Command Structure of the Ballistic Missile Defense System

David B. Weller, Dan C. Boger
Department of Information Sciences
Naval Postgraduate School
589 Dyer Road, Monterey, California 93943, USA
{dbweller, dboger}@nps.edu

James B. Michael
Department of Computer Science
Naval Postgraduate School
833 Dyer Road, Monterey, California 93943, USA
bmichael@nps.edu

ABSTRACT

The United States is embarking on a course of designing and fielding a Ballistic Missile Defense System (BMDS) to defend the nation and its allies against ballistic missile attacks. The BMDS will need a Command and Control, Battle Management, and Communications (C2BMC) system that can engage threat missiles in a timely manner. This paper covers how the Unified Command Plan affects missile defense efforts, the lessons learned from Desert Storm, and alternative chains of command for the BMDS to use to engage threat missiles in an expeditious manner. Preliminary findings indicate that a flattened chain of command for missile defense forces is a good starting point for the initial deployment of the BMDS.

Keywords: Battle Management, Ballistic Missile Defense, Command and Control

1. INTRODUCTION

The Ballistic Missile Defense System (BMDS) will provide a layered global defense against ballistic missiles of all classes (short-, medium-, and long-range). The command and control/battle management of the BMDS is a core element of the system-of-systems; this element is called the Command and Control, Battle Management, and Communications (C2BMC) system. Much of the C2BMC capability will need to be automated, due to the speed of engagements, quantity of battle-related information, and complexity of the decision processing, all of which portend strict time budgets for executing battle plans. In this paper, we treat the topic of command structures, with the aim of identifying what type of command structure will be needed in order to effectively interact with the automated portion of the system, which will include the battle managers. The initial findings indicate that the command structure for missile defense will need to be flattened.

The C2BMC will operate in an unpredictable environment. Like most strategic command and control systems, the majority of the time the system will be tracking almost nothing, passing messages only to ensure that point-to-point connectivity is maintained. However, the system must also be robust enough to neutralize any threat to the U.S. that ballistic missiles worldwide could present. The system will be required to help maintain the proficiency of the staff that mans the watch: it must be able to be both on-line for the sections that are on duty and off-line for the sections that are training and developing scenarios. These stated run-time requirements for the BMDS and C2BMC dictate that the battle management, node connectivity, and command structure be readily adaptable in order to address new types of threats.

Global ballistic missile defense is a new and different type of warfare that does not easily fit into the traditional military molds. The use of some of these molds is, however, necessary to allow for the military organization to absorb and interact with the BMDS. BMDS will be a global organization with each node depending on other nodes for the system to work correctly. There are few instances of such a global battlespace control. The Nuclear Triad is an example of global centralized C2, but that organization has never had the numbers of elements that the BMDS will have. The use of Special Operations Forces (SOF) teams in the Global War on Terror (GWOT) is another possible example, but the SOF teams do not, generally, have interdependencies that extend more than the range of the longest artillery round or the longest standoff weapon. Hence, the operation of the BMDS is deemed to be different than that of other forms of modern warfare, and to that end the application of a conceptual model is also different.

The outline of the proposed capabilities for the initial BMDS showed that the system's near-term objective was the ability to defeat a rogue state launch (five to ten missiles) or an unauthorized or limited objective attack by any adversary (twenty to fifty missiles) [3]. Given the number of ballistic missiles that Russia and China possess, the purpose of the initial BMDS is not to be able to defeat all the missiles of an all-out attack. Future expansion of the BMDS will be a global missile defense shield.

The C2 aspects, organization and operational control of the system should not change much from the first version to the later versions, for ease of operations, employment and cost effectiveness. Thus, it is imperative that the C2BMC be flexible enough to allow for adding systems and capacity.

2. NATIONAL DOCTRINE

2.1 National Security Strategy

The *National Security Strategy* (NSS) [11] sets securing the United States against Weapons of Mass Destruction (WMD) as a top priority. The road to defending the nation against WMD has multiple fronts, one of which is through ballistic missile defense. The NSS emphasizes acting preemptively against terrorists, or governments, that are planning to harm U.S. interests. Thus, the C2BMC must allow for directing and supporting preemptive operations. This support will add a level of complexity to the system, but the C2BMC must provide commanders with a single operational picture with respect to defense against WMD attack. All aspects of missile defense, from intelligence to tracking to crisis operations and preemption must be resident in the C2BMC, from the start, in order for the BMDS to accomplish its mission.

