RECORD VERSION

STATEMENT BY
LIEUTENANT GENERAL DANIEL L. KARBLER, USA
COMMANDING GENERAL,
U.S. ARMY SPACE AND MISSILE DEFENSE COMMAND
AND
COMMANDER,
JOINT FUNCTIONAL COMPONENT COMMAND FOR
INTEGRATED MISSILE DEFENSE

BEFORE THE

SUBCOMMITTEE ON STRATEGIC FORCES
COMMITTEE ON ARMED SERVICES
UNITED STATES HOUSE OF REPRESENTATIVES

SECOND SESSION, 116TH CONGRESS

FISCAL YEAR 2021 AUTHORIZATION REQUEST FOR MISSILE DEFENSE

MARCH 12, 2020

NOT FOR PUBLICATION UNTIL RELEASED BY THE
COMMITTEE ON ARMED SERVICES

Table of Contents

Introduction

Chairman Cooper, Ranking Member Turner, and distinguished Members of the Subcommittee, thank you for your continued support of our Service members, Civilians, and Families and your continued support of the Army, the U.S. Strategic Command, the U.S. Space Command, the Department of Defense, and the missile defense community. Thank you also for the opportunity to testify before this Subcommittee. I am honored to highlight the important space and missile defense capabilities and ongoing enhancements that enable the defense of our Nation, forward stationed and deployed forces, allies, and partners.

Today, with my assigned roles, I bring both an Army and a joint perspective on effective space and missile defense capabilities. Within the Army and joint communities, my responsibilities encompass several mission areas.

As the commander of the U.S. Army Space and Missile Defense Command (USASMDC), I have Title 10 responsibilities to organize, train, and equip Army space and global missile defense forces. I serve as the Army's force modernization proponent for space, global missile defense, and high altitude forces and capabilities. Further, with regard to missile defense, I am the Army Service component commander to U.S. Strategic Command (USSTRATCOM). In this role, I am responsible for planning, integrating, coordinating, and providing Army missile defense forces and capabilities in support of USSTRATCOM missions. In the space mission area, I support the U.S. Space Command (USSPACECOM).

I also serve as the Army's air and missile defense (AMD) enterprise integrator. In this role, I synchronize the balanced execution of the Army's AMD posture across the functions of force planning and sourcing requirements, combat and materiel development, AMD acquisition, and lifecycle management. I coordinate with the AMD community of interest to balance priorities, inform resourcing decisions, and pursue innovative approaches in order to fulfill our AMD mission requirements.

Finally, as the commander of USSTRATCOM's Joint Functional Component Command for Integrated Missile Defense (JFCC IMD), I am responsible for coordinating global missile defense planning, conducting missile defense operations support,

recommending allocation of missile defense assets, and advocating for missile defense capabilities on behalf of the combatant commanders.

Both commands are uniquely organized to conduct joint, global operations for space and missile defense and comprise multi-compo Soldiers, Airmen, Sailors, Marines, and dedicated Civilians and Contractors geographically postured to support diverse missions. Our vision is one team of professionals providing space, missile defense, and high altitude forces and capabilities to support joint warfighting readiness in all domains. To accomplish this vision, USASMDC is organizationally aligned to accomplish three major tasks which can be summarized as: providing forces and capabilities for current operations; preparing forces and capabilities for the future fight; and research and development of Army technologies that will provide future advancements in space, air, and missile defense capabilities. To achieve this, the organizations I command align their activities to these priorities:

- Provide trained and ready forces for space, missile defense, and high altitude missions.
- Conduct integrated planning and synchronized operations in the execution of our space and missile defense missions.
- Prepare for future conflict.
- Accomplish our mission as one team of empowered, innovative, ready and resilient professionals.

My intent today is to highlight the dedicated people who serve in the diverse and geographically dispersed organizations under my command, to briefly outline the strategic environment, and to emphasize the responsibilities USASMDC bears as a provider of missile defense and space forces to geographic combatant commanders (GCCs). I would also like to summarize key Army AMD developments in the context of a comprehensive approach to addressing the evolving air and missile threat. Finally, I will outline JFCC IMD's role as a warfighter advocate supporting USSTRATCOM's coordinating authority for global missile defense planning.

The Workforce—Our Greatest Asset

USASMDC and JFCC IMD cannot carry out our wide-ranging national security missions without the dedication of our greatest asset—our people. The continued support of Congress is critical to our ability to develop and retain a highly qualified and mission-ready team. Over the past months, I have seen countless examples of how our strength lies in our agile, adaptive space and missile defense workforce, a team of more than 3,000 highly trained and skilled Soldiers, Sailors, Airmen, Marines, and Civilians who stand vigilant 24/7/365, protecting the joint warfighter and defending the homeland. Our innovative and empowered personnel are the heart of both commands. It's our people who make us strong; it's our people who make winning possible.

> **People are the Army's greatest strength and our most important weapon system.**
> - CSA SASC Confirmation Statement May 2019

An Increasingly Complex Array of Threat Systems

Current global trends indicate adversary air and missile threats are becoming more capable, due in part to the proliferation of advanced technologies, resulting in systems with global reach, increasing speed, and greater accuracy. Many foreign missile systems are progressively incorporating advanced countermeasures including maneuverable reentry vehicles, multiple independent reentry vehicles, and electromagnetic jamming, all intended to defeat our missile defense capabilities. Moreover, numbers and variants of missile platforms are increasing. Many systems are mobile, which increases the difficulty in detecting, tracking, and targeting these weapons. Hypersonic glide vehicles delivered via ballistic missile boosters, as well as hypersonic cruise missiles under development, are emerging threats that will pose new challenges to missile defense systems.

