

# COMMON AVIATION COMMAND AND CONTROL SYSTEM



## 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 I to accommodate rapid fielding of operationally relevant capabilities, to include mobility, situational awareness, tactical communications, information dissemination, and operational flexibility. Phase I 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 awarded the Phase 2 Engineering, Manufacturing, and Development prime contract to General Dynamics C4 Systems, located in Scottsdale, AZ. The program completed its Critical Design Review in October 2013, conducted a series of three progressive, iterative developmental test periods in 2014, and completed an Operational Assessment in October 2014. Four Engineering Development Models were delivered by the prime contractor to the Government for the Developmental Tests and the Operational Assessment. A successful Milestone C was conducted in 2QFY15 and CAC2S received authorization from the Milestone Decision Authority to procure four Limited Deployment Units (LRIP) as production articles for Initial Operational Test & Evaluation in 2QFY16.

The success of the new CAC2S technology was publicly highlighted on June 15, 2012, when former Under Secretary of the Navy Robert O. Work and Assistant Secretary of the Navy for Research, Development and Acquisition Sean Stackley recognized the CAC2S program as one of the Department of the Navy's Major Acquisition Activity Awards for their "creative and effective practices that lead to lower costs and better technical performance."

## **CAC2S' Top Technical Issues**

### **1. Future Data Link Receiver and Processor**

The advent of future data links for 5th generation fighter aircraft introduces tremendous opportunities for the MACCS to participate in the exchange of high-quality, high-fidelity battlefield information collected by an array of airborne sensors. Examples of emerging data link technology include the F-35's Multi-Function Advance Data Links (MADL). To take advantage of the technology and phenomenology aboard these 5th generation airborne assets, the

PMO seeks technologies that will allow CAC2S to participate in this currently fighter-to-fighter domain.

## **2. C2 Command Tools**

Collaboration between staff members and other commanders is one of the major contributors to a Commander's situational awareness (SA). To improve SA decision making for the Commander, the CAC2S Program is seeking technologies that address information load and the cognitive demands of future network-centric forces. The program seeks new human-machine systems that translate high-rate inflow of battlespace data into a high-agility battle commands. The PMO seeks integration and awareness tools that continuously and autonomously fuse data into a high-quality shared information portrait. Moreover, the program seeks execution tools that support human-controlled automation of intelligence information, maneuver and air control measures, fires, and battle damage assessment.

## **3. Marine Transportable CAC2S**

As the fielding of CAC2S Increment continues and the system is more widely used, Tactics, Techniques and Procedures (TTP) are being refined and new uses for the system are being realized because of the capability that CAC2S brings. The new capabilities and TTP are predicting a need for a Marine transportable CAC2S variant that maintains full capability with no increase in latency. The PMO seeks solutions on the associated hardware that will fully enable CAC2S in its smallest form factor as well as the software tools required to efficiently load and maintain the CAC2S software.

## **4. Multi-Level Security Solutions**

As CAC2S integrates with fifth generation aircraft and potentially with coalition forces, the system requires the ability to provide multi-level security processing and dissemination. The PMO seeks tools

and systems that will allow the automatic exchange of information with systems in discrete classification domains. The PMO will need NSA-approved, small factor, and lightweight solutions that will permit the system to function in a multi-level security environment.

## **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.

## **6. Video Compression**

The proliferation of unmanned aerial vehicles in the battlespace has presented a new challenge for the C2 systems and command posts. The large volume of video downloaded from these systems presents a technical challenge for storing and sharing the video products in a low-bandwidth environment. The PMO seeks technologies to effectively compress videos, while retaining attributes that make them effective for situational awareness and decision making.



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

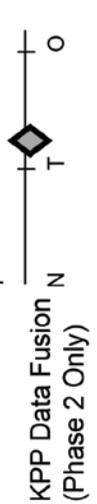
C Y S G P G

# CAC2S Increment I

Phase 2 MS C = Mar 15 AAO = 50  
 LDC = Feb 12 FDD = Oct 11 FD = Mar 22

**Description:** 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 with the PDS and will provide an Air Command and Control Subsystem (AC2S). Fielding of Phase 2 will complete CAC2S Increment I.

JAN 2016



N - No capability T - Threshold O - Objective

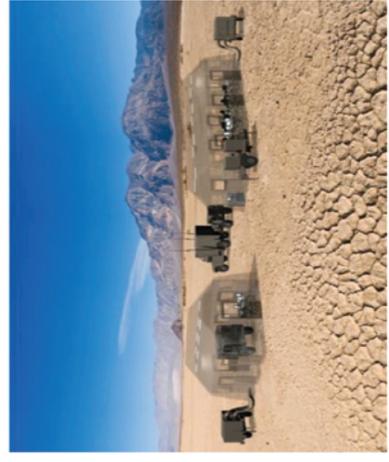
\*Assessment is based on contractor demonstrated capabilities during vendor demonstration. The prime contractor, General Dynamics, Scottsdale, has a path to meet the KPPs. The independent evaluation performed NSWC Corona demonstrating meeting the software aspects of the KPPs.

