

COMMON AVIATION COMMAND AND CONTROL SYSTEM



Common Aviation Command and Control System (CAC2S)

Program Background

The Common Aviation Command and Control System (CAC2S) is a modernization effort to replace the existing aviation command and control equipment of the Marine Air Command and Control System (MACCS). It also will provide the Aviation Combat Element (ACE) with the necessary hardware, software, equipment, and facilities to effectively command, control, and coordinate aviation operations. CAC2S accomplishes the MACCS missions with a suite of operationally scalable modules to support the MAGTF, Joint, and Coalition Forces. CAC2S integrates the functions of aviation command and control into an interoperable system that will support the core competencies of

all Marine Corps warfighting concepts. CAC2S, in conjunction with MACCS organic sensors and weapon systems, supports the tenets of Expeditionary Maneuver Warfare and fosters Joint interoperability.

The CAC2S program employs an evolutionary acquisition strategy using an incremental and phased approach for development and fielding of the CAC2S. The Capabilities Production Document identifies two increments to achieve the full requirements of CAC2S. Increment I of the CAC2S modernizes the assault support, air support, air defense, and ACE battle management capabilities of the MACCS.

Increment I of the CAC2S is accomplished through a two-phased approach. The CAC2S

PMO structured Phase 1 to accommodate rapid fielding of operationally relevant capabilities, to include mobility, situational awareness, tactical communications, information dissemination, and operational flexibility. Phase 1 established the baseline CAC2S capabilities for the MACCS and improved overall Aviation Command and Control performance and effectiveness. Phase 1 was accomplished by upgrading fielded MACCS equipment with mature, ready technologies, and it established an initial product baseline for a Processing and Display Subsystem (PDS) and Communications Subsystems.

Phase 2 addresses the requirements for remaining ACE Battle Management and Command and Control requirements and implements the Sensor Data Subsystem to fuse input from expeditionary sensors as well as real-time and near real-time data from ground force C2 centers, weapon systems, and Joint Strike Fighter sensors into a common operational picture of the battlespace. Phase 1 Limited Deployment Capability was achieved in 4QFY11. Phase 2 will accommodate the integration of technologies necessary for CAC2S to meet remaining ACE Battle Management and Command and Control requirements. Phase 2 completion will result in delivery of the full CAC2S Increment I capabilities, and full deployment fielding will begin in FY17.

Although requirements beyond Increment I are not yet defined, it is envisioned that CAC2S will continue to be developed in an evolutionary acquisition approach; follow-on increments will be defined and captured in subsequent Joint Capabilities Integration and Development System documents. Those increments will potentially focus on capabilities for an airborne node, integration of Air Traffic Control functionality, ground based air defense node, advanced decision support tools, Unmanned Aerial Systems ground station interoperability, Integrated Fire Control, Single Integrated Air Picture, Integrated Architecture Behavior Model,

integration with fifth generation aircraft, and full Network Enabled Command and Control.

Program Status

Phase 1 achieved Full Operational Capability in September 2013. Currently, 20 Phase 1 systems are deployed in units comprising the Marine Air Control Group of the Marine Aircraft Wing and the Marine Corps Communications and Electronics School in 29 Palms, CA.

The Government successfully completed Initial Operational Test and Evaluation of the Phase 2 systems in 2QFY16 and is preparing for full rate production. The Government released a Request for Proposal on 7 October 2016 and expects to award a contract by 3QFY17. The production contract will enable the Program to field systems to attain the program's acquisition objective and provide software sustainment services to produce software builds that maintain the system's cybersecurity posture and address software corrections and capability improvements.

CAC2S' Top Technical Issues

1. Bandwidth Efficient Radar Measurement Data Distribution

CAC2S currently interfaces with USMC air surveillance radars using high bandwidth, Local Area Networks (LANs) that are connected by tactical fiber optic cables. This approach limits radar emplacement to locations within relatively close proximity to CAC2S, which may not allow optimal surveillance coverage. This limitation will also preclude CAC2S from receiving air surveillance data directly from the Ground Weapons Locating Radar (GWLR) version of the G/ATOR. Connectivity between CAC2S and USMC radars using fielded data radios/wireless communications systems or a Wide Area Network is preferred, however this approach must consider bandwidth limitations of the supporting communications systems and architectures. The PMO seeks solutions that enables radar

measurement data to be extracted from existing radar outputs / interfaces and compresses this data to enable it to be sent to CAC2S in a bandwidth efficient manner.