Numerous countries are developing ground-, sea-, and air-launched land-attack cruise missiles using a variety of unconventional and inexpensive launch platforms. Today, nearly 30 countries possess ballistic missile capability. There are over 35 different variants of ballistic missiles in service across the globe today and new intermediate-range and intercontinental ballistic missiles (IRBM and ICBM) are under

development. North Korea maintains and continues to develop a viable short- to long-range ballistic missile inventory as a means to leverage political and economic gain and wield coercive influence over its neighbors. Iran's desire to have a strategic counter to the U.S. could drive it to field an ICBM. Its ongoing development of a space program could shorten a pathway to a longer-range system that could threaten U.S. and allied interests. China continues to have the most active and diverse ballistic missile development program in the world. It is developing, testing, and upgrading both ballistic and cruise missiles to counter a perceived threat to its national sovereignty. Intelligence assessments indicate China is developing offensive systems that can target areas of operation including Taiwan, the first and second island chains, as well as our homeland. In addition, China is developing a range of technologies to counter U.S. and other countries' ballistic missile defense systems. Russia, possessing a large strategic arsenal, continues to leverage emerging technologies to improve currently fielded and future systems. Other regional adversaries also possess ballistic and cruise missile capabilities that could pose a potential threat to U.S. interest and deployed U.S. forces, as well as those of our allies and partners. They have also shown an ever-increasing willingness to use them against opposition forces which can create ancillary global political and economic impacts.

> **"U.S. homeland missile defense must both outpace rogue state offensive missile capabilities and hedge against possible future threat developments."**
> - 2019 Missile Defense Review

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 combat operations from both state and non-state actors. The extensive range of UAS platforms in terms of size, velocity, range, altitude, flexibility, and capability makes the counter-UAS (C-UAS) mission complicated for AMD forces. We appreciate that Congress authorized the Department to take actions to mitigate the increasingly challenging UAS threat to facilities and assets related to the Department's missile defense mission.

In the future, U.S. missile defense systems will face increasing challenges in the form of electronic and cyber attacks, as well as directed energy (DE). These types of threats will become more acute, especially as we make progress to develop U.S. space-based capabilities. We expect these space, cyber, and electronic attacks will evolve around the anti-access/area-denial (A2/AD) strategies of our adversaries. Our ability to successfully counter these continuously advancing threats will rely heavily on our increased use of space and space-enabled capabilities. Space sensors, in greater numbers and diverse bandwidths, will expand our capability and capacity to track, discriminate, and successfully engage incoming ballistic and cruise, as well as hypersonic weapons.

The strategic AMD environment is becoming more challenging as threat systems continue to proliferate in number and advance in complexity. Our evolution of capabilities requires a holistic strategy that effectively integrates alternative approaches and technologies to defeat air and missile threats. A comprehensive approach, including attack operations, active and passive defenses, and integrated command and control (C2), increases lethality and enables more efficient and effective active missile defense capabilities. In addition, implementing technological advances requires more cost-effective solutions to integrate current and future capabilities. We continue to prioritize integrated AMD resources to optimize warfighter support and partner with the Missile Defense Agency (MDA), combatant commands (CCMDs), and the Services in pursuit of fiscally responsible methods to address evolving threats.

Global Posture to Counter the Threat

Strategic positioning must seek to deter adversary development, deployment, and employment of missile systems. To that end, a layered and integrated approach that synchronizes offensive and defensive capabilities ensures U.S. forces are prepared to leverage the full complement of fires in crisis and conflict. To enable effective active defenses and pre-launch attack operations, successful integration of multi-domain capabilities spanning from tactical to strategic and departmental to interagency is necessary.

To counter the threat and meet the objectives of the 2018 National Defense and Army Strategies, USSTRATCOM and the U.S. Army continue to enhance homeland

and regional active missile defenses as part of our evolving joint all-domain operations concept. We must also continue to work with our allies and partners in Europe, the Indo-Pacific region, and the Middle East to increase missile defense systems and operations integration and interoperability.

The 2018 National Defense Strategy prioritizes a strong commitment to security and stability in the Indo-Pacific region, Europe, and the Middle East. In conjunction with our allies and partners, the Department of Defense maintains deployed and forward-stationed Patriot; THAAD; Forward-Based Mode radars; and counter-rocket, artillery, and mortar (C-RAM) forces to enhance our AMD posture, sending a deterrence message to competitors and assurance to our friends. Through deployed and forward-stationed AMD commands and air defense brigade headquarters, we continue to work with regional partners and allies to increase information and data sharing, and we are developing a more robust global AMD force posture that leverages partner nations' growing capabilities and capacity. These efforts are intended to reduce the strain on U.S. forces while enabling more timely modernization of our AMD assets.

Army Air and Missile Defense 2028 is the new concept that will guide AMD readiness and modernization. It is the product of the Army AMD enterprise, which consists of agencies and organizations that develop, maintain, sustain, train, and employ AMD capabilities. This document is based on the National Security Strategy, the National Defense Strategy, the 2019 Missile Defense Review, the U.S. Army in Multi-Domain Operations 2028, and the Army Operating Concept, as well as the changing operational and threat environments and the rapid pace of technological advancement.

Army Air and Missile Defense 2028 charts a new path for Army AMD, which is a top Army modernization priority. It addresses our ability to balance current operational requirements while shaping the future force and modernization efforts to counter future challenges. AMD is a top priority because it enables the Army's ability to penetrate and dis-integrate enemy A2/AD systems and exploit the resulting freedom of maneuver to achieve strategic objectives. Consequently, the Army has acted to increase the speed with which we are modernizing the AMD force. Army Air and Missile Defense 2028 nests within the Army Modernization Strategy, which enables us to deliver advanced

AMD capabilities to our warfighters on a substantially decreased timeline. The Air and Missile Defense Cross-Functional Team (AMD CFT) is the key agent that is rapidly developing capabilities in accordance with the strategy. It is ensuring future capabilities transition quickly from concept, to prototyping, to fielding. The programs that Army AMD is rapidly developing through the AMD CFT are: Army Integrated Air and Missile Defense (AIAMD); Maneuver-Short Range Air Defense (M-SHORAD); Indirect Fire Protection Capability (IFPC); and Lower Tier Air and Missile Defense Sensor (LTAMDS). The AMD CFT also works closely with the Rapid Capabilities and Critical Technologies Office (RCCTO) on DE capabilities to include high energy lasers and high power microwaves.

