SPOTLIGHT 20-2

Integrated Air and Missile Defense in Multi-Domain Operations

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> *Never more in my 32 years of knowing about the Space and Missile Defense Command, has this command been more relevant. . . . The threats are out there. The adversaries are out there. They're contesting us in different domains. We've got to be prepared to take them on.*
>
> Lieutenant General Daniel L. Karbler,
> Commanding General,
> U.S. Army Space and Missile Defense Command

Introduction

In the years following 9/11, the U.S. military has predominantly fought low-tech adversaries. In these conflicts, aerial threats to U.S. assets and forces have been rudimentary. To maximize efficiency for the counterinsurgency mission, the U.S. military has had to deprioritize air defense units' personnel, training and equipment, allowing air defense capabilities to atrophy.

Meanwhile, America's rivals have been pursuing capabilities that threaten to deny U.S. forces the ability to deploy and maneuver. The U.S. Army aims to overcome this through the concept of multi-domain operations (MDO). Guided by the 2018 *National Defense Strategy* (NDS), the Army intends to field an MDO-ready force by 2028. To support MDO through force protection, the Army must grow, reorganize, modernize and integrate its air and missile defense (AMD) in close coordination with the other services.

The Army can lead the joint force in developing new AMD doctrine, training, technology and force structure. If properly funded, integrated air and missile defense (IAMD) can enable rapid ground force deployment from the United States and employment into the theater to defend against an array of aerial threats.[1]

The AMD enterprise must find equilibrium between readiness and modernization. Modernization requires a balance among near-, mid- and far-term technology to ensure overmatch against great-power adversaries, rogue states and violent extremist organizations (VEOs) through tiered, layered and integrated AMD.[2]

ISSUE

The U.S. Army must lead the joint force in developing IAMD to defend the homeland, assets and forces and enable MDO against resurgent great-power adversaries.

SPOTLIGHT SCOPE

- Highlights the importance of AMD to U.S. national security.
- Describes AMD threats, capability gaps and how the Army is modernizing and organizing to bridge them.

INSIGHTS

- U.S. AMD capabilities are inadequate to defeat growing threats, particularly complex, synchronized attacks that utilize multiple capabilities.
- The services must develop a unified approach toward IAMD, including joint command and control (C2).
- MDO requires tiered, layered and integrated AMD.

The Strategic Landscape

Threats

Russian and Chinese advancements are driving the U.S. Army's AMD vision. The chief AMD threat comes not from a single capability, but from an attack that "mixes and matches" existing ones.[3] For example, in 2014, Russia combined unmanned aerial systems (UAS), cruise missiles, precision artillery and massed indirect fires in the Ukraine to devastating effect. It is also important to note that both Russia and China are ahead of the United States in developing hypersonic missiles.

While the nation pivots to counter these great-power competitors, it also continues to face lower-tier threats. Rogue states, such as Iran and North Korea—and some VEOs, e.g., the Islamic State, Hezbollah and the Houthi rebels—have complex aerial capabilities.

A combined U.S. and Israeli color guard presents the colors during a closing ceremony for the Terminal High-Altitude Area Defense (THAAD) system deployment to Israel, 25 March 2019. The ceremony concluded a first ever deployment of a THAAD battery, along with other supporting troops and equipment, to Israel under DoD's Dynamic Force Employment concept (U.S Army photo by Captain Aaron Smith).

Global AMD Support

The United States supports international partners with AMD platforms and personnel to boost deterrence and defense. This includes development programs and deployments in Europe, the Indo-Pacific and the Middle East. For example, there are over 60 U.S. and partnered Patriot batteries deployed globally.[4] This high demand creates a rigorous operational tempo.

The U.S. Missile Defense Agency (MDA) helps NATO in developing AMD capability through the European Phased Adaptive Approach, which includes deploying Terminal High-Altitude Area Defense (THAAD) radar in Turkey and Aegis systems in Europe. The United States also has cooperative AMD programs in the Indo-Pacific with Japan, South Korea and Australia.[5]

In the Middle East, the United States supports partners against a range of threats. It invests in Israel's missile defense programs and deploys resources, including THAAD and Patriot batteries, to Saudi Arabia. Following Iran's 2019 attack on the Aramco oil fields, DoD sent additional platforms and personnel to Saudi Arabia.

