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Director, Missile Defense Agency
Before the
House Armed Services Committee
Strategic Forces Subcommittee
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Chairman Lamborn, Ranking Member Moulton, and distinguished Members of the subcommittee, thank you for taking my testimony today. The Missile Defense Agency (MDA) budget request of \$10.9 billion for Fiscal Year (FY) 2024 enables the continued execution of the MDA mission to design, develop and deploy a layered Missile Defense System to defend the United States and its deployed forces, allies, and international partners from increasingly diverse missile threats.

Potential U.S. adversaries are developing more advanced ballistic, hypersonic, and cruise missile systems, making them more mobile, survivable, reliable, accurate, and capable of achieving longer ranges. Ballistic and hypersonic missiles capable of high velocity and heavy maneuver, and their use in large numbers and combination attacks, which may also involve cruise missiles and unmanned aerial systems, could undermine the effectiveness of our missile defenses without continued development.

We are in the process of updating the September 17, 2009 DoD Directive for Missile Defense Agency acquisition authorities.¹ The update is needed to reflect changes incorporated in Directive-Type Memorandum 20-002 Missile Defense System Policies and Governance, the organization of the Department of Defense, and statutory law impacting MDA. The Department established MDA in 2002 as a capability-based

¹ The review is led by the Office of the Secretary of Defense (OSD) with participation by the Office of the Director of Administration and Management (ODA&M) and in consultation with OSD Research and Engineering (R&E), Acquisition and Sustainment (A&S), Director, Cost Assessment and Program Evaluation (CAPE), Office of General Counsel (OGC), Policy (P), the Joint Staff, U.S. Strategic Command (USSTRATCOM) and U.S. Northern Command (USNORTHCOM). The directive update is expected to be signed by the Deputy Secretary of Defense by March 1, 2024 in compliance with 10 USC 205 120-day congressional notification and waiting period.

acquisition organization, with authorities and governance processes designed to develop and field a missile defense capability rapidly and incrementally improve that capability over time. The update will finalize the MDA Director's acquisition authorities.

I continue to believe the Warfighter Involvement Process (WIP) is essential to the missile defense enterprise, and MDA is working with stakeholders to update the WIP to better support the Warfighter. MDA continues a very fruitful and important collaboration with the Combatant Commanders and Services to address the rapidly advancing and expanding threat with speed and agility. That collaboration includes the establishment of Service and MDA agreements, hybrid program offices, and regular Service and MDA Board of Directors meetings to address manning, training, and equipping requirements for fielded missile defense systems and sustainment support throughout the element's life-cycle.

Working with the Services to meet Combatant Command Requirements

MDA is developing, delivering, sustaining, and improving affordable, proven, and leading-edge capabilities to counter advanced ballistic and hypersonic missiles.

Space and Terrestrial Sensors

Space-based sensors are critical to integrated sensor-to-shooter capabilities used to defeat ballistic and hypersonic missile threats. MDA will continue collaborating with the U.S. Space Force (USSF) to deliver integrated capabilities that meet Warfighter requirements for missile warning, tracking, and defense.² USSF and MDA are

² In 2022, MDA collaborated with the USSF Space Systems Command and the Space Development Agency to form a Combined Program Office for missile warning, tracking and defense. MDA is also a member of the Program Executive Officer level Program Integration Council that facilitates cooperation and de-conflicts efforts enabling the National Security Space Enterprise force design to provide the Warfighter with integrated and synchronized space-based capabilities; and a member of the larger space acquisition community's Space Acquisition Council. MDA is

collaboratively developing satellites and integrating command and control capabilities to enable the tracking, targeting, cueing, and intercept of ballistic and hypersonic missiles. In fourth quarter FY 2023, the Hypersonic and Ballistic Tracking Space Sensor (HBTSS) will launch and begin demonstration of unique tracking and targeting capabilities needed to defend against hypersonic glide vehicles. HBTSS will participate in flight tests and real-world target-of-opportunity collections throughout FY 2024, and the proven capability will be proliferated and operated by the Space Force.

