Unclassified Statement of

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Before the

House Armed Service Committee

Subcommittee on Strategic Forces

Thursday, March 19, 2015

Embargoed Until Released by the
House Armed Services Committee
United States House of Representatives

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Good afternoon, Chairman Rogers, Ranking Member Cooper, distinguished Members of the subcommittee. I appreciate this opportunity to testify before you today. Our current budget request of $8.127 billion for Fiscal Year (FY) 2016 will continue the development of defenses for our Nation, deployed forces, allies, and international partners against increasingly capable ballistic missiles. The FY 2016 missile defense program will continue to support the warfighter and needs of the Combatant Commands (COCOMs) with the development and deployment of interceptors, sensors, and the command, control, battle management and communications (C2BMC) system for the integrated Ballistic Missile Defense System (BMDS). Our request for FY 2016 will improve and expand homeland and regional missile defenses and invest in advanced technology development and future capabilities to counter the increasingly complex threat.

Ballistic Missile Threat

The threat continues to grow as our potential adversaries acquire a greater number of ballistic missiles, increasing their range, incorporating BMD countermeasures, and making them more complex, survivable, reliable, and accurate. Space-launch activities involve multistage systems that further the development of technologies for intercontinental ballistic missiles (ICBMs). In addition to the Taepo Dong 2 space launch vehicle/ICBM, North Korea is developing and has paraded the KN08 road-mobile ICBM and an intermediate-range ballistic missile (IRBM) capable of

reaching Guam and the Aleutian Islands. As part of a series of provocations last year, North Korea conducted multiple short- and medium-range ballistic missile launches and threatened to conduct additional longer-range launches. Today it fields hundreds of Scud and No Dong missiles that can reach U.S. forces forward deployed to the Republic of Korea and Japan.

Iran has publicly stated it intends to launch a space launch vehicle as early as this year (2015) that could be capable of intercontinental ballistic missile ranges if configured as such. Iran also has steadily increased its ballistic missile force, deploying next-generation short- and medium-range ballistic missiles (SRBMs and MRBMs) with increasing accuracy and new submunition payloads. Tehran's overall defense strategy relies on a substantial inventory of theater ballistic missiles capable of striking targets in southeastern Europe. Iran continues to develop more sophisticated missiles and improve the range and accuracy of current missile systems, and it has publicly demonstrated the ability to launch simultaneous salvos of multiple rockets and missiles. Demonstrating it is capable of modifying currently deployed ballistic missile systems, Iran has flight-tested a Fateh-110 ballistic missile in an anti-ship role. By adding a seeker to improve the missile's accuracy against sea-based targets, Iran could threaten maritime activity throughout the Persian Gulf and Strait of Hormuz.

Support for the Warfighter

Our overriding goal is to support the warfighter, which includes delivering greater missile defense capability and capacity. With this budget we will maintain our commitment to build out homeland defenses to 44 Ground Based Interceptors (GBIs) by the end of 2017. We also will maintain our commitment to deploy Phases 2 and 3 of the

European Phased Adaptive Approach (EPAA) on schedule, which will include the deployment of Standard Missile-3 (SM-3) Block IB missiles and SM-3 Block IIAs (first available in 2018) on ships and at Aegis Ashore sites in Romania (2015) and Poland (2018). We currently have 33 Aegis BMD ships, on the way to 35 by the end of FY 2016. We are continuing efforts to improve the performance of the Aegis Weapons System and plan to procure a total of 209 SM-3 Block IBs by the end of FY 2016. We announced a Technical Capability Declaration this past December for the second forward-based X-band AN/TPY-2 radar in Japan, which improves homeland and regional defense capabilities and increases our global operational AN/TPY-2 radar posture. By the end of FY 2016, MDA is scheduled to deliver 48 additional Terminal High Altitude Area Defense (THAAD) interceptors, for a total of 155 interceptors fielded, and we are continuing our support of the operational Guam THAAD battery.

Last year we conducted or participated in several multi-event exercises and wargames, which are critically important to the warfighter and the intensive engineering efforts across the Agency. In response to the continued fielding by U.S. adversaries of air, missile, and rocket capabilities, as Technical Authority for Integrated Air and Missile Defense (IAMD), MDA is leading the integration of evolving MDA, Service, and COCOM command and control capabilities through systems engineering analysis and development of technical integration requirements and interface control documents. Other IAMD initiatives include integrating C2BMC with the Army's Integrated Battlefield Control System (IBCS) to exchange ballistic missile data and exploring THAAD integration within the IBCS Army architecture.