Background

DoD and Joint AMD

U.S. Army Space and Missile Defense Command's (SMDC) 100th Missile Defense Brigade operates the Command, Control, Battle Management and Communications System, i.e., C2BMC, under the operational control of the geographic combatant commanders. It integrates joint sensors and shooters, enabling the president, secretary of defense and combatant commanders to collectively manage AMD platforms.[6]

The U.S. Space Force requested 2.48 billion dollars in Fiscal Year (FY) 2021 for a next-generation, space-based overhead persistent infrared system, designed to counter adversary advances in missile technology. The MDA is pursuing layered homeland defense and improvements to regional

defense systems. These include: the next-generation interceptor; the hypersonic and ballistic tracking space sensor (HBTSS) program; and, potentially, a THAAD homeland defense tier.

Army AMD

SMDC integrates active duty and reserve components to protect the homeland against intercontinental ballistic missiles (ICBMs). The 32nd Army Air and Missile Defense Command conducts theater Army AMD. Units under its command have a 72-hour deployment mission to provide AMD support for their combatant commander. There are three short-range air defense (SHORAD) battalions in the U.S. Army—a number insufficient to cover every troop rotation.[7]

The Army's IAMD Vision

The Army's plan for IAMD involves: developing AMD technologies; building capability for MDO; providing ready forces; maintaining forward presence; and building allied and partner capacity.[8]

According to AMD cross-functional team (CFT) leadership, there are three AMD tasks essential for success in large-scale combat operations: protect maneuver; protect fixed and semi-fixed assets; and converge capabilities.[9] These tasks, along with homeland defense, require that Army IAMD forces achieve the five primary missions listed below.

ARMY IAMD: FIVE PRIMARY MISSIONS

- Global missile defense;
- ballistic missile defense;
- cruise missile defense;
- rocket, artillery and mortar defense; and
- unmanned aerial systems defense.

The evolving threat landscape demands a new mission, yet to be addressed by Army AMD: defense against hypersonic and hybrid missiles.

Gaps in AMD

The Army's primary AMD gap is its obsolete command and control (C2) system. **The military must transition from disconnected platforms to layered, interconnected defenses against a spectrum of air and missile threats—including combined attacks.**

Other Army IAMD gaps include indirect fire protection capability (IFPC) and maneuver short-range air defense (M-SHORAD). DoD agencies are addressing the hypersonic missile defense gap.

C2

The optimal platform to intercept a fast, long-range and maneuverable incoming threat can change rapidly. Optimized interception requires moving toward an "integrated joint kill web."[10] Current Army C2 only leverages its own sensors and fires.

NASA astronaut U.S. Army Colonel Andrew Morgan shows photos of his wife and children attached to his space suit during an extravehicular activity (EVA) space walk to repair the International Space Station's Alpha Magnetic Spectrometer, 20 January 2020. Morgan conducted the repairs with European Space Agency astronaut Luca Parmitano. This EVA marked the ninth for Expedition 61 and Morgan's seventh, setting an all-time record for U.S. astronauts for a single spaceflight. Morgan is the commander of the U.S. Army Space and Missile Defense Command's Army astronaut detachment at Johnson Space Center, Texas (NASA photo by Ronald Bailey).

ARMY PLAN FOR IAMD

- Develop AMD technologies;
- build capability for MDO;
- provide ready forces;
- maintain forward presence; and
- build allied and partner capacity.

M-SHORAD

There are too few M-SHORAD units to protect the maneuver force. The threat of complex and combined attacks—from UAS to cruise missiles and indirect fires—requires creating platforms and units using existing and emerging technologies, e.g., directed energy and high-powered microwave.

Indirect Fires Protection

Great-power rivals, rogue states and some VEOs have expanding indirect fire capabilities, including: cruise missiles, rocket, artillery and mortars and UAS. The United States needs elevated sensors with 360-degree capability to detect and classify these low-flying threats quickly enough to intercept them. Dispersion, concealment and deception help protect forces, but active defense requires more affordable, capable and higher-capacity interceptors.

