

ARMY AIR AND MISSILE DEFENSE 2028



Air and Missile Defense Vision 2028

"The AMD Force of 2028 will provide Combat Commanders with a flexible, agile, and integrated AMD force capable of executing Multi-Domain Operations and defending the Homeland, regional joint and coalition forces, and critical assets in support of unified land operations."

March 2019



FORWARD

The strategic shift from fighting an insurgency to strategic competition with revisionist powers directed by the National Security Strategy and the National Defense Strategy has made air and missile defense (AMD) one of the Army's top priorities, requiring a significant increase in capability and capacity. In concert with the 2018 Army Strategy, Army AMD forces of 2028 must be ready to deploy, fight, and win decisively against any adversary in a joint, multi-domain, high intensity conflict; simultaneously, they must deter others in order to defend the homeland, regional forces, and critical assets in support of unified land operations. This document provides a framework for the Army air and missile defense enterprise of 2028.

The AMD force of 2028 has to be responsive, relevant, and account for the future. As our national strategies have been updated and the operational environment continues to change, this framework places the AMD enterprise on track within today's environment. We must ensure we are postured to sustain mission readiness while simultaneously modernizing and transforming the force to overcome capability and capacity shortfalls and meet future challenges. We must develop more cost-effective capabilities that position us on the right side of the cost curve. We must invest in solutions to counter threats throughout all phases of flight, to include left-of-launch kinetic and non-kinetic technologies. We need to incorporate capabilities being developed by Army Futures Command, specifically those enabling enhanced use of space, communications, and offensive and defensive fires integration.

The AMD force must be agile, rapidly tailorable, scaleable, and able to fight multiple, complex, integrated attacks. To do this, we must build units containing a mix of capabilities that are integrated at all echelons, creating a layered defense in depth while optimizing force structure. Integrated missile defense planning, force management, and operations will emphasize global coordination with regional execution so that for any threat, we match the best shooter with the best sensors.

Investments in the generating force must be commensurate with those in the operating force. Training must be tough, realistic, iterative, and battle focused. Our Soldiers and leaders must be experts in our AMD core competencies. We need to continue to increase our integration into maneuver units across the Army. These relationships are critical to our success in combat.

Because active defense capacity will be finite, we will increase lethality through attack operations, passive defense, and integrating allies and partners into a common and mutually supportive architecture. We must continue to work with our allies and partners in Europe, the Indo-Pacific region, and the Middle East, building trust and increasing integration to maximize our collective capability and capacity. AMD systems and operations must create a layered and tiered defense with proper policies and authorities to facilitate interoperability, and ultimately, integration.

There is no one silver bullet to counter the rapidly changing and complex threat set; rather, we must have an assortment of capabilities available to counter the threat in any weather and in a denied, degraded, or contested environment. We owe this to our fellow warfighters, and to the Nation.

FIRST TO FIRE!

ARMY STRONG!

James H. Dickinson
Lieutenant General, United States Army
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1. Introduction

a. Army Air and Missile Defense (AMD) 2028 provides a holistic overview of Army AMD contributions to Army and joint missions. It addresses our need to balance today's operational requirements while shaping the force and modernization efforts to counter future challenges. Army AMD 2028 provides the overarching vision for the AMD force, describes how the AMD force is postured to support the Army and joint forces, and it articulates what must be accomplished to succeed. The intent of this document is to assist the current and future generations of the AMD Enterprise to adapt to the fast-paced, dynamic operational environment, and to inform the Department and HQDA Staff of key objectives and milestones for the AMD force.

The future operating environment is characterized by increasingly complex threats, sustained operational tempo (OPTEMPO), limited resources, and the ability of great power competitors to contest U.S. forces in all domains.

b. The future operating environment is characterized by increasingly complex threats, sustained operational tempo (OPTEMPO), limited resources, and the ability of great power competitors to contest U.S. forces in all domains. AMD forces will encounter multiple, complex, integrated threats from great power competitors, state and non-state actors, and terrorist organizations. The OPTEMPO for AMD forces will remain high, supporting current commitments while simultaneously developing capability to support Multi-Domain Operations (MDO). Budgetary constraints will continue to challenge force growth and modernization, and for the first time in decades, the conventional and asymmetric capabilities developed by technologically advanced competitors can contest U.S. superiority.

c. This roadmap synchronizes the four AMD lines of effort (LOEs) to achieve the Army's AMD vision and desired end state. These LOEs focus the Army's AMD capability, capacity, training, and international ally and partner initiatives to ensure Army AMD forces achieve their mission in a joint, combined, layered and tiered approach. The Army must ensure that these LOEs are managed through, and supported by all aspects of doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLPP-P).

d. This document is informed by the National Security Strategy and National Defense Strategy (NDS), and nests with the Missile Defense Review, The Army Strategy, The U.S. Army in Multi-Domain Operations 2028, and The U.S. Army Modernization Strategy. Army AMD 2028 is a living document that will be incrementally revised to remain relevant to the changing operational environment. It, along with supporting LOE strategies, must be continually assessed to ensure they provide sufficient guidance to achieve the desired outcomes.

2. Role of the Army AMD Enterprise

The Army AMD Enterprise consists of those agencies and organizations who develop, maintain, sustain, train, and employ Army AMD assets. The Chief of Staff of the Army (CSA) designated the Commanding General, United States Army Space and Missile Defense Command as the Army's AMD Enterprise Integrator. The AMD Enterprise Integrator synchronizes the balanced implementation of Army AMD efforts across the functions of force planning and sourcing requirements, combat and materiel development, AMD acquisition and lifecycle management, and orchestrates consistent strategic communication messaging themes.

3. AMD Vision 2028

a. Aligned with The Army Strategy, the AMD forces of 2028 must be ready to deploy, fight, and win against any adversary in a joint, combined, multi-domain, high intensity conflict, at any place or any time, while simultaneously deterring others. AMD forces must adapt tactics, techniques, and procedures to execute MDO while modernizing the force and developing cutting-edge capabilities. Army AMD needs to build new organizations, increase short range air defense (SHORAD) force capacity, and develop highly dynamic and adaptive leaders and Soldiers, while integrating with other Services, partners, and allies. To achieve this, it is imperative that all elements of the Army AMD Enterprise work toward a common vision.

“The AMD Force of 2028 will provide Combatant Commanders with a flexible, agile, and integrated AMD force capable of executing Multi-Domain Operations and defending the Homeland, regional joint and coalition forces, and critical assets in support of unified land operations.”

b. The AMD force must be: 1) Flexible – in order to adjust forces and capabilities to meet diverse threats, 2) Agile – in order to react faster than the enemy and converge capabilities to deter, defend and defeat the air threat across multiple domains, and 3) Integrated – multiple systems working as one in order to optimize capabilities with limited resources.

“The Army of 2028 will be ready to deploy, fight, and win decisively against any adversary, anytime and anywhere, in a joint, combined, multi-domain, high-intensity conflict while simultaneously deterring others and maintaining its ability to conduct irregular warfare.”

--Army Vision
June 2018

4. The Increasingly Complex Threat Environment

a. The threat environment continues to evolve in complexity, capability, and capacity across the spectrum of threat platforms. All threat capabilities, including ballistic and cruise missiles, unmanned aircraft systems, manned fixed and rotary wing (FW/RW) aircraft, and rockets, artillery, and mortars, are becoming more advanced, threatening our global forces and the homeland. In accordance with the 2018 NDS focus areas, AMD forces must be able to deter and defeat great power competitors (China and Russia) and destabilizing threats from rogue states and regional powers (North Korea and Iran), and address the challenges associated with terrorist organizations.

b. Ballistic missiles (BMs) are becoming more complex, due in part to the proliferation of advanced technologies, resulting in systems with regional, transregional and global reach. In addition to intercontinental ballistic missiles (ICBM), intermediate range ballistic missiles (IRBM), medium range ballistic missiles (MRBM) and short range ballistic missiles (SRBM), the integration of terminal guidance to long-range rockets has created a new class of systems called close range ballistic missiles (CRBM) that increases stress on AMD forces due to capacity overmatch and extremely short engagement windows.

c. BM technology is advancing at a rapid pace and incorporating advanced countermeasures intended to defeat our AMD capabilities, including aero ballistic threats, maneuverable reentry vehicles, increased accuracy, multiple independent reentry vehicles, hypersonic/supersonic glide vehicles, and electronic attack.

d. Cruise missiles (CMs) are becoming increasingly difficult to detect and track. Numerous countries are developing ground-, sea-, and air-launched land-attack CMs using an assortment of unconventional and inexpensive launch platforms. In addition, long-range, low-observable, advanced CMs enable our adversaries to present a complex air and missile defense problem with high-volume, high-precision missiles capable of 360-degree avenues of approach to our AMD systems and the critical assets they protect.

