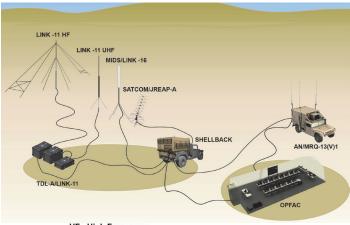# Common Aviation Command and Control System (CAC2S)

Executive Summary

- In December 2013, the Test and Evaluation Master Plan (TEMP) for Common Aviation Command and Control System (CAC2S) Increment I was updated by the CAC2S Program Office to support the planned Milestone C review, currently scheduled for 2QFY15.
- In October 2014, the Marine Corps Operational Test and Evaluation Activity conducted an operational assessment (OA) of CAC2S Increment I, Phase 2 during the Weapons and Tactics Instructors' (WTI) exercise at Marine Corps Air Station Yuma, Arizona, to assess its ability to support the Direct Air Support Center (DASC), Tactical Air Operations Center (TAOC), and Tactical Air Command Center (TACC) missions. The OA was conducted in accordance with a DOT&E-approved test plan, and the results will be used to support a Low-Rate Initial Production (LRIP) decision during the Milestone C review.
- During the OA, CAC2S, Increment I, Phase 2 demonstrated the ability to support mission accomplishment of the three Marine Corps aviation C2 missions. CAC2S Increment I, Phase 2 also demonstrated the ability to provide data fusion of real time, near-real time, and non-real time information onto a single tactical display.

System

- CAC2S consists of tactical shelters, software, and common hardware. The hardware components are expeditionary, common, modular, and scalable, and may be freestanding, mounted in transit cases, or rack-mounted in shelters and/or general-purpose tents that are transported by organic tactical mobility assets.
- CAC2S Increment I is being delivered in two phases. Phase I previously delivered hardware and software to fully support the DASC mission requirements and partially support TAOC mission requirements. Phase 2 combines the three legacy Phase 1 systems into two functional subsystems and fully supports the requirements of the DASC, TACC, and TAOC.
  - The Communication Subsystem (CS) provides the capability to interface with internal and external communication assets and the means to control their operation.
  - The Aviation Command and Control System (AC2S) provides:
    - The operational command post and functionality to support mission planning, decision making, and execution tools in support of all functions of Marine Aviation
    - An open architecture interface capable of integrating emerging active and passive sensor technology for organic and non-organic sensors to the Marine Air Command and Control System (MACCS)

HF - High Frequency
JREAP - Joint Range Extension Application Protocol
MIDS - Multi-Functional Information Distribution System
OPFAC - Operations Facility
SATCOM - Satellite Communications
TDL - Tactical Data Link
UHF - Ultra High Frequency

- The capability for the display of real time, near-real time, and non-real time sensor data to support C2 of Marine Air-Ground Task Force (MAGTF) aviation assets

Mission

- The MAGTF Commander will employ Marine Corps aviation C2 assets to include the DASC, the TAOC, and the TACC equipped with CAC2S to integrate Marine Corps aviation into joint and combined air/ground operations in support of Operational Maneuver from the Sea, Sustained Operations Ashore, and other expeditionary operations.
- The MAGTF Commander will execute C2 of assigned assets afloat and ashore in a joint, allied, or coalition operational environment by using CAC2S capabilities to:
  - Share mission-critical voice, video, sensor, and C2 data and information in order to integrate aviation and ground combat planning and operations
  - Display a common, real, and near-real time integrated tactical picture with the timeliness and accuracy necessary to facilitate the control of friendly assets and the engagement of threat aircraft and missiles
  - Provide fusion of real time, near-real time, and non-real time information in support of the MAGTF
  - Access theater and national intelligence sources from a multi-function C2 node
  - Standardize Air Tasking Order (ATO) and Airspace Control Order generation, parsing, interchange, and dissemination throughout the MAGTF and theater forces by using the joint standard for ATO interoperability

Major Contractors
- Phase 1
  - Government Integrator:
    Naval Surface Warfare Center – Crane, Indiana
  - Component Contractor:
    Raytheon-Solipsys – Fulton, Maryland
  - Component Contractor:
    General Dynamics – Scottsdale, Arizona
- Phase 2
  - Prime Contractor (no Government Integrator):
    General Dynamics – Scottsdale, Arizona

Activity
- The Marine Corps awarded the Engineering, Manufacturing and Development contract for CAC2S Phase 2 to General Dynamics C4 Systems.
- The CAC2S Program Office held a Critical Design Review for Phase 2 during 1QFY14.
- The CAC2S Program Office completed Developmental Test (DT) B-1, DT B-2, and DT B-3 between 1Q-4QFY14.
- In December 2013, the CAC2S Program Office updated the TEMP for CAC2S Increment I to support the planned Milestone C review. DOT&E approved the TEMP in January 2014.
- In October 2014, the Marine Corps Operational Test and Evaluation Activity conducted an OA of CAC2S Increment I, Phase 2 during the WTI exercise at Marine Corps Air Station Yuma, Arizona. The OA evaluated the ability of CAC2S Increment I, Phase 2 to support the DASC, TAOC, and TACC missions. The OA was conducted in accordance with a DOT&E-approved test plan, and the results will be used to support a LRIP decision during the Milestone C review.
- Milestone C for CAC2S Phase 2 is scheduled for 2QFY15.

Assessment
- Based on qualitative evaluation during the OA, CAC2S Increment I, Phase 2 successfully demonstrated the ability to support the primary mission areas for all three agencies: direct air support for the DASC, control of aircraft and missiles for the TAOC, and providing C2 aviation and planning support for the MAGTF commander in the TACC.
- Increment I, Phase 2 support of the TACC was limited primarily to the current operations cell due to the scope of the exercise scenario.
- During the OA, CAC2S Increment I, Phase 2 also demonstrated an ability to fuse real time, near-real time, and non-real time data onto a single tactical display, at medium operational tempo densities of aircraft and targets against older/current generation threats. However, because system interfaces are still in development, CAC2S connectivity to the Marine Corps' Composite Tracking Network was not demonstrated.
- Reliability, availability, and maintainability data were collected during the OA and the data indicate that CAC2S is making progress toward meeting its reliability growth objectives.
- The OA did not assess interoperability/integration of CAC2S with the Ground/Air Task Oriented Radar as that system is still undergoing development. However, the OA did demonstrate the ability to connect the AN/TPS-59 radar sensor directly to CAC2S displaying both radar plot and track data.

Recommendations
- Status of Previous Recommendations. DOT&E previously recommended that a balanced use of air and ground combat forces be used during future test venues to provide a better assessment of CAC2S support to the MAGTF and that 24-hour operations be conducted to ensure adequate hours for assessment of system reliability. Additionally, DOT&E also recommended that a Service-level preventative maintenance plan be developed prior to conducting the Increment I, Phase 2 IOT&E. The Marine Corps is actively addressing these recommendations. All other previous recommendations have been addressed.
- FY14 Recommendations. The Marine Corps should:
  1. Ensure that IOT&E of CAC2S' data fusion capability include the most current and the likely projected air threat available and that the scenario used is operationally realistic and of sufficient operational tempo to adequately stress the system.
  2. Conduct interoperability and integration testing with the Composite Tracking Network and Ground/Air Task Oriented Radar in an operationally realistic environment if these systems are sufficiently mature to reduce IOT&E risk.
  3. Conduct a Field User Evaluation as IOT&E risk reduction that includes all divisions/sections within the TACC in order to adequately stress the system and ensure that CAC2S capabilities meet the user mission planning requirements.