

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.
PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

| | | |
|--|---|--|
| 1. REPORT DATE (DD-MM-YYYY) 05-04-2019 | 2. REPORT TYPE Master's of Military Studies | 3. DATES COVERED (From - To) SEP 2018 - APR 2019 |
|--|---|--|

| | |
|--|--|
| 4. TITLE AND SUBTITLE Marine Corps Combat Operation Centers: An Easy Target for Peer Competitors | 5a. CONTRACT NUMBER N/A |
| | 5b. GRANT NUMBER N/A |
| | 5c. PROGRAM ELEMENT NUMBER N/A |

| | |
|---|------------------------------------|
| 6. AUTHOR(S) Brooks, Brandon, S., Master Sergeant, USMC | 5d. PROJECT NUMBER N/A |
| | 5e. TASK NUMBER N/A |
| | 5f. WORK UNIT NUMBER N/A |

| | |
|--|--|
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) USMC Command and Staff College Marine Corps University 2076 South Street Quantico, VA 22134-5068 | 8. PERFORMING ORGANIZATION REPORT NUMBER N/A |
|--|--|

| | |
|--|--|
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) | 10. SPONSOR/MONITOR'S ACRONYM(S) Mr. J.D. Work |
| | 11. SPONSOR/MONITOR'S REPORT NUMBER(S) N/A |

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT
Minimal focus has been placed on adapting to rapidly increasing adversaries who have developed new technologies and capabilities to attack Marine Corps command and control (C2) structures. Most traditional Marine Corps combat operation centers (COC) are tent configurations, which are cumbersome and not as expeditionary as designed. Peer near-peer adversary A2AD capabilities are the reason why the COC is more vulnerable than ever before; the Marine Corps must direct its attention to protecting its main C2 structure. This paper defines the current problem with COCs, introduces Marine Corps and adversary capabilities, and produces a DOTMLPF analysis which helps protect the Marine Corps COCs for future battles.

15. SUBJECT TERMS
Combat Operation Centers, COC; Signature Management; Peer Competitors; DOTMLPF

| | | | | | |
|--|--------------------|---------------------|-----------------------------------|----------------------------|---|
| 16. SECURITY CLASSIFICATION OF: | | | 17. LIMITATION OF ABSTRACT | 18. NUMBER OF PAGES | 19a. NAME OF RESPONSIBLE PERSON |
| a. REPORT | b. ABSTRACT | c. THIS PAGE | | | USMC Command and Staff College |
| Unclass | Unclass | Unclass | UU | 35 | 19b. TELEPHONE NUMBER (Include area code) (703) 784-3330 (Admin Office) |

MASTER OF MILITARY STUDIES

TITLE:

**MARINE CORPS COMBAT OPERATION CENTERS: AN EASY TARGET
FOR PEER COMPETITORS**

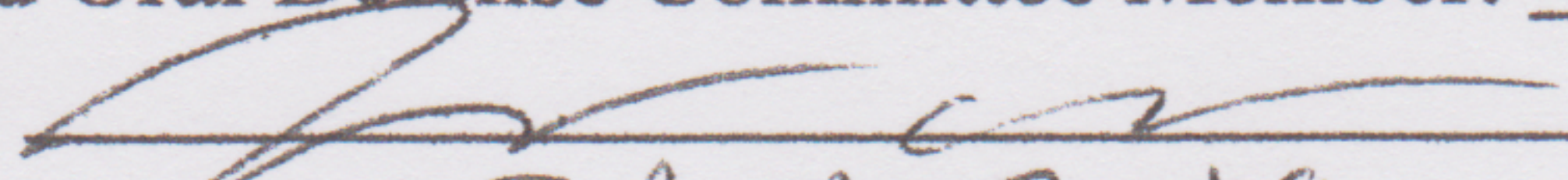
SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF MILITARY STUDIES

AUTHOR:

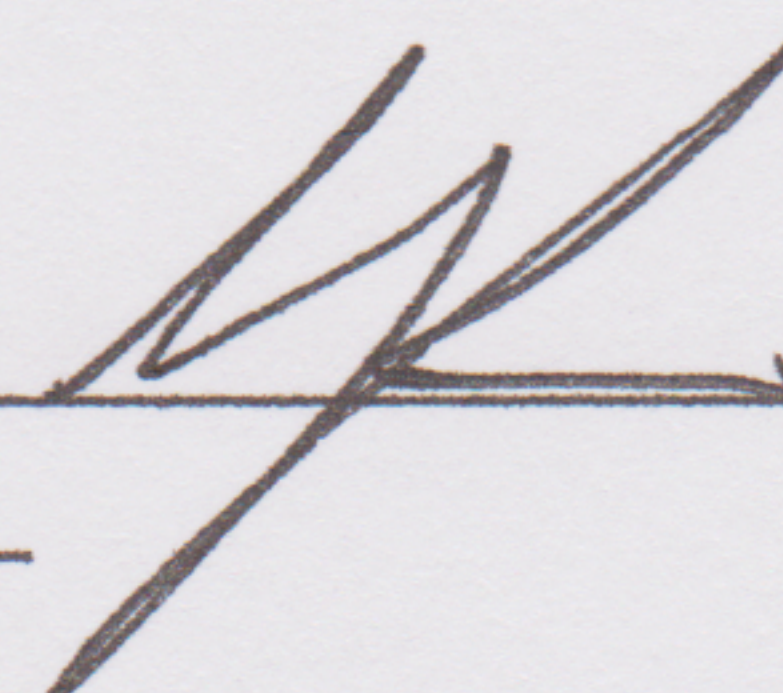
MASTER SERGEANT BRANDON S. BROOKS

AY 2018-19

Mentor and Oral Defense Committee Member: JD WORK

Approved: 

Date: 5 April 2019

Oral Defense Committee Member: LtCol RJ. Rego 

Approved: 5 APRIL 2019

Date: 5 APRIL 2019

Executive Summary:

Title: Marine Corps Combat Operation Centers: *An Easy Target for Peer Competitors*

Author: Master Sergeant Brandon S. Brooks, United States Marine Corps

Thesis: The Marine Corps must change its combat operation centers (COC) in order to adapt to peer competitor's evolving technologies on the battlefield. Using a DOTMLPF analysis (Doctrine, Organization, Training, Material, Leadership & Education, Personnel, and Facilities), there are a number of initiatives to make the COC smaller, more mobile, and less detectable to increase the survivability of the COC against a peer competitor.

Discussion: For the past sixteen years the Marine Corps has found itself fighting against an inferior enemy in Iraq and Afghanistan. The two campaigns created a certain level of complacency; always having air and ground superiority gives a false sense of security that needs to be addressed. Throughout these last sixteen years there have been efforts to make the COC more mobile and require less maintenance. However, minimal focus has been placed on adapting to rapidly increasing adversaries who have developed new technologies and capabilities to attack Marine Corps command and control (C2) structures. Most traditional COCs are tent configurations, which are cumbersome and not as expeditionary as designed. Other COC variants are more mobile and require less equipment, such as the Amphibious Assault Vehicle C7 command and control configuration, and also the Network on the Move (NOTM). These mobile COC concepts are suitable for front line units; however, advancements in enemy weaponry are creating situations where rear area units also require this capability. These new enemy capabilities are the reason why the COC is more vulnerable than ever before at all levels, and the Marine Corps must direct its attention to protecting its main C2 structure. This paper defines the current problem with COCs, introduces future Marine Corps and adversary capabilities, and produces a DOTMLPF analysis which helps protect the Marine Corps COCs for future battles.