The current Space-based Kill Assessment (SKA) network of infrared sensors hosted on commercial satellites will continue demonstrating hit assessment capabilities for homeland defense. SKA sensors provide hit situational awareness to U.S. Northern Command and participate in flight tests and engineering activities to characterize sensor capabilities and provide valuable data to support future Post Intercept Assessment capabilities. Additionally, the Discriminating Space Sensor (DSS) continues to mature ballistic missile birth-to-death tracking and discrimination technology to provide a pivotal capability as part of MDA's space architecture.

MDA also is developing, deploying, and sustaining a robust, cyber-secure and networked ground- and sea-based radar architecture. The Long Range Discrimination Radar (LRDR) will complete acceptance testing and participate in an operational flight test in FY 2023. Development of LRDR software will continue to enhance tracking and discrimination, hit assessment, space domain awareness (SDA), space-intelligence data collection, and modeling and simulation capabilities. Following operational fielding

also a full participant in the USSF Space Warfighter Analysis Center future Force Design studies and analysis to integrate missile defense space sensor capabilities into space enterprise architectures.

in FY 2024, LRDR will support the Ground-based Midcourse Defense (GMD) capability against Pacific theater long-range missile threats.

The Sea-Based X-Band (SBX) radar provides precision midcourse tracking and discrimination capabilities to support homeland defense operations, Missile Defense System testing, data collection, and SDA. SBX completed an in-port maintenance and capability upgrade period this past March, and it is again deployed at-sea. Fabrication of the SBX replacement radome continues on schedule for installation in FY 2025.

AN/TPY-2 radars deployed abroad support Terminal High Altitude Area Defense (THAAD) batteries for regional defense. Radar 13, planned for delivery in March 2025, will be part of THAAD Battery 8 and be a fully modernized configuration that includes significant obsolescence redesigns leveraged from our ongoing Foreign Military Sales (FMS) cases. AN/TPY-2 radars deployed abroad in forward-based mode support homeland defense to provide early warning, precision tracking, discrimination capabilities, and space domain awareness.

MDA sustains and updates the USSF Upgraded Early Warning Radars (UEWRs) in Alaska, Massachusetts, United Kingdom, Greenland, and California, and the Cobra Dane radar in Alaska. UEWRs support homeland missile defense and improve midcourse Missile Defense System sensor coverage by providing critical early warning, tracking, object classification and cueing data. The UEWRs and Cobra Dane radar provide space object detection and tracking data to the Space Surveillance Network.

MDA provides software upgrades to Aegis integrated missile defense destroyers equipped with the SPY-1 radar to support the USSF SDA mission. The Aegis SDA capability is fully compatible with deployed U.S. Navy operations and has appropriate

safeguards supporting full Aegis missile defense warfighting capability. In October 2022, we supported the Navy's first demonstration of SDA capability with the USS Nimitz (CVN 68) Carrier Strike Group during their Composite Training Unit Exercise. In FY 2024, we will continue to develop, test, and deliver this upgrade and support the Navy in future SDA demonstrations.

Command and Control, Battle Management and Communications

C2BMC is the integrating element of the Missile Defense System, providing Combatant Commanders and decision makers with a global, persistent, and near-real-time missile defense common operating picture. C2BMC joins space-based infrared, land-, and sea-based sensor threat observations to provide acquisition, tracking, cueing, discrimination, and targeting data to engagement elements in support of U.S. and coalition-partner missile defense and SDA operations. C2BMC also connects with Service, NATO, and international systems.

Funding in FY 2024 sustains the C2BMC planner, situational awareness, battle management, training, and SDA capabilities within Combatant Command user nodes as well as the global missile defense network. Additionally, this funding continues integrating space surveillance sensors with C2BMC in order to enhance the missile warning, missile tracking, missile defense, and SDA missions and address trans-regional threats. We continue to develop new capabilities to improve overall C2BMC system resiliency, enhance system discrimination of threat objects, and refine space track data to improve Missile Defense System operational effectiveness. MDA recently fielded a key software upgrade to integrate LRDR and the Ballistic Missile Defense System Overhead Persistent Infrared (OPIR) Architecture in order to bring a prototype

hypersonic missile tracking capability into full operations within the Missile Defense System. This spiral upgrade significantly expands SDA capabilities for U.S. Space Command using LRDR and the Aegis SPY-1 radar and integrates the U.S. Army's Integrated Air and Missile Defense Battle Command System with the Missile Defense System.