Colonel Richard Wright prepares to take aim at an unmanned aerial system remotely controlled by Command Sergeant Major Wilfredo Suarez, 20 August 2018, at Combined Task Force Defender. The 35th Air Defense Artillery Brigade command team received a hands-on briefing on E/6-52 AMD's counter-UAS capabilities (U.S. Army photo by Captain Marion Jo Nederhoed, 35th Air Defense Artillery Brigade).

Land-attack cruise missiles (LACMs) pose highly-accurate threats to strategic targets, while stealth features make them harder to detect. Enemies can launch multiple missiles at a target simultaneously from different directions. Russia, China and Iran all produce LACMs. In at least one case, a VEO acquired LACMs—they were provided by Iran to Houthi insurgents in Yemen.[11]

Rockets and mortars are cheap and easy to develop and use, making them asymmetric weapons of choice. Circumstances such as these pose tactical challenges for U.S. forces and a strategic challenge to some U.S. partners. Furthermore, short-range mortars are hard to defend against due to their extremely short time to target.

The number of countries that are integrating UAS into their militaries is increasing rapidly. Over 95 countries possess UAS for surveillance and targeting, while dozens more countries and some VEOs use armed UAS.[12] Iran's combined UAS and cruise missile attack on Saudi oil facilities exposed the limitations of AMD platforms in this kind of confrontation.

AMD GAPS

- Unintegrated C2 platforms;
- M-SHORAD;
- indirect fires protection;
- countering cruise missiles, aircraft, rocket, artillery and mortar (RAM) and UAS threats to fixed and semi-fixed assets; and
- hypersonic missile defense.

Enemy Aircraft

Russian and Chinese fifth generation fighters pose the greatest fixed wing threat. Additionally, Russian and Chinese advanced rotary wing platforms equipped with accurate and lethal air-to-ground weapons threaten to outrange U.S. capabilities.

Defense Against Hypersonic Missiles

Hypersonics pose a new and growing challenge, combining features of ballistic and cruise missiles. Traditional ballistic missiles fall to Earth on a predictable trajectory. Hypersonic missiles use atmospheric lift and drag to glide, accumulating tremendous heat and speed. They can maneuver low to evade radars that are designed to look for re-entry vehicles. Additionally, they are much faster than traditional ballistic missiles, can make minor course changes mid-flight, give little warning and can catch standard defenses—such as Patriot batteries—off guard.

As noted earlier, China and Russia's industrial bases both outpace the United States in research and development of hypersonic missiles; China is the global leader in hypersonics and, in 2019, Russia revealed their Avangard hypersonic glide vehicle, an ICBM that can reach 27 times the speed of sound.[13]

How the Army is Addressing These Gaps

The Army is addressing IAMD gaps through modernization, increasing endstrength and by optimizing force structure and training. These efforts require stable, sustained funding and thorough collaboration among the Army, the joint force, academia and industry.

Modernization

Army Futures Command's (AFC) AMD CFT drives AMD modernization, one of the Army's "big six" modernization priorities; SMDC's Technical Center develops directed energy platforms, while its Future Warfare Center advances doctrine, concepts, capabilities and training. The Fires Center of Excellence is the force modernization proponent for AMD, with the exception of Ground-Based Midcourse Defense, for which SMDC is the proponent.[14] The AMD CFT is slated to receive 8.8 billion dollars from FY20–FY24. This will go toward four signature programs that are needed to address critical AMD capability gaps: IAMD battle command system; M-SHORAD; indirect fires protection capability; and low-tier AMD sensors.[15]

C2. Cross-domain interoperability is critical in future battles where adversaries will converge land, air, sea, space and cyber operations at increasing speed, scale and complexity. **The Army is developing the IAMD battle command system (IBCS) to integrate all Army AMD sensors and shooters under common mission command. Scheduled for fielding in 2022, it will serve as part of the Army's contribution to joint all-domain C2 (JADC2).**[16]

SMDC leadership supports moving away from the linear concept of "the joint kill chain" toward a "joint kill web." This will integrate information from IBCS-enabled sensors across all domains "providing a comprehensive picture to leadership at all levels."[17]

IBCS is replacing seven unconnected systems. Its open architecture is designed to link any joint sensor with the optimal interceptor across commands, domains, forces and between partners.[18] It will also link new and legacy systems, smoothing modernization as older platforms are incrementally phased out of service.