We continue to work closely with the Director, Operational Test & Evaluation (DOT&E), independent testers, and the Services to develop an Integrated Master Test Plan (IMTP) to execute a robust, cost-effective flight test program that features operationally realistic conditions and integrates U.S. government stakeholders – to include Soldiers, Sailors, Airmen, and Marines – and allies to prove BMD capabilities. We have entered a period of unprecedented testing complexity and increased testing tempo. Our flight tests will involve increasingly stressful threat representative targets as well as longer range interceptors for our homeland and regional capabilities. From October 2013 to the present, we have executed seven high profile flight tests. In FY 2015 we will conduct 12 flight tests, and in FY 2016 seven flight tests.

Homeland Defense

MDA remains committed to operating, sustaining, and expanding our nation's homeland missile defenses and requests $1.76 billion for the Ground-based Midcourse Defense (GMD) program, or $613 million over our PB 2015 request. This budget request will allow us to grow the number of currently deployed Ground Based Interceptor (GBI) fleet to 44 by the end of 2017, continue flight and system ground testing, continue Redesigned Kill Vehicle (RKV) development, enhance the Stockpile Reliability Program, modify the current booster to increase survivability and hardness to support RKV integration and expand the battle space to enable later GBI engagements, upgrade the GMD ground system, and deploy upgraded GMD fire control software to enhance our ability to use land-based sensor discrimination data.

The successful FTG-06b intercept test this past June allowed us to assess the performance and interoperability of homeland defense weapon systems, including

GMD, an Aegis BMD ship, the Sea-Based X-band radar (SBX), and C2BMC. An Aegis BMD ship acquired an Intermediate Range Ballistic Missile (IRBM) target and forwarded the track through C2BMC to the GMD fire control system, which developed a weapon task plan that the warfighter used to launch a GBI. The SBX acquired the target objects and forwarded precision tracks with discrimination data through the GMD ground system to the in-flight GBI. The interceptor used SBX data to locate the target objects, complete discrimination, and successfully intercept the target. Our analysis indicates that all components of the system performed as designed. This was the first flight test of an operationally configured GBI that demonstrated the ability to correctly discriminate and intercept the reentry vehicle in the presence of countermeasures. FTG-06b also demonstrated that a Capability Enhancement-II (CE-II) exo-atmospheric kill vehicle (EKV) with a cradled Inertial Measurement Unit dampens the vibration environments experienced during the failure of the FTG-06a flight test conducted in December 2010. With this successful flight test we were able to resume production of eight planned GBIs in the proven FTG-06b configuration.

We are implementing several fixes to address the failed FTG-07 flight test in July 2013. While the GBI was in flight, a voltage shift caused by battery electrolyte leakage shut down the flight computer and prevented EKV separation. We developed EKV software for CE-I GBIs, which includes a capability to reset and recover the flight computer following a voltage shift. This software was fully tested and is now fielded to all deployed CE-Is. New battery and ground ties, once tested, will be incorporated in the CE-II Block 1 deliveries beginning in FY 2016.

The next flight test of the GMD system will take place late this year. GM CTV-02+ is a non-intercept test of a CE-II GBI to demonstrate the performance of alternate divert thrusters in a flight environment and test end-to-end discrimination of a complex target scene through the GMD fire control loop. The EKV will use Aegis BMD SPY-1, SBX, and AN/TPY-2 data for target selection. Data collected from this test will be used to evaluate Discrimination Improvements for Homeland Defense (DIHD) objectives. At the end of calendar year 2016 we plan to conduct FTG-15, which will be the first intercept flight test for the CE-II Block 1 GBI and the first intercept of an ICBM range target. Following a successful intercept, the plan is to deliver 10 CE-II Block 1 GBIs over the next year to achieve our goal of 44 GBIs by the end of 2017.

In addition to increasing the operational fleet from 30 to 44 GBIs by 2017, MDA will complete the refurbishment and reactivation of Missile Field 1 at Fort Greely by 2016 to provide sufficient silos for 44 GBIs. We will deliver eight new CE-IIs in 2015, upgrade eight currently fielded CE-IIs in 2016, and deliver 10 new CE-II Block 1 GBIs in 2017. Four previously fielded CE-II GBIs will be used for flight and Stockpile Reliability testing.