e. Unmanned Aircraft Systems (UASs) have advanced technologically and proliferated exponentially over the past decade. As technology has progressed, both reconnaissance and attack capabilities have matured to the point where UASs represent a significant threat to Army operations from both state and non-state actors. UASs are categorized by groups based on their size, speed, and operating altitudes. UAS Groups 4 and 5 are large, high-flying, long-distance platforms. UAS Group 3 is smaller, slower, and shorter ranged than Groups 4 and 5. UAS Groups 1 and 2 are systems with very small airframes and limited range. Low, slow, and small (LSS) UASs are defined as Groups 1-3, which current AMD systems find difficult to detect, identify, and defeat. The Army concentrates its counter-UAS efforts on defeating Groups 1-3 using a combined arms approach. These UAS threats range from simple off-the-shelf, remote-controlled vehicles to highly sophisticated intelligence, surveillance, and reconnaissance (ISR) and lethal attack platforms capable of kinetic and/or non-kinetic action against friendly forces. Both lethal and ISR UASs are being incorporated into the forces, doctrine, and tactics associated with other threat capabilities. The extensive range of platforms in terms of size, velocity, range, altitude, flexibility, and capability make this a very challenging mission area for AMD systems. New drone swarm technology also adds an extremely dangerous capability to the enemy UAS threat set. Drone swarms can be remotely operated, fly autonomously, or may accompany ground vehicles and aircraft that attempt to harm our troops.

f. With the reemergence of long-term strategic competition with revisionist powers (China and Russia), FW/RW aircraft are again threats that our AMD forces must prepare to defeat. The most concerning FW aircraft are 5th generation fighters using low-observable technology and advanced RW attack platforms employing accurate and lethal air-to-ground weapons that may outrange U.S. capabilities.

g. Rockets, Artillery, and Mortars (RAM) is an enduring threat that our AMD forces are actively countering today. The sheer volume and capability of these threats creates a significant challenge for our limited capacity and will continue to expand in the near and mid-term.

h. The most stressing threat is a complex, integrated attack incorporating multiple threat capabilities in a well-coordinated and synchronized attack. These attacks include off-axis approaches for CM and lethal UAS to neutralize our defensive capabilities and attack our critical assets. The challenge and lethality of this capability increased with the introduction of more complex electronic and cyber-attacks. We expect our adversaries to increasingly rely on cyber and electronic attacks to enable their anti-access/area-denial (A2/AD) strategies. Our ability to successfully counter these advancing threats will rely heavily on our increased use of space and high altitude-enabled capabilities in a GPS-denied environment.

5. Army AMD in support of Multi-Domain Operations

a. For the Army to succeed in large-scale combat operations, our AMD forces must be able to execute three essential tasks across the MDO framework. First, AMD must protect maneuvering forces, and their fixed and semi-fixed assets. This protection requires the fielding of Maneuver-Short Range Air Defense (M-SHORAD), Indirect Fire Protection Capability (IFPC), and an integrated, common, networked command and control (C2) capability, which is the Integrated Air Defense Battle Command System (IBCS). Second, AMD must defend critical assets in the theater and operational support areas against complex, integrated attacks. Defense against these attacks requires fielding IBCS, Patriot/Lower Tier Air and Missile Defense Sensor (LTAMDS), and IFPC. Finally, AMD capabilities must converge to help the joint force air component commander or area air defense commander create windows of superiority in the air domain that the joint force can exploit. The ability to do this requires fielding IBCS at all echelons and the appropriate joint fires mix of sensors and shooters to defeat the full range of aerial threats.

b. AMD is vital to the Army's ability to conduct MDO. As such, AMD is a critical enabler of the Army's ability to compete in all domains, and if competition fails, its ability to penetrate and dis-integrate enemy A2/AD systems and exploit the resultant freedom of maneuver to achieve strategic objectives. While not comprehensive, AMD's role in support of the Army's execution of the stated critical tasks in MDO include:

5.b.1. Compete

- Conduct deception - Given the visibility of Army AMD assets (Patriot, Terminal High Altitude Air Defense (THAAD)), AMD forces can be an effective tool in theater deception operations.
- Execute counter-reconnaissance - Forward stationed/ deployed Army AMD elements are vital to early warning, monitoring and dissemination of information to partner nations for their use in countering enemy air reconnaissance (Sentinel, Patriot, and the Lower Tier AMD Sensor (LTAMDS)).
- Demonstrate a credible deterrent capability - The visibility and defensive nature of Army AMD capabilities, forward stationed or strategically deployed, send an unambiguous signal to adversaries and assure our allies and partners of U.S. commitment (Patriot, THAAD, Ground-based Midcourse Defense (GMD), and AN/TPY-2 Forward Based Mode (FBM) radars). Joint and combined exercises conducted with allies and partners demonstrate our ability to protect critical theater assets and enable penetration and dis-integration of A2/AD, defeat surprise attacks and conduct strategic and operational maneuver.

Air and Missile Defense is vital to the Army's ability to conduct multi-domain operations

5.b.2. Penetrate A2/AD

- Neutralize enemy long-range systems - During a penetration of enemy A2/AD, AMD assets play an important role in preventing enemy attempts to regain the initiative with fires (M-SHORAD, IFPC, Patriot, THAAD).
- Deny enemy objectives - Short-range air defense consisting of M-SHORAD and IFPC, combined with other AMD assets from the Support Areas through a common, integrated, and networked C2 capability (IBCS) enable freedom of cross-domain maneuver.
- Degrade enemy long-range ISR - Theater AMD (Patriot, LTAMDS) contributes to the counter-aerial ISR effort.
- Protect and harden Army pre-positioned stocks (APS) - Forward presence, early entry, and ally and partner AMD assets protect APS (and other critical theater assets) from long-range aerial threats.

5.b.3. Dis-integrate A2/AD Systems

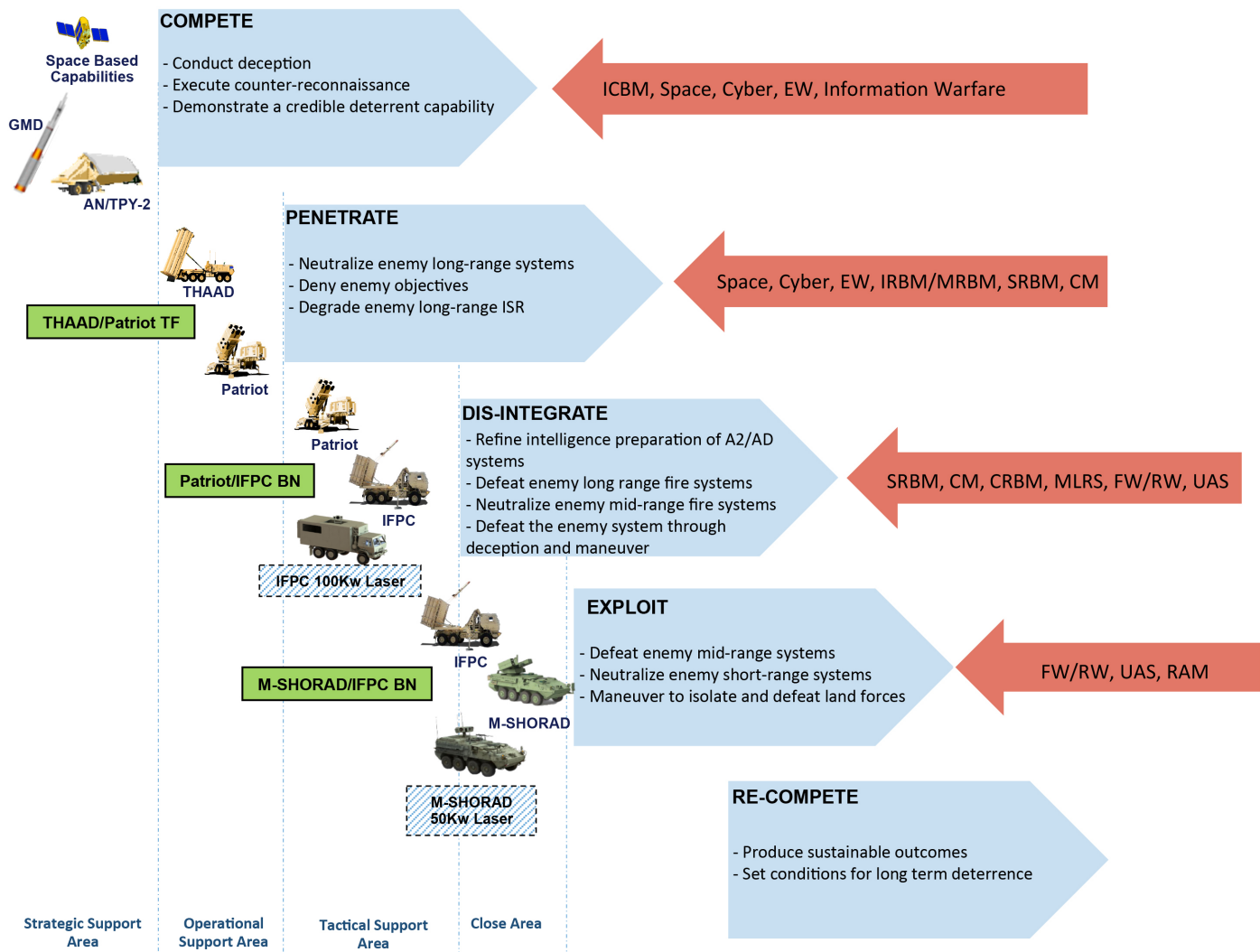
- Refine Intelligence Preparation of A2/AD systems - AMD sensors (Patriot, LTAMDS, Sentinel, and FBM radars) contribute to the air portion of the IPB effort and ensure common understanding of the air domain.
- Defeat enemy long-range fires systems - AMD sensors and C2 are critical enablers for "seeing" long-range fires (BM, CM, LRR) systems during launch and providing point of origin data to Army and joint strike capabilities. Additionally, as offensive fires and other strike assets are used to destroy enemy long-range fires, theater Army AMD assets (Patriot, THAAD, FBM), integrated with joint and multi-national AMD forces, must defend against launched aerial threats.
- Neutralize enemy mid-range fires - AMD forces (IFPC) must be prepared to counter enemy mid-range fires that target C2 and critical support nodes.
- Defeat the enemy system through deception and maneuver - AMD forces support deception (sensor management) and enable freedom of cross-domain maneuver (M-SHORAD).