As an integrated platform, IBCS must prioritize cyber security. Partner nations using unreliable networks (such as those utilizing Huawei components) could jeopardize AMD interoperability. To this end, the AMD CFT is partnering with the Army Artificial Intelligence Task Force to develop software to enhance cybersecurity, data-sharing, targeting and deconfliction.

Soldiers with 2nd Squadron, 13th Cavalry Regiment, 3rd Armored Brigade Combat Team (Rotational), conduct hands-on training with the FIM-92 Stinger, a man-portable air defense system, to enhance readiness, 14 March 2019. The 2nd Infantry Division/ROK-U.S. Combined Division hosted a mobile training team from U.S. Army Air Defense Artillery School to certify designated teams on proper use of the Stinger air defense missile (U.S. Army photo by Chin U. Pak).

AMD CFT SIGNATURE PROGRAMS

- IAMD battle command system;
- M-SHORAD;
- indirect fires protection capability; and
- low-tier AMD sensors.

M-SHORAD. M-SHORAD and IFPC overlap to cover the close, tactical and operational support areas. IFPC has greater capacity and range, while M-SHORAD is more mobile and resilient. As new technology blurs the lines separating missiles, UAS and aircraft, AMD integration is critical.[19]

To this end, the Army is creating M-SHORAD battalions—planned to enter production in 2021—that mount anti-aircraft and counter-UAS platforms on Strykers. The interim solution (IM-SHORAD) provides 360-degree defense for brigade combat teams (BCTs) using technology that is currently available. The next iteration may use directed energy to kill low-end UAS and to intercept UAS swarms.[20]

Despite challenges, Army Science and Technology Reinvention Laboratories are making significant strides—including work by the U.S. Army Space and Strategic Defense Command/Army Forces Strategic Command—to advance high-energy laser weapons, like this one. They have the potential to be an effective, low-cost complement to kinetic energy to address threats from rockets, artillery and mortars, as well as from cruise missiles and unmanned aerial systems (U.S. Army photo).

Indirect Fires Protection. To address the shortfall in protection from indirect fires, the Army is acquiring two Iron Dome missile defense batteries, as directed by Congress. Scheduled to be fielded in 2021, Iron Dome must be made compatible with the IBCS. By 2023, the Army plans to field the truck-mounted IFPC increment 2. This could feature a multi-mission missile launcher or a 250–300kw high-energy laser (HEL).[21]

Promising technologies include: medium-range HEL; high-power microwave systems; guided projectiles launched by rapid-firing guns; and low-cost surface-to-air missiles. Mounting these systems on aircraft could augment ground-based interceptors, protecting forces in contested areas more economically than expensive surface-to-air missiles. The Army has already successfully tested a Stryker-based electronic warfare (EW) system that was able to intercept "enemy" UAS and avoid friendly ones.[22]

Enemy Aircraft. The Army may consider bringing back M6 "Linebackers" to complement Air Defense Artillery (ADA) units, as the Linebacker features Stinger anti-aircraft missiles on a more durable platform than the Avenger Humvee.[23] The AMD CFT's newly-developed platforms will augment ADA and maneuver units' anti-aircraft capabilities as well. Artificial intelligence (AI) will enable them to better track and target fast, unpredictable fixed-wing and rotary-wing aircraft.[24]

Defense Against Hypersonic Missiles. Detecting hypersonic missiles with radar requires over-the-horizon visibility from high-altitude and space-based sensors. The Space Development Agency (SDA) and the MDA plan to detect and track hypersonic threats with a constellation of low-Earth orbit (LEO) satellites. In support of this goal, the 2020 defense appropriations bill provided 108 million dollars to the MDA to develop the HBTSS, a space-based sensor array to track hypersonic missiles.[25] Additionally, the SDA is investing 99.6 million dollars in FY21 to develop a hypersonic tracking layer by FY23.[26]

Combining space-based sensors and directed energy interceptors can revolutionize defense against hypersonic missiles and other aerial threats. Interceptors must fly three times faster than their targets; lasers move at the speed of light. Industry needs to reduce size and power requirements for energy output.