Conclusion: Eliminating MEF and Major Subordinate Command (MSC) COCs is a great start in the process of creating a smaller physical and electro-magnetic signature on the battlefield. Developing regiment and battalion COCs on vehicle platforms will make them faster, more mobile, and harder for the enemy to target. Eliminating robust antenna farms and procuring the proper funding to make communications equipment fit inside C2 vehicles is crucial, and increases the survivability of the COC. Proper training and education of COC procedures through established Marine Corps facilities must be conducted; in addition, COC staffs should have continuity of personnel to build a dynamic team for the commander. The operational environment is shifting away from an Afghanistan and Iraq scenario; the Marine Corps must put forth effort to make the COC smaller, more mobile, and less detectable to increase survivability and be more lethal on the battlefield against a peer competitor in a contested environment.

DISCLAIMER

THE OPINIONS AND CONCLUSIONS EXPRESSED HEREIN ARE THOSE OF THE INDIVIDUAL STUDENT AUTHOR AND DO NOT NECESSARILY REPRESENT THE VIEWS OF EITHER THE MARINE CORPS COMMAND AND STAFF COLLEGE OR ANY OTHER GOVERNMENTAL AGENCY. REFERENCES TO THIS STUDY SHOULD INCLUDE THE FOREGOING STATEMENT.

QUOTATION FROM, ABSTRACTION FROM, OR REPRODUCTION OF ALL OR ANY PART OF THIS DOCUMENT IS PERMITTED PROVIDED PROPER ACKNOWLEDGEMENT IS MADE.

Table of Contents

| | Page |
|---|------|
| DISCLAIMER | i |
| EXECUTIVE SUMMARY | ii |
| PREFACE | iv |
| INTRODUCTION | 1 |
| DEFINING THE PROBLEM | 2 |
| Misapplication of USMC Warfighting Philosophy | 2 |
| The COC | 3 |
| Anti-Access Area Denial (A2AD) | 6 |
| ENEMY THREATS | 7 |
| Current Threats from Russia | 7 |
| Current Threats from China | 11 |
| DOTMLPF ANALYSIS | 13 |
| Doctrine | 13 |
| Organization | 15 |
| Training & Facilities | 18 |
| Material | 19 |
| Leadership and Education | 22 |
| Personnel | 24 |
| CONCLUSION | 25 |
| CITATIONS AND END NOTES | 27 |
| BIBLIOGRAPHY | 29 |

Preface

Since becoming an Infantry Operations Chief, the Marine Corps combat operations center (COC) has become a big part of my job description. The operations chief must understand the COC, maintain it, and ensure that it is firing on all cylinders when employed in training or on the battlefield. As the 3d Marine Division G-3 Assistant Operations Chief, I was assigned as the senior watch chief and in control of the setup and displacement of the Division COC. When I received the Consolidated Memorandum Receipt (CMR) for the version two division COC, I quickly realized that there is no way all of this gear and equipment was realistic for deploying and establishing inside a contested environment. My biggest mentor of my career is and will always be Master Gunnery Sergeant Charles A. Walker; he was serving as the Operations Chief for the Division G-3 at the time and taught me everything I know today about operating a COC. MGySgt Walker and I spent an endless amount of time conceptualizing new ways to employ the division COC and minimize the physical footprint of it, along with the electromagnetic signature it produced. We utilized over six major exercises to experiment with the COC, and came to the agreement that the version two will never be employed the way it was meant to be.

I decided that it was my duty to research and find new ideas and initiatives to help the operating forces solve the problem of configuring a lethal COC and giving it more protection on the battlefield by lowering its signature both physically and electromagnetically. With new threats against peer competitors that the Marine Corps might face in the future, it is imperative to address the nucleus of command and control, the COC.

Introduction

The Marine Corps requires updated technologies, capabilities, and doctrine in order to maintain its competitiveness on the battlefield. A capability that the Marine Corps relies on to give a commander the ability to command and control (C2) is the Combat Operation Center (COC). If the Marine Corps continues to fight from the current COC constructs, peer-near peer competitors and their anti-access area-denial (A2AD) capabilities will destroy the COC within minutes of setting up in enemy territory. As the United States military becomes less dominant against its competitors, it is imperative that the COC adjusts its footprint and capabilities to survive in a contested operational environment.

The Marine Corps has become complacent over the years due to warfare against inferior adversaries. The Marine Corps developed a level of comfort by always having air superiority and ground superiority against its adversaries. This superiority has eliminated the fear of a COC being targeted, which created conditions for the development of oversized and easily detectable COCs. The enemies that the Marine Corps has been fighting in the past sixteen years did not possess the capability to cause significant disruption to its current C2 structures. As the wars in Afghanistan and Iraq continue to diminish, the United States military's focus shifted towards peer-near peer competitors such as China and Russia. The shift in focus to China and Russia creates the need to develop new solutions and initiatives to stay competitive in a contested environment; for the Marine Corps, gone are the days of robust COCs that can be easily targeted and disrupted against a much more capable adversary.

The COC's survivability is critical in an operational environment, whatever level it might be; company, battalion, regiment, division or even a Marine Expeditionary Force (MEF), they all serve the same function, and that is to command and control the battle. The Marine Corps must

change its combat operation centers in order to adapt to peer competitors evolving technologies on the battlefield. Using a DOTMLPF analysis (Doctrine, Organization, Training, Material, Leadership & Education, Personnel, and Facilities), there are a number of initiatives to make the COC smaller, more mobile, and less detectable to increase the survivability of the COC against a peer competitor.

Defining the Problem

Misapplication of USMC Warfighting Philosophy

In March 1989 the 29th Commandant of the Marine Corps, General Al Gray published Fleet Marine Force Manual 1 (FMFM-1) *Warfighting*. General Gray found it necessary to give his philosophy on warfighting, stamp it into doctrine, and mandate that all Marine Corps Officers become intimate with its content. Friction, uncertainty, fluidity, disorder, the human dimension, violence of danger, moral and physical forces, the evolution of war, and the art and science of war all became the foundation of understanding warfighting.¹ General Gray wanted to enforce the fact that all wars will vary in intensity and the Marine Corps will have to adapt accordingly to achieve its goals.² FMFM-1 equipped officers to understand, think, and act in an operational environment.

The Marine Corps' 31st Commandant of the Marine Corps, General Charles C. Krulak decided it was essential to update the FMFM-1 and published Marine Corps Doctrinal Publication-1 *Warfighting* in 1997. General Krulak echoes General Gray's words that "war is both timeless and ever changing. While the basic nature of war is constant, the means and methods we use evolve continuously."³ General Krulak foresaw the need for not only officers to

understand *Warfighting*, but also all enlisted. The enlisted ranks throughout the Marine Corps were charged with reading MCDP-1 to gain the understanding of war and its ever changing characteristics. MCDP-6 *Command and Control* encourages critical thinking Marine officers and enlisted to overcome and adapt to different combat situations; it offers a way to command and control at the lowest level. MCDP-6 states that command exercises authority, and control is the bottom up feedback from the subordinate units that have real-time situational awareness in the air or on the ground.⁴

The Marine Corps became accustomed to the over abundance of command and control capabilities at the highest level, this has led to the misapplication of the Marine Corps warfighting philosophy that General Gray and General Krulak emphasized. It is imperative that MEF and even Division Generals understand the importance of Mission Command and allow subordinate commanders to execute mission type orders with limited feedback. The United States Army defines Mission Command as the “exercise of authority and direction by the commander using mission orders to enable disciplined initiative within the commander’s intent to empower agile and adaptive leaders in the conduct of unified land operations.”⁵ Proposed later in this paper, for survivability reasons, MEF and division commanders must trust in their subordinate commanders to execute commander’s intent and prepare for limited C2 capabilities to decrease the footprint in a contested environment.

