

Maneuver Air and Missile Defense in an Anti-Access/Area Denial Environment

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Abstract

With the rise of multiple competitors to U.S. influence, the likelihood of military operations within an Anti-Access/Area Denial (A2/AD) environment is increasing. The United States and partner nations face an evolving and expanding array of air threats in terms of both capability and capacity. Given the likelihood that U.S. air superiority throughout an operation cannot be guaranteed, the joint force must develop an effective approach to air and missile defense to provide freedom of action to maneuver forces. The U.S. Army should organize maneuver air and missile defense (AMD) forces into Divisional Short Range Air Defense (SHORAD) Battalions to operate effectively with and as a part of maneuver forces to assure success in future operations.

Maneuver Air and Missile Defense in an Anti-Access/Area Denial Environment

Technology proliferation, combined with doctrines intended to deny the full range of U.S. capabilities access to contested areas, challenge fundamental assumptions about the joint force.

—Chris Spillman and Glenn Henke¹

With the rise of multiple competitors to U.S. influence across the globe, the likelihood of military operations within an Anti-Access/Area Denial (A2/AD) environment poses a significant challenge to U.S. security and U.S. military forces.² The most likely challengers to U.S. military capabilities are Russia and China, nations that possess powerful military forces that provide a formidable foe to U.S. joint forces. The United States and partner nations face an evolving and expanding array of air threats in both capability and capacity. Given the likelihood that U.S. air superiority throughout an operation cannot be guaranteed, a holistic approach to air and missile defense is required to provide freedom of action to combat forces. The United States must train, equip, and organize air and missile defense (AMD) forces ready to operate effectively within the multi-domain operational framework to assure success in the future operational environment.

To defeat this threat, the U.S. military must maintain forces capable of acting against all enemies and the full range of threats these adversaries may use.³ The ability to defend forces from air threats is a requirement for forces to “develop a lethal, agile, and resilient force posture and employment” as directed in the *National Defense Strategy* (NDS).⁴ The *National Security Strategy* (NSS) advises, “Allies and partners are a great strength of the United States. They add directly to U.S. political, economic, military, intelligence, and other capabilities.”⁵ No matter where the United States goes, the joint force will fight alongside like-minded nations to strengthen U.S. interests and to

deter or defeat adversaries. Both China and Russia are specifically noted in the NSS and NDS as nations that have increased military capabilities to marginalize U.S. influence within their respective regions.⁶ U.S. ground maneuver forces must prepare to meet these threats, regardless of location or enemy.

The elimination of active duty Army maneuver AMD forces in 2006 provided the Soldiers needed to grow additional maneuver forces during operations in Afghanistan and Iraq. The lack of air threat meant this decision was an acceptable risk to an Army that needed to grow additional maneuver structure. However, the battlefield the joint force faces today and in the future has drastically changed. This change necessitates a review of how the Army defends the modern maneuver force against air and missile threats and the level of risk that maneuver units face. Full evaluation of the threat and potential options to mitigate risk are critical for the Army to achieve success as part of future joint forces operating in future conflict.

LTG H. R. McMaster, while the director of the Army Capabilities Integration Command, stated: "There are basically two ways to fight the U.S.: asymmetrically and stupid."⁷ While the United States assumes no enemy intends to fight "stupid," the continual adaptation of competitors means symmetric threats to the U.S. military and allies continue to grow. By evaluating how conflict could unfold, and the associated threats faced, it is easier to understand capabilities required to defend joint and international forces. It is unlikely maneuver forces can successfully operate on the future battlefield without effectively managing threats from the air domain through effective force and technology management. As such, the Army must organize the force

structure to employ AMD forces capable of operating in defense of the joint maneuver force.

Nations competing with the United States and allied nations continue to evolve and adapt to compete on future battlefields. To close the military gap with the United States, adversarial militaries engage in a continual cycle of improving strategy and technology. These military competitors use a variety of air threats, including fixed and rotary wing aircraft, unmanned aerial systems (UAS), rockets/artillery/mortars, and cruise missiles. These threats shape the future battlefield, threats the U.S. must effectively counter to ensure the future of U.S. military might and power projection capabilities.

How A2/AD Impacts the Fight

Adversaries to U.S. influence have increasingly developed capabilities and doctrine to offset U.S. military power. Both China and Russia employ A2/AD in disputed regions to show strength and limit U.S. options.⁸ This method of warfighting makes use of military assets and capabilities to gain control of an area while ensuring the adversary is unable to do so. The primary mechanisms of doing so include preventing access and disrupting operations in a given area.⁹ Russia and China have made significant investments in integrated air defense systems, guided missiles, anti-satellite weapons, electronic warfare systems, and other capabilities to degrade U.S. and allied force operations.¹⁰ Technological enhancements yielded cruise missiles and UASs that can be used at increasing ranges to interdict U.S. forces.

As stated in the *Joint Integrated Air and Missile Defense Vision 2020*, “The future [Integrated Air and Missile Defense] environment will be characterized by a full spectrum of air and missile threats...with precision targeting.”¹¹ The possibility of an

adversary targeting U.S. forces from the air with weapon systems demonstrates why maneuver short range air defense (SHORAD) is needed. When “ground and maritime forces can be held at risk by sheer numbers of cheap, long-range rockets” and other threats, the need to incorporate robust AMD capabilities becomes more apparent. And in order to defeat an enemy operating an A2/AD strategy, U.S. forces must operate faster than the enemy’s decision cycle.¹² Threats from airborne platforms, which typically have speed, maneuverability, and weapons range advantages over a ground-based force, place U.S. forces at significant disadvantage, reducing the ability of commanders to operate within the enemy decision cycle.