ARMY IAMD PLATFORMS

Capability	Current	Future
C2	• **Seven unconnected systems**: stove-piped, vulnerable to complex attacks from multiple platforms.	• **IBCS**: open architecture links joint sensor to shooter across commands, domains, forces and partners.
Exo-atmospheric interceptors	• **GMD interceptors, exo-atmospheric kill vehicles**: intercept ICBMs; based in Alaska and California.	• **Next-Generation Interceptor**: hit-to-kill system; multiple warheads replace single warhead.[27]
Short-range sensors	• **Patriot radar**: detect/track 100+ targets; 100km range.	• **Low-Tier AMD Sensor (LTAMDS)**: simultaneous 360-degree; field to first Patriot unit planned for 2022; to 15 battalions by 2031.[28]
Short-range interceptors	• **Patriot**: terminal-phase interceptor for tactical and theater ballistic missiles and aircraft; PAC-3 upgrade; able to intercept small, fast targets. • **Iron Dome** is an interim measure for IFPC.	• **IFPC increment 2**: mobile mounted 250–300kw HEL; C-UAS (counter unmanned aerial system) and C-RAM (counter rocket, artillery and mortar) cruise missiles; Army could go with missile-based solution instead.
M-SHORAD	• **SHORAD battalion**: Avengers; Humvees with Stingers and .50 caliber machine gun. • **Interim (IM-SHORAD)**: prototypes delivered in 2020.	• **IM-SHORAD**: Stryker mounted 360-degree AMD for BCTs; Hellfire, 30mm chain gun, 7.62 machine gun, Stingers; planned to be in four battalions by 2022. • **M-SHORAD**: EW and 50kw laser, initially field on platoon of four Strykers in 2022.[30]

LAYERS OF DEFENSE IN SUPPORT OF MDO

Layer 1: Ballistic Low-Altitude Drone Engagement (BLADE)

- Most mobile layer
- Tactical level
- Able to intercept all classes of UAS

Layer 2: The Multi-Mission High-Energy Laser (MMHEL)

- Tactical and operational level
- On a platoon of four Strykers to support M-SHORAD

Layers 3 and 4: Maneuver Air Defense and Next-Generation Radar

- Stryker mounted M-SHORAD and an all-digital radar system for multiple target tracking and adaptive beamforming

Layer 5: IFPC-2

- Mobile 250–300kw HEL-IFPC for advanced cruise missiles
- Field first platoon of four by 2024[31]

Layer 6: Low-Cost Extended-Range Air Defense (LOWER AD)

- Largest dome of protection
- Targets subsonic cruise missiles and UAS
- Frees Patriot interceptors for higher-end threats
- Provides more missiles per launcher and enhanced navigation to maximize area and troop protection

Applying Future Capabilities to Operational Concept

AFC's Combat Capabilities Development Center (CCDC) set out a roadmap for organizing AFC's signature AMD programs to support MDO and create tiered, layered defense—a key tenet of the NDS. It envisions six-layered "domes of protection."[32]

Force Structure

The Army is investing 2.8 billion dollars to bolster regional missile defense capability, including fielding the LTAMDS by FY22 and four M-SHORAD battalions by FY23.[33] It is seeking to quadruple the number of tailorable and agile Soldiers with the air and missile defense crewmember military occupational specialty by 2024.[34] It is also creating eight new short-range ADA battalions and may deploy a new air defense brigade to Europe. Additionally, it is deploying an ADA brigade to Japan and a SHORAD battalion to Europe.