The COC

Throughout history, the Marine Corps fought in many types of environments against a range of dissimilar adversaries; this created a necessary adaptation to the COC. The concept of a centralized area to give the commander the ability to command and control has proven itself to

be effective, and that is why the COC could be considered the center of gravity for any command. The Marine Corps has identified the COC as a priority in the past, and has created four versions of the COC that pertain to different levels of command. Each echelon of command is associated with the following version: version four is the battalion COC, version three regiment, version two division and version one Marine Expeditionary Force (MEF). Each version of the COC has different configurations and requirements to maintain the ability to command and control; a division COC (version two) has a greater amount of tents and logistics associated with it for sustainment than a battalion (version four) would have. A similarity that all of the versions have in common, is that they all take up a lot of space and require manpower to set up and tear down when the time comes to displace to a different location.

The Marine Corps invested in new technologies to enhance the commander's situational awareness through a more accurate Common Operational Picture (COP) and Common Tactical Picture (CTP). Having these new capabilities allowed the commander to process information faster, which in turn could lead to faster and more accurate decisions on the battlefield. These capabilities are known as "Management Information Systems." In the *Journal of Information Warfare* Van Niekerk, B. and C. Cloete identify these systems as "an organized collection of people, procedures, software, databases, and devices used to provide routine information to managers and decision makers."⁶

Today's information systems within the COCs are necessary and have utility; however, with the constant introductions of more equipment and capabilities comes the increases of manpower, maintenance, and footprint needed to manage them. As stated before, the Marine Corps has become accustomed to fighting a less technologically advanced opponent and has developed a comfort level of maintaining a robust C2 structure. The COC slowly has become

unwieldy; because of the war in Afghanistan and Iraq, it is almost as if the COC became a science experiment with regards to the introduction of an overabundance of new equipment. New equipment and technologies are essential to stay current with a peer competitor; however, expectations must be tempered with the account of having too much equipment that can cause the COC to become more of a target. The case can be made that not being weighted down, the capability of agility, and swift movement on the battlefield can protect the COC from enemy targeting. Enemy capabilities and the A2AD threat in today's world will verify the need for a smaller, faster, and less detectable COC.

The COC requires management information systems that take up a voluminous amount of space, and to add to that space is the required power supplies to allow the systems to function. Logistical support is often overlooked when developing new technologies and equipment. The amount of generators, fuel, lift capabilities, and other sustainment items required to keep a division COC running each day takes a very large supply chain to keep it operational. Bill Gertz, a senior editor of the *Washington Free Beacon* states in a recent article that “since the end of the Cold War, the United States has not fought an adversary capable of the catastrophic disruption of military supply chains and deployment of personnel and materiel,”⁷ and due to new advanced weapon capabilities by Russia and China, this fact is in need of reconsideration. Initially a COC can sustain itself on the ground for two to three days; however, after that first day or two, if there isn't a logistics train coming to resupply, the COC will become obsolete. Gertz argues by not having this capability to provide military components with the resources needed, all of the new technologies and advancements being made would be rendered useless if they cannot be powered.⁸

Though advancements to improve the COC C2 capabilities have been made, those

advancements have created a larger physical footprint and electro-magnetic signature creating a problem in the survivability of the COC. Enemy A2AD capabilities need to be addressed to administrate what the new COC structure should look like. These enemy capabilities such as creating stand-off and the use of precision strike capabilities, might have been overlooked due to the comfort of fighting an adversary that has yet to challenge US C2 structures.

Anti-Access Area-Denial (A2AD)

Understanding a new operational environment is imperative in the process of changing the COC construct, so the Marine Corps also has to take into consideration the emerging A2AD threats that Russia and China pose. The focus on a peer competitor will have a reverse effect on the COC; instead of a “the more the better” mentality, there needs to be a “less is better” approach to COC survival on the battlefield.

Generals Brown and Spacy USAF define A2AD in an article written in 2015 as follows; anti-access simply means to prevent or lower the ability of entrance into an operational area, and area denial is the threat to the force that is operating within the area.⁹ This is not a new concept, but indeed has been the topic of discussion since shifting focus towards peer-near peer competitors, Russia and China remaining the focus in this instance.

The United States military’s possession of freedom of movement and being uncontested when entering another country no longer exists. The new weapon capabilities and developments from China and Russia have allowed them to contest the United States and other allied nations from crossing into their borders. In Iraq and Afghanistan, the Marine Corps had ample amounts of freedom to maneuver and because of its air superiority and ground superiority, the insurgents and Taliban found it very difficult to disrupt any Marine Corps C2 nodes. The Marine Corps and

its COCs maintained an extreme advantage over the battlefield; capabilities increased over time, and new technologies were consistently introduced to the point a battalion-sized COC turned into a permanent structure that consumed an entire grid square. In Iraq and Afghanistan these permanent structures were labeled as “FOBs” (Forward Operating Bases); the FOB mentality is no longer realistic against a peer competitor, as the FOBs would make an easy target for a peer competitor.

The new A2AD threats that Russia and China have developed over the years, will challenge the Marine Corps to command and control its forces. Creating and developing new ways to protect and make the COC more lethal is more necessary than ever before. The current COC structures are optimized for an uncontested environment, or against an enemy that is far inferior to the United States; however, they can easily be targeted and destroyed by a peer competitor. It is understood that the Marine Corps has looked at new ways to employ a COC in a contested environment, but the argument still remains as to what should COCs look like and what needs to happen to them in order to function on the battlefield. The best way to get started on answering this, is understanding the enemy threats.

Enemy Threats

Current Threats from Russia

Russia has been very proactive with protecting its borders, and has invested a lot of time preparing its A2AD capabilities. Generals Brown and Spacey USAF 2015 address the concern of Russia’s defense budget accounts for over twenty percent of all public spending, and that it is already looking into the future of investing an equivalent of 364 Billion US dollars on defense over the next five years. Most of that money will be put towards nuclear, space, reconnaissance,

and communications weapons.¹⁰ In the past years Russia has been a threat to the United States and other nations, but now that threat has become more capable than ever before.

New weapon developments by Russia spawn new concerns for the Marine Corps. The Marine Corps capabilities and doctrine to establish a foothold within a country are now in jeopardy. The Marine Corps' primary method of entry is through amphibious operations, and now that Russia has developed new and improved ballistic and cruise missiles that can range past 1,000 meters, it puts the US Naval ships in danger. Before a Marine Corps unit conducts its assault, C2 is established on ship in the Landing Force Operation Center (LFOC). If the LFOC is already under duress before the assault can commence, it could compromise all operations. The US military does possess ways to counter these potential dangers, but the concern still has to be addressed and initiatives must be developed to protect and commence COC operations. The LFOC's main mission is to command and control; however, it might have to be considered as a means to maintain situational awareness and not a C2 node. The main COC in this instance would be better off controlled in a rear area, which could be established by MEF at home station; passage of control would not be handed off until the landing force could establish a foothold on the ground.