Providing and Enhancing Missile Defense Capabilities

In accordance with Title 10 responsibilities, USASMDC is a force provider of missile defense capabilities. As a force provider, our first major task is to provide trained and ready missile defense forces and capabilities to the GCCs. This command is manned by multi-compo Soldiers, Civilians, and Contractors, who contribute to operations, planning, integration, control, and coordination of Army forces and capabilities in support of USSTRATCOM's missile defense mission. Other commands around the world, including all GCCs, also leverage the capabilities we provide. For example, USASMDC Soldiers serving in the homeland and in remote and austere forward-deployed locations operate the Ground-based Midcourse Defense (GMD) system and the Army Navy/Transportable Radar Surveillance and Control, Model 2, Forward-Based Mode (AN/TPY-2 FBM) radars. Highlights of the capabilities provided to current operations and readiness by our missile defense professionals include:

> **"[The] missile defense mission remains a no-fail mission."**
> - USNORTHCOM SASC Posture Statement February 2020

Support to Global Missile Defense: Soldiers from the 100th Missile Defense Brigade (MDB), headquartered in Colorado Springs, Colorado, and the 49th Missile Defense Battalion, headquartered at Fort Greely, Alaska, are ready to defend our Nation from an ICBM attack 24/7/365. In support of U.S. Northern Command

(USNORTHCOM), Army National Guard and Active Component Soldiers operate the GMD Fire Control Systems located at the Fire Direction Center in Alaska and the Missile Defense Element in Colorado; a detachment oversees operations at Vandenberg Air Force Base, California. These Soldiers, in conjunction with USNORTHCOM, also oversee maintenance of GMD interceptors and ground system components. At the Fort Greely Missile Defense Complex, the 49th Missile Defense Battalion military police secure the interceptors and C2 facilities from physical threats. Given their strategic mission in this remote location, the harsh environment and 20-hours per day of winter darkness, we must continuously review and enhance the Fort Greely Garrison services and support to these Soldiers, Civilians, Contractors, and their Families. Soldiers from the 1st Space Brigade provide combatant commanders with certified AN/TPY-2 FBM missile defense batteries that support strategic and regional missions. These batteries are globally located in five strategic locations where they provide a tangible contribution to both homeland and regional defense. Soldiers manning these radars, deployed to remote and austere locations, demonstrate daily our Nation's commitment to defend deployed forces, allies, and partners from ballistic missile attacks. With the ongoing support of Congress, we have realized substantial quality of life improvements for these remotely stationed personnel and their Families.

> **"Interceptors (GBI) currently emplaced have the capability of defending the homeland from today's limited rogue threat."**
> - USSTRATCOM HAC-D Posture Statement, February 2020

Support to Global Missile Defense System Test and Development: Soldiers from the 100th MDB and the 49th Missile Defense Battalion participate in GMD test activities and work with MDA developers on future improvements to the GMD system. MDA's testing regime, conducted through a series of ground-based and operational flight tests, and rigorously

> **"Our missile defense forces here, are vital to our national defense and the world should know that they're ready."**
> - VPOTUS Elmendorf Air Force Base, Alaska, 2018

verified, validated, and accredited models and simulations, emphasizes operational realism during test design and execution. This realism enables Soldiers of the 100th MDB to sustain and improve their proficiency and validate operational employment of the system. The most recent example was the FTG-11 test conducted in March 2019. The event enabled brigade and battalion Soldiers to demonstrate their tactics, techniques, and procedures in support of an operational flight test. GMD tests validate their readiness as they perform their operational tasks, while building warfighter confidence that the system will perform as designed.

Global Missile Defense System Development: MDA continues to evolve the GMD weapon system to enhance existing capabilities, as well as deliver new capabilities. Construction of Fort Greely's Missile Field 4 is scheduled to be complete at the conclusion of Fiscal Year 2021 and will provide additional capacity and flexibility. The development of the Next Generation Interceptor (NGI) will be a significant upgrade to the current interceptor fleet, providing the warfighter with improved system performance and greater reliability.

Space Support to Ballistic Missile Early Warning: Space-enabled capabilities are essential for missile defense operations. They provide and enable communications; positioning, navigation, and timing; intelligence, surveillance, and reconnaissance; and early warning. We routinely coordinate and collaborate with USSPACECOM's National Space Defense Center to ensure that space assets are poised to support missile defense.

> **"The exploitation of space provides a missile defense posture that is more effective, resilient and adaptable to known and unanticipated threats."**
> - 2019 Missile Defense Review

In support of joint force commanders, USASMDC continues to provide missile warning within the U.S. European Command (USEUCOM), U.S. Central Command (USCENTCOM), and U.S. Indo-Pacific Command (USINDOPACOM) theaters of operations. The 1st Space Brigade's Joint Tactical Ground Station (JTAGS) detachments, which are essential for USSPACECOM's assured missile warning mission, are operated by USASMDC Soldiers who monitor launch activity and other

events observed by infrared sensor platforms and quickly provide information to members of the AMD and operational communities. Our JTAGS detachments are forward deployed around the globe, providing continuous, dedicated, assured missile warning to USSPACECOM and GCCs in support of deployed and forward-stationed forces. In Europe, the relocation of the JTAGS detachment from Stuttgart, Germany, to Sigonella Naval Air Station, Italy, has been completed, increasing our operational missile warning capability. We continue to incrementally upgrade these systems to address the evolving nature of the threat.

USASMDC's second major task is to develop future missile defense forces and mature current capabilities. The Space and Missile Defense Center of Excellence (SMDCoE) represents Army equities across the joint community. Within the capabilities of Army and joint space, missile defense and high altitude, the SMDCoE trains and educates agile, adaptive, and ready Soldiers and leaders, executes lifecycle management for U.S. Army space operations officers, develops Army space Soldiers and enables informed decision making.