Such threats form the key enabling capability of current U.S. competitors. Both China and Russia have improved their ability to use the full spectrum of air and missile threats to impact ground and naval forces. The ability to use UASs to provide reconnaissance and targeting data will enhance the enemy’s situational understanding of the future battlefield, enabling better use of their attack aviation platforms, cruise missiles, and artillery. Current U.S. and allied forces also risk being overwhelmed by the complexity and volume of air and missile attacks against our formations, further degrading American freedom of maneuver in an A2/AD environment.¹³

Multi-Domain Battle

The U.S. Army and Marine Corps concept of Multi-Domain Battle (MDB) forms the operational concept for how to defeat aggressors to U.S. influence and military might. Given that maneuver operations are the key to MDB operations, the joint force must be “capable of outmaneuvering adversaries physically and cognitively through the extension of combined arms across all domains.”¹⁴ It is no longer enough that U.S. military forces have the greatest land forces in conflict; those capabilities must be

appropriately paired with the complimentary capability and capacity to operate within all domains, while simultaneously preventing the enemy from doing the same. As then-Chairman of the Joint Chiefs of Staff General Martin Dempsey stated in 2013, joint force commanders “will always rely on... [AMD] to survive air and missile attacks.”¹⁵

Growing threats from the air domain make effective AMD critical to allowing the joint force of the future to operate within the MDB construct. Chief of Staff of the Army Mark Miley said, “On the future battlefield, if you stay in one place longer than two or three hours, you will be dead.¹⁶ In order to operate at that speed, maneuver forces must bring AMD capabilities with them to the battlefield.¹⁷ The United States can no longer emplace in relatively static locations and provide air and missile defense capabilities from behind U.S. forces (Patriot/THAAD) or operate in platforms incapable of keeping pace with American maneuvering forces and without sufficient protection for the Soldiers that operate them (Avenger).¹⁸

The Future Operating Environment

Given the threat that China and Russia pose to the United States and partner nations, commanders must focus on the operational environment of conflict. As the United States never intends to fight within the territorial confines of the nation, any conflict with these nations will happen in their “backyard.” In the Pacific, the United States will face a difficult environment, highlighted by numerous littoral areas, an expansive ocean, and maneuver-restricting terrain. If conflict in or around Russia occurs, the geography will comprise mobility-limiting terrain and numerous urban areas. The ability for these nations to operate with shorter internal lines of supply places the United States at a significant disadvantage. As such, the United States and partner nations will have to rapidly and effectively generate combat power in a distant theater

and defeat the enemy's attempts to execute a strategy of anti-access, all while operating on extended lines of communications.¹⁹ Further, ground force commanders will have to maximize the mobility and tempo of operations to defeat area denial attempts and avoid enemy actions to disrupt operations.

Loss of Air Superiority

The air threat to U.S. forces has drastically increased, a change that will likely expand in the future. Once an absolute of modern warfare, the U.S. Air Force can no longer guarantee air supremacy for future operations. Enemies continue to evolve, developing capabilities to overcome this traditional strength of the United States. The MDB operations concept requires the joint force, with partners, "to create windows of superiority" as a means to defeat the adversary.²⁰ This reliance on the temporary window of superiority outlines U.S. acceptance that air supremacy is a bygone aspect of conflict. Instead, the force must deal with complex, integrated attacks using a robust AMD capability and capacity.

Competitors understand the reliance of the U.S. military on air power to establish conditions for ground force success. Joint and partner air power platforms achieve air superiority to facilitate "freedom from attack, freedom to attack, freedom of action, freedom to access, and freedom of awareness."²¹ These capabilities are primarily created through two tactical missions, offensive counter air (OCA) and defensive counter air (DCA). OCA disrupts enemy air capabilities by engaging as close to the source of attack as possible, ideally prior to launch. The primary role of DCA is to protect friendly forces and vital assets from air attacks, requiring the ability to detect, identify, intercept, and destroy air threats.²² U.S. enemies will seek to limit the ability of

the U.S. Air Force and Navy/Marine Corps aviation to achieve dominating effects by challenging the OCA and DCA missions while defeating U.S. AMD capabilities.

Adapting to this changing operational environment requires materiel and structural investment. Multiple nations have or are developing 5th generation fixed wing aircraft that rival the capabilities of U.S. fighter fleets.²³ Many of these aircraft enjoy a technological advantage over current U.S. detection capability, ensuring they can approach, survey, and engage U.S. forces with impunity. Once able to mitigate U.S. air dominance, adversaries will employ tactical air capabilities, including manned and unmanned systems, against ground forces. When coupled with the increased number of platforms adversaries can employ, and the continuing challenges to U.S. fighter readiness due to maintenance and pilot shortages, U.S. ground forces will not enjoy freedom of movement and maneuver without facing attack or surveillance from the air.²⁴ Russia and China have further demonstrated the ability to use advanced electronic warfare capabilities to geolocate opposing forces and then target those forces with long range kinetic weapons while placing their forces at minimal risk.²⁵ After years of assured air supremacy, and the accompanying overreliance on it for planning future operations, SHORAD capabilities have been significantly neglected.²⁶ This places our maneuver forces at significant risk and shows why maneuver forces must have organic, dedicated protection against air and missile threats.