Russia continues to look for new ways to improve A2AD zones by expanding its presence within the eastern Mediterranean area. Jonathan Altman, a program analyst with Systems Planning and Analysis Inc., states that the Russian Black Sea Fleet still remains a threat carrying advanced capabilities utilizing enhanced Kilo-class diesel electric submarines, eleven thousand marines, and a surface contingency force of over forty two naval ships.¹¹ The US has addressed this issue and utilizes the US Sixth Fleet to survey Russia's activities, but it still remains an expanding threat that Russia poses to US military forces. The expansion of Russia's

A2AD zones limits US military potential staging or assault platforms for entry operations, which in turn affects the placement and size of the COC and the ability to command and control.

According to Kramer & Binnendijk, Russia's assessment of future battles does not involve much ground fighting. They forecast operations including cyber-attacks, aerospace operations, biological weapon employment, unmanned aerial vehicles (UAV), spy satellites, robots, and a new development of hypersonic weapons.¹² These focuses and initiatives that Russia continues to develop, take away the ability for the Marine Corps to operate out of a robust COC. The current Marine Corps COCs would be vulnerable to Russia's new A2AD capabilities because of its physical and electro-magnetic signatures. Kramer & Binnendijk (2018) also state that Russia maintains a very capable cyber program that can attack critical infrastructures, which include electric grid, and communication systems.¹³

The strategic initiatives Russia is developing includes not only advanced weaponry and technologies but also owning land. Russia continues to expand its A2AD zones with its presence in the Black Sea, but it also takes advantage of other areas to expand their platforms. Currently Russia has forces in Syria, and now with the United States scheduled to pull out of Syria, Russia would for the most part have free reign to move weapons and other capabilities inside and expand its A2AD threat that much more. Kramer & Binnendijk (2018) bring out a key consideration to keep in mind, and that is Russia's A2AD capabilities expand all the way from the north, starting at the Kola Peninsula, reaching all the way down to the south in the Crimean Sea. By owning this territory and reinforcing it with submarines armed with cruise missiles, it would inhibit the ability to reinforce through the Atlantic and the Baltic.¹⁴

Understanding the strategic environment that Russia has developed through A2AD capabilities is pivotal. Another major threat to the Marine Corps COCs is the Iskander-M. To

NATO the Iskander-M is known as the SS-26; this weapon system is a highly maneuverable ballistic missile that can range between 250 miles to 300 miles and can avoid anti-ballistic missile systems. Francis & Manea (2018) assert that this weapon system and its range capability can have a momentous impact on the US military's ability to conduct forcible entry operations into Russia, or any countries allied with Russia for that matter.¹⁵ Even if the Marine Corps was able to conduct a successful amphibious operation into Russia, the COC and the current configuration would be an easy target for Russia.

An argument could be made that the US enforces counter capabilities to the Iskander-M threat by strategically positioning Amphibious Ready Groups (ARG) equipped with Anti-Ballistic Missiles (ABM); however, the 9M729/ SSC-8 Ground Launched Cruise Missile (GLCM) system complements another threat the Russians could employ that would add to the area denial problem. The SSC-8 violates the Intermediate Nuclear Forces Treaty (INF Treaty), but yet the Russians still maintain it within their weapons arsenal. In an article produced by the Center for Strategic and International Studies (CSIS), *Missile Threat*, states that “on January 23rd 2019, Russia publicly displayed the SSC-8 missile for the first time.”¹⁶ The *Missile Threat* article also emphasizes the fact that the 9M729 model delivers a more powerful warhead and has a more advanced guidance system than the 9M728 Iskander-M model.¹⁷ Not only do the Iskander-M and the SSC-8 pose a significant threat to US military operations, but also the new Su-30 Russian aircraft can finish off what the Iskander-M and the SSC-8 could not.

Surface-to-surface ballistic missiles are effective to gain or control ground. The US military faces another obstacle, the reality that it may not have air superiority. The Su-30 Russian aircraft has “an effective range of over 3,500 kilometers (1,900 miles) depending on their weapons configuration, and both jets can carry a combination of up to ten air-to-air missiles

including the advanced AA-10 ‘Alamo’ infrared missile and AA-11 ‘Archer’ semi-active radar missile capable of destroying enemy air assets at reported ranges of greater than 80 kilometers (50 miles).”¹⁸ Without the advantage of air superiority, the COC will remain vulnerable to attacks; this will force the COC to blend in with the environment to avoid detection.

There are many more capabilities that Russia has possession of that can cripple the Marine Corps’ ability to C2. Not only does the Marine Corps have to assess Russia’s threats, but it also needs to assess other peer competitors’ threats.

Current Threats from China

Russia and China both maintain similar capabilities and they both understand the concept of A2AD to the fullest. Amongst all capabilities that China and Russia possess, their ability to locate and target the COC through advanced technologies is detrimental to the Marine Corps COC. These capabilities drive the importance to make the COC smaller, faster, and less detectable.

Chinas’ proactiveness in the development of more modernized weaponry and technologies allowed the ability to extend A2AD capabilities. Peter Lupo & Bradly Bucholz enforce the fact that China has heavily invested in a military program that can create the far-reaching ability to deny access to threats to China; the building projects are currently on their way in the South China Sea to also allow China the capacity to act coercively across the Western Pacific.¹⁹ Projects that China is developing mentioned by Lupo and Bucholz include “technological developments in long range anti-maritime weapons, networking, and sensors to target naval forces with precision over a large portion of the Western Pacific.”²⁰ China’s possession of these capabilities strengthens its area of influence on bordering countries, and

could possibly turn them against the United States. The Marine Corps relies on US Naval ships getting close enough to conduct an amphibious landing. However, Naval ships are now being contested by China's A2AD capabilities, to the point where the US will have to accept that this battle could result in the loss of ships.

The Marine Corps likes to operate close to the ocean or sea so that it can utilize Naval Surface Fire Support (NSFS) and Close Air Support (CAS). Imagine if a foothold was established in China by the Marine Corps and the COC would have to worry about NSFS from China, another new threat the Marine Corps is not used to. According to Konishi, a Senior Fellow with the Maureen and Mike Mansfield Foundation, China is rapidly developing naval power that is starting to rival the United States maritime capabilities.²¹ China has yet another platform that can threaten the COC through naval gunfire; this is another validation as to why the COC must be smaller, move quicker, and strive to be undetectable.

China's improved maritime capabilities have raised many concerns for the US military, but one platform that China has been heavily invested in for years now is through cyber. Sometime in 2010, "numerous computer systems around the world, including those owned by the US government, continued to be the target of intrusions that appear to have originated within the People's Republic of China. These intrusions focused on extracting information, some of which could be of strategic or military utility."²² COCs utilize many computer systems and other technologies that are susceptible to cyber-attacks. Therefore, in the process of developing new ways to re-structure the COC, improved computers and technologies must be developed that are less vulnerable to cyber-attacks. According to Rosenzweig & Sayler, China has employed the tactic of hacking into US government computers by creating a hacking community that works to breach US systems.²³ China will stay persistent on tapping into US military systems, hence why

the Marine Corps must stay persistent in protecting those systems.