Future multi-mission battalions will contain a variety of capabilities, including THAAD, Patriot, M-SHORAD and IFPC. They will customize force packages at the battalion, battery and platoon level as needed to integrate AMD forces horizontally, vertically and with the supported force.[35]

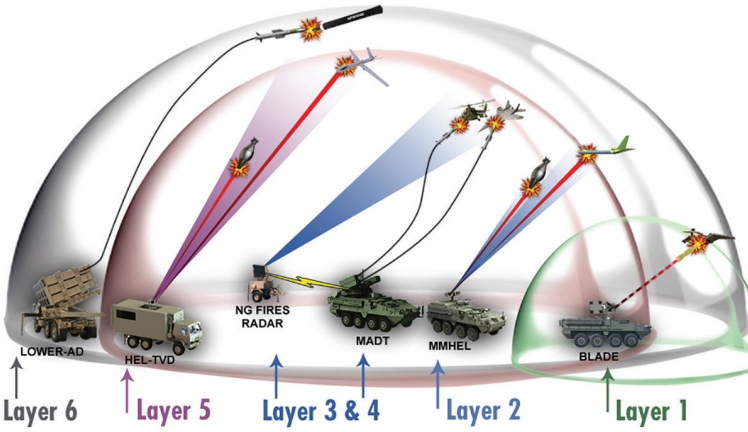
Even with anticipated growth, the AMD force structure still will not meet all combatant commanders' requirements. Therefore, combined arms units will feature organic AMD, such as the man-portable air defense system (MANPAD), and employ passive defense—dispersion, early warning, camouflage, cover and concealment—to reduce risk from aerial attacks.[36]

Dwell Time. Since 1991, U.S. Army air defenders have constantly deployed to meet theater missions, with emergency deployments to remote locations often becoming enduring duty stations. This high operational tempo for Army AMD forces will remain a constant as they support commitments while modernizing for MDO. Consequently, AMD forces must grow to meet the demand. This requires improving career development opportunities, recruiting and retention benefits and AMD facilities.

Partnerships

IAMD requires interoperability with joint and interagency partners, meaning that the intelligence community must promptly share information on adversaries' aerial capabilities. These partnerships undergird efficient acquisition efforts, especially in times of unpredictable funding. The newly-established Joint Counter Small Unmanned Aerial Systems Office is an excellent example of cross-service IAMD partnership.

The Army created AFC and its CFTs to enhance partnerships with academia and industry. Along with bridging Army, joint and government agencies to support modernization, CCDC partners with Carnegie Mellon University to develop air defense algorithms and with the University of Oklahoma to develop radar hardware. Regulatory and statutory acquisitions reform should smooth military-industry coordination, although persistent challenges include budgetary uncertainty and security concerns over sensitive technology.



AMD capabilities that will create a tiered, layered defense are being developed.

Layer 1: The Ballistic Low-Altitude Drone Engagement is used with the Common Remotely Operated Weapon Station to shoot down unmanned aerial systems.

Layer 2: The Multi-Mission High-Energy Laser, a laser weapon system integrated onto a combat platform, can engage and destroy incoming munitions and drones.

Layer 3 and 4: Maneuver Air Defense Technology interceptor technologies are designed for integration into the Maneuver – Short-Range Air Defense platform to enable a greater level of protection by hitting larger aircraft at increased ranges. Eventually the missile interceptor technologies will operate with next-generation fires radar technology via the network.

Layer 5: The High-Energy Laser Tactical Vehicle Demonstrator will protect sites from rockets, artillery and mortars, and unmanned aerial systems.

Layer 6: Low-Cost Extended Range Air Defense missile interceptor technology will defeat subsonic cruise missiles and lethal unmanned aerial systems, leaving the advanced Patriot interceptors for the more stressing threats.

(Source: U.S. Army Combat Capabilities Development Command)

International partnerships can also promote readiness and modernization. For example, partnered air defense exercises—like Nimble Titan—boost interoperability and international ties, while U.S research and development partnership with Israel created Iron Dome. Not surprisingly, the FY21 defense budget request continues support for international AMD collaboration.[37]

Training

Concurrent with modernizing capabilities, building capacity and maintaining a forward presence, the Army must train AMD forces. The 2018 ADA training strategy demands realistic, interactive, iterative combat-focused training. Future training programs will integrate into the synthetic training environment to train core competencies and the interoperability needed for MDO.[38]

Senior leaders from 23 nations and three international organizations gathered at the NATO headquarters in Brussels, Belgium, 12–13 September 2018, to collaborate on the Nimble Titan 18 IAMD exercise (NATO photo by Dottie White).