Unmanned Aerial Systems

The proliferation of ever smaller and more capable Unmanned Aerial Systems (UASs) has dramatically altered how military adversaries will fight the United States. Enemies have focused on low, slow, small platforms that are nearly undetectable. These systems operated in ways many U.S. detection platforms are unable to

consistently detect as their size, altitude, and speed lead systems to filter them out as clutter or spurious data. Such was the case in the Persian Gulf when Iranian UASs overflew U.S. ships transiting the Strait of Hormuz. In each instance, the United States had limited options for how to deal with this threat and may not have known the extent of the surveillance until after the incident.²⁷ This is not an isolated event, showing increased capabilities of enemy UAS platforms to evade detection.

As optical and electronic detection capabilities have improved, adversaries continue to develop UASs that operate at greater altitudes and are able to detect ground forces at greater distances. Today's UAS platforms can operate well outside the engagement ranges of most SHORAD weapons systems. This capability overmatch led to an allied nation engaging a small quad-copter using a Patriot missile that cost in excess of \$2 million.²⁸ While the fiscal mismatch of that engagement is obvious, the greater concern is the United States currently has no better solution for how to defeat that threat. This places American ground forces at a significant disadvantage and tremendous risk. Allowing the enemy increased freedom to observe U.S. ground forces provides them a greater ability to engage those same forces with direct and indirect fires. But the threat does not end with observation alone.

Current U.S. capabilities and plans for the future development of UASs for the joint force provide insight to likely development of enemy capabilities. Mimicking the United States, adversaries have increased the capability of armed UASs. Reports in Syria show that nations, and potentially non-state actors, possess the ability to use UAVs to interdict forces on the ground. Russian officials stated that swarms as large as thirteen drones, each equipped with explosive devices, have attacked bases in the

region.²⁹ China has been at the forefront of UAS proliferation and currently builds the “Wing Loong,” a system similar to the American-designed Predator. Additionally, Iran has built and proliferated UASs, some operating near U.S. forces in Syria.³⁰ Given these technological capabilities, it is clear they will continue to develop even more capable systems in the future to aid A2/AD operations.

Cruise Missiles

Multiple nations have embarked on a program to acquire and improve cruise missile weapons systems. Many of the components of cruise missile technology are “dual use” technologies, making the cost to develop effective cruise missiles relatively low.³¹ This enables nations to purchase or develop a significant quantity of these weapons as compared to pricier technologies, such as ballistic missiles or manned aircraft.³² This presents a significant danger to U.S. and international forces because the quantity alone could overwhelm current U.S. AMD capacity within a given area of operations. Specifically, China has made improving their cruise missile capabilities and capacities a key area of emphasis to deny the ability of the United States and other nations to intervene using military forces.³³ These systems travel significant distances, with ranges in excess of 1500 km, and demonstrate precision targeting accuracy capable of striking within 10-15 m. This provides U.S. adversaries a means of interdicting forces and infrastructure without placing significant risk on their own forces. The small radar signature and low flight profile of cruise missiles make them difficult to detect, making them likely to find their targets.³⁴

Rockets, Artillery, and Mortars

The Army is currently equipped to defeat a wide variety of Rockets, Artillery, and Mortar (RAM) rounds. These weapons are primarily “dumb” munitions that travel along

a parabolic path from origin to impact point. An enemy could mass these types of weapons against a maneuver force to inflict damage. Defense against RAMs is a critical need for maneuver SHORAD forces given the wide proliferation of weapons in this category due to low cost of acquisition and availability.³⁵

Current AMD Posture to Support Maneuver Units

Following the elimination of Divisional SHORAD units in 2006, the Army faces a critical gap in protection. While the focus of air and missile defense forces was rightly shifted to the growing ballistic missile threat, especially from Iran and North Korea, attempts to counter this singular problem set led to seams in protection, leaving maneuver forces vulnerable to adversarial platforms that seek to exploit these seams.³⁶ Enemy manned aircraft, UASs, and cruise missiles place the maneuver force at a growing risk, made apparent when viewed through the wide proliferation of these assets. Despite events in Ukraine and Syria, which showed the potential folly of having no SHORAD forces in divisional Army structure, there is little if any capacity to provide AMD for contingency operations.³⁷

Today's AMD forces, and those planned for the immediate future, are incapable of supporting operations under the MDB concept.³⁸ While the enemy has increased capability of delivering effects on maneuver forces, the United States has allowed SHORAD forces to atrophy to near the point of extinction. The primary SHORAD interceptor (the Stinger missile) does not have sufficient range to engage threats prior to their ability to detect and engage ground forces. Nor is the seeker head it contains optimized to detect and track the UAS platforms it is likely to target.³⁹ Additionally, the limited detection range of U.S. sensors against the small UASs being developed by adversaries limits ground force ability to impact these intelligence and targeting

platforms. Effectively, current AMD units (and by extension the maneuver units they would seek to defend) are “outgunned and outmatched” by an enemy that has outpaced our minimal investments in maneuver SHORAD.⁴⁰

Current and Future Capabilities Required

Joint Publication 3.0, *Joint Operations*, defines the purpose of AMD forces: “Countering Air and Missile Threats...integrates offensive and defensive operations and capabilities to attain and maintain a desired degree of air superiority and force protection. These operations are planned to destroy or negate enemy manned and unmanned aircraft and missiles, both before and after launch.”⁴¹ This definition shows AMD takes multiple forms and has a requirement to protect from all air threats an adversary can direct against the joint force. The evolving threat requires the Army to reverse the elimination of maneuver SHORAD. It is critical that integration take multiple forms, both technically and doctrinally. The U.S. Army must make use of the traditional pillars of Active Defense, Passive Defense, and Attack Operations to ensure protection for maneuver forces.