Establishing a baseline of understanding enemy capabilities before moving on to problem solving is crucial. The mentioned capabilities that Russia and China possess are ones that will help drive ideas and initiatives that will be developed through the Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities (DOTMLPF) analysis. This analysis will expose the current problems with the COC and target areas that can be addressed by the Marine Corps through funding and ingenuity.

DOTMLPF Analysis

Doctrine

Marine Corps has developed best practices on the employment and setup of a COC and put those practices into unit Standard Operating Procedures (SOPs); however, Headquarters Marine Corps has never developed a doctrinal or warfighting publication on what the setup of the COC has to look like. The Marine Corps Infantry Training and Readiness (T&R) manual has created a collective event, which is “Conduct Combat Operations Center Operations” (INF-C2-8004, Regiment level), but the event components associated with this collective event only set the standard for what must be produced from the COC, for example: organize a battle staff, establish a COC, coordinate movement of forces, maintain communications with higher, etc.²⁴ Understanding what the different COC functions should produce is essential so that the staff understands what and how information should be procured for the commander. The Marine Corps intentionally created flexibility with regards to the setup of the COC, because in most cases terrain on the battlefield is going to dictate when, where, how, and why the COC will configure. This flexibility created is necessary for the commander to employ his or her COC;

however, in this analysis, new initiatives will be introduced that could help exploit the Infantry T&R in order to produce funding for some much needed capabilities.

The Marine Corps does not establish specific doctrine for fighting specific adversaries, such as China and Russia; for the most part the Marine Corps treats every competitor equally with regards to how the Marine Corps will fight. There are plans in place for certain contingencies, but these plans still do not effect Marine Corps doctrine; it is up to the commander on how he or she will prepare forces, which will be driven by the mission. Peer competitors and their improved A2AD capabilities will force Marine Corps units to change the installation of C2 capabilities within the COC. Marine Corps Doctrinal Publication (MCDP) 6 Command and Control reinforces the importance of C2 by stating “no single activity in war is more important than command and control...none of these essential warfighting activities, or any others, would be possible without effective command control.”²⁵ Headquarters Marine Corps understands the importance of C2 and is pushing the significance of it to the commanders; therefore, C2 must be lethal and it must be protected at all cost.

With China and Russia’s new and future capabilities, it is crucial that new T&R standards are developed that support the training, manning, and equipping of new initiatives with regards to the improvement of COC capabilities. Throughout this analysis, the process will continue to flush out ideas that will change equipment needs and also personal needs, all of which will need to be etched into the Infantry T&R manual in order to allot the funding. The T&R manual should also remain flexible for the commander; by no means will it restrict him or her as to what the configuration of the COC will be, but it will in fact give new and better means to protect the COC and remain lethal on the battlefield.

Organization

The Marine Corps insists on fighting as a Marine Air Ground Task Force (MAGTF); a fully formed MAGTF is typically only seen at the MEF level, due to the fact that the MEF commands the Ground Combat Element (GCE), Logistics Combat Element (LCE), and the Aviation Combat Element (ACE). Having all of these supporting commands makes the MEF a fully capable, self-sustaining organization. As large as the MEF is, it would not be able to sustain itself in a contested environment and would need to procure sustainment from other organizations in order to survive, such as the Army and Air Force. The main point of understanding the MEF organization, is to deliver the realization of how big of a footprint it takes to set up the version one COC. The version one COC when fully erect can encompass half a grid square of real-estate. This size COC would not survive a day against a peer competitor in a contested environment; the version one would be easily targeted and would not be able to displace fast enough.

The MEF's C2 nodes will be in the rear area of battle, and that is typically where they will fight from; however, this paper proposes that the rear area of battle needs to remain at home station, whether that be in the Continental United States, or in III MEF's case Okinawa, Japan. The MEF COC is the most vulnerable to attack if deployed to a contested environment due to the size of its physical footprint and also the size of the electromagnetic signature it produces while operating. With current technologies ranging from advanced satellite communication structures to UAVs, it is possible for the MEF commander to fight the MAGTF from home station, which could be considered the rear area. Not only is a MEF COC a large target on the battlefield, but the logistical support to sustain it is so complex, that a whole other paper could be written on it. The MEF version one COC should be removed from Marine Corps inventory, and money should

be allotted to the MEF to build internal COCs at home station that can house all seven warfighting functions. The MEF version one COC takes up too much space, logistical sustainment in a contested environment is unrealistic, and it cannot pick up and move quickly, which makes it an easy target for the enemy.

Under the maneuver warfare philosophy and mission command located in MCDP 1-0 with change 1, specific guidance is given:

success in fluid environments demands leaders and organizations that can understand the nature of a given situation and adapt to it faster than their opponents. There are several ways we can increase speed. First, we can emphasize simplicity in all we do. Second, we can employ mission tactics and commander's intent to decentralize execution of operations.²⁶

This guidance is important to the structure of the COC. The enemy is adapting its capabilities; therefore, the Marine Corps must adapt its C2 capabilities by placing it where it cannot be targeted, making it smaller and more mobile to keep the enemy guessing, and allowing logistics the ability to maintain a realistic sustainment plan.

The Division COC (version two) is less robust than the version one COC, but not by much; the version two still takes up a lot of space and when fully setup, it remains a logistical challenge as well. The Division puts its focus on commanding the GCE units; however, it must also tie-in the Intelligence Operations Center (IOC), Admin and Logistics Operations Center (ALOC), Fire Support Control Center (FSCC), and the Direct Air Support Center (DASC) to support combat operations. The Division COC becomes a highly capable C2 structure, but the down side is that it becomes another easy target on the battlefield in regards to the physical footprint and the electromagnetic signature it produces. The Division commander needs to be

closer to the fight, but has three regimental commanders (O-6 level) that are more than capable to conduct and control operations on the ground. The argument remains the same as the MEF COC; the version two COC needs to be made obsolete and removed from Marine Corps inventory. It is unrealistic to deploy and employ a COC of this stature in a contested environment. One could question, if the Division is operating in a non-contested environment, will there still be a need for the version two COC; the answer is simple, the Division will never need the version two COC.

During time spent as the 3d Marine Division Assistant Operations Chief, there were plenty of exercises to develop new practices of employing the COC; at no time was there a scenario where erecting the version two COC was realistic. The G-2 Intelligence staff would operate out of two seven-ton trucks, the G-4 brought its own tent to tie-in the ALOC, and the FSCC and DASC would tie-in with their own tent. The Division G-3 would only have to provide one tent, and in most exercises no tent was needed because the Division would occupy hardened structures to run COC operations out of.

All four COC versions are more than just tents though; the COC versions also include all of the communication equipment and audio visual displays to convey information. This gear and equipment needs to be a part of the Communications Company inventory or at the Regiment/Battalion level, it needs to remain with the S-6 or communications platoon. All of the communications equipment requires constant software updates and extensive training that needs to be maintained, which the communications field have Marines that can produce this level of sustainment for the equipment.

The last organizations that will be addressed are the regiment and battalion. The version three and four COCs are much more realistic and capable of functioning on the battlefield, but

still need to be reconfigured. The regimental and battalion level COCs will be the main focus for the rest of the DOTMLPF analysis. The regiment and battalion are the most likely units to actually employ a COC in a contested environment, unlike the argument being made for MEF and division remaining at their home station or on naval ships. The version three and four are much smaller and more mobile on the battlefield but still can become an easy target in a contested environment; the physical footprint can be hidden from its adversaries but the electromagnetic signature can still be acquired by a peer competitor. The structure of the version three and four COCs need to be adjusted with regards to Command, Control, Communications, Computers, and Intelligence (C4I); through new materials and initiatives, a more mobile and lethal structure can be achieved.