**Contract Data:** FPIF (EMD RDT&E), 2 FPIF LDU Option CLINS (PMC), 2 FFP S/W Maintenance Option CLINS (OMMC) and 1 FFP Refurb/Initial Spares Option CLIN (PMC) Contractor GD-MS  
 Start - Complete 7 Nov 2012 - 3QFY16 (EMD RDT&E)

**Next Contract:** FRP = 2QFY17 **G**

**DCMA Schedule Health Assessment** = 9/15

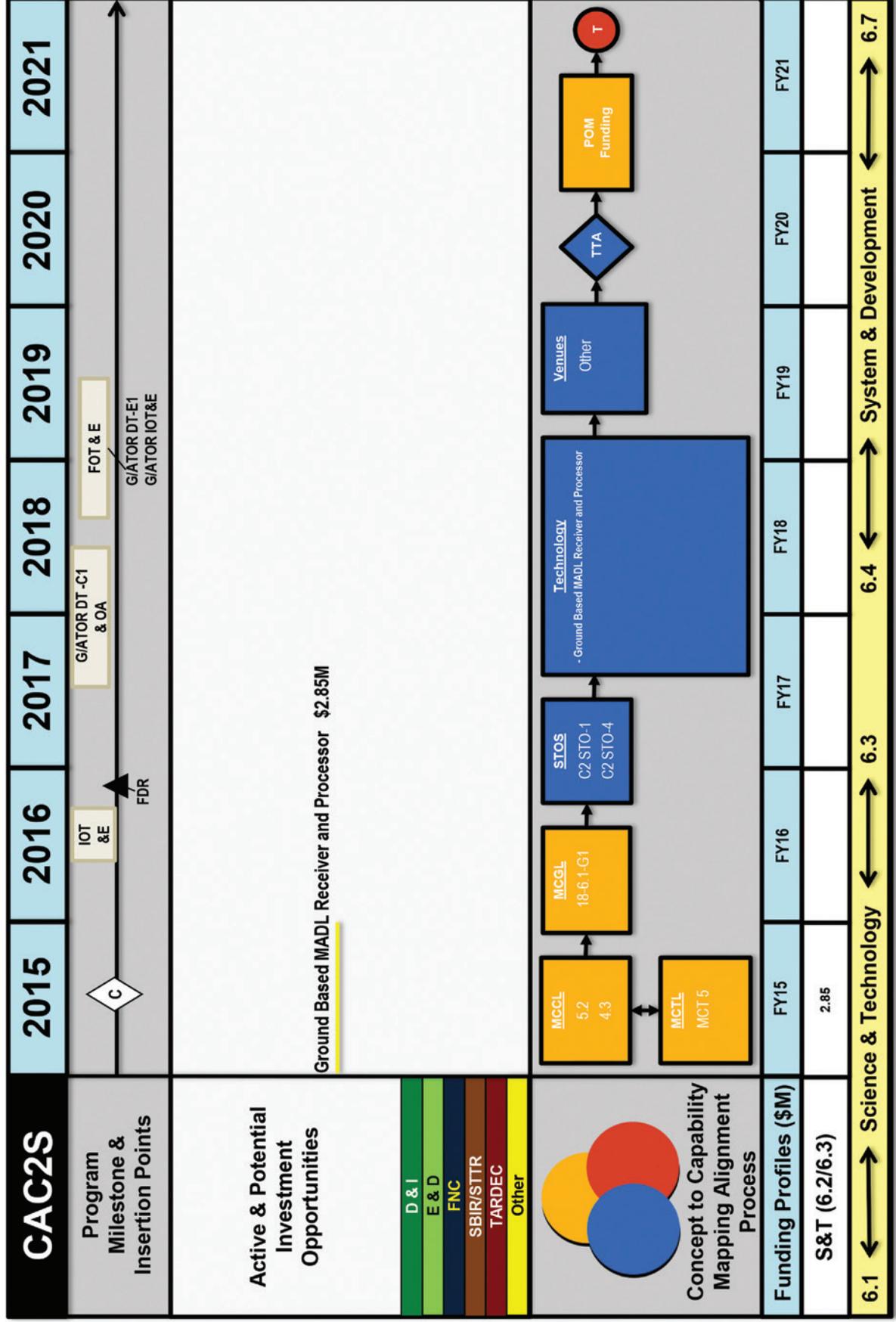
**ISSUES:** Expenditures lag OSD benchmark because of Performance Payment schedule.