Effective AMD requires both pre- and post-launch activities to defeat enemy air threats. The United States and allied forces possess significant OCA and DCA capabilities as a means of defeating enemy air threats. In addition to OCA, the United States has heavily invested in cyberspace operations as a means of disrupting enemy communications, command and control networks, and even launch commands from control stations to platforms. These capabilities could stop a platform from launching, negating the future need to deal with a threat as it never becomes active. Attack Operations further nest with actions before launch, seeking to destroy enemy systems capable of launching air threats, such as missile launchers and UAS ground stations,

which would impact U.S. and allied forces. Once the threat is airborne, Active Defense provides the greatest likelihood of defeating the threat. DCA and ground based air defense seek to destroy a threat platform, optimally prior to the threat impacting U.S. forces.

Maneuver AMD forces must possess the tools required to perform the full engagement sequence: Detection, Identification, and Engagement. This is supported by a robust communications and data sharing structure that enables the exchange of information required to ensure accurate target detection, rapid correlation of detected targets, identification and threat decision made by an appropriate leader, and engagement by a designated defeat mechanism. Operations in a complex A2/AD environment necessitate maneuver SHORAD forces with the ability to operate in coordination with adjacent AMD forces. However, forces must also protect associated maneuver forces if required to operate independently due to a communications-denied environment.⁴²

The Army's current force structure assigns no SHORAD assets to the Brigade Combat Team (BCT), negatively impacting integration with the primary fighting force employed by the Army. Given the likelihood of a sophisticated enemy that will use multi-echelon, asymmetric operational capabilities to attack U.S. forces, this places great risk on American primary combat forces. In 2014 Lieutenant General Sean MacFarland, then the Commanding General of III Corps and Fort Hood, stated to a forum of Battalion and Brigade leaders that AMD for maneuver units was his greatest concern as it was a significant capability gap that the Army was doing little to address.⁴³

Recent actions to increase SHORAD capabilities to the Army demonstrate actions to mitigate this problem. While senior leaders realize the need to ensure maneuver units are protected from air attack and surveillance, much more remains to do. Organization and capabilities must start from an approach of ensuring AMD is “incorporated into the maneuver scheme of warfighting” to enhance combat readiness, capability, and lethality of the BCT. The means to enable freedom of movement for the maneuver forces is through SHORAD.⁴⁴

The modern battlefield is infinitely more complex than in the past. As the number of air space users has increased, due to the proliferation of UASs, rockets, cruise missiles, etc., it is difficult to manage those users, detect and evaluate threats, and mitigate the risk to forces. This requires that SHORAD forces have the ability to detect airborne platforms, correctly identify those platforms and classify as friendly or enemy, disseminate targeting and identification data horizontally and vertically, and successfully engage airborne threats if required.

Ability to Provide Trained and Ready Forces

Any organizational construct for maneuver SHORAD must account for how the AMD force will provide trained and ready forces to the maneuver commander. A structure for training core tasks and competencies necessitates that experienced AMD professionals lead their Soldiers and units through tough, realistic training that not only encourages but allows for growth as individuals and teams. The duty of all leaders is to provide the resources and direction necessary to set the conditions for readiness when called to deploy and fight.

Interoperability and Data Sharing

AMD forces must effectively share information across the force and with coalition and allied partners. No force is capable of fully defending the large battlefields U.S. forces will compete on in the future. As such, the ability to share fire control data in a net-centric environment is critical to protecting the joint force. This requires SHORAD forces to possess the robust communications necessary to send and receive early warning and identification information. Only by effectively sharing all information about threats can the force take coordinated action to enhance protection.

That ability to share data must also take place within the contested environment likely to exist in the future. A significant aspect of A2/AD operations requires the adversary to impact information sharing and decision making processes. While the ongoing development of the Integrated Air and Missile Defense Battle Command System (IBCS) is an important part of integrating AMD systems into the joint force, it is more important for the maneuver forces likely to be the target of disruption attempts to share information across the depth and width of the battlefield.

Technical interoperability between forces is necessary on the modern battlefield. Many of the platforms the joint force relies on require tremendous amounts of external data to effectively operate. The need to share real time data across the battlefield is crucial for the success of AMD forces given the speed of targets and the risk if information is not shared both vertically and horizontally. Establishing such a robust communications package requires integration and interoperability, both internal and external to the organization. Having outside assets available to ease that data sharing burden improves the ability of the force to establish redundant communications means that protect the network, and the data resident in it. It is critical this integration occur at

the lowest echelon as possible to ensure integration into the communications, maneuver, protection, and logistics plan for maneuver BCT operations.

Integration with Joint Force/Allies/Partners

The United States only fights effectively while operating in a joint environment. Additionally, U.S. military forces take great pride in only fighting “Away Games,” necessitating operations outside the United States in order to minimize disruptions to the national economy and keep conflict off American shores. Effectively fighting as part of combined forces to achieve military objectives requires the ability to operate alongside allies and partners, and that only happens with integration.⁴⁵

Integration of maneuver SHORAD forces into U.S./joint/partner forces is about much more than the technological capability of passing data. True integration requires complete involvement in the battlespace, including planning, entry, logistics, communications, command and control, and operations. That integration requires relationships developed prior to mission execution and the development of tactics, techniques, and procedures that facilitates SHORAD forces again becoming a part of the combined arms team.