MDA completed a GBI Fleet Assessment last year that pointed out the need for improvements in reliability of the EKV, GBI, and ground systems, and we will continue to implement its findings in FY 2015 and beyond. We have introduced an enhanced Stockpile Reliability program to better understand the service life and reliability of the fielded fleet and are conducting design and reliability analysis on the fielded CE-IIs and booster to establish performance margins. We are analyzing the GBIs to identify potential failures modes and reliability risks so that we can conduct the right ground

tests. These efforts will improve confidence in the current GBI fleet and influence our development of the next GBI with a Redesigned Kill Vehicle.

We will continue development of a Redesigned Kill Vehicle (RKV) for initial deployment in 2020. The RKV will be a modular design using mature subassemblies and components to improve reliability, maintainability, producibility, and affordability when compared to the current EKV. The program will perform full qualification and reliability testing of components and subassemblies. The RKV will incorporate performance enhancements in target acquisition and discrimination and include on-demand communications. On-demand communications enables better use of off-board sensor data and provides improved situation awareness for the warfighter. The RKV also will include survivability enhancements. The first flight test of the RKV is planned for 2018, and the first intercept test is planned for 2019. We will acquire two additional boosters beginning in FY 2016 to support RKV flight tests.

This year we will finish construction of the GBI In-Flight Interceptor Communication System (IFICS) Data Terminal (IDT) at Fort Drum, New York. The east coast IDT will enable communication with GBIs launched from Fort Greely, Alaska and Vandenberg Air Force Base in California over longer distances and improve defenses for the eastern United States.

MDA will implement upgrades to the GMD ground system to improve reliability, maintainability, and eliminate obsolescence problems. The existing GMD ground system was built in 2004 using technology developed in the 1990s. Without an upgrade, the ground system reliability would decay and impact GBI availability to the warfighter. Phase I will upgrade the GBI command launch equipment, GMD fire control

servers, and address obsolescence problems on the IFICS data terminal by 2017. Phase II upgrades the GMD communications network and launch systems equipment and modifies the IFICS data terminal to support on-demand communications with the RKV by 2020.

Working with our Japanese partners, we completed the deployment of the AN/TPY-2 radar in Kyogamisaki in southern Japan to complement the radar currently operating in Shariki in northern Japan. This radar and a new C2BMC capability will enhance the overall performance of the Kyogamisaki and Shariki radars when operating in a mutually supporting AN/TPY-2 dual radar mode. We made a Technical Capability Declaration for the Kyogamisaki radar this past December. Together with the Shariki AN/TPY-2 radar in the north, the new radar will enhance the ability to defend our forward deployed forces, Japan, and the U.S. homeland from ballistic missile attack by providing improved tracking coverage for launches out of North Korea.

We will continue missile defense upgrades of the Early Warning Radars in Clear, Alaska and Cape Cod, Massachusetts. We expect to complete the Clear radar upgrade in 2017 and the Cape Cod upgrade in 2018. In FY 2016 we will continue to support flight testing with the SBX to demonstrate improvements to discrimination and debris mitigation. Our budget request of $72.9 million for SBX includes funds for improving reaction time and conducting contingency operations for defense of the homeland. We also plan to support a near-term discrimination capability in 2016 and fielding near-term discrimination improvements for homeland defense in 2020 to enhance the tracking and discrimination capabilities of currently deployed sensors.

In FY 2016 we request $137.6 million to continue the development of the Long Range Discrimination Radar (LRDR), the new midcourse tracking radar that will provide persistent coverage and improve discrimination capabilities against threats to the homeland from the Pacific theater. LRDR will provide larger hit assessment coverage enabling improved warfighting capability to manage GBI inventory and improving the capacity of the BMDS. We have completed technical trade studies and defined requirements for the LRDR and started acquisition planning and pre-construction activities. MDA has released a Request for Proposal (RFP) for the development, deployment, and initial operation of the LRDR. We anticipate contract award before the end of FY 2015. In FY 2016 we plan to conduct a System Requirement Review and Preliminary Design Review. MDA worked closely with Air Force Space Command to verify LRDR's inherent capabilities to support the space situational awareness (SSA) mission. The Command is jointly exploring system design and operations alternatives to maximize the exploitation of LRDR's inherent SSA capabilities. Air Force Space Command envisions using LRDR to augment the Space Surveillance Network capabilities as a secondary mission if it proves viable.