5.b.4. Exploit freedom of maneuver

- Defeat the enemy's mid-range systems - AMD forces (IFPC) must be prepared to counter enemy mid-range fires that target C2 and critical support nodes. As with the defeat of long range systems discussed earlier, AMD sensors and C2 are critical enablers for "seeing" long-range fires systems during launch and providing point of origin data to Army and joint strike capabilities.
- Neutralize the enemy's short-range systems - As the division converges capabilities to achieve this objective, it will coordinate with the field army to integrate its M-SHORAD and IFPC assets with the joint air campaign.
- Maneuver to isolate and defeat land forces - AMD forces enable freedom of cross-domain maneuver by providing early warning, supporting the de-confliction of the air domain and defeating aerial threats which could disrupt/interdict the division's scheme of maneuver to isolate and defeat enemy land forces (M-SHORAD and IFPC).

5.b.5. Re-compete to consolidate and expand gains

- Produce sustainable outcomes - AMD forces re-position to protect critical assets and forces in order for the field army to consolidate gains.
- Set conditions for long-term deterrence - Army AMD forces, in concert with joint and partner AMD assets, re-calibrate force posture to ensure long-term deterrence against air domain exploitation by the defeated adversary or their proxies.



AMD in support of Multi-Domain Operations

6. Army AMD 2028 Design, Lines of Effort and End State

6.1 Assumptions and Risk

a. Army AMD 2028 assumes risk in some baseline assumptions that, if not true, could delay or negate our ability to deliver the required capabilities by 2028. It assumes that force allocation will remain relatively constant, neither significantly increasing or decreasing through 2028. Should force demand significantly decrease, the momentum gained for growth could decline in favor of other priorities, thereby reducing resources (materiel and personnel) needed to achieve the AMD force of 2028. Should force allocation significantly increase, there is risk of pushing equipment and people beyond the breaking point with unsustainable OPTEMPO.

b. Army AMD 2028 assumes predictable, adequate, sustained, and timely funding for programs. The AMD modernization plan requires committed investment in manpower and materiel through 2028 and beyond. Decrements to funding against specific programs, or to the portfolio overall, will widen gaps in capability and capacity that increase risk to the warfighter. Because the programs are complementary parts of a layered and tiered defense, reductions in one system will reduce the capability of the portfolio.

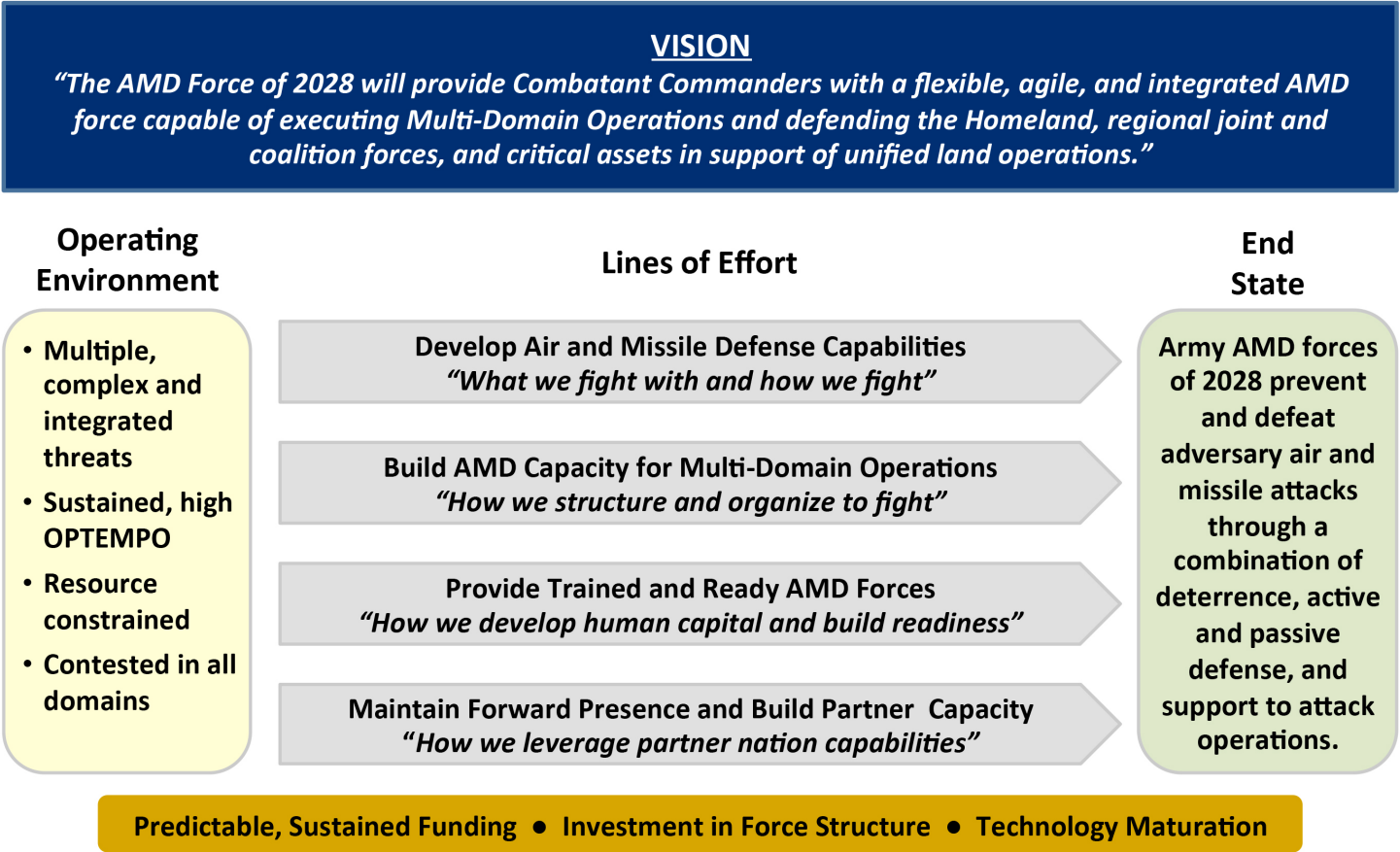
c. Army AMD 2028 assumes that research and development (R&D) efforts will deliver programmed capabilities by 2028. The AMD modernization plan is dependent on the additive capabilities provided by directed energy (DE) and advanced sensors. Significant delays to the programmed delivery dates of these capabilities will leave the force with capability and capacity shortfalls, resulting in the adversary gaining advantage with systems that will overmatch our defenses.

d. Army AMD 2028 assumes adequate investment by the joint force in strategic lift and forcible entry capabilities. Strategic and operational AMD assets require significant mobility and infrastructure support. To be effective in an A2/AD environment and support MDO, AMD forces must be rapidly deployed and employed, in most cases prior to execution of hostilities. Without sufficient strategic lift and the ability to create and maintain a forced entry position, AMD forces risk being poorly positioned to support strategic, operational, and tactical maneuver.

6.2 Ends, Ways, and Means

a. The operating environment challenges us to sustain current mission readiness while simultaneously modernizing and transforming the force to overcome shortfalls in capability and capacity, and to meet future challenges in a resource-constrained environment. The Army AMD force of 2028 end state (Ends) is a force that is able to prevent and defeat adversary air and missile attacks through a combination of deterrence, active and passive defense, and support to attack operations. To achieve this (Ways), the Enterprise will execute four distinct, but interrelated lines of effort (LOEs). The AMD Enterprise will 1) Develop AMD capabilities; 2) Build AMD capacity for MDO; 3) Provide trained and ready AMD forces; 4) Maintain forward presence and build partner capacity. Execution of the LOEs requires short- and long-term commitments both within and from outside the Enterprise. We must have (Means): 1) Predictable, sustained funding for materiel modernization and development, including the resourcing of sustainment and maintenance functions of fielded capabilities; 2) Increased investments in infrastructure, manning, and equipping of both the operating and generating forces; 3) The maturation and integration of new technologies into the force in time to achieve and maintain adversary overmatch.

b. Each LOE has a lead office that is actively developing and updating their associated roadmaps and decision points. When coordinated through the DOTMLPF-P process and informed by continuous evaluation and assessment, the LOEs provide the guidance and direction that shapes the supporting efforts to meet the desired AMD end state.



