

The Need for a Common Aviation Command and Control
System in the Marine Air Command and Control System

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The Marine Air Command and Control System (MACCS) is absolutely critical to the success of the Marine Air-Ground Task Force (MAGTF). The MACCS acts as a force multiplier, increasing the speed, fluidity and efficiency of the Marine Corps Air Combat Element (ACE). It also integrates the ACE with the Ground Combat Element (GCE) and Logistics Combat Element (LCE) and ensures that ACE meets the ACE commander's intent and ultimately the MAGTF commander's intent. The integration of the GCE, ACE and LCE into one cohesive force is what makes the MAGTF powerful and effective. Without an effective MACCS air assets are underutilized, or even wasted all together

. To maximize the potential of the ACE, the Marine Corps must deploy the most efficient and capable MACCS to the fight. Currently, command and control agencies that comprise the MACCS use a variety of different systems to accomplish their missions. These systems are not always interoperable or as efficient as they could be. Implementing a common aviation command and control system across the MACCS would increase the speed, situational awareness, and flexibility of the ACE, and the MAGTF as a whole.

The MACCS is designed to provide the MAGTF's ACE commander with the ability to monitor, supervise, and influence the application of Marine aviation's six functions: assault

support, anti-air warfare, offensive air support, electronic warfare, control of aircraft and missiles, and aerial reconnaissance. In order to support the six functions of Marine aviation, the ACE utilizes four primary C2 agencies: the Tactical Air Command Center (TACC), the Tactical Air Operations Center (TAOC), the Direct Air Support Center (DASC) and the Marine Air Traffic Control Detachment. Currently each agency utilizes its own system. These agencies provide the command and control backbone for the ACE, and must be able to operate effectively and efficiently together. MACCS agencies need to operate as one cohesive force, and frankly, that is not always the case.

Tactical Air Command Center

The Marine Air Command and Control System Handbook (MCWP 3-25.3) states "the Marine TACC is the senior agency of the Marine air command and control system. It provides the facilities for the ACE commander and the battle staff to command, supervise, and direct MAGTF air operations. Other service's comparable agencies include the Air Force's Air Operations Center and the Navy's Tactical Air Control Center."¹ The physical TACC is a large, composite system which consists of a multiple source correlation system, the contingency theater automated planning system, three AN/MRQ vehicles, a commander tactical terminal, a

suite of expandable shelters with related furnishings, a collection of commercial off-the-shelf computer equipment and peripherals, and combination of stand-alone command, control, and communications distribution system components. It takes significant training and experience to become a proficient member of the TACC crew. Also, no formal school house exists to train Marines working in the TACC. Command and control Marines working in the TACC are sourced from other agencies within the MACCS. They must quickly adjust to new equipment and be able to support a new mission. A significant amount of training for Marines checking in to a MTACS unit is on the operation of the TACC-specific equipment. Training is also a challenge for Marine maintenance personnel as well, who must quickly learn to maintain equipment they may not have worked with before.

Tactical Air Operations Center

"The TAOC provides air surveillance and control of aircraft and surface-to-air weapons for anti-air warfare (AAW) in support of the MAGTF. Its primary function, to conduct and coordinate AAW, is accomplished through the direction, coordination, and employment of various air defense weapons systems that include interceptor aircraft and ground-based air defense (GBAD) weapons"². The TAOC consists of operator shelters known as Tactical Air Operations Modules (TAOMs), air surveillance

radars, communications equipment, and mobile electric power generators. This equipment allows the TAOC to maintain air situational awareness and to effectively control, coordinate, and manage air defense employment within the TAOC's assigned sector. The TAOC generally forwards the common tactical picture (CTP), generated from their organic radars, to the TACC via tactical data link for their situational awareness. The only other MACCS agency currently able to receive the CTP from the TAOC is the Marine ATC Detachment, over an older and less capable tactical data link. The TAOC and TACC utilize Link-16 primarily, which can exchange information at up to 115.2 kilobits per second. Marine ATC Detachments utilize Link-11B which normally passes information at 1200 bits per second. This huge difference in capability severely limits the speed at which the ATC Detachments can send and receive information on tracks and track data. Operators within the TAOC work primarily out of the TAOM, a shelter which is used only by the TAOC. The TAOM, although very capable, requires significant training and experience to become proficient at operating. Liaisons and service members outside of the TAOC often require significant assistance when required to work within the TAOM.

Direct Air Support Center

"The DASC processes immediate air support requests, coordinates aircraft employment with other supporting arms, manages terminal control assets supporting GCE and combat service support element forces, and controls assigned aircraft, unmanned aerial vehicles (UAVs), and itinerant aircraft transiting through DASC controlled airspace."³ The DASC controls and directs air support activities that affect the GCE commander's focus on close operations and those air missions requiring integration with the ground combat forces, close air support (CAS), assault support, and designated air reconnaissance. A radio-intensive air control agency, DASC uses manual information displays, procedural control, and voice communications systems to direct and coordinate direct air support activities. In short, the DASC is the least technologically complex of the MACCS agencies and may be simply Marines with maps and radios conducting procedural control.