To carry out its mission, the SMDCoE executes U.S. Army Training and Doctrine Command and Army Futures Command established practices to meet force management and Army Modernization Enterprise responsibilities. This includes performing concept development, capabilities determination, and capabilities integration relative to doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLPF–P) for process change, integration, and transition for materiel development. Additionally, the organization executes the Army's institutional training and education for space and global missile defense mission areas.

In the fall of 2019, USASMDC established the first commandant of the U.S. Army Space and Missile Defense (SMD) School within the SMDCoE. The commandant oversees all Army space and missile defense training, leader development, education, and personnel responsibilities, provides Army space proponency, and supports force modernization. The U.S. Army SMD School executes the Army Space Training Strategy in coordination with TRADOC and FORSCOM across the entire Army institutional and operational training enterprise at Army schools, home station training, and combat training centers. The SMD School is expected to expand its current

mission to educate, train, and develop world-class, highly skilled Army space and missile defense professionals to support Army and joint multi-domain operations at the strategic, operational, and tactical levels.

The SMDCoE is USASMDC's architect for future force design. While unified, its geographically dispersed team designs, builds, modernizes, trains, and educates Army space and missile defense forces. It contributes to developing superior space, missile defense and high altitude capabilities that enable multi-domain effects to protect the homeland and support tactical to strategic success whenever and wherever required. It drives change to the current force focused on combat ready forces and capabilities. This effort is balanced with a constant view to the future by preparing or adopting leap-ahead concepts or technologies through innovative solutions. In summary, it is uniquely organized and geographically well positioned to meet future Army needs.

USASMDC's third major task is to provide critical technologies to address future needs that will enhance warfighter effectiveness. USASMDC's Technical Center supports the joint warfighter by providing disruptive and critical technologies that meet today's requirements and address future needs, enabling warfighter dominance in multi-domain operations. The Technical Center manages science and technology, research and development, and conducts test programs for space, integrated AMD, DE, hypersonics, and related technologies. As part of the Army science and technology enterprise, the Technical Center contributes to the current fight and enables the next generation to prevail in conflicts to come.

Following are brief summaries of a few of our research and development efforts, as well as an overview of the capabilities of an essential Army testing range.

> **"We are no more than a few years of having…directed energy weapons of military utility."**
> - Dr. Michael Griffin, Center for Strategic and International Studies Interview, December 2018

Directed Energy: The Technical Center is the Army lead for high energy laser technology development. This technology can be effectively employed in a variety of mission areas and offers unique performance attributes that will contribute directly to addressing existing operational capability gaps. High energy lasers have the

potential to be a low-cost, effective complement to kinetic energy to address rocket, artillery, and mortar (RAM) threats; unmanned aircraft systems; and cruise missiles. Additionally, the Technical Center is exploring the use of high power microwave technology for use in interdicting unmanned aerial systems and defeating improvised explosive devices and other improvised threats.

Tactical Space Technologies: As the Army lead for space research, development and engineering, our Technical Center identifies, develops, demonstrates, and integrates space technologies in the areas of responsive space and space superiority. To meet Army operational needs, focus areas include persistent beyond line-of-sight communications via small satellites for forces deployed in remote areas; functionally effective resolution imagery via small satellites; solutions for assured positioning, navigation, and timing; ground C2 systems to reduce operator burden; and direct downlink of tactical data feeds.

Missile Defense Testing Assets and Range: USASMDC's Technical Center is an invaluable part of the Army Test and Evaluation Enterprise and provides a suite of low-cost ballistic missile targets for use in developmental and operational AMD testing, transportable and configurable launchers, and test support. The Ronald Reagan Ballistic Missile Test Site (RTS) at the U.S. Army Garrison-Kwajalein Atoll in the Republic of the Marshall Islands provides test support to the MDA, the U.S. Air Force, NASA, and others. Additionally, the Technical Center is providing hypersonic flight test support from the test planning and design phase through mission execution and post-flight analysis for the Army, Navy, and Air Force. The strategically located and remotely challenged site provides critical testing support to both offensive and defensive missile testing requirements for programs such as GMD and U.S. Air Force strategic ballistic missile systems. RTS retains preeminent ballistic missile testing capabilities used in validating the Nation's ability to sustain a strong, credible ballistic missile deterrent as a key element of national security and the security of U.S. allies and partners.

RTS continues to support the developmental and operational testing of both homeland and regional missile defense systems as well offensive ballistic missile testing for the Air Force Global Strike Command. During 2019, RTS supported four Minuteman III test launches (Glory Trips) to successfully validate and verify the

effectiveness, readiness, and accuracy of the weapon system. Hypersonic system testing has become a significant element of test planning at RTS. Because of the geographic remoteness and available complex sensor suite, RTS has seen a significant upswing in hypersonic systems test planning. There are currently multiple active hypersonic test programs in various stages of planning at RTS.

In concert with its testing mission, RTS also supports the command's space object identification and space domain awareness missions in support of USSPACECOM. This mission includes space object tracking and characterization, providing critical orbital information on new foreign launches, and providing high-resolution images in support of space situational awareness. RTS supports this mission 24/7/365. The U.S. Air Force's Space Fence will be an important capability in this mission. When Space Fence becomes fully operational, it will enable proactive space domain awareness while complementing existing systems at the RTS. Finally, RTS works in conjunction with DoD customers to develop and demonstrate space testing capabilities. These emerging capabilities and test missions provide essential data and feedback to the space enterprise and support customers concerning spacecraft and operational performance.