A Continental United States (CONUS) Interceptor Site (CIS) study, conducted in accordance with Section 227 of the FY 2013 National Defense Authorization Act, determined the following sites were viable candidates to be included in the Environmental Impact Statement (EIS): Fort Drum, New York; Portsmouth SERE Training Area, Maine (Rangley); Camp Ravenna, Ohio; and Fort Custer Combined Training Center, Michigan. The Department is conducting EIS activities that will evaluate each of the four candidate sites, to include potential impacts to land use, water

resources, air quality, transportation, socioeconomics and other factors established by the National Environmental Policy Act. The EIS will take approximately 30 months and should conclude in 2016. There has been no decision by the Department to move forward with an additional CONUS interceptor site. The current GBI sites at Fort Greely and Vandenberg AFB provide capability necessary to protect the U.S. homeland against the current and projected ICBM threat from North Korea as well as the future Iranian ICBM threat should it emerge. Even though an additional CONUS interceptor site would add battle space and interceptor capacity, a decision to construct the new site would come at a significant material development and service sustainment cost. Near-term, upgrading the kill vehicle on the GBI and enhancing the homeland defense sensor network are higher priorities and prerequisites for improving protection against limited ICBM attack.

Regional Defenses

Deployment of regional defenses to protect our deployed forces, allies and international partners remains one of our top priorities. Our FY 2016 budget request funds the continued development and deployment of defenses against SRBMs, MRBMs, and IRBMs in support of Combatant Commanders' near-term and future priorities and supports the President's commitment to EPAA.

Terminal High Altitude Area Defense

Today, four Terminal High Altitude Area Defense (THAAD) Weapon System Batteries are delivered, with the fifth planned for activation this year. To meet the demand from combatant commanders for THAAD, in FY 2014, MDA accelerated procurement of THAAD Battery 7 for delivery in FY 2017, two years earlier than

previously planned. We also completed the development and fielding of THAAD Software Build 1.4, which includes critical updates to weapon system components and Information Assurance update. MDA also continued its support of the first deployed THAAD battery in Guam, exceeding the Army's required operational readiness rate.

This year THAAD will participate in two flight tests, FTT-18 and FTO-02. In FTT-18 THAAD will demonstrate an intercept of a separating IRBM target using the THAAD radar, launcher, fire control and communication, interceptor operations and engagement functions. In FTO-02, Event 2, THAAD will engage a SRBM and demonstrate advanced radar algorithms. During this operational test of our regional defense architecture, which will include the attempted intercept of an MRBM and air-breathing target by Aegis BMD, THAAD will demonstrate a layered defense capability.

For FY 2016, MDA is requesting $464.1 million for THAAD procurement, which includes the purchase of 30 THAAD interceptors and procurement of training devices for the THAAD institutional training at Fort Sill, OK. By the end of FY 2016, MDA will deliver an additional 48 THAAD interceptors to the U.S. Army, for a total of 155 interceptors delivered. We will continue to support the forward deployed THAAD battery in Guam. We are requesting $228.0 million in RDT&E funding in FY 2016 as part of the continued development of THAAD capabilities, and begin concept development and risk reduction activities for THAAD follow-on capabilities. These activities will explore and mature the design concept of expanding THAAD system interoperability with air and missile defense systems, and expanding the battlespace and defended area of the current baseline THAAD Weapon System. We are also

requesting $63.7 million for THAAD operation and maintenance for 6 delivered batteries.

Aegis Ballistic Missile Defense

In FY 2014, MDA continued to expand global BMD capability for the Aegis Fleet. Together with the U.S. Navy, we completed four BMD Weapons System installations on Aegis ships -- one Aegis BMD 3.6 ship and three Aegis BMD 4.0 ships -- and we commenced upgrades on existing BMD ships, two from 3.6 to 4.0 and one from 3.6 to Aegis Baseline 9.C1 with BMD 5.0CU. We now have a total of 33 BMD capable Aegis ships in the Fleet. We continued delivery of Standard Missile-3s to the Fleet, including 29 Block IAs and 26 Block IBs.