IAMD in MDO

Great-power adversaries have expanded the battlespace. In competition, they seek to deter the U.S. from defending its interests and to shake allies' confidence in U.S. support. In conflict, they aim to increase the cost of military action through precise and lethal attacks across the expanded battlespace.

To defeat these strategies, the Army developed the MDO concept to compete, to penetrate enemy anti-access/area denial (A2/AD) and to create favorable conditions for the future. IAMD will protect U.S. and partnered assets and forces throughout the battlespace—from the strategic support area through the operational support, tactical support, close and deep maneuver areas—as the joint force conducts joint all-domain operations, i.e., JADO.

IAMD IN MDO

Battlespace	Role of IAMD in MDO	AMD Platforms
Strategic Support Area *(5,000+ km)*	Protect and reassure the homeland and partners throughout competition and conflict.	Satellites, ground-based midcourse defense interceptors, potential future THAAD homeland defense tier.
Operational Support Area *(1,500+ km)*	Protect critical combat support brigades.	THAAD and Patriot.
Tactical Support Area *(500+ km)*	Protect deployed forces as they gather and prepare for combat.	Patriot, IFPC and M-SHORAD.
Close and Deep Maneuver Area *(200+ km)*	Protect the maneuver force as it exploits gaps in enemy A2/AD.	M-SHORAD.

Conclusion

Great-power adversaries threaten the homeland, critical assets, maneuver forces and partners with indirect fire, precision munitions and UAS. In the United States, AMD capabilities are inadequate to meet these growing threats; however, the U.S. Army has a comprehensive plan—IAMD—to mitigate this risk. IAMD contributes to deterrence, provides defense if deterrence fails and it enables MDO. The Army's IAMD modernization plan seeks to provide comprehensive C2 and overlapping layers of AMD. This requires harnessing emerging technologies, like directed energy and AI, and optimizing doctrine, organization, training, logistics and force structure.

Stable and sustained funding and robust partnerships are needed to enhance current readiness, to develop emerging technologies, to field new capabilities and to provide U.S. forces with the protection that they need to defeat any threat, anywhere and at any time.

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Notes

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A2/AD	Anti-Access/Area Denial
ABCT	Armor Brigade Combat Team
ADA	Air Defense Artillery
AFC	Army Futures Command
AI	Artificial Intelligence
AMD	Air and Missile Defense
BCT	Brigade Combat Team
BLADE	Ballistic Low-Altitude Drone Engagement
BM	Ballistic Missile
C2	Command and Control
CCDC	U.S. Army Combat Capabilities Development Command
CFT	Cross Functional Team
C-RAM	Counter Rocket, Artillery and Mortar
C-UAS	Counter Unmanned Aerial System
DoD	Department of Defense
FY	Fiscal Year
HBTSS	Hypersonic and Ballistic Tracking Space Sensor
HEL	High-Energy Laser
HEL-IFPC	High-Energy Laser Indirect Fires Protection
IAMD	Integrated Air and Missile Defense
IBCS	Integrated Air and Missile Defense Battle Command System
IFPC	Indirect Fire Protection Capability
IM-SHORAD	Interim Solution Mobile Short-Range Air Defense
JADC2	Joint All-Domain Command and Control
LACM	Land Attack Cruise Missile
LEO	Low Earth Orbit
LTAMDS	Lower Tier Air and Missile Defense Sensor
MANPADS	Man-portable air-defense systems
MDA	Missile Defense Agency
MDO	Multi-Domain Operations
MMHEL	Multi-Mission High-Energy Laser
M-SHORAD	Mobile Short-Range Air Defense
NDS	National Defense Strategy
SBCT	Stryker Brigade Combat Team
SDA	Space Development Agency
SHORAD	Short-Range Air Defense
SMDC	U.S. Army Space and Missile Defense Command
THAAD	Terminal High-Altitude Area Defense
UAS	Unmanned Aerial System
VEO	Violent Extremist Organization