Homeland Defense

The GMD system has protected the U.S. Homeland from rogue long-range ballistic missile attacks since 2004. Today, we are delivering new capabilities to address the limited but increasingly advanced North Korean long-range ballistic missile threat. Earlier in this fiscal year, we increased US Northern Command ~~three~~ ~~new~~ Ground Based Interceptor capacity in the most advanced configuration with Capability Enhanced-II Block 1 Exo-atmospheric Kill Vehicles integrated on new Configuration 2 boost vehicles. These interceptors will help mitigate the risk until the Next Generation Interceptors are fielded no later than the end of 2028. The Ground Based Interceptors continue to undergo a Service Life Extension Program to improve reliability and availability, which we anticipate will extend portions of the existing fleet beyond 2030. In parallel, MDA continues to upgrade the ground system infrastructure, communications network, fire control system, Warfighter training systems, and missile fields to improve the reliability, capability, cybersecurity, and resiliency of the GMD weapon system.

In FY 2024, we will execute an intercept flight test demonstrating the capability to select a 2- or 3-stage burn of a Ground Based Interceptor booster, which enables an earlier release of the kill vehicle to expand significantly the engagement area and time

to counter inbound threats. This flight test also will demonstrate the latest incremental improvements we have developed for the entire kill chain to defeat an advanced threat-representative long-range target equipped with countermeasures.

We awarded two Next Generation Interceptor contracts in March 2021, and our competing Industry prime contractors are on track and rapidly advancing through the design development process with full technical rigor to deliver this new capability as soon as possible. Both designs feature multiple kill vehicle payloads to reduce the number of interceptors required to defeat a single ballistic missile threat to our Nation. Our FY 2024 budget request transitions the programs from Technology Development to the Product Development Phase.

Regional Defense

Globally deployed ship-based and land-based Aegis BMD capabilities are critical to the Nation's defense of our deployed forces, allies, and partners against short-, medium-, and intermediate-range missile threats. In FY 2024, MDA is designing improvements to the Aegis BMD capability, to include procuring and delivering Standard Missile (SM)-3 Block IB Threat Upgrade (TU) and Block IIA missiles, improving Sea-Based Terminal (SBT) defense, advancing weapon system and missile reliability, and enhancing Aegis BMD engagement capacity and lethality. We will continue to develop Aegis BMD weapon system software to enhance functionality and leverage more-capable radars and national technical means.

MDA continues to support defense of NATO's European territory and forces against the ballistic missile threat from the southeast of the Alliance's border. Aegis Ashore in Romania is operational, and we are working to complete and prepare Aegis

Ashore in Poland for Navy acceptance, followed by transfers of authority to U.S. European Command and NATO. We recently completed installation and testing of the combat system equipment at Naval Support Facility Redzikowo, Poland, in parallel with construction activity. Both Aegis Ashore sites are designed to launch the SM-3 Block IBTU and Block IIA missiles.

In FY 2022, MDA successfully executed PACIFIC DRAGON 22 (PD-22). Event 1 marked the first use of a SM-3 Block IA engagement of a Short Range Ballistic Missile (SRBM) in a fleet exercise. Event 2 demonstrated J7.1 Sea-Based Terminal capability by conducting a simulated SM-6 engagement with the new Maya-class Japanese destroyer against a live target. We also executed an intercept flight test campaign (Japan Flight Test Aegis Weapon System-07, or JFTM-07) with Japan, demonstrating the newest engagement capability of the Japan (J7) Aegis BMD configuration with SM-3 Block IIA against a Medium Range Ballistic Missile (MRBM). JFTM-07 also demonstrated Aegis ship-to-ship engage-on-remote in a simulated engagement, an integrated missile defense capability using SM-2 surface-to-air defense missiles, and an engagement of an SRBM with a SM-3 Block IBTU.

