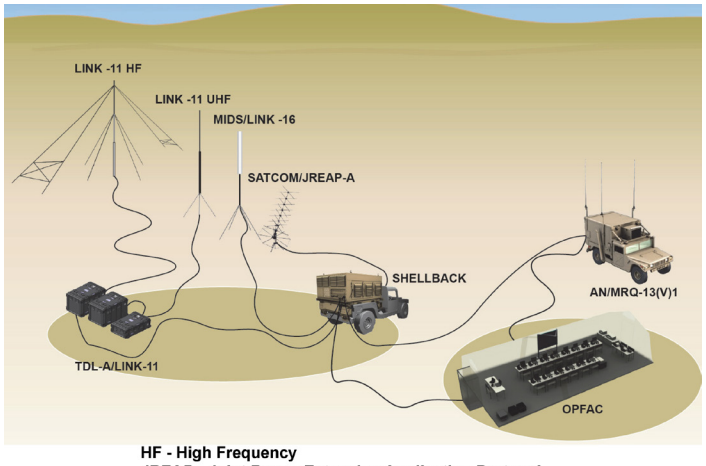
Common Aviation Command and Control System (CAC2S)

Executive Summary

- In October 2014, the Marine Corps Operational Test and Evaluation Activity conducted an operational assessment (OA) for the Common Aviation Command and Control System (CAC2S) Increment I Phase 2 during the Weapons and Tactics Instructors' (WTI) exercise at Marine Corps Air Station Yuma, Arizona. The OA was conducted in accordance with a DOT&E-approved test plan.
- During the OA, CAC2S Increment I Phase 2 demonstrated the ability to support mission accomplishment of the three Marine Corps aviation command and control agencies. Additionally, CAC2S demonstrated the ability to provide data fusion of real-time, near real-time, and non real-time information onto a single tactical display.
- In 2QFY15, the Assistant Secretary of the Navy, Research, Development, and Acquisition, as the Milestone Decision Authority, conducted a Milestone C review for CAC2S, which resulted in an approval to enter the Production and Deployment Phase of its lifecycle and to procure low-rate initial production items to support IOT&E.
- During 3QFY15 and 4QFY15, the Marine Corps conducted additional data fusion testing using updated operational scenarios, and integrated/interoperability testing with the Composite Tracking Network (CTN). At the end of FY15, the Marine Corps continued risk reduction efforts by conducting a full Tactical Air Command Center (TACC) functionality demonstration during a WTI exercise at Marine Corps Station Yuma, Arizona, as well as datalink testing and an integration demonstration with the Ground/Air Task Oriented Radar (G/ATOR).
- IOT&E for CAC2 Increment I Phase 2 is scheduled for 3QFY16.

System

- CAC2S consists of tactical shelters, software, and common hardware. The hardware components are expeditionary, common, modular, and scalable. Components 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 Direct Air Support Center (DASC) mission requirements and partially support Tactical Air Operations Center (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.



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 Communication Subsystem provides the capability to interface with internal and external communication assets and the means to control their operation.
- The Aviation Command and Control System provides:
  - The operational command post and functionality to support mission planning, decision making, and execution tools to support 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
  - The capability to display 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, including 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 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 to support the MAGTF
- Access theater and national intelligence sources from a multi-function C2 node
- Standardize Air Tasking Order and Airspace Control Order generation, parsing, interchange, and dissemination throughout the MAGTF and theater forces by using the joint standard for Air Tasking Order interoperability

Major Contractors

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

---

Activity

- In October 2014, the Marine Corps conducted an OA of the CAC2S Increment I Phase 2 in accordance with a DOT&E-approved OA plan.
- In 2QFY15, the Assistant Secretary of the Navy, Research, Development, and Acquisition, as the Milestone Decision Authority, conducted a Milestone C review for CAC2S, which resulted in an approval to procure low-rate initial production items to support IOT&E.
- During May 2015, the Program Office conducted interoperability/integration testing with the CTN.
- In June 2015, and again in August 2015, the Marine Corps conducted data fusion testing using an updated and operationally realistic scenario that more adequately stressed the system.
- The Marine Corps conducted CTN connectivity testing during 3QFY15 and continued CTN evaluation during the fall 2015 WTI course.
- The Marine Corps continued risk reduction efforts with a datalink connectivity functionality demonstration during 4QFY15.
- During the fall 2015 WTI course, the Program Office conducted integrated testing of CAC2S for all operations cells within the TACC. In addition, operational endurance testing was conducted over the same period as risk reduction for the upcoming IOT&E. An integration demonstration of CAC2S with G/ATOR was also conducted during the WTI primarily as a risk reduction effort since the G/ATOR system is still under development.
- IOT&E for CAC2S Increment I Phase 2 is scheduled for 3QFY16.

Assessment

- Based on qualitative evaluation during the 1QFY14 OA:
  - CAC2S successfully demonstrated the ability to support the primary mission areas for all three agencies: direct air support for the DASC, control aircraft and missiles for the TAOC, and C2 aviation and planning support for the MAGTF commander in the TACC.
  - CAC2S 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.
  - DOT&E did not assess interoperability/integration of CAC2S with G/ATOR as that system is still undergoing development. However, testing did demonstrate the ability to connect the AN/TPS-59 radar sensor directly to CAC2S displaying both radar plot and track data.
  - Reliability, availability and maintainability data, collected during testing and throughout the remainder of FY15, indicate that CAC2S continues to make progress toward meeting its reliability objectives.
- During 3QFY15 and 4QFY15, the Marine Corps continued testing the CAC2S data fusion capability, successfully demonstrating the ability to fuse real-time, near real-time, and non real-time data against an updated operational threat scenario for the test venue.

Recommendations

- Status of Previous Recommendations. The Marine Corps addressed some previous problems and is in the process of addressing the remaining recommendations:
  1. Utilize a balanced use of air and ground combat forces during future test venues to provide a better assessment of CAC2S support to the MAGTF.
  2. Conduct 24-hour operations to ensure adequate hours for assessment of system reliability.
  3. Conduct interoperability and integration testing with CTN and G/ATOR in an operationally realistic environment prior to IOT&E in order to reduce risk if those systems are sufficiently mature.
  4. Conduct a Field User Evaluation prior to IOT&E that exercises all divisions/sections within the TACC.
- FY15 Recommendations. The Marine Corps should:
  1. Continue data fusion testing in support of the CAC2S IOT&E in FY16. Data fusion testing must be conducted using operationally realistic scenarios with the most

likely air threat available in a stressing operational tempo environment.
2. Conduct integration/interoperability testing of CAC2S with G/ATOR in order to assess system characteristics and support integration of G/ATOR when that system achieves its Initial Operational Capability.
3. Complete a user evaluation of all system functionality during a TACC support demonstration. Ensure that evaluations include those for the Future Plans, Future Operations, and Air Combat Intelligence cells in addition to the Current Operations cell in order to reduce risk prior to IOT&E.
4. Conduct datalink demonstration testing, and where feasible, use data in support of CAC2S IOT&E scheduled for 3QFY16. Ensure that functionality and system usability are assessed as part of the pre-operational test risk reduction effort.