Major General John Rossi, then-Commanding General of the Fires Center of Excellence, clearly stated maneuver forces did not want “an air defense battalion dragging behind, slowing it down with thin-skinned vehicles.”⁴⁶ While maneuver forces focus on forced entry and rapidly transition, SHORAD forces must be fully integrated enablers to those roles. The array of platforms under evaluation for addition to the Army make it clear that full integration with the scheme of maneuver and the speed of maneuver is a factor.

AMD forces also provide key enablers to U.S. partners and allies. The very strengths of integration and data sharing provide robust capabilities to partners and allies that otherwise might not exist. The communications infrastructure brought to the battlefield by AMD forces provides a significant boost to ally and partner situational understanding. Additionally, U.S. forces have tremendous ongoing innovation and technological development in the AMD fight. These capabilities, when shared with American allies and partners, enhance cooperation, provide security, demonstrate commitment to coalition warfighting, and enhance integration between multinational forces.⁴⁷

Contribution beyond AMD

General Rossi's comments regarding speed and integration demonstrate that SHORAD units must do more than "just" be air and missile defense experts. In order to maximize their contribution to the maneuver fight, they must do far more than defeat air threats. Prior to 2006 when the last divisional SHORAD units were inactivated, SHORAD units routinely operated alongside their maneuver counterparts. Whether direct force-on-force operations, security missions, or training foreign military forces, SHORAD units demonstrated proficiency on a variety of missions that went beyond protection from air threats⁴⁸

Earning the confidence and trust of the maneuver commander that owns a battlespace is only achieved through interaction, integration, and repetition. A maneuver commander always looks to maximize the ability to influence the enemy, and the additional force structure of a robust SHORAD capability provides a boost to the combat power of a BCT. If that combat power is planned for, employed, and executed, SHORAD forces become a capability multiplier for the maneuver commander.

Research and Development

U.S. military forces cannot rely on current capabilities to defeat regional competitors, especially in an A2/AD environment. Ongoing development must provide a full range of technical solutions to defeat air threats. As enemy air threats increase in both quality and quantity, U.S. forces must seek budget-informed solutions for detection, identification, and engagement. Further development for detection systems should include a wide array of radar, acoustic, visual, and electromagnetic solutions. Only by bringing in all potential detection methods, in a networked environment, can detection thresholds improve, providing the maneuver force with adequate protection. IBCS provides a powerful backbone for data exchange in a network centric environment of sensors, shooters, and command and control platforms. All future systems must operate on this network to enhance detection and engagement opportunities. A holistic approach to defeat mechanisms is required for interceptors also. All kinetic and non-kinetic defeat mechanism must be considered, including high energy laser, electromagnetic weapons, missiles, and guns. Protection for maneuver forces is only possible with a threat-oriented mix of detection and defeat mechanisms that puts the right capability on target.

This research and development may produce capabilities or applications beyond those directly related to military forces. Expanded use of drones by civilians, including the potential for unlawful surveillance, harassment, or even destruction, is a significant threat across the nation. Law enforcement authorities and the Department of Homeland Security could use any technology capable of safely and effectively defeating UASs.⁴⁹ This military-civilian cooperation would benefit overall security and safety of the United States.

Potential Organization of Maneuver SHORAD Forces

Heeding the counsel of Brigadier General Randall McIntire, Commandant of the ADA School, “Survivability of the maneuver force requires an organic air and missile defense.”⁵⁰ Getting the force structure and organization right is the only way to ensure ground maneuver forces operate with the freedom of action required to effectively conduct operations.⁵¹

Divisional SHORAD Battalions were successfully employed for many years in the U.S. Army, ensuring forces were trained, integrated, and ready for operations as a part of maneuver forces. This alignment allowed for a robust operational cycle as the battalion-level headquarters oversaw training and readiness for SHORAD forces which were allocated to support BCTs. This enhanced the integration of SHORAD forces with aligned maneuver forces in garrison, facilitating transition during times of conflict.

SHORAD Batteries also existed previously within each Armored Cavalry Regiment and the geographically separated BCTs. These batteries provided their respective forces with dedicated SHORAD protection within their organic structure. Each Battery was responsible for establishing priorities for maintenance, training, and readiness with the Battery Commander serving as the senior AMD professional for the BCT.

Organizing SHORAD Battalions under a Brigade headquarters would provide trained and ready AMD forces to deploy in support of contingency operations. Establishing Corps-aligned Brigades with subordinate SHORAD Battalions assigned would provide a closer relationship between AMD and maneuver forces, including a habitual alignment of SHORAD Battalions to Divisions.

Recommendation and Implementation

The optimal organization of Maneuver SHORAD units is as Divisional SHORAD Battalions. This organizational structure provides the greatest likelihood of integration into all aspects of maneuver warfare while balancing the training, readiness, and maintenance needs of a force operating while spread across the expansive modern battlefield. Such organization optimizes the developmental opportunities of the force as well, ensuring an effective pipeline to grow leaders. Integrating at the Division level ensures the SHORAD force has a senior advocate, the Battalion Commander, with the experience and rank to operate as an independent organization and to advise the Division Commander on how best to allocate this low-density capability.