While WMD delivered by ballistic missiles is only one way that the U.S. could be attacked, it is possibly the most dangerous in terms of casualties and destruction [10]. Therefore one of the main pillars of the defense against WMD is deterrence, as outlined in [12]. This strategy does not specifically call out the BMDS as a devaluing agent for ballistic missiles, but with BMDS deployed the U.S. will no longer be tied to a massive response to ballistic missile attacks as the only defensive measure.

2.2 BMDS and the Current Unified Command Plan

The BMDS and the C2BMC need to integrate into the current Unified Command Plan (UCP) and be flexible enough to change when the national and military command structure change. While overhauls to the structure of US military combat forces are rare, they do happen as the military innovates and modernizes. The most radical changes to the UCP and the basic military command structure have to be approved by Congress, but the President has the authority to change missions and geographical AORs (Area of Responsibility) with only an Executive Order (EO). The Unified Combatant Commanders (CCs) are responsible for all military operations within their AOR, with only a couple of exceptions. Should Missile Defense be one of these exceptions? This section investigates the command relationships between the CCs and offers suggestions for command and control within the C2BMC.

Under the current Unified Command Plan, USSTRATCOM (United States Strategic Command) has the primary responsibility for providing integrated missile defense to the United States and her military.[1] This responsibility ultimately spans many layers of defensive weapons from the PATRIOT batteries that support Army Divisions to the Ground-based Midcourse Defenses (GMDs) designed to kill inbound missiles in their cruise phase (exoatmospheric) of flight. This responsibility also includes all the collection assets which provide first launch indications and tracking of attacking missiles.

The C2BMC structure will be the responsibility of, and controlled by, Commander USSTRATCOM and as such will require total awareness of all airborne entities worldwide and the ability to integrate pictures from the Joint Battle Management Command and Control (JC2BMC) capabilities group, being developed by USJFCOM (United States Joint Forces Command). To assist USSTRATCOM with this responsibility, command of NORAD has been shifted from USNORTHCOM (United States Northern Command) to a co-command between USSTRATCOM and USNORTHCOM. NORAD, whose primary mission is the defense of North America against air-breathing entities, also monitors all the objects in orbit and that are launched to orbit. NORAD has played a role as the military command center that could direct military forces after a nuclear first strike since early in the Cold War. The other command centers capable of directing forces from a hardened and secure site are the National Military Command Center (NMCC), the Alternate NMCC, and airborne command centers. The continued use of NORAD for BMDS launch and C2 is one way to limit the cost and integration problems of adding new weapons systems to the U.S. arsenal.

[1] http://www.stratcom.af.mil/ Downloaded 1/10/04

Through a Memorandum of Agreement (MOA) with USSTRATCOM, USNORTHCOM is currently designated as the launch control authority for the GMDs that will be deployed. The idea behind the MOA was that the defense of North America was part of the charter of USNORTHCOM and as such USNORTHCOM was the best CC to exercise launch authority over the GMDs [3]. Also, the proximity of USNORTHCOM's Headquarters to the NORAD Operations Center made the chain of command less disjointed. However, USNORTHCOM is not the Combatant Commander that should be responsible for missile defense. That job needs to be performed by USSTRATCOM.

Although both USSTRATCOM and USNORTHCOM seem to control the national architecture for missile defense, each of the Regional CCs has a Title 10, USC, Section 164 responsibility to defend the United States forces and interests in their AOR. That requirement creates within every CC AOR a missile defense architecture that provides for the defense of U.S. forces and interests. Normally, the missile defense responsibility is delegated to the JFACC (Joint Forces Air Component Commander) for standing Joint Force Structures (e.g., Korean Peninsula) or the Air Force's service component commander for the CC's AOR.

