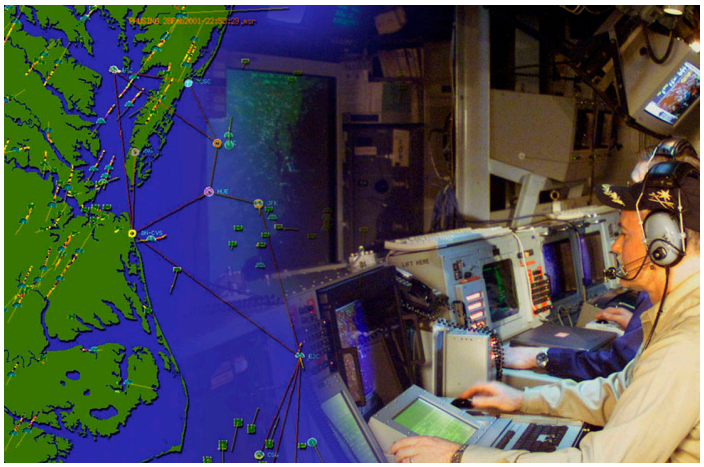
Cooperative Engagement Capability (CEC)

Executive Summary
- The Navy's Commander, Operational Test and Evaluation Force (COTF) continued FOT&E of the Cooperative Engagement Capability (CEC) USG-2B with the Aegis Baseline 9A Combat System in December 2015 and commenced FOT&E of the CEC USG-2B with the Aegis Baseline 9C Combat System in March 2016. Data analysis is ongoing. Preliminary indications are that the CEC USG-2B, as integrated in the Aegis Baseline 9A and 9C Combat Systems, remains operationally effective and suitable and continues to perform comparably to previous CEC USG-2 and USG-2A variants.
- DOT&E will provide a full assessment of the CEC USG-2B's operational effectiveness and suitability on Aegis Baseline 9A and Baseline 9C Combat System platforms upon completion of the CEC USG-2B FOT&Es in late 2017.

System
- CEC is a real-time, sensor-netting system that enables high-quality situational awareness and integrated fire control capability.
- There are four major U.S. Navy variants of CEC:
  - The USG-2/2A is used in selected Aegis cruisers and destroyers, LPD 17/LHD amphibious ships, and CVN 68-class aircraft carriers.
  - The USG-2B, an improved version of the USG-2/2A, is used in selected Aegis cruisers/destroyers as well as selected amphibious assault ships. The USG-2B is planned for use in the CVN 78 and DDG 1000 ship classes.
  - The USG-3 is used in the E-2C Hawkeye 2000 aircraft.
  - The USG-3B is used in the E-2D Advanced Hawkeye aircraft.
- The two major hardware pieces are the Cooperative Engagement Processor, which collects and fuses sensor data, and the Data Distribution System, which exchanges data between participating CEC units.



- The CEC increases Naval Air Defense capabilities by integrating sensors and weapon assets into a single, integrated, real-time network that:
  - Expands the battlespace
  - Enhances situational awareness
  - Increases depth-of-fire
  - Enables longer intercept ranges
  - Improves decision and reaction times

Mission
Naval Commanders use CEC to:
- Improve battle force air and missile defense capabilities by combining data from multiple battle force air search sensors on CEC-equipped units into a single, real-time, composite track picture.
- Provide accurate air and surface threat tracking data to ships equipped with the Ship Self-Defense System.

Major Contractor
Raytheon Systems Co., Command, Control and Communications, Data Systems – St. Petersburg, Florida

Activity
COTF conducted the following CEC test events in FY16 in accordance with the DOT&E-approved test plans:
- Continued FOT&E of the CEC USG-2B with the Aegis Baseline 9A Combat System in December 2015
- Commenced FOT&E of the CEC USG-2B with the Aegis Baseline 9C Combat System in March 2016

Assessment
- CEC test results to date indicate that the CEC USG-2B, as integrated with the Aegis Baseline 9A and 9C Combat Systems, remains operationally effective and suitable and continues to perform comparably to previous CEC USG-2 and CEC USG-2A variants. DOT&E will provide a full assessment of the CEC USG-2B's operational effectiveness

and suitability upon completion of all FOT&Es of Aegis Baselines 9A and 9C with the CEC USG-2B in late 2017.

- Test results indicate that, under certain conditions, some CEC messages were not being distributed to all participating CEC units in the network, resulting in CEC-equipped units having inconsistent tactical pictures which could adversely affect fire control solutions.
- Integration problems were identified during the December 2015 testing when a legacy Aegis baseline ship operated as an assist ship, providing track support to the CEC network. This problem resulted in unnecessary loading of the CEC network. Further details are classified.

Recommendations

- Status of Previous Recommendations. The Navy has not satisfied the following previous recommendations to:
  1. Demonstrate corrections to the problem that degrades the USG-3B CEC's Track File Concurrence in a phase of FOT&E.
  2. Implement changes to the USG-3B CEC interface with the E-2D mission computer that would allow data from the E-2D's APY-9 radar to be used by the USG-3B CEC without first requiring the creation of an E-2D Mission Computer track.
  3. Reassess the USG-3B CEC reliability requirement and whether the logistic supply system can support the demonstrated USG-3B CEC reliability.
  4. Correct the cause of the electromagnetic interference between the USG-3B CEC and the E-2D radar altimeter and demonstrate the corrections in a phase of FOT&E.
  5. Take action on the recommendations contained in DOT&E's classified report to Congress on the CEC USG-3B FOT&E.
  6. Complete the FOT&E of the CEC USG-2B with the Aegis Baseline 9A Combat system
  7. Update the CEC Test and Evaluation Master Plan to include details of:
     - The second phase of the USG-3B FOT&E with the supersonic sea-skimming target scenario
     - FOT&E of corrections made to the CEC USG-3B
     - FOT&E of the CEC USG-2B with the Aegis Baseline 9 Combat System
     - FOT&E of the CEC USG-2B with the DDG 1000 Zumwalt Combat System
     - FOT&E of the CEC USG-2B with the CVN 78 Combat System
     - FOT&E of USG-3B CEC to demonstrate the system's ability to support the E-2D's Theater Air and Missile Defense and Battle Force Command and Control missions
     - The test program supporting the Acceleration of Mid-term Interoperability Improvements Project
- FY16 Recommendations. The Navy should:
  1. Complete the FOT&E of the CEC USG-2B with the Aegis Baseline 9C Combat System.
  2. Investigate and correct the cause of some CEC messages not being consistently distributed to all participating units in the CEC network and demonstrate the correction in a phase of FOT&E.
  3. Investigate and correct the integration problems with legacy Aegis baseline combat systems operating in a CEC network and demonstrate the correction in a phase of FOT&E.