Reconstituting SHORAD forces into Divisional SHORAD Battalions has a model for successful implementation. Given that a similar force structure existed prior to 2006, this is a structure that is easier to organize under existing unit alignments. This structure provided a robust air and missile defense structure within a maneuver Division that encouraged full integration into planning and execution. By organizing these forces as a Battalion under Division control, the unit has maximum flexibility to implement task organization changes required to support operations and the ability to allocate resources for support. This organizational structure also optimizes economy of scale for AMD specific training and logistics needs, ensuring the greatest likelihood of trained and ready forces and equipment. The need for SHORAD forces is apparent: the U.S. Army needs to commit to growing the required forced structure to ensure that all maneuver BCTs have AMD protection in their formations.

Organizing into separate ADA Batteries does not meet needs of maneuver forces. While embedding a maneuver SHORAD Battery into a BCT ensures closest

integration with planning and operations, it does not provide flexibility of forces. Additionally, a separate battery does not have significant enablers, such as communications support, maintenance assets, or transportation and logistics platforms, to operate. Finally, placing all maneuver SHORAD elements internal to the BCT means that no AMD professional above the battery commander is assigned responsibility for training, readiness, or leader development.

However, the Army is unlikely to reconstitute the full ten battalions necessary to assign a maneuver SHORAD Battalion to each active duty division. The large manpower and resource additions required to man and equip such an alteration to the force structure is beyond the Army's current operational construct. The Fiscal Year 2019 proposed budget shows an increase in Army end strength of approximately 4000 Soldiers per year for the next three years.⁵² Each SHORAD Battalion would be approximately 650 Soldiers (based on historical sizing configurations); adding ten SHORAD Battalions would consume nearly one-half of that end-strength gain. That percentage becomes even larger if a SHORAD Battalion has to be larger to account for the increase in maneuver units from 2006 to present force structure. It is unlikely the Army, already limited in other areas of need, would dedicate such a large percentage of growth to this area.

If this optimal solution is not possible, the next best option is to develop maneuver SHORAD Battalions under a single SHORAD Brigade. Such organization would allow management of priorities for manning, training, and support as the battalions would still be responsible to provide trained and ready forces. Organizing under a SHORAD Brigade would allow those units to focus on preparation for maneuver

operations in a way not possible if they were organized within the current ADA Brigades, which focus almost exclusively on HIMAD operations and Ballistic Missile Defense.

While not the optimal solution, organizing under a SHORAD Brigade would form a necessary bridge if the Army is unable to field a Divisional SHORAD Battalion for each maneuver division. This arrangement would allow proper allocation of SHORAD capabilities for units that are training or deploying. Given that not every division will have a dedicated maneuver SHORAD unit, this will facilitate effective force management while ensuring trained and ready forces when and where needed.

The lack of a credible SHORAD capacity in the Army for over a decade also impacts the ability to implement the recommended solution. Currently, most leaders with SHORAD experience are very senior. As such, there is a very limited experiential baseline to draw from to create Divisional SHORAD Battalion leaders. The quantity of mid-grade leaders required to build the ten battalions required to assign one organically to each of the active Army's ten divisions does not currently exist. As such, the Army will have to grow the force at a deliberate pace to provide junior Soldiers and leaders the time, training, and experience required for these new units. If not, the Army risks failure by building units comprised of leaders that do not have the skills and experience required to man, train, and equip the SHORAD forces needed to protect BCTs.

Conclusion

The continually evolving abilities and organization of potential peer adversaries demonstrates they have studied the lessons of recent joint force operations. The resulting growth of symmetric means to counter the technological advantages of the United States have led to a challenging A2/AD strategy. This strategy is supported by a

robust capability to hold the U.S. joint force and allies at risk from the air, a significant threat the United States has not faced in recent memory. These threats must be countered to allow U.S. ground forces to execute operational and tactical maneuver.

The complexities of the future operational environment and the need to overcome adversarial advances in technology, employment, and capacity require materiel solutions and effective organization, training, and doctrine for its employment. Acquiring new detection and engagement systems designed to protect forces from a full array of air threats, including UASs, cruise missiles, rockets, artillery, and mortars, and manned air platforms, is the only means to effectively protect maneuver forces on the future battlefield. These systems are best assigned to the Division level where they can be optimally trained and task organized to provide AMD for the joint maneuver force, the cornerstone of U.S. operational approaches in an A2/AD environment.

Endnotes

¹ Christopher Spillman and Glenn Henke, "The New Threat: Air and Missile Defense for Brigade Combat Teams," *AUSA Online* (February 17, 2017): <https://www.ausa.org/articles/new-threat-air-and-missile-defense-brigade-combat-teams> (accessed November 2, 2017).

² Stephen Biddle and Ivan Oelrich, "Future Warfare in the Western Pacific," *International Security* 41, no. 1 (Summer 2016): 7, https://www.mitpressjournals.org/doi/full/10.1162/ISEC_a_00249 (accessed January 19, 2018). A2/AD is a two-part strategy employed to deter or defeat an adversary. The enemy seeks to deny an opposing force the ability to enter a region to initiate operations and to further deny the enemy use of an area once in theater.

³ Donald J. Trump, *National Security Strategy* (Washington, DC: The White House, December 18, 2017), 29, <https://www.whitehouse.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905.pdf> (accessed January 20, 2018).

⁴ Jim Mattis, *Summary of the 2018 National Defense Strategy of the United States of America*, (Washington, DC: The Defense Department, January 19, 2018), 7, <https://www.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf> (accessed January 19, 2018).

⁵ Trump, *National Security Strategy*, 37.

⁶ Trump, *National Security Strategy*, 2; 46-48; Mattis, *Summary of 2018 National Defense Strategy*, 1.