In FY 2014, MDA conducted several critical flight tests to prove the operational capability of the Aegis BMD weapon system. In FTM-22, we successfully engaged and destroyed an MRBM target using the Aegis BMD 4.0 weapon system and an SM-3 Block IB. This test exercised the second-generation Aegis BMD 4.0 weapon system and supported production decisions for the SM-3 Block IB by completing developmental and operational testing for both the weapon system and missile. With the successful completion of DOT&E testing requirements, Aegis BMD 4.0 and the SM-3 Block IB were found to be operationally suitable and effective. FTM-22 was also the final flight test executed by the USS Lake Erie, the BMD test ship for over 10 years.

We also brought ballistic missile defense flight testing back to the east coast in FY 2014. In FTX-18 we successfully simulated engagements against a raid of three short-range targets using the Aegis BMD 4.0 Weapons System and simulated SM-3

Block IBs to evaluate the effectiveness and suitability of the weapon system in a raid environment off the coast of Virginia at NASA's Wallops Island facility.

As construction began at the Aegis Ashore site in Romania, we conducted the first Controlled Test Vehicle at the Aegis Ashore Missile Defense Test Complex at the Pacific Missile Range Facility (PMRF) in Kauai, HI. This flight test proved the design of the Aegis Ashore system and the ability to launch an SM-3 from land. The first Aegis Ashore intercept test from PMRF will occur in the third quarter of this year to support turn-over of the Romanian site to the Navy for operation.

In its homeland defense role, Aegis BMD executed long range surveillance and track to provide data for the GBI launch in FTG-06b. In the test, USS Hopper, with the BMD 4.0 weapon system, acquired the target and sent track data to the BMDS Command, Control, Battle Management and Communications system, directly contributing to successful intercept of the target.

This past fall we conducted two operationally representative tests for certification of the Navy's Aegis Modernization Baseline 9 weapon system. In FTX-20, we used our new MRBM target to exercise several BMDS sensors and C2BMC. This was also the first tracking exercise for the new Navy/MDA Integrated Air and Missile Defense Baseline 9 test ship, USS John Paul Jones. A couple of weeks later, in FTM-25, USS John Paul Jones launched an SM-3 Block IB to intercept an SRBM target while simultaneously launching two SM-2 Block IIIAs against two air-breathing threats, successfully exercising the Navy's Integrated Air and Missile Defense capability inherent in Baseline 9.

In FY 2016, we will continue our commitment to develop, test, and deliver global naval capability to the warfighter and support defense of our deployed forces and NATO

European allies through delivery of EPAA Phases 2 and 3. We request $448.0 million in FY 2016 to procure 40 SM-3 Block IBs, for a total of 209 procured and 107 delivered by the end of FY 2016. In anticipation of FY 2016 and beyond Multiyear Procurement Authorization for the SM-3 Block IB, MDA requests $147.8 million in economic order quantity for missile components for FY 2016-19 Block IB multiyear procurements. By moving to a multiyear procurement, we may realize an estimated cost savings of up to 14 percent across the FYDP. To recertify SM-3 rounds which have been previously delivered and deployed to the Fleet, MDA requests $19.8 million for sustainment of these assets.

We request $172.6 million for the SM-3 Block IIA cooperative development effort with the Japan Ministry of Defense. In FY 2014, the SM-3 Block IIA completed Propulsion Test Vehicle-01, in which the missile and new composite canister both demonstrated successful and safe ignition and egress from the vertical launching system. Upon completion of this test and the system level critical design review, the SM-3 Block IIA transitioned into the integration and testing phase and will execute the first controlled test vehicle flight test in third quarter FY 2015. Along with a total of five flight tests for the SM-3 Block IIA through FY 2018, FY 2016 will focus on an extensive ground test campaign to prove system design and missile capability. We are committed to delivering the SM-3 Block IIA to the Fleet to meet global threat requirements, and specifically to support EPAA Phase 3.

MDA is strongly committed to further enhancing capability of the Aegis BMD weapon system to give Sailors the tools needed to successfully execute their mission. MDA requests $40.7 million for the BMD 4 series weapon systems to bring advanced

threat and raid scenario capability to the legacy Aegis BMD Fleet. As we wrap up BMD 5.0CU development, MDA has prioritized delivering BMD 5.1 capability on schedule and requests $180.6 million to continue software development and testing to certify in FY 2018 and meet the delivery timeline of the SM-3 Block IIA missile for deployment on ships and at Aegis Ashore sites. In addition to weapon system development, MDA requests $110.9 million to procure weapon system equipment for installation and upgrade to the BMD Fleet and $12.6 million to sustain BMD specific equipment on the existing Fleet.