PROGRAM	FY15				FY16				FY17				FY18				FY19				FY20				FY21			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Milestones	MSC				FDR																							
SETR Reviews	FCA				PCA				TDP																			
Test Events	OA				DT-C1				DT-C2				OATR				IOT&E				FCT&E				GIATOR DT-E1 GIATOR IOT&E			
Contract Events	LDU #1 Build Option				LDU #2 Build Option				Prod Contract RFP				Prod Contract Award				Syst Eng Contract RFP				Syst Eng Contract Award							

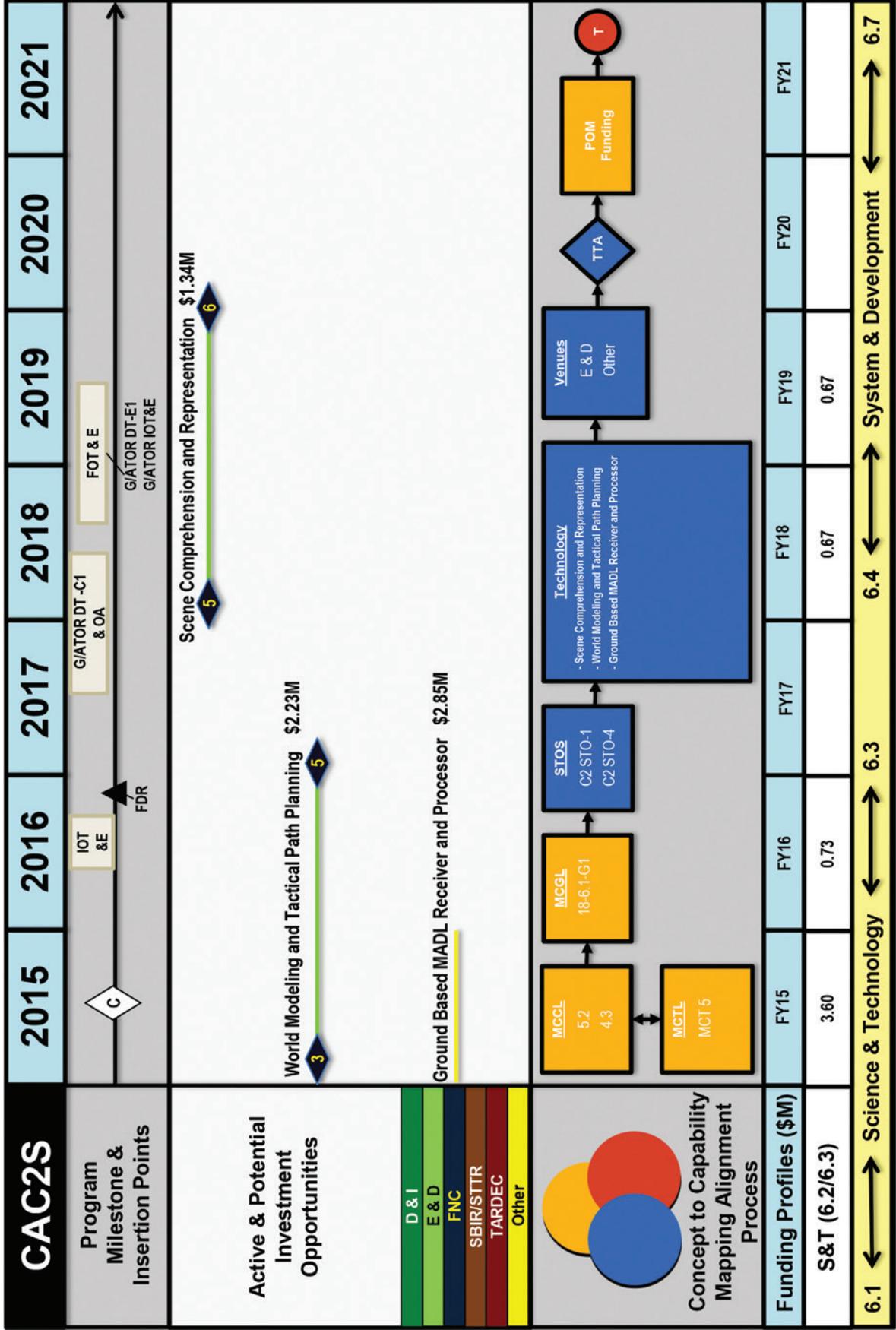


# CAC2S Technical Issue #1 Future Data Link Receiver & Processor





# CAC2S Technical Issue #2 C2 Command Tools



Funding Profiles (\$M)	FY15	FY16	FY17	FY18	FY19	FY20	FY21
S&T (6.2/6.3)	3.60	0.73		0.67	0.67		
6.1	6.2		6.3		6.4		6.7



# CAC2S Technical Issue #3 Marine Transportable CAC2S