Army Contributions to the Nation's Missile Defense Capabilities

Army Air and Missile Defense 2028 meets the directives of the National Defense Strategy and the Army Vision and enables Multi-Domain Operations (MDO). To achieve the AMD force of 2028, we must continue to modernize and develop AMD capabilities, build sufficient AMD capacity for MDO, and ensure AMD forces are trained and ready. MDO requires that our capabilities and associated C2 systems are resilient and interoperable with joint and allied forces. Accomplishing these essential tasks will allow us to provide deterrence through deployments and forward stationing and enable a more robust, comprehensive defense by coordinating and integrating with our partners and allies. AMD is one of six Army modernization priorities in which the Army has significantly increased investment. The Army AMD CFT is the Army's modernization

AMD is a Critical Enabler of the Army's Ability to Conduct Multi-Domain and Joint All-Domain Operations

lead for these capabilities and works closely with the other Services, the Joint Staff, and MDA toward joint IAMD capabilities. The Program Executive Office for Missiles and Space is the Army's materiel developer for these capabilities and works closely with the AMD CFT. A summary of the Army's AMD strategic direction and major programs follows:

Air and Missile Defense Readiness: Readiness remains the Army's top priority. The operational demand to meet the requirements of joint warfighters continues to stress the Army AMD force, impacting current and future readiness, as well as modernization initiatives. With an increased AMD presence in USCENTCOM, USINDOPACOM, and USEUCOM, a significant portion of the AMD force is committed abroad. The Army must continue to take action to mitigate stress on the force and restore strategic flexibility. Without a sustained decrease in demand, the AMD force will face difficult choices over the coming years as overseas requirements will consume several battalions that require modernization. Within the last five years, the Army has implemented a Sustainable Readiness Model, established an AMD test detachment, and fielded the Dismounted Patriot Information Coordination Central (DPICC). During the past couple of years, the Army fielded five DPICCs to USINDOPACOM, USEUCOM, and USCENTCOM providing these CCMDs greater flexibility and a smaller deployable footprint to meet mission requirements.

Mission Command: Closely linked to AMD readiness is the ability to provide low density, high demand AMD mission command elements. The mission command elements are pivotal to laying the foundation and creating an environment that supports the integration of Army AMD forces into joint C2 architectures. Over the past few years, the Army has activated an additional Active Component air defense artillery brigade headquarters in USINDOPACOM, rotated a National Guard air defense artillery brigade headquarters to USEUCOM, and elevated the command of the 10th Army Air and Missile Defense Command in USEUCOM to a general officer.

Army Integrated Air and Missile Defense: The AIAMD program is a top Army AMD modernization priority. AIAMD integrates current and future AMD sensors and weapons into a common integrated fire control capability that allows the warfighter to fully integrate AMD capabilities across all echelons. The Integrated Air and Missile

Defense Battle Command System (IBCS) is the materiel solution for AIAMD and allows rapid convergence of sensors, shooters, and mission command components on an integrated fire control network. Once fully fielded, IBCS will provide a game-changing capability, allowing AMD forces to be tailored and scaled appropriately to meet the given threat. The quantity and mix of capabilities can be task organized into a formation with an inherent, integrated mission command system. The IBCS open architecture enables rapid integration of legacy and developmental sensors and shooters, providing capabilities to defeat emerging threats in MDOs. The program is on schedule, moving forward in accordance with the 2018 Congressional report. It will go into its limited user test this spring, leading to a scheduled Milestone C decision in Fiscal Year 2022.

The program will field common mission command nodes for Army AMD forces to defend against manned aircraft and UAS, air-to-ground missiles, tactical ballistic missiles, cruise missile (CM), and RAM attacks. The IBCS will operate with air surveillance and fire control capabilities across the Army, Air Force, and with joint and multinational AMD capabilities across all echelons. It will enhance the lethality of the AMD force. By dismantling the current system-centric mission command paradigm, it will dramatically increase capability and also facilitate open industry competition in support of the AMD community. AIAMD is one of the Army's contributions to Joint All Domain Command and Control (JADC2) and there is continued experimentation to link with C2 systems for Army and joint fires. Additional efforts are currently underway to explore the feasibility and potential benefits of integrating the Army's IBCS and MDA's Missile Defense System (MDS) Command and Control, Battle Management, and Communications (C2BMC), including THAAD fire control center, to fully support AIAMD interoperability with the MDS.

Terminal High Altitude Area Defense System: THAAD is a key component of the MDS architecture. It is designed for area defense of deployed and allied forces, population centers, and critical infrastructure against short-, medium-, and intermediate-range ballistic missiles. THAAD is a mobile and globally transportable, low density, high demand asset. THAAD has a unique endoatmospheric and exoatmospheric intercept capability using proven hit-to-kill technology. There are currently seven operational THAAD batteries. THAAD batteries are deployed to Guam and the Republic of Korea in

response to the North Korean nuclear and missile threat. The U.S. Forces Korea (USFK) Joint Emergent Operational Needs Statement (JEONS) requirement improves Patriot and THAAD interoperability and brings a Patriot launch-on-remote capability in Fiscal Year 2020 and a THAAD Missile Segment Enhancement (MSE) Integration in Fiscal Year 2021. As directed in the 2019 Missile Defense Review, the Army, in conjunction with OSD and MDA, reassessed the THAAD requirement as eight batteries.

Patriot/Patriot Advanced Capability-3 Missile Segment Enhancement: The Army Patriot force remains the cornerstone of AMD protection for our deployed forces, friends, and allies. The Patriot force is 53 percent forward stationed or deployed as GCCs' increasing AMD requirements drive the operational tempo, stress the Patriot force, and have resulted in modernization challenges. The PAC-3 and PAC-3 MSE interceptors employ a hit-to-kill capability. PAC-3 MSE fills the engagement gap between the THAAD and the PAC-3 missiles while also defeating advanced threats earlier, at greater range, with increased lethality. The PAC-3 MSE is in full-rate production and is the latest generation hit-to-kill PAC-3 interceptor in the Patriot force to meet global capability requirements. Annual PAC-3 MSE production capability has increased by approximately 30 percent to address U.S. requirements and demand from our international partners.