It is possible that two geographically proximate CCs will have to manage the short-range ballistic missile defense laterally across the two AORs. During Desert Storm the defense of Israel was one such instance. Israel geographically belonged to USEUCOM (US European Command) and the main battlefields of Desert Storm belonged to USCENTCOM (US Central Command). The lessons of theater missile defense in Desert Storm will be discussed in detail later. However, this command relationship (difficult delineation between supported and supporting CC) has the potential to 'muddy the waters' with respect to C2BMC launch authority and prioritized defense areas.

The necessary involvement of all of the above mentioned Combatant Commanders in missile defense has increased the complexity of the BMDS and the C2BMC. The next section discusses how, using existing doctrine, the missile defense C2 can be tailored to increase efficiencies and reduce the complexity of operations.

2.3 Current Theater Missile Defense Doctrine

The current Theater Missile Defense (TMD) Doctrine is based, like most operational (offensive) doctrines, on apportionment and pre-planning. The key to TMD against a limited range threat (up to 1000Km, like a Scud or Scud variant) is target analysis from the enemy perspective and possible interceptor positional analysis from the friendly perspective. Placing PATRIOT batteries in line with anticipated launch azimuths creates lines of fire that can reduce TBM effectiveness with limited anti-TBM assets [5]. TMD doctrine places great emphasis on attacking the TBMs before they are used in combat [5]. On the world stage, while preemption is an option, it is not a realistic option for countering all possible first strike scenarios. Therefore the United States must proceed with a good 'in-flight' defense from ballistic missiles.

While the TMD doctrine is good for limited area and regional crises, there needs to be a cogent doctrine for defining the C2 for all missile defenses. Given the potential magnitude of damage and casualties, apportionment of missile defense forces against

targets no longer makes sense. The U.S. will likely never possess enough missile defense forces to launch multiple interceptors against every possible inbound missile, so the C2BMC must allocate the BMDS resources wisely.

2.4 BMDS Command and Control

There are three distinct layers of missile defense. The first layer and most prolific threat is, as discussed above, Theater Missile Defense and short-range ballistic missiles. The second is medium-range and intermediate-range ballistic missiles, with ranges from 1000Km to 5500Km. This range could affect the entire AOR of a Combatant Commander, and might affect several CCs' AORs. This level can also be thought of as the Regional missile defense arena. The final layer, and perhaps the most dangerous, is ICBM range missiles, which are generally accepted to be missiles that have a range in excess of 5500Km [16]. This layer can also be thought of as the global missile defense layer.

Each level of missile defense has overlap with the adjoining layer(s). The C2BMC will have to not only direct operations within one layer but all the layers simultaneously. Managing the 'in between' areas is key to maintaining effective C2 over the entire BMDS. The use of one type of interceptor vice a different type of interceptor from a different 'level' may determine the long-term success of the defense. For example, if too many interceptors were used within one level, the missile defense forces may become depleted of assets and overwhelming the defenses may become feasible for the adversary. So the C2BMC must have the intelligence and missile defense forces necessary to fight the defense in the most efficient manner.

Both Tzu and Von Clausewitz espoused the need for clear chains of command and unified commands where at all possible [17, 18]. 'Unity of Command' is listed as one of '…the bedrock[s] of US military doctrine' in [4] and is defined as follows: Unity of command means that all forces operate under a single commander with the requisite authority to direct all forces employed in pursuit of a common purpose. Unity of command helps to eliminate confusion within the forces caused by having more than one commander or having more than one chain of command (COC).

The current design for BMDS C2 as outlined above does not have unity of command as a central characteristic. If unity of command were stressed in BMDS, the Combatant Commander with cognizance over the system would also be the *supported* commander. Some may argue that through the use of technology both unity of command and clear COCs are no longer necessary since technology can overcome span of control problems. But the use of technology has not in the past produced gains in a commander's span of control. The key to developing C2BMC command architecture is to eliminate the span of control issue by identifying the informational flow and couple that with the appropriate decision making aids and processes to allow for the commander to make timely orders to the missile defense forces.