Training & Facilities

Training with COC equipment is the cornerstone for employment of the COC; without proper training, the COC cannot be effective. The Marine Corps has done the operating forces a great service with the creation of static training facilities such as: Marine Corps tactics and Operations Group (MCTOG) and the MAGTF Integrated Systems Training Center (MISTC). MCTOG is located aboard the Marine Corps Air Ground Combat Center (MCAGCC) in 29 Palms California, and MISTC has installations located aboard Camp Lejeune, 29 Palms and Okinawa, Japan. MCTOG provides training and education to all GCE operation officers and infantry operation chiefs on the Marine Corps Planning Process and COC operations. MCTOG also provides a Battle Staff Training program that will deploy to GCE units and help evaluate and coach with COC operations. MISTC offers a variety of classroom instruction on COC operations and will also deploy to commands to assist in training more focused on the systems,

unlike MCTOG whose focus is more on the process.

To give a COC its lethality, not only does it need the proper equipment in order to receive and push data; it also needs a strong team that is highly trained in the process it takes to run the COC and a high level of knowledge on the systems to be able to use them to their full capacity. Where the Marine Corps has it right is the amount of training facilities to help keep a COC staff up to date on the latest equipment and technologies, and also best practices. What is lacking by the Marine Corps is the continuity of personnel within a staff to be able to create a team that knows exactly what it needs from one another and establish a dynamic operations center. At most levels of command in the Marine Corps, the operations office and operations chief have to beg for personnel to assemble a team to run a COC. At most, a Marine will stay with the staff for a year, but in a lot of cases he or she will only be there for one exercise in order to “fill a spot”. This topic will be addressed in more detail during the “Personnel” portion of the DOTMLPF analysis.

Material

Training and education on Marine Corps COC operations is vital; however, having the right materials to execute COC operations in a contested environment is a priority for survivability. The MEF version one, and Division version two COCs should not exist; the amount of tents and logistics it takes to support is too robust and an easy target. As mentioned before, the division could operate from an LFOC aboard a naval vessel (as could the MEF), but if it had to go ashore, it would need to take on a smaller footprint and utilize a “forward” COC concept. A forward COC when established is more than capable of executing C2 and can displace quicker due to the smaller size. Inside the MCTOG Operations and Tactics Instructor

handbook, it acknowledges that the combat environment continues to change and that the Marine Corps must adapt its COC configurations according to what it has on inventory, and whatever vehicles it has to make the COC mobile should be equipped with the proper C2 systems to give the commander everything he or she needs to execute operations.²⁷ This is the right mentality that Headquarters Marine Corps must continue to adopt. Elaborate COCs may look appealing when set up, but they are not tactically realistic.

When it comes to the regiment and battalion sized units, the version three and version four COCs, most units are already espousing the idea of extricating from the tents and building their COCs on mobile platforms. The Marine Corps has addressed this situation at the lower level by introducing the Network on the Move (NOTM) and AAV C7/P7 COC configuration; at this point though, the Marine Corps needs to go all in and concentrate on making these platforms more capable, and possibly introducing dedicated vehicles built specifically for COC staffs. These platforms with improved C2 capabilities can help protect the COC by creating a faster, lighter, and a more concealable signature on the battlefield. One initiative that was conducted by 3rd Battalion 2nd Marines was developing a C2 structure mounted on two Polaris MRZR (a light tactical vehicle); this structure allowed the battalion to communicate with all functional areas needed to C2, while giving them the ability to move rapidly throughout the battlefield without being targeted.²⁸ The battalions must continue to test these ideas and hone them throughout time, document these concepts, and push them to Headquarter Marine Corps to create new and relevant doctrine.

The enemy maintains a clear understanding of US weapon capabilities and technologies; Brimley (2018) reinforces the fact that the enemy is countering US capabilities by constructing underground sanctuaries, underground weapons platforms and underground C2 structures.²⁹ If

the US military cannot target and destroy enemy weapon capabilities “stand-off strikes”, then “boots on the ground” becomes even more relevant to clear out enemy threats. Sustaining C2 on the ground and back to rear echelon units becomes even more of a challenge. Due to stand-off created by enemy underground facilities; the COC must now get closer than ever to the enemies’ doorstep.

To close with on a peer competitor will be a daunting task; therefore, camouflage, concealment, denial, and deception (CCD&D) concepts must be considered at all times for the COC. A new technology that is currently being tested in the US Army is a new type of paint that can reduce the infrared signature an armored vehicle produces, which makes it harder to detect by the enemy.³⁰ This paint is known as “TALON”, but it currently does not have a definition associated with the acronym.³¹ If COC operations were conducted out of vehicles, this paint could be utilized to help manage the thermal signature that they produce, which creates concealment for the COC. Updated multispectral and hyperspectral camouflage technologies must continuously be explored and tested to minimize the COC signature; light and transportable camouflage makes it easy for the COC to displace at any given time in a quick and organized manner.

Not only will underground facilities produced by the enemy cause concern for the US military, but the enemy utilization of rugged terrain will generate a C2 nightmare if not addressed. The Marine Corps has invested in solving the problem of communications in rugged terrain. Nicholas asserts that the Marine Corps is in the midst of developing and fielding new tactical wideband radios that are meant for highly mobile units operating in austere environments; however, the biggest downfall of these new materials is that they require a large electromagnetic spectrum that can be easily targeted by the enemy.³² Extensive research has

been conducted to understand the electromagnetic signature that these new radios produce and how to minimize it.. An important note from this research and a concept that Nicholas extracts from it, is the concept of a “spectrum manager” (signature manager); a signature manager does not currently exist as a billet within a Marine Corps COC structure.³³ There is a joint publication “Joint Electromagnetic Spectrum Operations 3-16” that gives guidance for the electromagnetic “spectrum” at the strategic and operational level; however, it does not introduce the very need for a signature manager at the tactical level inside of a COC. The introduction of a signature manager and its relevance will be discussed further in the “Personnel” portion of this paper. Yes, the goal is to make the COC smaller and not introduce more people inside of it, but the duty of a signature manager could be assigned to the radio operator.

Takeaways from the “Material” portion of this analysis are: tents, generators, a/c units, and the ridiculous amount of communications equipment needed, must be eliminated from all COC inventories. Mobile platforms must be introduced for the battalion and regiment level COCs; communication equipment and future technologies associated with communications should be geared towards being smaller and configured inside vehicles. The communications gear must also be able to move from vehicle to vehicle in case of break-down. The need for a single manager to control the electromagnetic signature the COC produces is vital to making the COC less vulnerable to enemy targeting.

Leadership & Education

Leadership is what the Marine Corps prides itself on; it does not matter if it’s a training event, or a real world mission; leadership will drive all operations and ensure proper execution throughout. A quote from General Philip Breedlove USAF in the Courtney McBride article,

stated that “The Russians are learning and adaptive. They see how we roll, and they know that they need to deny us the ability to build a force on the continent should they decide to take military action in NATO areas.”³⁴ Marine Corps leaders need to pay attention to Russian capabilities, because the Russians are paying attention to the US military; it takes great leaders to understand their adversaries and begin the education process.