Patriot must continually modernize through software and hardware upgrades to address obsolescence and the evolving threat, and to best utilize the extended battlespace performance afforded by the PAC-3 MSE interceptor. Modernization efforts provide combat identification enhancements, address upper-tier debris mitigation, improve performance of the PAC-3 MSE interceptor, and enable increased Army and joint interoperability. Ten of fifteen Patriot battalions are modernized with the latest software and hardware capabilities to counter new emerging and evolving threats. Another two battalions are currently under modernization and the final three Patriot battalions will be modernized during Fiscal Year 2020. Ongoing development efforts include the enhanced interoperability of Patriot and THAAD systems. This new integrated capability expands Patriot's battlespace by enabling it to leverage THAAD's AN/TPY-2 radar together with the Patriot radar to detect threat targets at greater ranges. Originally developed for USFK, this capability will be pure-fleeted across all

Patriot battalions beginning in Fiscal Year 2022. To overmatch the near-term evolving threat, the Army is continuously improving Patriot capability while moving toward the AIAMD IBCS architecture including a new sensor and fire protection capability.

Lower Tier Air and Missile Defense Sensor: Replacing the present Patriot radar, LTAMDS will provide sensing capabilities in the lower-tier portion of the missile defense battlespace and enable the full capabilities of the PAC-3 MSE missile. Additionally, LTAMDS will serve as a sensor node on the IBCS network, address capability gaps against advanced threats, modernize technology, reduce operations and sustainment costs, mitigate obsolescence, and enhance reliability and maintainability.

To ensure a fair-and-open competition, an LTAMDS Sense-Off demonstration was conducted in 2019. The competition provided industry the opportunity to demonstrate potential LTAMDS solutions. The Army leveraged sense-off results, with modeling and simulation efforts to evaluate industry capabilities and determine future growth potential. Following the sense-off and proposal evaluations, the Army awarded an Other Transactional Authority (OTA) to Raytheon on October 16, 2019, for the delivery of six prototypes. The objective of the rapid prototyping effort is fielding four sensors to one battalion in 2022.

Indirect Fire Protection Capability: The Army is developing new capabilities to defeat air, UAS, CM, and RAM threats. The primary IFPC mission is to provide a robust protection capability against these threats to supported forces within fixed and semi-fixed locations. To address a near-term gap in defenses against potential CM threats, the Army is procuring the Israeli Iron Dome system as an interim capability.

Counter-Unmanned Aircraft Systems: Technological advances and the proliferation of commercial and tactical UAS in both reconnaissance and attack capabilities have matured to the point where they represent a significant threat to Army operations from both state and non-state actors. To address these threats, the Army, at the direction of the Secretary of Defense, assumed C-UAS executive agent duties and established a C-UAS joint capability office (JCO). Key focus areas for the JCO include developing joint requirements and materiel solutions, as well as integrated plans, training, and doctrine. C-UAS efforts are critical to defeat the rapid proliferation of small, commercially available UAS technology on the battlefield. In response to a warfighter

Joint Urgent Operational Needs Statement (JUONS), the Army has deployed over 500 C-UAS systems (man-portable, expeditionary, and mobile) and continues to adapt to changes in theater UAS threats. The modification of counterfire target acquisition radars, equipped with multi-mission air surveillance target acquisition capabilities, improves the warfighter's ability to detect and defeat these low, slow, and small UAS threats. Efforts continue to close the risk gap to protect our maneuver forces with short-range defense capabilities.

Maneuver-Short Range Air Defense: M-SHORAD will provide a dedicated maneuverable and survivable AMD capability for maneuvering forces against fixed-wing, rotary-wing, and UAS threats. In Fiscal Year 2018, the Army began developing and fabricating initial M-SHORAD systems that integrate existing Army capabilities into a Stryker combat vehicle. Rapid prototype development and integration activities continue, and four M-SHORAD battalions are scheduled to be fielded in Fiscal Years 2021 through 2023. In addition, the Army continues to mature high energy lasers and electronic warfare (EW) to increase M-SHORAD capabilities in support of the maneuver force. The Army will begin to integrate DE by fielding four DE M-SHORAD prototypes in Fiscal Year 2022. Ultimately, M-SHORAD battalions will contain a mix of complementary DE and kinetic interceptor systems to protect the maneuver force.

Joint Functional Component Command for Integrated Missile Defense (JFCC IMD)—Integrating and Synchronizing Missile Defense

JFCC IMD is USSTRATCOM's missile defense integrating element. USSTRATCOM formed JFCC IMD to execute its Unified Command Plan (UCP) assigned missile defense mission, enabling the headquarters to focus on integration and advocacy. Headquartered at Schriever Air Force Base in Colorado Springs, Colorado, JFCC IMD is manned by a cohesive team of Army, Navy, Air Force, Marine Corps, Civilian, and Contractor personnel.

As the Secretary of Defense and various combatant commanders have previously testified, warfighters remain confident in our ability to protect the Nation against missile attacks. However, as the global missile threat continues to evolve and in accordance with the Missile Defense Review, we must invest in holistic approaches to defeat adversary missiles before launch or during all phases of flight (boost,

midcourse, and terminal phases). Additionally, we must continue to invest in capabilities that limit or mitigate the effects of an attack which penetrates our defenses. JFCC IMD's principal mission is to coordinate with, and operationally support, the joint warfighters at the GCCs, and advocate for their requirements with the materiel developers at MDA and the Services. On behalf of the GCCs and USSTRATCOM, JFCC IMD champions warfighter priorities and capability needs, including continued development of a robust sensor network, integrated discrimination capabilities, redundant and resilient C2 networks with enhanced cybersecurity defenses, and improved interceptors for both homeland and regional missile defenses.

Through JFCC IMD, we work across DoD and alongside key allies and partners to improve integration of existing capabilities, maximizing efficiency and effectiveness in global missile defense missions. The essential force multiplier is integration—a critically important mission enabler that JFCC IMD directly supports. As a functional component command of USSTRATCOM, JFCC IMD supports designated UCP responsibilities along four lines of effort:

- Synchronizing global missile defense planning, global force management, and missile defense security cooperation activities.
- Conducting global missile defense operations support, to include asset management, alternate execution authority, federated intelligence support, and network monitoring and protection.
- Executing above element, joint, and combined global missile defense training and education, exercises, and experimentation.
- Advocating for and recommending acceptance of global missile defense capabilities, conducting analysis and assessments of current and future capabilities, and supporting ground and flight tests.