3. DESIGN OF THE BMDS COMMAND AND CONTROL ARCHITECTURE

Flexibility is an essential aspect of the C2BMC. The flexibility in the system must be designed from the ground up. USSTRATCOM, the overall commander for global missile defense, needs to be able to use the system in a number of different ways, from the highly centralized manner in which all interceptor launches are assigned and authorized from STRATCOM Headquarters (or possibly the CMOC) to a highly decentralized weapons-free mode in which every missile defense agent has the authority and responsibility to take a shot at any ballistic missile that is in range of their interceptors.[2] The weapons-free mode would be an extreme scenario, so it is important to allow the commander to tailor the BMDS system as necessary and for all eventualities. The best and easiest way to manage a system that will be as complex as the BMDS is to allow extensive flexibility in command and control.

3.1 Command Responsibilities

The Commander USSTRATCOM has the overall responsibility for global missile defense. Whether or not STRATCOM is the supporting or supported command in that role is still to be decided, but to achieve the C2 necessary to successfully intercept missiles, USSTRATCOM should be the *supported* commander.[3] By granting USSTRATCOM the role of *supported* Combatant Commander for all aspects of missile defense, it will allow a single staff organization the duties of planning and reviewing supporting commanders' plans with respect to missile defense. All geographic CCs will have a theater plan that will propose positioning of forces to best detect and interdict short- to medium-range missiles based on guidance provided by the USSTRATCOM staff that will be able to merge all the theater and regional plans into one cohesive global plan. These plans will have to be developed prior to the execution of any intercepts. The Joint Staff has created a process that produces plans for likely scenarios; that process is called joint operations planning. Joint operations planning consists of two processes: deliberate and crisis action planning.

USSTRATCOM will be tasked by the Chairman Joint Chief of Staff (CJCS) to provide Operational Plans (OPLANs) and Concept Plans (CONPLANS) to the Joint Staff that show how the BMDS will be used against the highest possibility threats [6].[4] This deliberate planning process will allow all the CCs to review, comment, and help solidify STRATCOM's plan for attack operations, active and passive operations. The OPLANS generated will primarily deal with intercept geometries, detection plans, and interceptor launch windows for threat ballistic missiles from adversarial countries thereby allowing for smoother control of missile defense forces during times of crisis and while under attack.

Crisis Action Planning (CAP) will normally not be applicable to missile defense. The reason is that the CAP process is designed to be a necked-down version of the deliberate process that takes

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[2] Weapons free is defined as any contact not positively identified as friendly must be engaged by U.S. or Allied forces.

[3] References [4] and [7] cover supported and supporting commands as it pertains to Unity of Effort. Just as a JTF can designate supported and supporting roles, the NCA through the CJCS can do so for cross- and multi-CC relationships.

[4] Chapter III of [6] describes deliberate planning, what is involved with a OPLAN/CONPLAN, and what the Joint Staff requires from the CC.

hours or days vice months or years.[5] Missile defense is not measured in days or even hours. Rather, it is measured in minutes and seconds. If there is not a solid plan as to how to engage a missile, the duty will fall to the C2BMC watch staff to fight the U.S., and possibly allied, missile defense forces against the threat. If there is not a specified OPLAN for a missile defense event, then the reactions become procedural-based.

Both the deliberate planning process and the CAP are designed to produce plans for force movements, force positioning, and possible engagements. Missile defense is unique in that the forces need to be in place prior to advent of hostilities. So decisions to deploy missile defense forces will have to be made well in advance. If a particular intercept has not been pre-planned (e.g., geometry, type of missile, intended targets) and pre-deployed for, you will have to 'fight with what you have on hand.'

3.2 C2BMC as a C2 Enabler

Timing in missile defense is everything. Not since the advent of the airplane has the tempo of operations increased to such a degree. The Clausewitzian fog of war as it applies to the ability to command forces in the field has always been an obstacle for effective employment of forces. The C2BMC will need to provide the commander, the commander's staff, the supporting CCs, the supporting CC's staffs, and the forces in the field a common missile defense picture. The C2BMC will have to provide an array of information that is unprecedented. If the C2BMC can provide the correct picture to the correct operator, the system will be performing its job superbly [9].[6] The challenge is to provide enough different displays that can be molded to allow for efficient human interaction without making the overall system cumbersome.