The Marine Corps needs to put more focus on the COC due to an adversary that can and will challenge the current C2 structures; the focus of the COC needs to start with the leadership getting fully on board with the same idea. Throughout the research it is evident that Marine Corps leaders have acknowledged that new technologies need to be introduced to overcome peer competitor A2AD capabilities. As new technologies are very important, leadership must continue to push creative thinking and foster new ideas from commands that are executing operations, and capture and support initiatives that develop throughout the process. Every two years Training and Education Command (TECOM) will hold a T&R conference; this is a chance for leaders to gather together in one location and discuss these new ideas and best practices and get them officially put into the T&R manual. If new ideas and initiatives can be justified and added into the T&R as event components associated with the conduct of COC operations, this in turn can create funding and materials needed for the COC.

Education begins at the lowest level; alerting young Marines, both officers and enlisted, about the realism of contested environments must be a priority. “Complacency kills” rings true to this day, and if the ones executing orders on the ground do not understand their tactical environment, then everything that is stated throughout this paper is all for naught. Education will drive these initiatives that need to be put in place to protect the COC and make it lethal on the battlefield.

Personnel

There are key billets for every staff that has priority inside the COC such as: watch officer, watch chief, command and control personal computer (C2PC) operator, intel analysts, fire support coordinators, etc. A proposed key billet that would be crucial to the staff organization is a signature management officer. Inside all levels of COCs there are computers, radios, telephones, etc., and all of these systems produce an electromagnetic signature. As stated earlier, the concept that Nicholas brought up was employing a signature manager that monitors the electro-magnetic signature being produced. Through an extensive amount of field experience, it is apparent that a lack of attention is given to the electromagnetic signature, which leads to an undisciplined use of electronic equipment. Having a signature manager in place to constantly track the electro-magnetic signature will be an added force protection to the COC no matter what configuration it is in.

Continuity factors are a vital area of concern to sustain COC operations. Whatever level of command that is operating a COC, the right people with the right education needs to be in the seats on the watch floor. A key position inside the COC is the C2PC operator; his or her job requires them to operate an intricate piece of software that takes extensive training and practice to become proficient. MISTC provides training for this, but very minimal. The Marine Corps needs to invest into the C2PC operator, to the point that a Military Occupational Specialty (MOS) is created. Currently a C2PC operator is a junior marine chosen to do this job based solely on availability; no background in COC operations, just on-the-job training. The commander relies heavily on the C2PC operator to maintain the common operational picture (COP) or the common tactical picture (CTP) on C2PC in order to keep them abreast of the battlefield situation. C2PC operators need to be highly proficient, and be able to spend a three

year tour at a unit that requires one. Having a properly school trained and long lasting C2PC operator within the COC will pay dividends for the unit and again make the COC more lethal in combat.

Conclusion

The COC will forever remain the nucleus of command and control, and as the enemy becomes more adaptive and more capable with their ability to protect their home ground, the Marine Corps must work even harder to maintain the advantage by improving its COC. Understanding just the basics of peer competitors' new weaponry and technologies, even at the unclassified level, is crucial to the employment concepts of the COC. If the Marine Corps can capture the way an enemy fights, their terrain, their mindset and philosophies, it can adapt and overcome through critical thinking and development of new initiatives to protect its COC capabilities.

Eliminating MEF and Major Subordinate Command (MSC) COCs is a great start in the process of creating a smaller physical and electro-magnetic signature on the battlefield. Developing regiment and battalion COCs on vehicle platforms will make them faster, more mobile, and harder for the enemy to target. Excluding robust antenna farms and procuring the proper funding to make communications equipment fit inside C2 vehicles is crucial, and increases the survivability of the COC. Proper training and education of COC procedures through established Marine Corps facilities must be conducted; in addition, COC staffs should have continuity of personnel to build a dynamic team for the commander. The operational environment is shifting away from an Afghanistan and Iraq scenario; the Marine Corps must put forth effort to make the COC smaller, more mobile, and less detectable to increase survivability

and be more lethal on the battlefield against a peer competitor in a contested environment.

Endnotes

-
- ¹ Headquarters US Marine Corps. *Warfighting*. Fleet Marine Force Manual 1 (FMFM-1). Washington, DC: Headquarters US Marine Corps, March 6, (1989): 4-14
- ² FMFM-1 *Warfighting*, (1989): 20
- ³ Headquarters US Marine Corps. *Warfighting*. MCDP 1. Washington, DC: Headquarters US Marine Corps, June 20, (1997): 6
- ⁴ Headquarters US Marine Corps. *Command and Control*. MCDP 6. (Washington, DC: Headquarters US Marine Corps, October 4, 1996), 40.
- ⁵ Headquarters Department of the Army. *Mission Command*. ADP 6-0 C2. Washington, DC: Headquarters Department of the Army, March 12, (2014): iv
- ⁶ B. Van Niekerk & C. Cloete, "Management Information Systems for Electronic Warfare Command and Decision Support." *Joint Force Quarterly* 14, no. 2 (2015): 64
- ⁷ Bill Gertz, "Pentagon: Military Logistics System Not Ready for War With China or Russia," *The Washington Free Beacon.com*, (2019): 1
- ⁸ Bill Gertz, (2019): 2
- ⁹ Charles Brown, Bradley Spacy & Charles Glover USAF, "Untethered Operations: Rapid Mobility and Forward Basing are Keys to Airpower's Success in the Antiaccess/Area-Denial Environment." *Air & Space Power Journal* (2015): 18
- ¹⁰ Charles Brown & Bradley Spacy, (2015): 19
- ¹¹ Jonathan Altman, "Russian A2/AD in the Eastern Mediterranean; A Growing Risk." *Naval War College Review* (2016): 72
- ¹² Franklin Kramer & Hans Binnendijk, "The Russian Challenge" *Atlantic Council*, (2018): 4.
- ¹³ Franklin Kramer & Hans Binnendijk, (2018): 4
- ¹⁴ Franklin Kramer & Hans Binnendijk, (2018): 5
- ¹⁵ Taylor Francis & Octavian Manea, "The Black Sea and NATO in the Age of Access-Denial." *Studia Politica; Romanian Political Science Review*, (2018): 491
- ¹⁶ Missile Defense Project, "SSC-8 (Novator 9M729)," *Missile Threat*, Center for Strategic and International Studies, published October 23, 2018, last modified January 23, (2019): 1
- ¹⁷ Missile Defense Project, (2019): 1
- ¹⁸ Taylor Francis & Octavian Manea, (2018): 492
- ¹⁹ Peter Lupo, Bradly Bucholz, Jeffrey Sizemore & Nicklaus Walker, "Building a Response in the Pacific." *The Military Engineer*, (2017): 43
- ²⁰ Peter Lupo, Bradly Bucholz, Jeffrey Sizemore & Nicklaus Walker, "Building a Response in the Pacific." *The Military Engineer*, (2017): 43

