber survivability assessment of the AN/USG-2B *Zumwalt*-class variant is classified. DOT&E will submit an FOT&E report for the AN/USG-2B *Zumwalt*-class variant

after completion of FOT&E that the Navy expects to occur in FY25.

Insufficient data are available to determine the cyber survivability of the AN/USG-2B *Gerald R. Ford*-class and Aegis variants. DOT&E will submit FOT&E reports for the AN/USG-2B *Gerald R. Ford*-class and Aegis variants after completion of their FOT&Es that the Navy expects to occur in FY25 and FY26, respectively.

## RECOMMENDATIONS

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The Navy should:

1. Complete FOT&E on the AN/USG-2B *Zumwalt*-class and *Gerald R. Ford*-class variants in FY25, and the AN/USG-2B Aegis variant in FY26, as recommended in the FY23 Annual Report.
2. Provide a CEC Increment II Block II TEMP for DOT&E's approval in FY25, as recommended in the FY23 Annual Report.
3. Address the recommendations from the FY20 and FY23 Annual Reports that pertain to the AN/USG-3B variant of CEC on E2D.
4. Ensure that cyber survivability evaluations on Aegis ACB 16 platforms comprehensively assess CEC.