

Global Command and Control System – Maritime (GCCS-M)

Executive Summary

- The Navy’s Commander, Operational Test and Evaluation Force (COTF) conducted the IOT&E of the Global Command and Control System – Maritime (GCCS-M) version (v4.1) Group Level variant onboard the USS *Milius* from May 28 through June 13, 2014. GCCS-M v4.1 occasionally experiences a low memory condition, making the system run too slowly to be operationally effective. Users performed a preemptive 12-minute reboot of the GCCS-M v4.1 client prior to daily operational exercise participation to prevent this condition. DOT&E determined that the Group Level variant is operationally effective (with the operational workaround for the low memory condition) and operationally suitable.
- The Navy Information Operations Command (NIOC) Red Team attempted to penetrate and exploit the GCCS-M v4.1 system during the IOT&E and identified two major and two minor cybersecurity deficiencies. The two major deficiencies were attributed to the Consolidated Afloat Networks and Enterprise Services (CANES) program, which interfaces with GCCS-M v4.1. The two minor deficiencies were a result of inadequate system documentation and a non-responsive helpdesk, which prevented the user from restoring the system. DOT&E determined that the Group Level variant is not survivable until cybersecurity deficiencies have been corrected.

System

- GCCS-M is a command, control, communications, computers, and intelligence system consisting of software, procedures, standards, and interfaces that provide an integrated near real-time picture of the battlespace used to conduct joint and multi-national maritime operations.
- The Navy is developing GCCS-M Increment 2 at the Force, Group, and Unit Levels. Force Level includes aircraft carrier (CVN), amphibious assault (LHA and/or LHD), and command ships (LCC). Group Level includes guided missile cruisers (CG), destroyers (DDG), and submarines. Unit Level includes guided missile frigates, dock landing ships, amphibious transport docks, and patrol coastal craft.
- GCCS-M Increment 2 consists of two distinct types of software:
 - Aircraft carrier, amphibious command ship (LCC), and amphibious assault ship capability based on the GCCS-Joint software baseline



- Guided missile cruiser and below capability based on the eXtensible Common Operational Picture software baseline
- The Navy intends to release the Group and Unit Level solution in a three configuration phased approach, starting with the patrol coastal ships, then the full Unit Level ships, and finally the Group Level ships.

Mission

- U.S. maritime commanders utilize GCCS-M to exercise command and control over forces in support of maritime operations.
- Commanders at all echelons use GCCS-M to:
 - Integrate scalable command and control, communications, and intelligence capabilities
 - Support the decision-making process
 - Process, correlate, and display geographic track information on friendly, hostile, and neutral land, sea, air, and space forces, integrated with available intelligence and environmental information

Major Contractor

Northrop Grumman Mission Systems – San Diego, California

Activity

- COTF conducted the IOT&E of GCCS-M v4.1 Group Level variant onboard the USS *Milius* from May 28 through June 13, 2014, in accordance with the DOT&E-approved IOT&E Plan.
 - The USS *Milius* was pier-side at Naval Base San Diego, California, from May 28 through June 8, 2014, and underway in the Southern California Operations Area for the remainder of the test period.
 - Combat Information Center Battle Force Team Trainer and Surface-Launched Attack Missile Exercise scenarios were executed to stimulate the GCCS-M v4.1 system.
- Concurrently with IOT&E, a NIOC Red Team performed a cybersecurity assessment that included system scans, penetration testing, and malicious insider analysis.
- DOT&E intends to publish an IOT&E report in FY15.

Assessment

- The Group Level variant of the GCCS-M v4.1 system is operationally effective, with the operational workaround for the low memory condition. GCCS-M v4.1 performed its command, control, and communications mission well during IOT&E.
 - USS *Milius* maintained an integrated common operating picture with the Commander, Third Fleet Maritime Operations Center (MOC) successfully exchanging, processing, and displaying near real-time track data.
 - Users successfully created, displayed, and stored overlay tactical decision aids in the Common Tactical Picture Manager and exchanged them with the Third Fleet MOC.
 - GCCS-M v4.1 received and displayed historical and current Blue Force Tracking data from the Joint Tactical Terminal.
 - GCCS-M v4.1 received position and intended movement data over the Navigation Sensor System Interface (NAVSSI).
- Testing identified four defects affecting operational effectiveness.
 - First, GCCS-M v4.1 occasionally experiences a low memory condition, making the system run too slowly to be operationally effective. Users performed a preemptive 12-minute reboot of the GCCS-M v4.1 client prior to daily operational exercise participation to prevent this condition.
 - Second, during Undersea Warfare (USW) operations, GCCS-M v4.1 did not transmit tracks and overlay messages to the Tactical Decision Support System (TDSS). The mission impact was minor because TDSS was the primary decision aid for USW operations and relied on the USW Combat System as the primary source for track messages.
 - Third, 10 surface training tracks out of 80 randomly displayed incorrect courses and speeds; 5 of the 10 affected tracks stopped displaying. Users were able to reintroduce tracks into the common operating picture to accomplish

- training objectives. This defect was isolated to local training tracks, as operational tracks were not affected.
- Fourth, GCCS-M v4.1 sometimes starts up in a condition where it is unable to accept own ship position information from the NAVSSI. Since this condition occurs randomly and infrequently, the system is recoverable by performing a 12-minute reboot.
- The Group Level variant of the GCCS-M v4.1 system is operationally suitable. GCCS-M v4.1 met reliability, maintainability, and availability requirements.
 - The GCCS-M v4.1 Mean Time Between Operational Mission Failure was 372 hours (100 hours or greater required).
 - GCCS-M v4.1 corrective maintenance for one operational mission failure was 12 minutes (40 minutes or less required).
 - Operational availability was 0.99 (0.95 or greater required).
 - GCCS-M v4.1 training provides the knowledge necessary to operate GCCS-M in its typical missions, when supplemented with on-the-job training. Program Office processes and procedures used to identify, track, and correct system defects were effectively used to support and sustain the system.
- DOT&E determined that the Group Level variant is not survivable until cybersecurity deficiencies have been corrected. NIOC identified two major and two minor cybersecurity deficiencies during IOT&E. The two major deficiencies were attributed to the CANES program, which interfaces with GCCS-M v4.1. The two minor deficiencies were a result of inadequate system documentation and a non-responsive helpdesk, which prevented the user from restoring the system.

Recommendations

- Status of Previous Recommendations. The Navy addressed all previous recommendations.
- FY14 Recommendations. The Navy should:
 1. Correct the following GCCS-M v4.1 Group Level deficiencies—
 - Occasional low memory condition requiring daily reboot
 - Lack of tracks and overlay messages to the TDSS
 - Displaying incorrect surface training track information
 - Unable to accept own ship position information from the NAVSSI upon startup
 - Two cybersecurity deficiencies relating to system restoration
 2. Review CANES-equipped ships to ensure the two major cybersecurity deficiencies are corrected.
 3. Implement an operational workaround to periodically reboot the GCCS-M v4.1 client to prevent a low memory condition, until the defect can be corrected.