2. Bandwidth Efficient Networked Voice Communications Vehicles

The CAC2S AN/MRQ-13 Communications Subsystems (CS) currently interfaces with the CAC2S operations facility using high bandwidth, Local Area Networks (LANs) that are connected by tactical fiber optic cables. This approach limits CS (and associated radio antennas) emplacement to locations within relatively close proximity to CAC2S, which may not provide optimal tactical voice radio line-of-site / coverage. Additionally, the CS lacks the ability for remote users to access the tactical voice radios contained within a CS. As such each CS currently functions as a dedicated communications platform for the agency with which it is deployed. The PMO seeks bandwidth efficient solutions that enables the tactical voice radios contained within the CS to be connected to the CAC2S operations facility using fielded data radios / wireless communications systems. Additionally, the preferred solution will allow bandwidth efficient networking of CS's across a Wide Area Network (WAN) enabling users to remotely employ tactical voice radios contained within a CS.

3. Cross Domain Security Solutions

MACCS units are increasingly tasked to support exercises and operations that involve coalition forces. Meanwhile, CAC2S operates on SIPRNet as its primary data network for information exchanges, while most coalition systems and users operate on CENTRIX. Although some information that CAC2S processes could potentially be exchanged with coalitions forces; system, network and data security considerations prevents CAC2S from exchanging information on SIPRNet and CENTRIX concurrently. The PMO seeks NSA-approved, Marine Corps Enterprise Network (MCEN) authorized, small

form factor solutions that enables CAC2S to operate in cross domain environments, allowing exchange of select information with coalition partners through automated processes, while maintaining security requirements of the discrete network domains.

4. Small Form Factor CAC2S

CAC2S is designed to operate as main unit MACCS agencies (DASC, TACC, TAOC). These agencies often deploy smaller, mobile, forward echelon detachments that require similar information and capabilities (or a subset) that are available with a main unit. Meanwhile, transport and employment considerations for forward echelon forces severely limits the size, weight and power (SWAP / footprint) of the equipment that these detachments can deploy. The PMO seeks solutions that minimizes the footprint of equipment required to employ CAC2S capabilities with forward echelon detachments. The preferred solution will consider environmental conditioning and power consumption / generation factors that tend to increase a system's footprint due to the required addition of ancillary equipment.

5. Contextual Search Engines

CAC2S processes inputs from aircraft, sensors, data links, and other C2 systems. The data is stored and fused in a global track file and displayed to the operator for situational awareness and decision making. Typically, operators in C2 systems get overwhelmed by "too much information" and suffer from the "glare" of information. Data typically flows through the system, but the operator cannot locate or access the data when it is needed. The PMO seeks technologies that can discern the themes and relationships among data in unstructured content. Search results can identify relevant results based on context, not just keyword matches, by examining contents of a document as well as the files by which it is surrounded.

CAC2S

ACAT IAC (MAIS)
Phase 1- Operations & Support
Phase 2- Production & Deployment

Key Events

- AC2S production & software maintenance source selection activities are in progress
 - Proposals received 6 December 2016
 - Evaluations progressing as scheduled
 - CA planned 3QFY17
- Software updates to address IOT&E OSur findings are underway
 - 3.0 R2 September 2016 addressed 10 of 11 OSur Vulnerabilities
 - 3.0 R3, addresses remaining OSur Vulnerability, two test events, MCTSSA, March 2017 & NCSW Crane, Apr 2017

Program Status/Issues/Concerns

- Phase 1 Processing and Display Subsystem (PDS) & Communication Subsystem (CS)
 - Fielded 23 PDS and 75 CS

Description: Common Aviation Command and Control System (CAC2S) is a modernization effort to replace existing Marine Air Command and Control System (MACCS) equipment. Phase 1 has fielded a product baseline Processing and Display Subsystem (PDS) and Communications Subsystem (CS). Phase 2 is the integration of sensor capabilities and will provide an Air Command and Control Subsystem (AC2S). Fielding of Phase 2 will complete CAC2S Increment I.