MDA plans to conduct a Tracking Exercise, Flight Test Other (FTX)-23, with two Aegis ships to perform target scene data collection of an MRBM with countermeasures. We will also demonstrate Aegis SBT with a salvo engagement in Flight Test Aegis Weapon System (FTM)-32, firing two (salvo) SM-6 Dual II software upgrade guided missiles against a MRBM. In FTX-40 we will fire a simulated SM-6 missile against a hypersonic glide vehicle.

The THAAD Weapon System is a globally transportable, ground-based system that is highly effective against short-, medium- and intermediate-range missile threats inside and outside the atmosphere in the terminal phase of flight. MDA currently supports forward-deployment of two batteries stationed in the U.S. Indo-Pacific Command (INDOPACOM) area of responsibility, cooperates with the United Arab Emirates in support of two operational FMS THAAD batteries, and supports the Kingdom of Saudi Arabia in the production of seven additional FMS THAAD batteries scheduled to begin fielding in FY 2025. In FY 2024, we will continue THAAD interceptor procurement, production of battery hardware, obsolescence mitigation efforts, fielding and training support, the THAAD Stockpile Reliability Program, and modifications to meet growing cybersecurity threats.

In October 2022, MDA, in conjunction with the U.S. Army, successfully delivered capability and enhancements to one of the forward-deployed THAAD batteries in support of INDOPACOM. The battery can now execute THAAD remote launch capability, execute Patriot Launch-on-Remote, and integrate Patriot Missile Segment Enhanced (MSE) launchers and missiles into the THAAD battery. This capability increases Patriot-defended area and engagement opportunities by allowing the MSE interceptor to leverage the highly effective THAAD AN/TPY-2 radar. In August 2022, the U.S. Army validated the requirement for accelerated fielding of this capability to all other U.S. THAAD batteries. MDA is currently coordinating fielding of this capability with the U.S. Army and will begin global fielding this fiscal year.

Rigorous testing will continue in FY 2023 with the execution of Flight Test THAAD Weapon System-25, which will demonstrate for the first time the THAAD

weapon system's concurrent control of both a THAAD interceptor and firing a salvo of two Patriot MSE interceptors in an engagement of multiple MRBM targets. In FY 2024, we will execute FTX-28 to demonstrate interoperability with Patriot by exchanging Link-16 messages and assess THAAD's capability to detect, track, and discriminate SRBMs with countermeasures (no interceptors).

The Department is continuing development of a missile defense system for defense of Guam against diverse missile threats. We will expand capability and capacity as the threat evolves. In collaboration with the Army and Navy, we are moving towards meeting an INDOPACOM requirement for a persistent 360-degree layered defense capability on Guam against simultaneous raids of cruise, ballistic, maneuvering, and hypersonic threats. Today we are in the early stages of developing the Homeland Defense Radar-Guam (now designated as the AN/TPY-6 radar) and the Aegis Guam System to provide persistent long-range midcourse discrimination, precision tracking, missile engagements, and hit assessment to protect Guam.

We also are developing a layered defense capability against regional hypersonic threats and have initiated a development program for a Glide Phase Interceptor, leveraging existing systems where possible, including proven engage-on-remote and launch-on-remote capabilities. We are focusing on the proven Aegis Weapon System to provide the depth-of-fire needed for a layered defense against hypersonic threats. In FY 2024, MDA will continue to develop and mature the GPI capability and leverage the Aegis Weapon System. Today, MDA already provides the Navy an initial terminal defense capability. We also are working closely with the Navy to develop, field, and upgrade SBT defenses to counter more advanced maneuvering and hypersonic threats.