⁷ Allison Schrager, "The Four Fallacies of Warfare, According to Donald Trump's New National Security Advisor," *Quartz Media Online*, <https://qz.com/915438/the-four-fallacies-of-warfare-according-to-national-security-advisor-hr-mcmaster/> (accessed January 24, 2018).

⁸ Zach Berger, "China's Anti-Access Area Denial," *Missile Defense Advocacy Alliance*, July 2016, <https://missiledefenseadvocacy.org/missile-threat-and-proliferation/todays-missile-threat/china-anti-access-area-denial-coming-soon/> (accessed January 24, 2018).

⁹ Nathan Freier, "The Emerging Anti-Access/Area-Denial Challenge," *Center for Strategic and International Studies Online* (May 27, 2012): <https://www.csis.org/analysis/emerging-anti-accessarea-denial-challenge> (accessed January 19, 2018).

¹⁰ Mark Gunzinger et al., *Force Planning for the Era of Great Power Competition* (Washington, DC: CSBA, 2017), 18.

¹¹ Geoffrey Weiss, "Seeing 2020, America's New Vision for Integrated Air and Missile Defense" *Joint Force Quarterly* 76 (1st Quarter 2015): 109, <https://ndupress.ndu.edu/Media/News/News-Article-View/Article/577599/jfq-76-seeing-2020-americas-new-vision-for-integrated-air-and-missile-defense/> (accessed November 19, 2017).

¹² Tyler Rogoway, "America's Startling Short Range Air Defense Gap and How to Close It Fast," <https://www.thedrive.com/the-war-zone/13284/americas-gaping-short-range-air-defense-gap-and-why-it-has-to-be-closed-immediately> (accessed November 2, 2017).

¹³ Thomas Karako and Wes Rumbaugh, *Distributed Defense* (Lanham, MA: Rowman & Littlefield, 2018), 1.

¹⁴ *Ibid.*, 2.

¹⁵ U.S. Joint Chiefs of Staff, *Joint Integrated Air and Missile Defense: Vision 2020*, (Washington, DC: U.S. Joint Chiefs of Staff, December 5, 2013), 3, <https://www.jcs.mil/Portals/36/Documents/Publications/JointIAMDVision2020.pdf> (accessed November 19, 2017).

¹⁶ Sydney J. Freedberg, Jr., "Army Races to Rebuild Short-Range Air Defense: New Lasers, Vehicles, Units," *Breaking Defense Online* (21 Feb 2017): <https://breakingdefense.com/2017/02/army-races-to-rebuild-short-range-air-defense-new-lasers-vehicles-units/> (accessed February 2, 2018).

¹⁷ William Dries, "Some New, Some Old, All Necessary," *War on the Rocks Online* (March 27, 2017): <http://warontherocks.com/2017/03/some-new-some-old-all-necessary-the-multi-domain-imperative/> (accessed February 2, 2018).

¹⁸ Sebastien Roblin, "Is the U.S. Army Getting Ready to Bring Back the 'Linebacker?'" *National Interest Online* (January 21, 2018): <http://nationalinterest.org/blog/the-buzz/the-us-army-getting-ready-bring-back-the-linebacker-24146> (accessed January 21, 2018).

¹⁹ Gunzinger et al., *Force Planning for the Era of Great Power Competition*, 18.

²⁰ Karako and Rumbaugh, *Distributed Defense*, 2.

²¹ U.S. Air Force, *Air Superiority 2030 Flight Plan* (Washington, DC: U.S. Air Force, 2016), 1, <https://www.af.mil/Portals/1/documents/airpower/Air%20Superiority%202030%20Flight%20Plan.pdf> (accessed January 19, 2018).

²² U.S. Air Force, *Counterair Operations*, Doctrine Annex 3-01 (Washington, DC: U.S. Air Force, February 1, 2016), https://www.doctrine.af.mil/Portals/61/documents/Annex_3-01/3-01-ANNEX-COUNTERAIR.pdf?ver=2017-09-19-153800-487 (accessed February 20, 2018).

²³ Dave Majumdar, "Russia's Lethal Su-35 Fighter vs. America's F-35, F-15 and F-16: Who Wins?" *The National Interest Online* (September 19, 2016): <http://nationalinterest.org/blog/the-buzz/russias-lethal-su-35-fighter-vs-americas-f-35-f-15-f-16-who-17753?page=show> (accessed February 18, 2018).

²⁴ Stephen Losey, "Growing Readiness Woes: Only 7 in 10 Air Force Planes are Ready to Fly," *Air Force Times Online* (April 2, 2017): <https://www.airforcetimes.com/news/your-air-force/2017/04/02/growing-readiness-woes-only-7-in-10-air-force-planes-are-ready-to-fly/> (accessed February 17, 2018); Christopher Woody, "The Air Force Is Facing a 'Quiet Crisis' of Manpower, but Recruitment Isn't the Problem," *Business Insider Online* (October 9, 2017): <http://www.businessinsider.com/air-force-has-a-pilot-shortage-due-to-lack-of-training-resources-2017-10> (accessed February 17, 2018).

²⁵ Gunzinger et al., *Force Planning for the Era of Great Power Competition*, 17.

²⁶ Karako and Rumbaugh, *Distributed Defense*, 12.

²⁷ Nasser Karimi and Jon Gambrell, "Iran Claims It Flew Drone Over a U.S. Aircraft Carrier and Snapped 'Precise' Photos," *Business Insider Online* (January 29, 2016) <http://www.businessinsider.com/iran-claims-it-flew-a-drone-over-a-us-aircraft-carrier-2016-1> (accessed February 17, 2018).