There is ongoing work within the U.S. DoD to create a baseline for interoperable situational awareness pictures. These interoperable pictures, or displays, will provide 'shared' Situational Awareness (SA) between all the forces, with the aim of increasing lethality and decreasing its own forces' vulnerability. The Navy's Cooperative Engagement Capability (CEC), the Army's Land Warrior project, the Air Force's Theater Battle Management Core System (TBMCS), and the USJFCOM effort to merge all these programs, plus all the current military data links, into a single system (JC2BMC) show the potential of eliminating, or at least reducing, the 'Fog of War.' The C2BMC must also be part of this merging of pictures to ensure that C2BMC is not relegated to the periphery of the military.

3.3 Creation of overarching Missile Defense Doctrine

During Desert Shield, PATRIOT missile batteries were deployed from EUCOM AOR (from West Germany) to Saudi Arabia, and later to the outskirts of Israel's two major cities. This deployment created the first co-Combatant Commander missile defense architecture deployed and created. While in the Cold War planning and strategy, this co-CC relationship was the exception to the rule. After the Cold War having two or more Combatant Commanders involved in a crisis seems to be closer to the new rule [14].[7]

Much of the foundation of theater missile defense doctrine was developed as a result of the lessons learned from the employment of the PATRIOT batteries during Desert Storm. While the success of the PATRIOT batteries to defeat the relatively slow-flying, short-range Scud is debatable, the C2 that allowed the information to be passed from the overhead satellites to the individual batteries in only a couple of minutes is not debatable. The C2 architecture worked well during Desert Shield/Desert Storm (DS/DS).

Here is a trace of the C2 that allowed the coalition to conduct military operations with little regard for the 'terror weapons' as General Schwarzkopf called the Scud missile being launched from Iraq [8]. The DSP satellites were maneuvered to be able to detect launches throughout USCENTCOM's AOR. At the time of DS/DS, there was not a direct feed from the satellites to any CC AOR. Even EUCOM who was the most likely candidate for a short- to medium-range ballistic missile attack had to rely on information being forwarded from the U.S [8]. JTAGS (Joint Tactical Ground Station) was developed as a result of this lesson learned in TMD. The DSP signal was sent from the ground station in Colorado to the AOR by a double satellite bounce.[8] After the signal was received by the Combatant Commander's HQ the signal then had to be rebroadcast to the batteries in the field that might be able to intercept the incoming Scud.

One of the problems of the system was that the information was passed by voice once it got to the AOR. C3 has improved greatly since the early 1990s and now that JTAGS is a deployable unit the information can be passed via JTIDS (Joint Tactical Information Distribution System) directly from the JTAGS unit to the PATRIOT batteries, which reduces both time to deliver the message and errors in voice reporting.

C2BMC can improve the existing relay of information from the sensor to the shooter by incorporating the existing weapons platforms into the applicable nets. Also, by passing digital track and cueing data between platforms, the accuracy of the data will be maintained throughout the kill chain.

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[5] The deliberate planning timeline is between 18-24 months per plan and crisis action planning can be done in as little as 8-12 hours for a small reaction force strike or special operations event.

[6] By 'correct' we mean that an individual will have little time to sort through several different types of displays to discover the one piece of information that is necessary for optimized use of their particular missile defense system: the Commander USSTRATCOM, the THADD operator in field, and the GMD operators will all have different information needs.

[7] World hot spots, with the exception of the Korean peninsula, typically straddle borders of CC AORs.

[8] Since the distance between Colorado and the Desert Storm AOR (Saudi Arabia and Israel) was so great, a single satellite bounce would not interconnect the two. Nominally the first bounce would have gone from the U.S. to Central Europe, using a GEO satellite and then re-bounced off another GEO satellite to CENTCOM's AOR. Latency of the signal would be nominally less than 2 seconds from original transmission from the DSP ground station to the CCHQ.