AMD 2028 – Vision, Ends, Ways, and Means

6.3 Lines of Effort

6.3.1. LOE 1 Develop Air and Missile Defense Capabilities

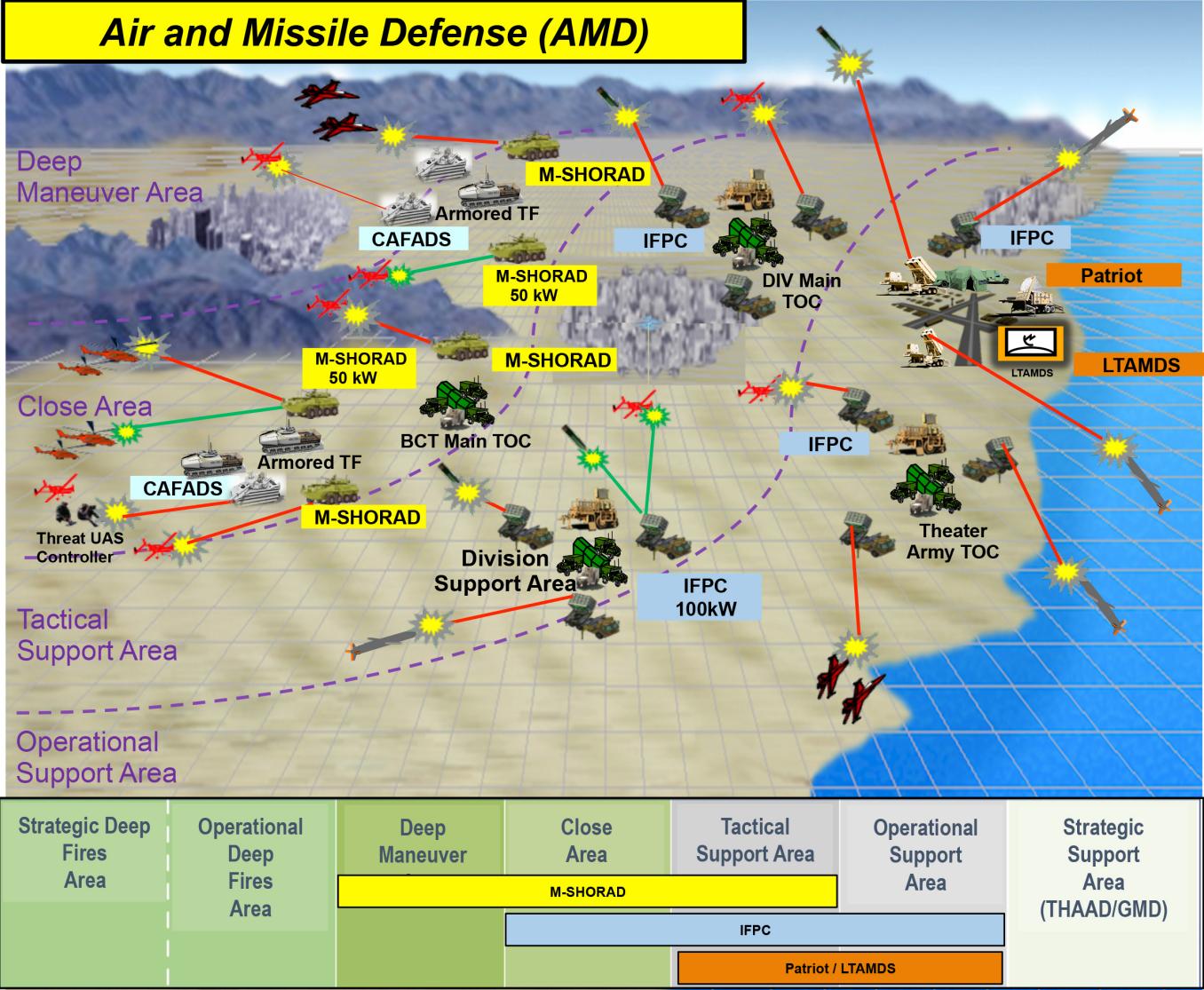
6.3.1.1. The AMD Problem: Complex, Integrated Attack Through the Air Domain

Threats in and through the air domain are the predominant concern of AMD, as these threats can create catastrophic impacts on the homeland and threaten national objectives at the strategic level through military missions at the tactical level. These aerial threats consist of a wide range of missiles, aerial platforms, rockets, and projectiles. Of these, ICBMs pose the most dangerous threat, while the most likely aerial threats are intermediate range and theater class BM, CM, UAS, RAM, and FW/RW aircraft. These aerial threats become increasingly dangerous when the enemy employs them in force as a complex, integrated attack, arriving near-simultaneously from different directions, altitudes, and ranges on friendly forces and assets.

6.3.1.2. AMD Components of the Solution

The current Army AMD portfolio consists of systems and capabilities to deny, disrupt, and defeat air and missile threats, from outside the atmosphere to within the atmosphere and across the strategic, operational, and tactical operating areas. Army AMD units conduct five different missions: ballistic missile defense (BMD), cruise missile defense (CMD), defense against manned FW/RW aircraft, counter-UAS (C-UAS), and counter-rocket, artillery, and mortar (C-RAM). These areas span the MDO framework: the BMD capabilities protect assets in the Strategic through Tactical Support Areas and assist other forces in getting to and conducting the deep fight. CMD and FW/RW aircraft defense forces protect assets in the Operational and Tactical Support Areas and the Close Area. The C-UAS and C-RAM capabilities support the fight in the Close Area. Many Army AMD sensors

and shooters have capabilities against more than one threat set. Satellites supplement the surveillance capabilities of ground-based sensors, enable long-range communications, and provide situational awareness and warnings. In the future, the Army will organize multi-mission AMD battalions with a mix of capabilities (THAAD/Patriot, Patriot/IFPC, M-SHORAD/IFPC) and employ tailored force packages (composite battalion/ battery/platoon sized) as the mission dictates.



AMD Components of the Solution

6.3.1.2.1 Ballistic Missile Defense.

a. The GMD system, AN/TPY-2 FBM radars, THAAD, and Patriot are the key BMD capabilities in the AMD enterprise. The Army operates the MDA developed Command and Control Battle Mangement Communications system (C2BMC) and Ground-Based Interceptors (GBIs) as part of the Ballistic Missile Defense System (BMDS), providing a credible deterrent and a capability to counter ICBMs. AN/TPY-2 FBM radars provide surveillance, tracking, external cueing, launch and impact estimates, and discrimination of BMs during the boost phase. THAAD can defeat short-, medium-, and intermediate-range BMs in defense of strategic and operational assets in theater and across Combatant Command regions to support both homeland and regional missile defense. Using Guidance Enhanced Missiles (GEM), Patriot can defeat close-, short-, and medium-range BMs, providing lower-tier defense, and also defeat CMs, FW/RW aircraft, and UASs. Patriot’s Advanced Capability-3 (PAC-3) Cost Reduction Initiative (CRI) and Missile Segment Enhancement (MSE) interceptors provide a hit-

to-kill capability against ballistic missiles. The MSE interceptor fills the engagement gap between the THAAD and PAC-3 CRI missiles; it also defeats advanced threats earlier, at greater range, and with increased lethality. The Patriot radar provides search, detection, target tracking and missile guidance. Fielded in the early 1980s, the current Patriot radar is approaching the end of its service life. LTAMDS will replace the current Patriot radar, increasing detection and tracking capabilities. LTAMDS will provide dramatically improved sensing capabilities and address complex integrated attacks. LTAMDS also maximizes the full kinematics of the Patriot missile set. As a state of the art sensor, LTAMDS will mitigate the obsolescence challenges of the Patriot radar.

b. The Joint Tactical Ground Station (JTAGS) processes direct downlink data from Overhead Persistent Infrared (OPIR) satellites, then disseminates BM warning or special event messages to warfighters in support of Combatant Commanders over multiple theater communication systems. Four operational detachments, located in Korea, Japan, Italy, and Qatar, provide situational awareness and early warning from a multitude of theater and strategic threats. JTAGS is upgrading to “Block-II” via a pre-planned product improvement which provides improved prediction and reporting times.

c. Recent and rapid advancements in adversary capabilities, including hypersonic glide vehicles, multiple reentry vehicles, and highly maneuverable warheads pose significant risk to our forces and assets. Working with the MDA and our sister services, the Army must continue to vigorously pursue capabilities and technologies to counter the advancing BM threats through advanced interceptor and sensor programs.

6.3.1.2.2. Protecting the Maneuver Force

a. While Army AMD forces provide capabilities against BM threats, they do not possess adequate defenses against air threats to the maneuvering forces in the close fight and the fixed and semi-fixed assets that support maneuver forces. The re-emergence of great power competition has left our maneuver forces and key assets vulnerable to enemy air surveillance, targeting, and attack from aerial platforms.

Additionally, enemy indirect fires enhanced through the employment of UASs, threatens our ability to protect and sustain the force, leading to potentially higher friendly attrition, loss of initiative, and reduced freedom of action. Consequently, AMD forces are challenged to support the “close fight” with our current capabilities.