We anticipate delivering these Increment 3 capabilities in 2025. In FY 2024, Aegis SBT will demonstrate an engagement against an advanced target in the terminal phase (FTM-32) and a simulated engagement against a hypersonic glide vehicle (FTX-40). In FY 2025, SBT Increment 3 will demonstrate an engagement against a hypersonic glide vehicle firing an SM-6 Block IAU missile (FTM-43).

We are continuing our cooperative missile defense relationship with Israel, jointly developing and delivering systems to strengthen its missile defenses and increase interoperability between U.S. and Israeli forces. In FY 2024, our two nations continue to cooperate on engineering, development, co-production, testing, and fielding of the Arrow Weapon System, the David's Sling Weapon System, and co-production for the Iron Dome Defense System. I would like to highlight the March 22, 2022 ceremony for the transfer of the David's Sling Elevated Sensor System from the Israel Missile Defense Organization (IMDO) to the Israel Air Force, a significant milestone for our joint program, with final validation and testing occurring this year. MDA also executed the \$1 billion Iron Dome Replenishment funding to Israel, and participated in contract negotiations and awards, where agreement with suppliers and IMDO increased the U.S. workshare to 30%. This increase of U.S. workshare is \$50 million above the mandated 25%, thus providing more funding back to the U.S. industrial base.

Developing Technology to Support Missile Defense

MDA has an integrated, strategic Science and Technology (S&T) approach to identify, develop, and transition key enabling technologies to the Missile Defense System and the Warfighter. Our S&T investment strategy balances rapid development and fielding of capabilities with leap-ahead technologies for the future system.

MDA is collaborating with the Office of the Secretary of Defense, the Services and Warfighters, National Laboratories, Universities/ Academia, International partners, and Industry (traditional and non-traditional defense partners) to implement a coordinated S&T approach to develop advanced missile defenses. We are aligning our S&T roadmap to close capability gaps, develop strategic thrusts, deliver Warfighter requirements, and enhance the future architecture to maximize the transition of cutting-edge and transformational technology to outpace the current and future threat. Specifically, MDA is developing key technologies to support hypersonic defense with the Hypersonic Defense Architecture Risk Reduction and Testing, High Operational Tempo for Hypersonics, and Hypersonic Test Bed efforts, including axial upper stage throttling, communications, seeker windows, material characterization, hypersonic wind tunnel testing, and thermal protection systems.

In the future, MDA seeks to enhance current kinetic kill capabilities with directed energy and other non-kinetic solutions to keep pace with the volume and complexity of threats. MDA is working with OSD and the Services to develop the technologies to support the development and integration of lasers and high power microwave systems, and we are participating in studies to assess the viability of various directed energy weapons to optimize tracking, typing, targeting, and engagement management. MDA continues to work closely with OSD to develop and transition Diode-Pumped Alkali Laser technology out of the laboratory to Industry, and MDA is determining lethality mechanisms using pulsed lasers. We are also developing advanced sensors to improve position accuracy and range estimates of missile threats. The NanoSat Testbed Initiative is a collaborative, experimental approach leveraging commercial

satellite platforms to mature technology and perform risk reduction for encrypted communications in a meshed network in space to support Service and Agency initiatives.

MDA has started Left Through Right-of-launch Integration (LTRI) activities, which will enhance offensive-defensive integration. LTRI will optimize the efficiency and effectiveness of situational awareness between intelligence activities, offensive attack operations, and right of launch defenses, improving overall missile defeat capabilities. MDA has developed a medium fidelity model to simulate LTRI and is beginning to apply Artificial Intelligence and Machine Learning to LTRI. MDA's LTRI activities and collaboration with other partners will optimize missile launch operations and provide data to inform decision-making in time critical situations.

Conclusion

Chairman Lamborn, Ranking Member Moulton, Members of the Subcommittee, we are committed to attracting and building a strong, talented future workforce to meet the mission challenges of tomorrow. I would like to recognize and thank the men and women who serve in our Armed Forces at home and abroad and who operate the integrated Missile Defense System with the support of our dedicated civilian and contractor workforce. I appreciate your continued support for MDA and the missile defense mission, and I look forward to answering the committee's questions. Thank you.