The three-layer model of ballistic missile defense is problematic when a single false alarm rate is applied to BMD. The timeliness of information is critical to the two lower levels of the missile defense model. The decision timing of the intercept for a short- or medium-range ballistic missile intercept is such that the interceptor must be launched within two to three minutes of the first detection of the inbound or the missile will be out of parameters for a successful intercept [3]. NORAD's role necessitates highly reliable data be delivered to decision-makers at the expense of overall timing [13]. The use of multiple false alarm rates within one system is not as large a problem as it might seem. If all the systems have the same data, shared over the Sensor Net, each level can apply different rules to initiate actions. So while the National level is awaiting refined launch and impact points for the ICBM raids, the lower two levels can be working on firing solutions and launch on short- and medium-range ballistic missiles (S/MRBMs).

The Theater and Regional levels of the BMDS would need to use cueing data from the sensor network to help the onboard radar systems on the PATRIOT, THAAD, and AEGIS systems. These platforms would have to compute a local track before the system would allow for interceptor launch, in current system implementations; these systems could tolerate a higher false alarm rate, and can even help in refining flight data for the higher levels.

The use of a GMD against any target would be a serious matter and would require high levels of assurance to release the interceptor. Thus, the false alarm rate for the C2BMC at that level has to be almost zero. However, the sensor network could maintain a higher sensitivity to ensure there were no untargeted ballistic missiles or missed detections. The problem of missed detections would also need to be studied to ensure that the system maintained a zero missed detection record. The low false alarm rate has to be balanced with a fast track development speed since SLBMs would give the system almost no time to react since they use depressed trajectories and are much closer to the potential targets.

The JFACC is the component commander that is normally assigned the responsibilities of planning and directing execution of TMD [5]. While it is logical to assign the JFACC these responsibilities, it has always been a secondary role for the JFACC and its staff. In the future, missile defense actions and responsibilities will expand as the threat does. The duties of the JFACC staff with respect to missile defense will easily exceed the resources and talents of the JFACC staff. While adding to the JTF organization could be a large step in redefining the way the U.S. military fights its wars, the need for a JFMDCC (Joint Forces Missile Defense Component Commander) type of command will arise at either the theater or regional level.

In fielding the BMDS and the C2BMC, the Missile Defense Agency has determined that using existing C2 communications 'pipes' will not allow for the responsiveness required to effectively manage the missile defense assets and defeat incoming missiles, whose targets may number in the hundreds. By fielding the C2BMC, the door is open to allow a direct chain of command (COC) for missile defense from the highest levels (USSTRATCOM) to the individual batteries in the field. While the Title 10 responsibility of the CCs to defend their troops has not diminished, the reality of the timing and decision speed of missile defense necessitates the use of a dedicated COC to allow for timely and accurate engagements. USSTRATCOM should be the commander for missile defense and NORAD should act as the national executive agent for operational missile defense.

Having a Functional Combatant Commander operate within a geographic CC AOR is not entirely without precedent. Recently, United States Special Operations Command (USSOCOM) has been given the authority to conduct 'Special Operations Missions' in a geographic AOR using Special Operations Forces (SOF) teams while under the operational control (OPCON) of United States Special Operations Command (USSOCOM) [15]. USSOCOM's leeway in conducting operations would be similar to USSTRATCOM operating and commanding missile defense assets within the geographic area of another CC. The ability for the U.S. military to create a few staffs that are focused on missile defense will also allow the military to more easily provide personnel and train these staffs: they can be highly trained and routinely exercised to help maintain the force-readiness levels needed to ensure that the human aspect of missile defense can perform as well as the computerized part. Just like the Missileers of the Air Force, missile defense personnel can create their own functional area and devote their entire career to missile defense.

4. ALTERNATIVE MISSILE DEFENSE CHAINS OF COMMAND

The role of the overall missile defense commander (or coordinator, depending on the Combatant Commander supported/supporting relationships) and the C2 that can be exerted cannot be downplayed, as the goal is to destroy 100% of the inbound ballistic missiles before they can inflict damage on their targets. Here we propose three different chains of command to address the C2 problem for the BMDS. While any of them will provide adequate C2 for the system, the one that stands out in terms of speed of command and flexibility should be selected to provide the best possible defense.