²⁸ Chris Baraniuk, "Small Drone 'Shot With Patriot Missile'," *BBC Online* (March 15, 2017) <http://www.bbc.com/news/technology-39277940> (accessed January 24, 2018).

²⁹ Tom Embury-Dennis, "Russia Says Mysterious Army Drones Are Attacking Its Military Bases in Syria-And They Don't Know Who's Sending Them," *Independent Online* (January 10, 2018) <http://www.independent.co.uk/news/world/middle-east/russia-military-bases-drones-syria-armed-attacks-tartus-uavs-latakia-a8151066.html> (accessed February 17, 2018).

³⁰ Rogoway, "America's Startling Short Range Air Defense Gap."

³¹ Dual use technologies are those that can be used in non-military products such as navigation systems and other electronic controls. Multiple nations use these technologies as a means of bypassing export restrictions.

³² Joel Wuthnow, *The Impact of Missile Threats on the Reliability of U.S. Overseas Bases: A Framework for Analysis*, Monograph (Carlisle Barracks, PA: U.S. Army War College, January 2005), 8, <http://ssi.armywarcollege.edu/pdffiles/pub594.pdf> (accessed November 17, 2017).

³³ Otto Kreisher, "Authors Say U.S. Military Not Giving Enough Attention to China's A2AD Capabilities," June 5, 2014, <http://www.andrewerickson.com/2014/06/authors-say-u-s-military-not-giving-enough-attention-to-chinas-a2ad-capabilities/> (accessed January 19, 2018).

³⁴ Ibid.

³⁵ Missile Defense Advocacy Alliance, "Rocket and Mortar Basics," <http://missiledefenseadvocacy.org/missile-threat-and-proliferation/missile-basics/rocket-and-mortar-basics/> (accessed February 15, 2018).

³⁶ Karako and Rumbaugh, *Distributed Defense*, 4.

³⁷ Lawrence Kapp et al., *How Big Should the Army Be? Considerations for Congress* (Washington, DC: Congressional Research Service, September 2, 2016), 9.

³⁸ Karako and Rumbaugh, *Distributed Defense*, 9.

³⁹ Roblin, "Is the U.S. Army Getting Ready to Bring Back the 'Linebacker?'"

⁴⁰ Karako and Rumbaugh, *Distributed Defense*, 9.

⁴¹ U.S. Joint Chiefs of Staff, *Joint Operations*, Joint Publication 3-0 (Washington, DC: U.S. Joint Chiefs of Staff, January 17, 2017), III-26, http://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3_0_20170117.pdf (accessed November 19, 2017).

⁴² Rogoway, "America's Startling Short Range Air Defense Gap."

⁴³ Notes taken by author when LTG MacFarland spoke to Brigade and Battalion Command Teams during an Officers Call.

⁴⁴ Jason Epperson, "SC Army National Guard unit arrives in Germany," *DVIDS Online* (January 16, 2018) <https://www.dvidshub.net/news/262272/sc-army-national-guard-unit-arrives-germany> (accessed January 19, 2018).

⁴⁵ Mattis, *Summary of 2018 National Defense Strategy*, 9.

⁴⁶ David Vergun, "Air, Missile Defense Effectiveness Transcends Materiel Solutions," *Army Online* (February 13, 2015) https://www.army.mil/article/142901/air_missile_defense_effectiveness_transcends_materiel_solutions (accessed January 10, 2018).

⁴⁷ Mattis, *Summary of 2018 National Defense Strategy*, 9.

⁴⁸ Rick Starkey, "Divisional Air Defense Artillery Units Learn Keys to Survival and Victory in Iraq and Afghanistan," *ADA Magazine Online* (April-June 2005): 12-15, http://sill-www.army.mil/ada-online/pb-44/docs/2005/4-6/ADA_MAG%20April-June%202005.pdf (accessed November 19, 2017); Scott Dellinger, "Task Force 1-4: 1-4 ADA Soldiers Defend Baghdad International Airport," *ADA Magazine Online* (April-June 2005): 17-23, http://sill-www.army.mil/ada-online/pb-44/docs/2005/4-6/ADA_MAG%20April-June%202005.pdf (accessed November 19, 2017).

⁴⁹ Mark Rockwell, "DHS Wants a Look at Anti-Drone Tech," *FCW Online* (March 9, 2017) <https://fcw.com/articles/2017/03/09/dhs-counter-drone-tech.aspx> (accessed February 22, 2018).

⁵⁰ Robbin Laird and Ed Timperlake, "Army Boosts Air Defense, Key to Joint and Allied Fight," *Breaking Defense Online* (January 10, 2018) <https://breakingdefense.com/2018/01/army-boosts-air-defense-key-to-joint-allied-fight/> (accessed January 10, 2018).

⁵¹ Nathan Freier et al, *Beyond the Last War: Balancing Ground Forces and Future Challenges Risk in USCENTOM and USPACOM* (Lanham, MA: Rowman & Littlefield, 2013), 70.

⁵² Jen Judson, "Army's FY19 Budget Growing by 8 Percent to Fill Readiness Gaps, Gradually Grow Force," *Defense News Online* (February 11, 2018) <https://www.defensenews.com/land/2018/02/12/armys-fy19-budget-growing-by-8-percent-to-fill-readiness-gaps-gradually-grow-force/> (accessed February 11, 2018).