To accomplish these efforts, we maintain close collaborative relationships with the GCCs, MDA, the Services, OSD, the Joint Staff, and our allies and partners. We continually seek to enhance our deployed forces' capabilities while gaining operational experience and confidence in our collective ability to defend the Nation, deployed forces, partners, and allies. Some of our key efforts to enhance missile defense planning and capabilities for both the homeland and regional architectures follow:

Expansion and Integration of the Missile Defense Architecture: In response to the evolving strategic environment, we continue to bolster homeland and regional missile defense capabilities. In development of the global missile defense mission, we are supporting the advancement of the new capabilities such as the Aegis Ashore in Poland; the Standard Missile-3 Block IIA; the Long Range Discrimination Radar at Clear Air Force Station, Alaska; Spacebased Kill Assessment; Hypersonic and Ballistic Tracking Space Sensor; Next Generation Interceptor for Homeland Defense; and various other new capabilities such as high energy laser, and other DE technologies. Given the many challenges associated with implementation of these architectures, JFCC IMD, in support of USSTRATCOM's coordinating authority role for global missile defense, collaborates with the GCCs to assess and address cross-regional gaps in the areas of planning, policy, capabilities, and operations.

Multiregional Missile Defense Asset Management: JFCC IMD, in coordination with USSTRATCOM and the GCCs, manages missile defense operational readiness posture, coordinates missile defense system maintenance, and supports MDA and Service tests. The asset management process allows us to continually assess our readiness to defend against missile attacks and to recommend adjustments to optimize the overall missile defense architecture.

Cybersecurity of the Missile Defense System: JFCC IMD, in coordination with USSTRATCOM and MDA, conducts the Cybersecurity Service Provider mission for the missile defense architecture to ensure cyber defenses and operations are planned and executed across the globe. JFCC IMD works with key stakeholders to enhance the cyber defense posture of our missile defense operational architecture against malicious activity. We are collaborating with our mission partners to incorporate realistic cybersecurity testing in support of the Warfighter Capability Acceptance process. We are working with the National Security Agency's Cybersecurity Directorate to use their insights on threat analysis and mitigations to continue to harden our internal networks against adversary intrusion and attack. JFCC IMD also works closely with the Joint Staff, CCMDs, and MDA to educate, train, and exercise cybersecurity protocols to ensure the highest levels of readiness.

Global Planning and Assessment: JFCC IMD works with the missile defense community to refine processes that synchronize transregional global missile defense planning and operations. Codified in periodic revisions to the Global Missile Defense Concept of Operations, these processes ensure unity of effort and mitigate potential seams and gaps across geographic areas of responsibility. Consistent with the Department's transition to planning based on adversary problem sets, JFCC IMD has continued to refine our process for adversary-centric missile defense plans assessments, and completed further objective analysis of missile defense risks across multiple GCC plans. This assessment methodology identifies systemic risk, informs recommendations for shortfall mitigation, and increases effectiveness in future missile defense planning efforts. This analysis informs our biennial Global Integrated Air and Missile Defense Assessment which shapes recommendations for global force management and future capability advocacy. Looking forward, we will work with the warfighter community to increase integration, enabling a more holistic approach to missile defense.

Global Force Management: USSTRATCOM, as the designated Joint Functional Manager for missile defense, relies upon JFCC IMD to evaluate and recommend to the Joint Staff risk-informed sourcing of missile defense requirements. Due to the low density/high demand nature of missile defense assets, all sourcing decisions have a direct and significant impact on other combatant commanders' campaign and contingency plans. We continue to refine our approach, ensuring integrated capabilities are appropriately postured to counter transregional threats in accordance with the National Defense Strategy, the Missile Defense Review, and Department steady-state priorities. This globally integrated approach serves as the baseline for our risk-based recommendation into the Global Force Management process, enabling senior leaders to make informed decisions on allocation of low density missile defense forces.

Allied and Partner Missile Defense Integration: Given that we will never have enough active defense capacity, integrating our allies and partners into a common and mutually supportive architecture is a critical warfighter priority. In support of those efforts, our Global Missile Defense Concept of Operations includes an International Engagement Framework which provides a common approach to identify potential

partners, a model to identify a level of maturation, and an assessment mechanism. This approach has formed the analytical basis for previous Department Reports to Congress on Allied Integration. Another venue aimed at promoting increased cooperation is the Nimble Titan Campaign of Experimentation, a biennial series of multinational missile defense experiments. Nimble Titan brings together policy and military subject matter experts from allied and partner nations to explore the national policy and military interfaces and dynamics involved in collaborative coalition and alliance missile defense planning. Meeting this intent is necessary to develop regional defense designs, C2 relationships, and collective, bilateral, and multilateral policy. Today, ministries of foreign affairs and defense representatives from 24 nations, the North Atlantic Treaty Organization (NATO), and three additional multinational organizations, as well as Department of State, OSD, Joint Staff, CCMDs, and MDA convene quarterly to exchange views and insights and collectively explore policy and operational concepts. The current Nimble Titan 20 campaign incorporates recent guidance from senior leaders and lessons learned to experiment with the future use of space sensors for missile defense, advanced weapon systems, deterrence, de-escalation, and non-kinetic effects as part of IAMD. The campaign continues to address the challenges of intelligence and information sharing in a multinational coalition as well as some of the operational considerations involved in integration and countering specific threats such as cruise missiles and unmanned aerial systems. The campaign also added a "peer excursion" element to explore how national perspectives would change with the introduction of a major peer-level state in a conceptual "what-if" construct. Nimble Titan continues to be a gateway for the U.S. to establish crucial relationships with allies and partners. It also informs the missile defense policies of the participating nations and international organizations. Events like Nimble Titan foster greater confidence in combined missile defenses and provide a means to advance U.S. efforts in

> **"By working together with allies and partners we amass the greatest possible strength for the long-term advancement of our interest."**
> - 2018 National Defense Strategy

collaboration, integration, interoperability, and burden sharing with our allies and partners.