The re-emergence of great power competition has left our maneuver forces and key assets vulnerable to enemy air surveillance, targeting and attack from aerial platforms

b. Today’s Avenger units lack the survivability, mobility, range, and lethality required to provide modern maneuvering forces with the necessary protection from air threats. To defeat the evolving and increasing air threat — low, slow, and small UASs, FW aircraft with smaller radar cross sections, RW aircraft with longer attack standoff ranges, and CMs with increased accuracy — air defenders must be able to operate alongside maneuvering forces in the close area and defeat the threats employed against them at increased ranges. As part of the response to these requirements, the Army is expanding the number of AMD short-range systems, enhancing SHORAD capabilities and growing AMD formations.

c. The Army’s SHORAD vision embraces three complementary efforts: defense of the maneuvering force, defense of fixed and semi-fixed assets, and combined arms for air defense. The first effort is defense of the maneuvering force. Today’s maneuver formations have limited ability to detect and engage aerial threats. Without such capabilities, maneuver formations are at risk of continuous surveillance by threat UASs and subsequent aerial attacks. M-SHORAD will provide a maneuverable and survivable dedicated AMD capability in direct support of a maneuvering force against threat FW/RW aircraft and UASs. The Army recently selected the configuration for the first four M-SHORAD battalions. Missile, gun, and radar systems will be integrated into a single mission equipment platform on the Stryker chassis and will include existing Army capability enablers

(including Forward Area Air Defense C2, voice/data radios, and mission command data feeds). The system will be capable of allowing growth of additional effectors to include directed energy (DE) (including both high energy lasers and high power microwave weapons) and electronic warfare (EW) to increase range and lethality. An initial fire unit with 12 systems is projected for fielding in FY21. M-SHORAD will begin to integrate a laser with an initial capability projected in FY24. By 2028 M-SHORAD battalions will field a mix of DE and missile-based systems, with an increasing ratio of DE as the objective force for 2034 is fielded.

d. The second effort addresses protection at critical fixed and semi-fixed assets. The Army's plan is to replace current SHORAD systems with a new capability — IFPC. IFPC, using a kinetic (missile) interceptor, a networked sensor, and a common, networked C2 capability (IBCS), will provide a transportable, multi-threat defense capability against CMs, UAS Groups 2 & 3, and RAM. Developmental efforts will prioritize counter CM and UAS capabilities and address the RAM threat set with a missile and DE mix as technology evolves. Initial operational capability is planned for FY23. Sensor upgrade anticipated in FY25 will further enhance the IFPC capability by providing increased range and detection capability, enabling earlier engagement, along with advanced electronic protect for survival on the battlefield. Additionally, to address the urgent need for protection from CMs, the Army is planning to field two batteries of interim IFPC capabilities by 4th Quarter FY20. The High Energy Laser Tactical Vehicle Demonstrator will be used to develop a laser capability to be incorporated into IFPC. This additional weapons mix will increase capability to counter RAM threats.

e. M-SHORAD and IFPC are complementary systems that provide a tiered defense of critical formations and assets. The IFPC is planned to contribute to this tiered defense with a greater capacity (magazine depth) for engagements of CMs and UASs targeting fixed and semi-fixed assets. M-SHORAD trades magazine depth for the mobility and survivability required to move with maneuver forces. M-SHORAD and IFPC have distinct roles and are not interchangeable. IFPC will not adequately maneuver with our combat forces, and M-SHORAD is not designed to defeat advanced CM threats that will target friendly operational and strategic assets. The integration of DE for both programs will contribute to lower engagement costs and increase the magazine depth that is needed to penetrate and dis-integrate enemy A2/AD systems by 2028.

f. The third effort of the Army's SHORAD vision focuses on the combined arms contributions to air defense. Even with anticipated growth, the AMD force will not have the number of units and systems to provide the defenses required. To address this gap, combined arms contributions to air defense consists of defensive actions taken by a unit using organic weapons and employing passive defense measures. Passive defenses are those actions taken to limit or mitigate the effects of an aerial attack, including, but not limited to, attack avoidance, dispersion, directed and sensor provided early warning, and camouflage, cover, and concealment. In the case of passive defense, unit commanders must make a risk assessment in the confidence of their ability to adequately camouflage, harden, and disperse as a means to protect the force. Although countering air threats and early warning is a shared joint and combined arms responsibility, in some situations, combined arms for air defense are the only air defense capabilities available to maneuver formations, especially for countering some UASs. The Army reintroduced organic man-portable air defense (MANPADS) teams into the maneuver force and continues to assess this initiative.

6.3.1.2.3. Common Integrated and Networked C2 (IBCS)

a. The Army's common integrated and networked AMD C2 capability, IBCS, will allow the warfighter to fully integrate joint and multinational AMD capabilities across all echelons. IBCS, planned to begin fielding in FY22, will also provide the commander the ability to tailor the force to provide the most effective layered tier of sensors and shooters to defeat aerial threats. In keeping with the C2 concept for MDO, IBCS will:

- Rapidly converge sensors, shooters, and C2 components on an integrated fire control network.
- Enable convergence of joint offensive and defensive fires and space capabilities.
- Enable the agility to support flexible command relationships across all echelons.

- Enable the rapid planning, dissemination, and implementation of flexible, time-sensitive control measures, which are critical to the convergence of capabilities and friendly protect in the congested, highly contested air domain.

b. When fully fielded, IBCS will be a game changing capability, allowing AMD forces to be tailored and scaled appropriately to meet the given threat. The right number and mix of capabilities can be task organized into a formation with an inherent, integrated C2 system. The IBCS open architecture will enable rapid integration of legacy and developmental sensors and shooters, providing capabilities to defeat emerging threats in Multi-Domain Operations.

c. IBCS, when fielded will enable integration between future fires forces. In the future, reliable, rapid, and agile linkages between sensors and shooters will provide cross domain data to both offensive (Long Rang Precision Fires (LRPF)) and defensive (AMD) fires. Informed by the sensor network, target data will be available to fires networks; appropriate shooters (offensive and defensive) will pair quickly, either automatically or by a decision maker, and fires will be delivered across all domains.

d. As new cyber and space-based capabilities are developed and deployed, the AMD community must ensure a coordinated approach to fully incorporate them. Future offensive and defensive cyber capabilities will be critical to the success of future AMD forces. Similarly, Assured Positioning Navigation and Timing (APNT) is a critical enabling space-based capability for AMD forces. The AMD community, through close coordination with TRADOC and Army Futures Command's Cross Functional Teams, must actively participate in the cyber and space-based capabilities requirements and development processes to reduces risk, ensure commonality, and reduce materiel solution costs and development timelines.

6.3.2. LOE 2 Build AMD Capacity for Multi-Domain Operations

a. The investments in modernizing systems and developing advanced capabilities will have limited impact without commensurate investments in forces and force structure to employ them. The AMD force must be agile, rapidly tailorable, scalable, and able to fight multiple, complex, integrated attacks. These formations must be able to seamlessly integrate with each other and the supported force, both horizontally and vertically, using the IBCS common C2 architecture to provide situational understanding, decision flexibility, and resource allocation for the commander.

b. Balancing new AMD growth with required AMD capacity must be closely managed so as not to imbalance the portfolio. Existing units must be sustained while growing new units (M-SHORAD, IFPC). Of critical importance is the management of the junior noncommissioned officer (NCO) and warrant officer (WO) ranks who form the operational nucleus of the units. In the near term the demand for NCOs and WOs will outpace the available force pool. The ADA branch must develop and implement innovative recruiting and manning strategies until the force pool grows to meet requirements. Additionally, to maintain sufficient unit manning in the operating force the Enterprise must also sustain the quality and increase the quantity of instructors in the generating force.

c. Force structure must complement the MDO concept and provide commanders with the necessary flexibility and capability to counter the increasingly complex and dynamic air threat. Units containing a mix of capabilities must be integrated at all echelons, creating a layered defense in depth while optimizing force structure. Such integration is currently taking place with THAAD and Patriot. While not finalized, the future AMD force structure is currently planned to consist of multi-mission units such as Patriot/THAAD, Patriot/IFPC, and M-SHORAD/IFPC. Because the units will have a mix of capabilities in their formations, commanders can rapidly task organize and employ them at any echelon to achieve the best possible defense based on the threat.

d. The most critical near and mid-term capacity gaps are maneuver force protection and countering air threats. Maneuver force protection is being addressed by the growth of M-SHORAD battalions. In accordance with the CSA's directive, four battalions (144 systems) will be fielded by FY23 with a desired end state of one battalion

per division in the active and reserve components. The initial battalions will respond to the urgent needs of U.S. European Command. M-SHORAD units will provide capability against UASs and FW/RW aircraft threats to maneuver forces. The second capacity and capability gap is countering CM, FW/RW aircraft, RAM, and UAS threats to fixed and semi-fixed assets. The Army is addressing this gap with IFPC. AMD leaders envision an IFPC capability assigned as part of each Patriot and M-SHORAD battalion. In conjunction with the increases in M-SHORAD and IFPC units, the addition of AMD brigade level organizations to provide administrative, logistic, and operational C2 are required.