4.1 Current Conventional Doctrinal Chain of Command

The process of engaging a ballistic missile can be traced across the phases of the kill chain: surveillance, detection, tracking, identification of targets, targeting weapons/engagement, and kill assessment [2]. C2 plays an important role in each and every one of the steps of the kill chain. Under conventional military doctrine, the origination of the orders can come from any of the echelons above commanders, who have the information necessary to order a launch. Organizing the missile defense C2 in this fashion will promote familiarity within the military for a smoother introduction and development. This organization would be quick in issuing orders in a small crisis environment where all the needed information could be developed within the AOR.

The number of links required to be exercised in the chain of command can reduce the overall speed of command. When speed is of the essence, the military's C2 has often failed both the forces charged with carrying out the mission.[9] Pearson gives three exam-

[9] The World Wide Military Command and Control System (WWMCCS) and Global Command and Control System (GCCS) introduce significant delays for disseminating orders.

ples of instances in which the number of links failed to give the deployed forces their orders in adequate time: the seizure of the *USS Pueblo*, the shooting down of an EC-121 near North Korea, and the attack on the *USS Liberty* [13]. Although all of these instances of slow C2 occurred over twenty years ago, the underlying reasons for the slowness with passing orders (time to absorb the meaning, inform superiors, ensure compliance, and redistribute them to lower echelon units) still exist today.

While every step in the chain of command has in the past given on-scene commanders a greater authority and responsibility, missile defense is a different kind of warfare. Missile defense requires large amounts of situational awareness to effectively manage and fight. A regional CC has the staff to manage a single conflict within their AOR, and even then the Commander's Staff will most likely be augmented by others staffs or reserve components. Creating a small cadre of personnel who run the TMD organization is within the staff's capability, but the Operations staff (J3) and Intelligence staff (J2) requirements of even a relatively low complexity ballistic missile defense structure will overwhelm the regional CC's staff.

4.2 Compressed Chain of Command for Regional Commanders

The regional U.S. Combatant Commanders have a US Title 10 responsibility to defend the US forces and interests within their AOR. The regional CCs, if given the option, would have the missile defense forces to answer to their combat watches at their headquarters. For the compressed COC to work, the regional CCs must be persuaded that the battle can better be fought from a centralized watch center. The proposed compressed, or hybrid, chain of command involves having two commanders for the missile defense forces. Each of the commanders would be intimately involved with fighting at least two levels of the missile defense battle, with the probability of overlap of authority between the commanders. While this overlap may seem advantageous from the point of view that more oversight might result in fewer missed events, it is counter to both unity of command and unity of effort. These two principles of war should be viewed as a basis for how the U.S. military should operate in the future.

For the co-commander relationship to work, the common operational picture (COP) must be fully developed and fielded. Unfortunately, a 'truly' common operational picture is still an uncommon fact of warfighting.[10] To that end the proposed chain of command would unfairly pull the missile defense units in two directions and increase the command and control aspect of an engagement. USSTRATCOM needs to be able to provide information, support, and control to all missile defense forces per the UCP, and each of the regional CCs has a vested interest in the battle taking place in their AOR. It should be stressed that for USSTRATCOM to fully support the regional Commanders they have to be supportable. As discussed in Section 3, the regional CCs would have a difficult time managing their own missile defense, both from an organizational and personnel perspective.

4.3 Flattened Chain of Command for Missile Defense

By applying the lessons from Desert Storm and use of SOF during the GWOT, an increase in the efficiency and lethality of the missile defense forces can be created by eliminating several links in the chain of command. Advisory messages would act as a bridge to the regional CCs to inform them of launch orders for their AOR; these same advisory messages would keep the national leadership aware of the progress of the battle. Within this flattened organization structure, there is room for national leadership or the regional CC to issue counter-orders if they have additional information or intelligence that has not yet reached USSTRATCOM. USSTRATCOM, and its backups, act as the single point of contact for missile defense.

The flow of the chain of command will be quick and efficient to allow for follow-up launches for second- or even third-chance intercepts. When a sensor registers a missile event it will be fed into the BMDS sensor network and the C2BMC network. USSTRATCOM will evaluate the type of missile and its trajectory to assign an interceptor to eliminate the threat the quickest, with the least amount of collateral damage possible, and with an appreciation of the consequence management from the debris field. The launch order will be transmitted from the USSTRATCOM command center directly to the launch unit, thereby saving time that might allow for a follow-up shot against an incoming missile.