AN/MRQ-13



AC2S

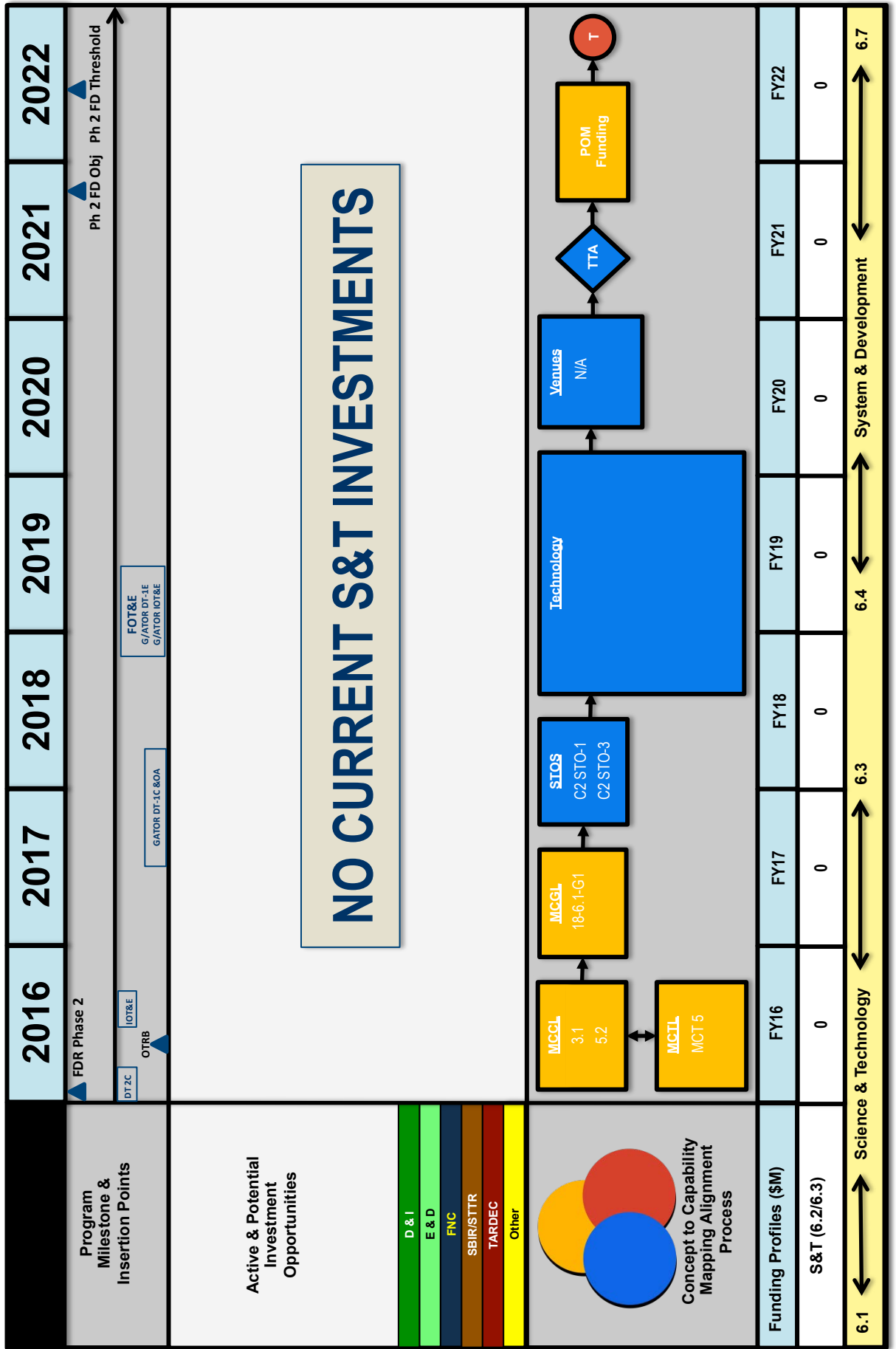


OPFAC

PROGRAM	PRIOR	FY16			FY17			FY18			FY19			FY20			FY21			FY22		
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Milestones & Phases		DT 2C			IOT&E			OTRB			FDR Phase 2			Ph 2 FD Objective			Ph 2 FD Threshold					
SETR Reviews					GATOR DT-1C & 0A			CS Refresh														
Test Events					GATOR DT-1E			FOT&E GATOR DT-1E GATOR IOT&E														
Contract Events					Full Production: 41 AC2S & SW Main Supt Contract			LDU Option #2-5 AC2S														



CAC2S Technical Issue #1 Future Data Link Receiver & Processor





CAC2S Technical Issue #2 C2 Command Tools

	2016	2017	2018	2019	2020	2021	2022	
Program Milestone & Insertion Points	FDR Phase 2 DTZC IOT&E OTRB FOT&E (G/ATOR DT-1E / G/ATOR IOT&E) Ph 2 FD Obj Ph 2 FD Threshold							
Active & Potential Investment Opportunities	Artificial Intelligence (AI)-based C2 Digital Assistant 							
D & I E & D FNC SBIR/STTR TARDEC Other								
Funding Profiles (\$M)	FY16	FY17	FY18	FY19	FY20	FY21	FY22	
S&T (6.2/6.3)	0	0.08	0	0	0	0	0	
6.1	← Science & Technology		← 6.3		← 6.4		← System & Development	← 6.7



CAC2S Technical Issue #3 Marine Transportable CAC2S