6.3.3. LOE 3 Provide Trained and Ready AMD Forces

6.3.3.1. A Trained AMD Force

a. Critical to Army AMD's success in MDO is training and developing flexible and adaptive AMD Soldiers and leaders who are able to master AMD's core competencies, expertly employ current systems, and fully exploit new capabilities as they are fielded (IBCS, M-SHORAD, and IFPC). Training must be tough, realistic, iterative, and battle-focused. Air defense forces will leverage the Synthetic Training Environment which will integrate virtual, constructive, and gaming training environments into a single environment.

b. To focus AMD training and education efforts across the force, the 2018 Air Defense Artillery Training Strategy defined five AMD core competencies: (1) Understand AMD Capabilities and Doctrine, (2) Synchronize AMD Operations (across Warfighting Functions and Joint/Coalition AMD), (3) Conduct AMD Mission Command, (4) Execute AMD Force Operations, (5) and Execute AMD Engagement Operations.

c. The approach to achieving mastery of our competencies is expressed in the 2013 Army Leader Development Strategy and the 2016 Training and Education Concept to Support Air Defense Artillery Transformation. These documents describe three essential elements (training, education, experience) in professional development and the mastery of the craft.

d. Ensuring our AMD core competencies are understood and mastered across the entire force requires the thorough analysis of existing training and education programs and the willingness to design and implement change as necessary to keep pace with changing requirements. These efforts must be synchronized across the domains of DOTMLPF-P. Leaders must implement the programs and initiatives required to field an AMD force prepared for MDO across the Army's three domains of learning: the Institutional Domain, the Operational Domain and the Self-Development Domain. These domains are described in the 2016 Training and Education Concept to Support Air Defense Artillery Transformation and the 2018 Air Defense Artillery Training Strategy and constitute training and education requirements that must be adequately resourced to provide the Army with the AMD Soldiers and leaders needed to execute AMD in support of MDO.

e. To achieve a trained AMD force, there must be the necessary investments in the generating force and institutional training base(s) to support the operating force. Procurement and sustainment plans need to include sufficient assets to support the school house(s), and only the most qualified should be selected to serve as instructors.

f. Immediate investments are needed to update the Army's test and operational training ranges, especially in the areas of radars, optics, telemetry, and integrated networks to provide rigorous testing, realistic environments, and relevant operational conditions. These investments are necessary to maintain current warfighter capabilities while accommodating experimentation and rapid transitions of new capabilities being delivered to the warfighter. The ability to conduct realistic training and live fire events over expanded battlespaces, with faster and more lethal interceptors, and new technologies such as EW and DE necessitate a significant increase in our current range capabilities.

g. In order to evaluate and provide an effective and cost efficient AMD capability for a variety of engagement and threat scenarios, test and operational training ranges must be able to support experimentation. Specifically, the Army must conduct experimentation and evaluation of integrated AMD capabilities, including the rapid insertion of new concepts. Warfighter experimentation with the integrated systems (including DE, kinetic, cyber, and EW weapons) is critical to defining concepts of employment, concepts of operations, tactics, techniques, and procedures (TTPs), and possible rules of engagement prior to deployment. The test and evaluation community, in concert with the Fires Center of Excellence, needs to include the capability to support such experimentation by providing appropriate physics-based modelling and simulation, wargaming, and evaluation tools. At least one test range should be capable of supporting system of systems live fire testing/training capability utilizing joint, integrated C2 nodes and architectures, joint suites of operational-quality sensors (including ground, air, sea, and space), and full kill chain evaluations. This will aid in a more rapid transition of an optimal mix of AMD capabilities while simultaneously reducing risk. The Virtual Warfare Center provides an ideal capability to conduct experimentation and wargaming with a real-time, operator-in-the-loop simulation environment and should be leveraged by the warfighting and acquisition communities.

h. The Enterprise must continue to emphasize integration with supported maneuver units through habitual planning and training events and large-scale exercises such as rotations to the Combat Training Centers (CTCs). These events provide a critical venue for air defense leaders to learn how to operate in support of maneuvering forces while simultaneously educating the supported forces on the capabilities that AMD brings to the fight. Adversary representations at the CTCs must replicate current and emerging threats and adversary TTPs.

6.3.3.2. A Ready AMD Force

Developing capabilities (LOE 1) and providing sufficient capacity (LOE 2), combined with training the force (LOE 3) set the initial conditions for success of our AMD formations as they support MDO. AMD forces have been operating in a high OPTEMPO environment for the last 25 years, however, MDO will require units to maintain higher levels of sustained readiness. To address this challenge, leaders at all echelons must ensure they are dedicating the necessary time and resources to training readiness, equipment readiness, and Soldier and Family readiness.

6.3.3.2.1. Training Readiness

Leaders and Soldiers must sustain those critical, mission specific skills associated with their military occupational specialty (MOS). To maintain proficiency, institutional training, on the job experience, and individual learning opportunities must provide the Soldier with sufficient recurring exposure to those tasks associated with their assigned MOS. As new weapons systems are developed, fielded, and modernized, it may be necessary to establish new MOSs or additional skill identifiers.

6.3.3.2.2. Equipment Readiness

Obsolescence, high OPTEMPO, and harsh operating environments have challenged AMD equipment readiness over the past 25 years. New AMD capabilities and the high OPTEMPO of MDO will require innovative and more efficient ways of maintenance and resupply that ensure AMD capabilities are available to commanders in a timely manner. Sustainment of AMD capabilities in the decentralized, dispersed operations envisioned within MDO require flexible, adaptable logistics support strategies informed by analysis of system capabilities, operational requirements, and transportation timelines.

6.3.3.2.3. Soldier & Family Readiness

The lessons from the past 16 years of low-intensity conflict, characterized by multiple deployments, have helped to inform leaders of the policies and procedures they must implement to ensure today's Soldiers and

Families are prepared for the challenges they will face. AMD leaders must devote the time, resources, and energy to ensuring that the Army's Readiness & Resilience Strategy is implemented across the AMD force.

6.3.4 LOE 4 Maintain Forward Presence and Build Allied and Partner Capacity

6.3.4.1 Maintain Forward Presence

a. AMD contributes directly to assurance and deterrence strategies; deterring attack on the United States and U.S. forces abroad, assuring allies and partners through forward presence. Through the extensive forward presence of Army AMD assets and capabilities, the U.S. underwrites the Nation's security commitments to our allies and partners, reduces vulnerability to coercion, and provides opportunities for defense collaboration.

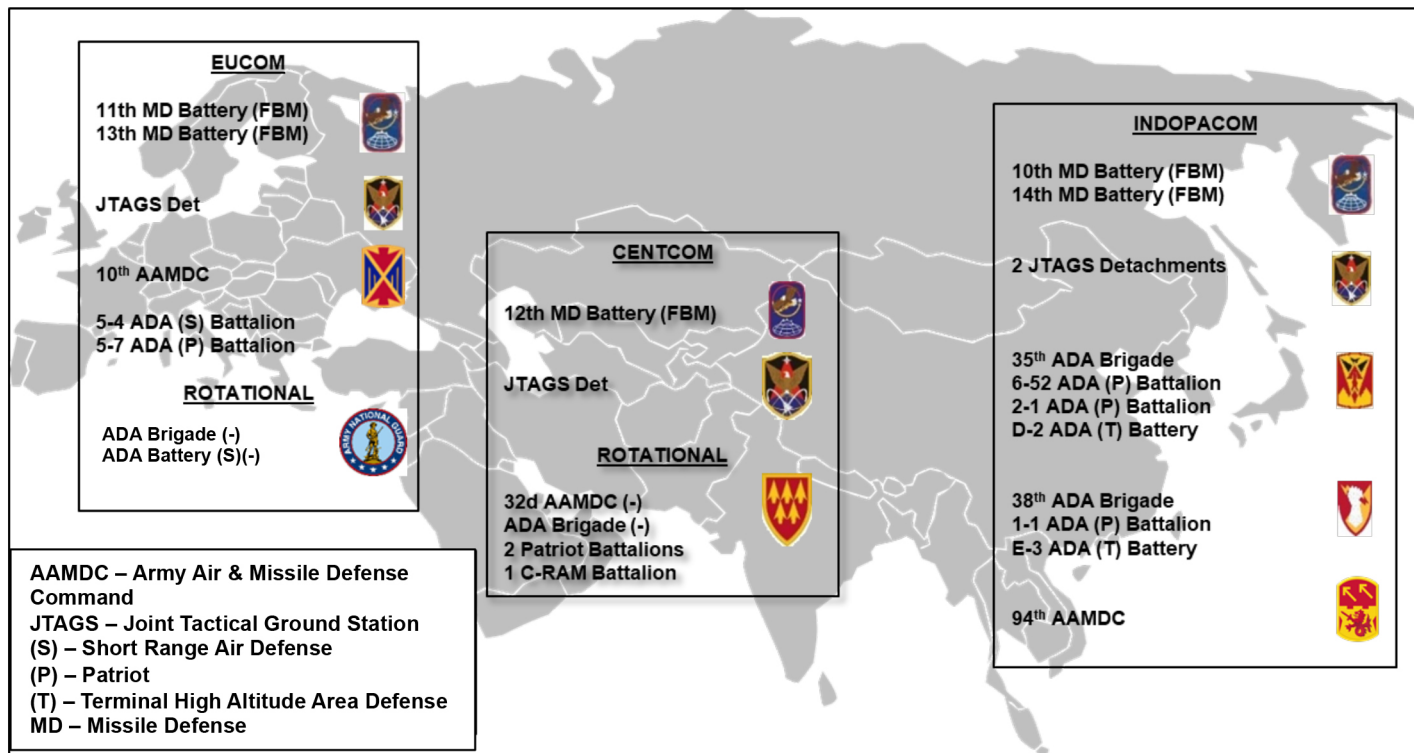
b. AMD is a critical enabler against a near-peer adversary. It is imperative to balance the trend toward a more dynamic employment framework against the need to deter enemy aggression prior to hostilities, create access, set the theater, and defeat enemy asymmetric capabilities. Army AMD, despite capacity challenges, counters a near-peer adversary's A2/AD capabilities and is a necessary enabler for the joint force in Phase 0-2 operations.