This chain of command will not negate or lessen the unit commander's inherent right and responsibility for self-defense. If a unit operating in the field completes all portions of the kill chain without external support, it is still that unit's obligation to engage with all means available to destroy the incoming missile or if unable to pass the target to a unit who can destroy it.

Flattening of a command or organization is a relatively new business concept that allows for greater horizontal communication within an organization. There has always been a great deal of military work that has been done across military units at the action officer level (i.e., the military action officers would solve problems and coordinate amongst themselves before problems had to be elevated to the higher echelons of command). This flattening is more of a way for the commander to increase the span of awareness necessary to allow for better decision-making and resource-management decisions to be accomplished in the necessary time during a missile defense event.

This flattened chain of command for missile defense can already be seen in the deployments of the GMDs to Alaska. The C2 for the GMDs will most likely be hardwired to all of the national command centers which can already be viewed as a flattening of the conventional chains of command. This C2 arrangement for the GMDs should be used as an example of flattening that could occur throughout the entire BMDS.

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[10] USJFCOM is working on the Common Operational Picture (COP), but the quantity of different data links, reference origins, and time stamps currently prevent a totally fused picture for any BM or C2 picture larger than a few units or a single service component (e.g., a Carrier Strike Group (CSG) can manage its own air/land/sea picture, but the picture becomes 'muddied' as soon as another link is introduced).

5. CONCLUSION

The three chains of command, the conventional, the hybrid, and the flattened, each provides a different and varied approach to command and control. Each COC will enable the military to fulfill it mission with respect to missile defense and protect the U.S. However, moving to a more centralized C2 structure, in the form of the proposed 'flattened' CoC, is based on several assumptions:

1. Turn-around time from one layer of the CoC to the next adjacent lower level is too long to allow for time budgets to be met.
2. A centralized commander may have a better overall picture of the battlespace and be better equipped and staffed to most efficiently fight the battle.
3. The deployment of the GMDs in Alaska is, to an extent, the CoC is already being flattened.

The complexity of the BMDS is without parallel; by limiting human interaction, the system-of-systems will have to be a mostly self-regulating system-of-systems. The U.S.'s Strategic Defense Initiative (SDI) failed in the late 1980's because of the complexity of the undertaking. Technology has evolved greatly in the intervening two decades between the failure of SDI and the development of BMDS, but the risk of failure remains. To mitigate some of the risk in the BMDS, the C2 system must be adaptable, flexible and robust. The ability to hit a missile with a missile has been proven, but only in a sterile test intercept environment. The challenge for the BMDS will be to launch the interceptor in time to make the intercept; that duty is classic command and control and will be the job of the C2BMC.

All the proposed missile defense chains of command will require an entirely new communications suite to handle the bandwidth requirements of the BMDS. The targeting data alone would stymie most of the military data links now in service; when the C2, intelligence, and other data sets necessary are added to the system requirements the amount of bandwidth is unparalleled in the military today [1]. Although great leaps in communications bandwidth and processing power have been realized in the last decade, there is still a need for a dedicated communications system for missile defense [1]. For the speed with which orders, track data, and kill assessment need to flow for missile defense to be effective, organizational changes alone will not work. For BMDS to truly be effective, a dedicated C2 system, the C2BMC, and a new organizational structure both need to be deployed. This new communications suite, part of the C2BMC, will also lead the TMD Doctrine away from the 'ride on the back of existing C4I' paradigm to a contained system that will provide for its own commands and intelligence. In certain circumstances, a regional commander will be supporting USSTRATCOM by protecting STRATCOM assets (radars and MD batteries) while STRATCOM is supporting the regional CC with a missile defense shield.

The flattened COC is quite possibly the leader in positive transformational capabilities that are presented to the warfighter, but further research is necessary to validate the claim of increased responsiveness, increased robustness, increased flexibility and improved decision-making speed. The DoD should look beyond the current structure of the regional Combatant Commanders and provide the decision-makers with an organization that is flattened and that can complete the kill chain in time to engage threats.

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