Marine Air Traffic Control Detachment

"The mission of Marine air traffic control (ATC) is to provide all-weather radar/non-radar approach, departure, en route, and tower ATC services to friendly aircraft."⁴ Although the mission of the ATC Detachment is fairly straight forward, ATC Marines also play an important role in the integrated air defense system the MACCS is responsible for providing and

greatly increase the overall situational awareness of the MACCS. ATC Detachments utilize the Marine Air Traffic Control and Landing System (MATCAL) to provide continuous radar approach, departure, and en route ATC capabilities. MATCAL collects, evaluates, and displays air track data and disseminates information to other air control agencies. MATCAL consists of three subsystems: AN/TPS-73 radar, AN/TPN-22 all-weather landing system (ALS), and AN/TSQ-131 control and communications subsystem (CCS). Normally, the ATC Detachment will integrate their air picture into the common tactical picture via Link 11B with the TAOC, an older and less capable tactical data-link.

Marine Air Command and Control System

The four primary agencies which comprise the MACCS conduct four separate but related missions utilizing four separate operating systems. These systems are interoperable to some degree, but their ability to integrate is limited. The TACC, TAOC, and ATC Detachments are able to share a CTP, although the ATC Detachment possesses limited functionality. (Tactical data links allows units to send and receive radar track information in near real time.) Other units within the MACCS rely on radios and chat to build situational awareness. The DASC has no ability to receive the CTP without being supplied with external equipment. All organizations are able to coordinate via single channel radios, phones, email, and chat with the assistance of

the Marine Wing Communication Squadron. Currently it is difficult for Marines to move between agencies due to the different operating systems utilized. A transition to a single common aviation command and control system across the MACCS would allow the MACCS to operate as a single cohesive force with increased flexibility.

Common Aviation Command and Control System

Technology has reached a point where a common aviation command and control system is a possibility. Numerous advantages to using a common aviation C2 system exist. All agencies within the MACCS would be completely interoperable. Additionally, Marines within the MACCS could move seamlessly from one agency to another. Although training on the mission, tactics, and techniques of the agency would still be necessary, the manipulation of the equipment would be no different. Situational awareness across the MACCS would be greatly increased and similar due to a shared CTP, particularly at the DASC which does not normally have the benefit of an air picture. The larger agencies within the MACCS which have had to bring large shelters with them when they deployed in the past would be more mobile and scalable, and would benefit from updated technology and more user friendly equipment. A common aviation C2 system would also be advantageous to the supply system as the entire MACCS would be utilizing one system.

Although many advantages to a common aviation C2 system exist, obviously some disadvantages exist as well. Supplying the entire MACCS with a new system would be extremely expensive and time consuming to develop. Initially, agencies would experience a drop in proficiency while transitioning to the new system and establishing procedures on new equipment. It would be unwise to implement a new system to all agencies at the same time. A new aviation command and control system must be phased in, agency by agency, over a number of years to minimize the effects of the initial drop in proficiency. Also to design a single system that works for all agencies would require compromise between agencies on the capabilities and limitations of the system.

In order to implement a common aviation C2 system the system must be clearly defined. Most importantly the system must support the current mission essential tasks of all agencies. It must be scalable and mobile. This will allow commanders to achieve an effective balance between mobility and capability for their specific tasking. Units like the DASC, in certain situations, need to be very mobile to keep pace with the GCE. They must have the ability to control their size and mobility in order to maintain their ability to relocate quickly. The system must be as simplistic as possible as aviation command and control is already inherently complicated and time

sensitive. An effective balance between capability and simplicity, while difficult to achieve, is crucial to the success of a common aviation command and control system. As systems become more and more capable they generally become more complicated. The development of a common aviation command and control system would need to be carefully monitored to ensure that features and options do not make it overly complicated to operate. It must also be extremely redundant. If one component fails the operating system must continue to operate. A series of servers, processors and driver must exist and have the ability to back up the each other in the event one component fails. Also, as the US military becomes more and more joint in nature, the system must work with Marine Corps joint and coalition partners. In any joint or coalition environment the MACCS must be able to integrate adequately to support the mission. A common aviation command and control system must also be customizable to fit the unique requirements of the different agencies within the MACCS. Customizable displays would allow organization to tailor the system to fit their needs. Units would have the able to control what information is displayed, and what information is filtered. The decision making process would be streamlined and efficient.

In order to stay ahead of emerging threats, and increase the speed and quality of decision making within the ACE, a new

common aviation command and control system is needed. The MACCS must be able to decide and act faster than the enemy. As the Marine Corps continues to develop newer, more lethal weapon systems, their capabilities will never be fully utilized unless they are effectively controlled. A common aviation Command and control system would provide a huge leap in the capability of the MACCS, and allow the ACE commander to employ his weapon systems to their full capacity. Although the development and introduction of this system would be time consuming and costly, the increased speed, fluidity, adaptability, and capability make the costs well worth it.

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