c. AMD is an integral part of the NDS and global posture. Forward deployed and stationed THAAD (USINDOPACOM), Patriot (USEUCOM, USINDOPACOM, USCENTCOM), FBM radars (USEUCOM, USINDOPACOM, USCENTCOM) and close-range systems (USCENTCOM, USEUCOM) are key components of Army AMD, serving to deter aggression and assure our allies and partners. These systems contribute to freedom of action to confront regional aggression, enable freedom of maneuver, and provide protection should deterrence fail.

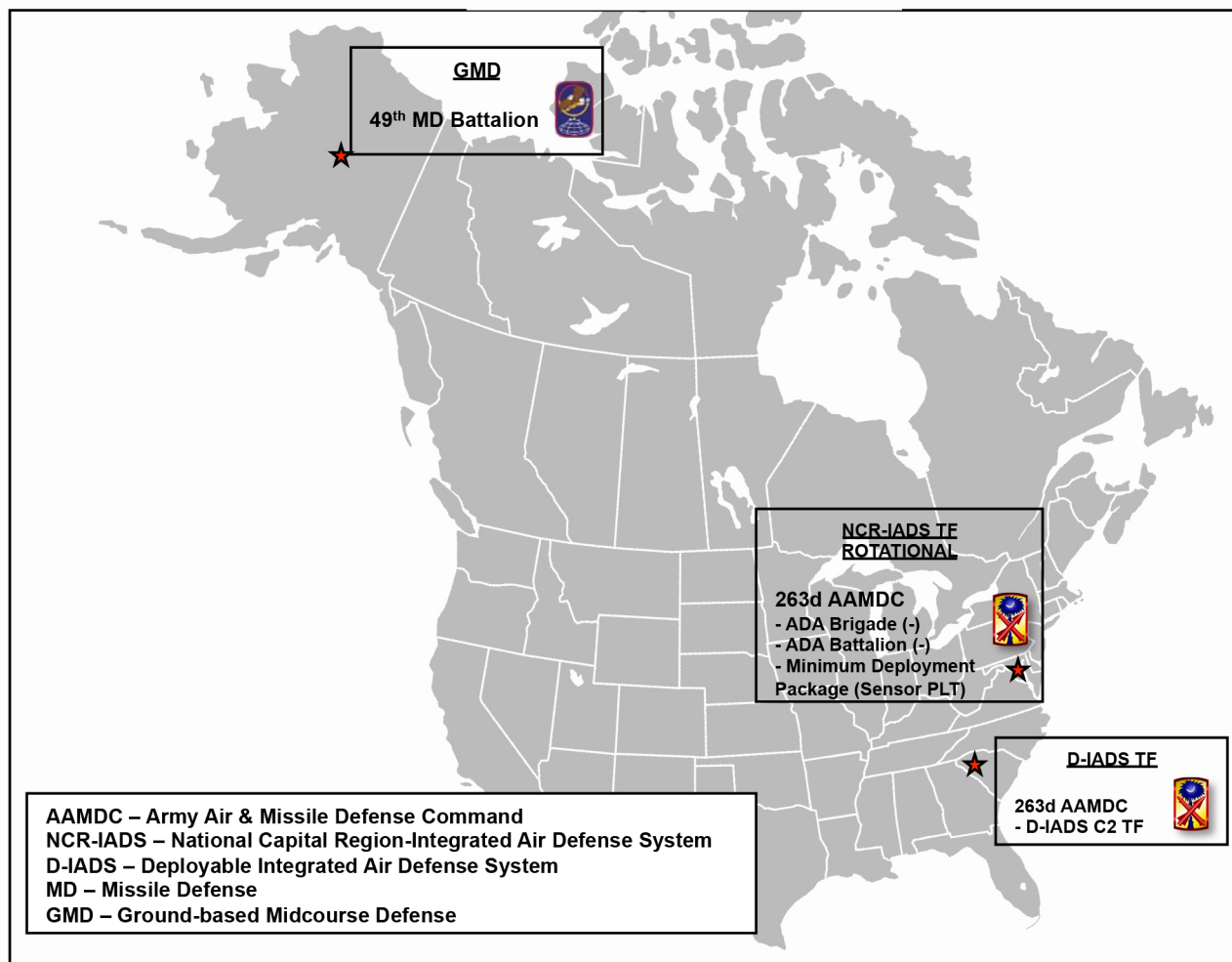
6.3.4.2 Global Engagement

Army AMD forces routinely collaborate with allies and partners across the globe, strengthening our alliances and increasing our lethality and resilience. We will pursue cooperative relations with allies and partners to reinforce and advance AMD architectures for our common protection, deterrence, and assurance. This cooperation will focus on expanding opportunities for collaboration on AMD programs, deepening interoperability in AMD systems and operations, and expanding ally and partner capacity to confront shared threats. Exercises and collective training activities designed in support of Combatant Command priorities increase interoperability and build ally and partner capacity. U.S. AMD deployments and cooperative AMD activities are also expressions of U.S. security commitments; they strengthen relations with allies and partners and reduce their vulnerability to coercive threats and attacks. They also provide opportunities for cooperative allied and partner burden sharing discussions and defense collaboration. Two examples of collaboration and building ally and partner capacity take place in USEUCOM and USINDOPACOM.

- USEUCOM. 10th AAMDC focuses IAMD allied and partner engagements across Europe primarily on interoperability and building operational depth. These engagements include joint and multi-national exercises designed to improve technical integration and experimentation. Working closely with NATO Alliance members and partners across the Eastern Flank of Europe, from Scandinavia to the Black Sea Region and south to the Mediterranean, these efforts contribute directly to the European Deterrence Initiative (EDI).
- USINDOPACOM. The 94th AAMDC conducts a series of tri- and bilateral Integrated AMD exercises, tabletops, and wargames with allies and partner nations to promote security and cooperation in the Indo-Pacific region. "We will strengthen our alliances and partnerships in the Indo-Pacific to a networked security architecture capable of deterring aggression, maintaining stability, and ensuring free access to common domains." (NDS Summary, p. 9)



AMD Forces Forward Presence - OCONUS



AMD Forces Forward Presence - CONUS

6.3.4.3. Building Ally and Partner Capacity (Challenges)

- **Foreign Disclosure (FD).** One constant challenge to building ally and partner capacity is the sensitive nature of sharing operational and technical capabilities and data with other nations. Early engagement of desired integration activities and exercises combined with persistent engagement enables the U.S. and other nations to work within the FD guidelines while maintaining sovereignty and national security.
- “A robust and durable alliance and partnership network provides an asymmetric strategic advantage that no competitor or rival can match. Security and freedom are always strongest when defended by strong broad alliances.”***

—NDS Fact Sheet, p. 2
- **Technical Integration.** Integrating technologies of varying age, national origin, capability, and specifications presents unique challenges and requires technical experts to review and develop solutions that are executable and conform to release authorities. This includes assurance that Allied systems meet U.S. cybersecurity standards to facilitate operational integration.
 - **Interoperability.** The Army Deputy Chiefs of Staff for Intelligence (DCS G2) and Operations (DCS G-3/5/7) co-signed an August 2017 memorandum noting the importance of improving the ability to “share critical information with allies and partners.” As the Army modernizes, it is critical to ensure these allied and partner interoperability requirements are incorporated into the 2018 AMD Modernization plan and the foreign military sales (FMS) letters of intent.
 - **Sufficiency.** AMD forces must work closely with allies and partners to share the responsibility with U.S. forces for the common defense. It is critical that we continue to stress the importance of aligning the BMD, C-UAS, and CMD capabilities of our allies and partners in order to provide for an AMD network of sensors and shooters that deters and defeats aggressors.