-
- ²¹ Weston S. Konishi, "China's Maritime Challenge in the South China Sea." Options for US Responses: *Chicago Council on Global Affairs*, (2018): 3
- ²² Paul Rosenzweig, Kelley Sayler, Camille Francois, Jennifer Mcardle & Thomas Scheber, "Cyber Weapons and Military Capabilities"; An Introduction: *Center for a New American Security*, (2015): 8
- ²³ Paul Rosenzweig, Kelley Sayler, Camille Francois, Jennifer Mcardle & Thomas Scheber, (2015): 8
- ²⁴ Headquarters US Marine Corps. *Infantry Training and Readiness Manual*. NAVMC 3500.44C (Washington, DC: Headquarters US Marine Corps, November 4, 2016), 3-6.
- ²⁵ MCDP-6 *Command and Control* (1996), 35.
- ²⁶ Headquarters US Marine Corps. *Marine Corps Operations*. MCDP 1-0 (w/change 1). (Washington, DC: Headquarters US Marine Corps, July 26, 2017) 1-3.
- ²⁷ Marine Corps Tactics and Operations Group (MCTOG). *Operations Tactics Instructor Handbook*. Version 3. (29 Palms, CA: Marine Corps Tactics and Operations Group, August, 2014), 45.
- ²⁸ Robert Sholtis and Jon Wagner. "Employing Lethal GCE C2 in the 2025 Fight." *Marine Corps Gazette* 102, no. 5 (2018): 51
- ²⁹ Shawn Brimley, Jerry Hendrix, Lauren Fish, Adam Routh, Alexander Velez-Green & Michele Flouno, (2018): 26
- ³⁰ Joseph Trevithick. "Army Tanks and Other Vehicles Get New Paint Jobs to Help Hide From Thermal Optics." *The War Zone Wire*, published March 21,(2019): 1
- ³¹ Joseph Trevithick, (2019): 1
- ³² Paul J. Nicholas "Optimal Allocation of Electromagnetic Spectrum to Support Tactical Wideband Communications." *Military Operations Research* 21, no. 1 (2016): 21
- ³³ Paul J. Nicholas, (2016): 22
- ³⁴ Courtney McBride, "Breedlove Asks for Industry's Help to Counter Russian Capabilities." *Inside Missile Defense* 21, no. 24 (2015): 6

Bibliography

- Altman, Jonathan. "Russian A2/AD in the Eastern Mediterranean; A Growing Risk." *Naval War College Review* 69, no. 1 (2016): 72-85.
<http://www.jstor.org.lomc.idm.oclc.org/stable/26397912>.
- Brimley, Shawn, Jerry Hendrix, Lauren Fish, Adam Routh, Alexander Velez-Green, and Michèle Flournoy. Shortening the Interval between Target Acquisition and Kill: *Center for a New American Security*, 2018. <http://www.jstor.org.lomc.idm.oclc.org/stable/resrep16986.9>.
- Brown, Charles Q, Jr, USAF, Bradley D. Spacy USAF, and Glover, Charles G, III, USAF. "Untethered Operations: Rapid Mobility and Forward Basing are Keys to Airpower's Success in the Antiaccess/Area-Denial Environment." *Air & Space Power Journal* 29, no. 3 (2015): 17-28. <https://search-proquest-com.lomc.idm.oclc.org/docview/1695413848?accountid=14746>.
- Francis, Taylor and Octavian Manea. "The Black Sea and NATO in the Age of Access-Denial." *Studia Politica; Romanian Political Science Review* 18, no. 3 (2018): 478,582.
<https://search-proquest-com.lomc.idm.oclc.org/docview/2136407135?accountid=14746>.
- Gertz, Bill, "Pentagon: Military Logistics System Not Ready for War With China or Russia," *The Washington Free Beacon.com*, January 9, 2019, <http://www.freebeacon.com/national-security/pentagon-military-logistics-system-not-ready-for-war-with-china-or-russia/.com>
- Headquarters Department of the Army. *Mission Command*. ADP 6-0 C2. Washington, DC: Headquarters Department of the Army, March 12, 2014.
- Headquarters US Marine Corps. *Command and Control*. MCDP 6. Washington, DC: Headquarters US Marine Corps, October 4, 1996.
- Headquarters US Marine Corps. *Marine Corps Operations*. MCDP 1-0 (w/change 1). Washington, DC: Headquarters US Marine Corps, July 26, 2017.
- Headquarters US Marine Corps. *Infantry Training and Readiness Manual*. NAVMC 3500.44C Washington, DC: Headquarters US Marine Corps, November 4, 2016.
- Headquarters US Marine Corps. *Warfighting*. Fleet Marine Force Manual 1 (FMFM-1). Washington, DC: Headquarters US Marine Corps, March 6, 1989
- Headquarters US Marine Corps. *Warfighting*. MCDP 1. Washington, DC: Headquarters US Marine Corps, June 20, 1997
- Konishi, Weston S. China's Maritime Challenge in the South China Sea:; Options for US Responses: *Chicago Council on Global Affairs*, 2018.
<http://www.jstor.org.lomc.idm.oclc.org/stable/resrep17324>.
- Kramer, Franklin D. and Hans Binnendijk. The Russian Challenge: *Atlantic Council*, 2018.
<http://www.jstor.org.lomc.idm.oclc.org/stable/resrep16782.4>.

-
- Lupo, Peter, Bradly Bucholz, Jeffrey Sizemore, and Nicklaus Walker. "Building a Response in the Pacific." *The Military Engineer* 109, no. 710 (2017): 42-45. <https://www-jstor-org.lomc.idm.oclc.org/stable/26464623>.
- Marine Corps Tactics and Operations Group (MCTOG). *Operations Tactics Instructor Handbook*. Version 3. 29 Palms, CA: Marine Corps Tactics and Operations Group, August, 2014
- McBride, Courtney. "Breedlove Asks for Industry's Help to Counter Russian Capabilities." *Inside Missile Defense* 21, no. 24 (2015): 6. <https://www-jstor-org.lomc.idm.oclc.org/stable/24788992>.
- Missile Defense Project, "SSC-8 (Novator 9M729)," *Missile Threat*, Center for Strategic and International Studies, published October 23, 2018, last modified January 23, 2019, <https://missilethreat.csis.org/missile/ssc-8-novator-9m729/>.
- Nicholas, Paul J. "Optimal Allocation of Electromagnetic Spectrum to Support Tactical Wideband Communications." *Military Operations Research* 21, no. 1 (2016): 21-39. <http://www.jstor.org.lomc.idm.oclc.org/stable/24838660>.
- Rosenzweig, Paul, Kelley Sayler, Camille Francois, Jennifer Mcardle, and Thomas Scheber. Cyber Weapons and Military Capabilities; An Introduction: *Center for a New American Security*, 2015. <http://www.jstor.org.lomc.idm.oclc.org/stable/resrep06382.5>.
- Sholtis, Robert and Jon Wagner. "Employing Lethal GCE C2 in the 2025 Fight." *Marine Corps Gazette* 102, no. 5 (2018): 50-52. <https://search-proquest-com.lomc.idm.oclc.org/docview/2037423605?accountid=14746>.
- Trevithick, Joseph. "Army Tanks and Other Vehicles Get New Paint Jobs to Help Hide From Thermal Optics." *The War Zone Wire*, published March 21, 2019, <https://www.thedrive.com/the-war-zone/27088/army-tanks-and-other-vehicles-get-new-paint-jobs-to-help-hide-from-thermal-optics>
- Van Niekerk, B. and C. Cloete. "Management Information Systems for Electronic Warfare Command and Decision Support." *Journal of Information Warfare* 14, no. 1 (2015): 74,IV,VI. <https://search-proquest-com.lomc.idm.oclc.org/docview/1967363013?accountid=14746>.