JFCC IMD, in coordination with CCMDs and selected allied and partner militaries, is developing a multilateral information sharing and modeling and simulation construct to enable collaborative planning and provide a better assessment of allied and partner nations' missile defense systems and capabilities. It also participates in regular multilateral tabletop exercises and events to help partner nations identify and close capability gaps. Additionally, we have successfully integrated allies directly into the JFCC IMD staff through the Foreign Liaison Officer (FLO) program. Our current FLO, a German Air Force officer, has been an integral player in Nimble Titan, NATO ballistic missile defense training, and allied and partner modeling and simulation efforts. We expect to receive a Danish FLO this year to increase our understanding of multinational missile defense policy, capabilities, and planning initiatives in the European region.

Joint Missile Defense Training and Education: In coordination with USSTRATCOM, the Joint Staff, CCMDs, and the Services, we continue to develop comprehensive and innovative training programs to close gaps between Service, joint, and regional missile defense training and education. Last year, OSD designated JFCC IMD's Joint Ballistic Missile Defense Training and Education Center as the first Joint Center of Excellence. It now offers 16 mission-oriented resident and mobile training team courses, and online courses to include orientation, asset management, C2BMC situational awareness, and general officer/flag officer seminar training. Over the past year, JFCC IMD instructors executed 230 courses, training over 3,700 students worldwide. Additionally, JFCC IMD provided training courses to our allies and partners through military-to-military and Foreign Military Sales training venues. In 2019, this included training to the Japan Self Defense Force Joint Staff, the Republic of Korea Armed Forces, and the United Arab Emirates.

Warfighter Capability Acceptance and Integrated Master Test Plan: As missile defense architectures mature, warfighters require a credible, comprehensive assessment of new capabilities to inform operational acceptance into the global MDS. The warfighter relies on a robust and operationally relevant test campaign to confidently field and integrate new capabilities into their existing IAMD architectures.

Our recent Warfighter Capability Acceptance Progress Report highlights improvements made to Robust IRBM Defense for USEUCOM and USCENTCOM. The next Warfighter Capability Acceptance report is scheduled to be completed in 2020 and will include THAAD remote launcher capability in support of the USFK JEON.

In the past year, JFCC IMD supported the MDS test campaign with some significant firsts: the first salvo (two GBIs) engagement of an ICBM-class target; operational flight test of the GMD system; the first use of the space segment of the Spacebased Kill Assessment in a GMD flight test; the first Aegis SM-3 Block IIA simulated engagement of an ICBM-class target; and the first use of THAAD remote launch capability.

We also supported a Patriot MSE launch-on-remote engagement using THAAD data. This test featured the first Patriot launch-on-remote engagement against an SRBM class target and supports USFK's JEON and the 2016 National Defense Authorization Act (NDAA) interoperability requirement for Patriot and THAAD. In a few months, a flight test is scheduled to demonstrate Aegis BMD's capability to engage an ICBM-class target.

Offense-Defense Integration: An optimal missile defense requires an offensive capability. By retaining a capability to attack the adversary's ability to launch missiles in addition to a capability to destroy them after launch, JFCC IMD can lower the overall cost of missile defense and reduce the risks of failure. The 2019 Missile Defense Review highlighted this and directed that our future missile defense integrate offense and defense in a comprehensive posture. Creating a comprehensive approach will require balancing a variety of offensive approaches within our deterrence calculus. Methods that could be used to attack the adversary's ability to launch include kinetic attack, cyber, the electromagnetic spectrum, or DE. Each provides opportunities to reduce the burden on active defense; however, there is no "silver bullet" to defeating the threat. As we continue to develop increased range and lethality in our precision strike capability, we need to consider how this fits

> **"The United States will pursue greater integration of attack operations with active and passive missile defenses."**
> - 2019 Missile Defense Review

within our deterrence calculus, how we should organize to operationalize the capability, and its contribution to missile defense. Our future offensive materiel solutions to address the adversary's strike capabilities will likely be a mix of guns, missiles, EW, cyber, space, and DE. To this end we must understand how they complement each other and strive for a balance that includes left-of-launch and offense-defense integration capabilities.

In summary, JFCC IMD continues to expand our Nation's global missile defense architecture and explores future capabilities to maintain operational advantage against current and future threats. Our competitive edge is maintained through integrated planning and operational support, deliberate investments in our capability developments by MDA and the Services, investments in our warfighters through education and training, expansion of collaboration with our allies and partners, and the speed of innovation and fielding to get capability in the hands of our warfighters.

Conclusion

Chairman Cooper and Ranking Member Turner, as members of the joint missile defense community, the Army and USSTRATCOM continue to pursue enhancements to the Nation's IAMD systems, from the tactical to the strategic levels of warfare. As outlined here, USASMDC and JFCC IMD perform a broad set of critical national security missions. These missions include providing professional warfighters and capabilities to support current operations, ensuring they are prepared for tomorrow's fight, and developing new technologies required to maintain a technological advantage against our adversaries. Our trained and ready Soldiers, operating GMD elements in Colorado, Alaska, New York, California, and from remote, globally deployed locations, remain on point to defend the homeland against an ICBM attack. As a force provider to the GCCs, we provide essential regional sensor capabilities, ballistic missile early warning, and space-enabled communications. Our regional forces continue to leverage allied collaboration and planning efforts in developing integrated and interoperable defenses against the various threat sets. USSTRATCOM, through JFCC IMD, continues to integrate MDS capabilities to counter global missile threats and to protect our Nation, deployed forces, allies, and partners.

While operational, doctrinal, and materiel developments are essential, our most important assets are the thousands of Soldiers, Sailors, Airmen, Marines, Civilians, and Contractors who deploy and operate our IAMD systems. As recognized by Department leadership, the strength behind our outstanding workforce is their Families. Their contributions and sacrifices are foundational to the dedication and performance of our workforce—the role and support of our Families empowers mission accomplishment.

I appreciate having the opportunity to address missile defense matters and look forward to addressing your questions.