6.3.4.4. Building Ally and Partner Capacity (Way Ahead)

a. Addressing these challenges requires us to work continuously with our multinational partners and allies to improve, modernize, and synergize our global AMD posture. To implement this LOE, it is critical that the Army leverages opportunities across the national, strategic, operational, and tactical levels.

b. Methods of Implementation:

- **Foreign Military Sales:**
 - o At the national and strategic levels, our allies and partners have increased their AMD capabilities through multiple FMS purchases. Today, over 15 countries use the Patriot system, which is a significant step towards interoperability. Recent FMS purchases include the purchase of Patriot by Romania, Sweden, and Poland, and Aegis Ashore by Japan. When appropriate, the U.S. should engage and expand AMD FMS efforts with our coalition partners and encourage them to share responsibilities for AMD. This includes U.S. consideration of future FMS cases ensuring the terms of these cases do not preclude the interoperability, integration and mutual support with U.S. forces envisioned in strategic guidance.
 - o At the operational and tactical levels, commanders must reinforce the need for common systems and architecture by pursuing frequent opportunities to demonstrate U.S. capabilities. This creates a bottom-up demand for sales of these weapons systems. Enhanced capability through increased ally and partner interoperability is a cornerstone of FMS efforts.

- **Interoperability Through the DOTMLPF-P Lens:**

- o The Army will continue to train and fight with allies and partners, and therefore, it is important that they be integrated further into our operations to increase interoperability. Interoperability is the ability to routinely act together coherently, effectively, and efficiently to achieve tactical, operational, and strategic military objectives.
- o Commanders at all levels must seek out opportunities to integrate with our allied and partner nations to develop common language through TTPs, leader development, and joint combined live fire and training events. Improving rapport and increasing commonalities with our partners across the DOTMLPF-P spectrum increases the lethality of joint and coalition forces against near-peer adversaries.
- o The Army must continue to collaborate with our allies and partners to strengthen regional deterrence and demonstration of force through coalition exercises. These efforts enhance Army AMD posture by leveraging ally and partner contributions to address capability and capacity shortfalls and strengthen the efficacy of AMD architectures.
- o The desired end state is to achieve integration, or the combining of U.S. and ally and partner capabilities into a unified system of systems under a single overarching command and control, resulting in increased capacity and lethality. Interoperability is a critical step to achieve integration.

“In consultation with Congress and the Department of State...the Department of Defense will prioritize requests for U.S. military equipment sales, accelerating foreign partner modernization and ability to integrate with U.S. forces.”
– NDS Summary, p. 9

- **Persistent Engagement at All Levels of Command:**

- o The cornerstone of successful integration and interoperability with our allies and partners are relationships based on trust and open dialogue. Commanders at all echelons must be able to recognize and leverage these opportunities to strengthen our commitment to our allies and partners and our national security. Cultural awareness and education for all Soldiers is a critical element to building positive and enduring relationships.
- o The AMD Centers of Excellence in USEUCOM, USCENTCOM and USINDOPACOM are excellent resources that AMD forces need to leverage to facilitate this relationship building.

c. Through persistent engagement synchronized across all echelons of command, the Army assures our commitment to our allies and partners, and enhances our AMD capabilities and increases capacity.

7. Summary

a. The AMD force faces challenges in the future operating environment. Complex, integrated, high capacity threats from great power competitors, high OPTEMPO, limited resources, and shrinking dominance across the domains will challenge the AMD force’s ability to prevent and defeat adversary air and missile attacks. Only through synchronized execution of the four lines of effort can we achieve the Army’s AMD vision and desired end state.

b. The Enterprise needs to develop AMD capabilities to overmatch our adversaries, prioritizing protection of our maneuver forces and the ability to defeat complex, integrated attacks through the air domain. Continued

modernization of our missile defenses, including the development and fielding of LTAMDS, M-SHORAD, IFPC, and IBCS will result in a multi-mission force capable of providing protection throughout the MDO battlespace framework.

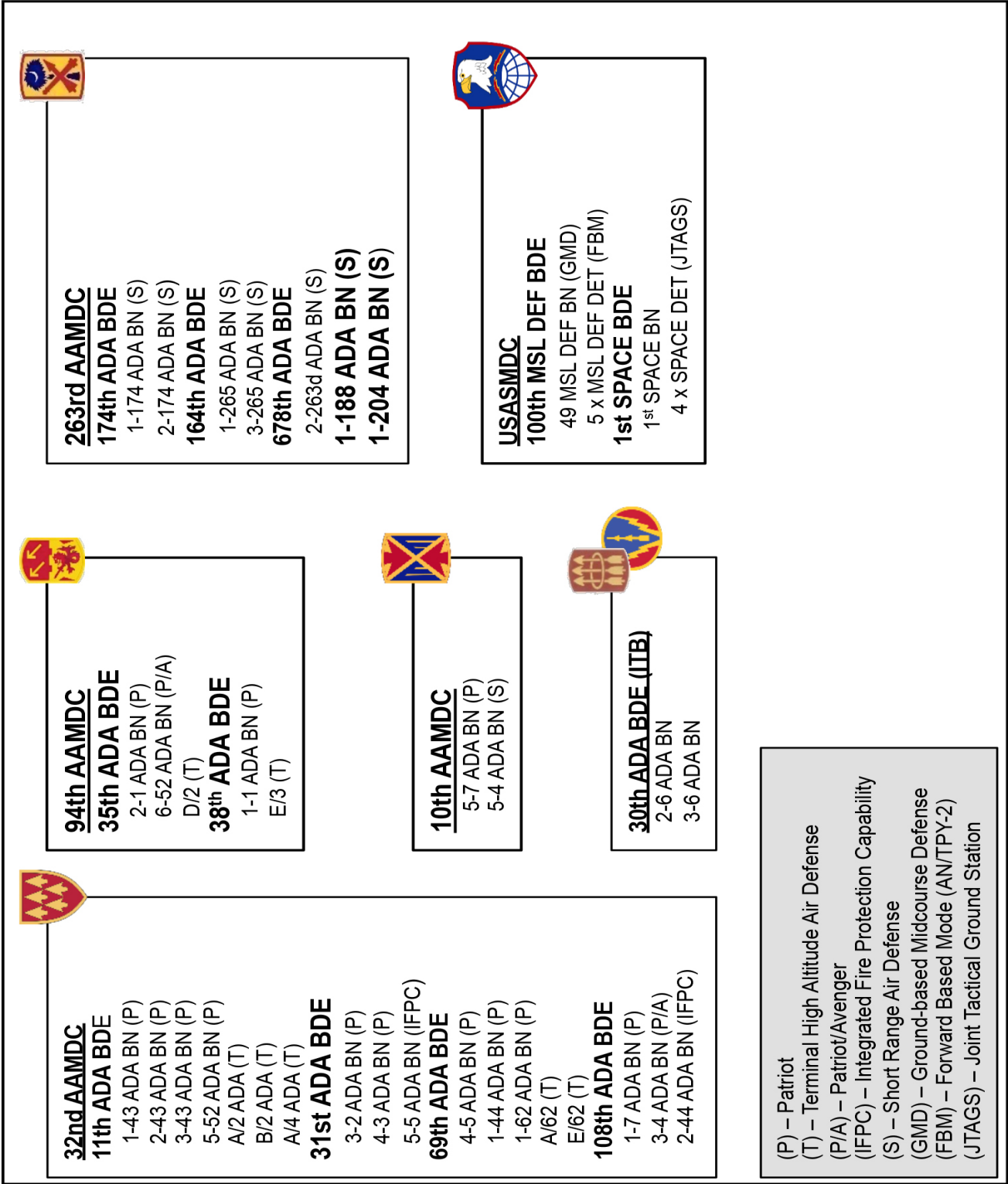
c. Investments in personnel and increased force structure must be comensurate with investments in capability. The force must be agile, rapidly tailorable, and able to defeat multiple complex, integrated attacks. Formations must seamlessly integrate horizontally and vertically with each other, and with the supported force. Force structure must complement the MDO concept and provide commanders with the necessary flexibility and capability to counter the increasingly complex threat.

d. The AMD force must be trained and ready to support MDO. Leaders and Soldiers must be masters of their craft, able to understand new doctrine underpinning the employment of new capabilities. The Army must fully resource the institutional, operational, and self-development domains of training and enhance our training ranges to enable realistic training and operational experimentation of integrated weapons systems. Leaders at all echelons must dedicate necessary time and resources to doctrine, training, equipment, and Soldier and Family readiness.

e. Through extensive forward presence, Army AMD assures our allies and partners, and provides a credible deterrent to our adversaries. The continued cooperation towards interoperability with allies and partners significantly increases the capabilities of the combined defense. The U.S. must continue to reduce the barriers of foreign disclosure, increase technical integration and interoperability, and emphasize the necessity of shared responsibility.

f. Army AMD forces of 2028, developed through this roadmap, will be postured to prevent and defeat adversary air and missile attacks through active and passive defense and support to attack operations. Properly enabled by consistent, predictable funding, investments in force structure, and technology maturation, they will be ready to deploy, fight, and win decisively against any adversary in a joint, multi-domain, high-intensity conflict while simultaneously deterring others, to defend the homeland, regional forces, and critical assets in support of unified land operations.

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US AMD Forces

Army Air and Missile Defense 2028

**The proponent for Army Air and Missile Defense
2028 is the Air and Missile Defense Integration
Division, USASMDC/ARSTRAT.
Send Comments to:**

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