We also continue development of a Sea Based Terminal capability to provide protection of maritime forces against observed or demonstrated advanced anti-ship ballistic missiles and increased layered defense for forces ashore. Using an incremental development approach, we are incorporating BMD capability into the Navy's Baseline 9 architecture, to include terminal defense with the SM-6 guided missile and the BMD 5 series weapon systems. In 2014, we completed Sea Based Terminal Increment 1 missile (SM-6 Dual I) software build 1, and we demonstrated its performance in a simulated environment. We plan to test and certify the first increment of Sea Based Terminal capability in fourth quarter FY 2015 in four Multi-Mission Warfare events, with follow-on performance testing in FY 2016. Sea Based Terminal Increment 2 is on schedule to be certified and operational in 2018.

European Phased Adaptive Approach

We will continue to expand the EPAA to provide additional coverage of European NATO territory from Iranian ballistic missile threats by investing resources for EPAA development, testing and deployment. EPAA Phase 1 was implemented in 2011 with

the fielding of an AN/TPY-2 radar in Turkey and stationing of an Aegis BMD ship in the Eastern Mediterranean.

MDA is on schedule to deliver EPAA Phase 2 by the end of 2015, which will enhance U.S. and NATO capabilities with the addition of more capable Aegis BMD SM-3 Block IBs and upgraded Baseline 9 weapon system with BMD 5.0CU. Phase 2 will include deployment of Aegis Ashore to Romania with capability to launch both SM-3 Block IA and IB variants and upgraded versions of the Aegis BMD weapon system. Required military construction, installation, integration and testing activities will be complete for technical capability declaration in 2015. After having tested the system at the Moorestown, New Jersey site in 2014, the deckhouse, including all weapon system equipment was disassembled, packed and shipped to Romania. MDA requests $33.4 million in FY 2016 to complete site activation, integration, and testing of the system in-country and to maintain the test site at PMRF to support system-wide testing for Phase 2 deployment. We are on track to turn over Aegis Ashore Romania to the Navy, and in FY 2016 we have requested $13.9 million for sustainment of the system once it is operational. MDA also completed installations and upgrades to the BMD-capable multi-mission ships that are shifting homeports from Norfolk, VA to Rota, Spain, which will support the EPAA Phase II architecture. The homeport transfer of four multi-mission Aegis BMD ships to Rota, Spain began in 2014 with the USS Donald Cook and USS Ross. The remaining two Aegis BMD ships, USS Porter and USS Carney, will transfer this year.

EPAA Phase 3 will improve defensive coverage against medium- and intermediate-range threats with the deployment of a second Aegis Ashore site in

Poland, equipped with the BMD 5.1 weapon system and capability to launch SM-3 Block IIAs. Construction at Redzikowo, Poland is expected to begin in FY 2016. We request $30.6 million in FY 2016 for procurement of Aegis Ashore equipment and $169.2 million for the construction of the Aegis Ashore site in Poland. We need this funding to complete this site by the end of 2018.

Command, Control, Battle Management, and Communications and Sensors

C2BMC provides persistent tracking, cueing, discrimination, and fire control quality data to Aegis BMD, GMD, THAAD, and coalition partners to support homeland and regional defense objectives. Last June we successfully forwarded Aegis BMD system track data through the C2BMC system to the GMD fire control system during FTG-06b. We continue to support warfighter command and control and battle management needs across the globe by providing the strategic BMD planner, which provides Combatant Commanders situational awareness tools to support weapons release authority for homeland defense and control and tasking of forward-based AN/TPY-2 radars. C2BMC operators and maintainers are deployed forward in some of the world's highest threat spots and continue to provide around-the-clock support to the local commanders. As the BMDS integrating element, C2BMC has also demonstrated proven interoperability across regional BMD architectures.

In addition to continuing the enhancement of global BMD survivable communications and support for operations and sustainment of C2BMC at fielded sites, this year we will integrate Space Based Infrared System Increment 2 capabilities into C2BMC to support cueing of BMD sensors worldwide. We have initiated a Space Based Kill Assessment (SKA) demonstration that will host sensors on commercial

satellites to collect data on missile intercepts, make an independent kill assessment, and pass that information on to the BMDS to support a multi-sensor kill assessment of the target.

The Services and COCOMs, with logistical support from MDA, are operating forward based X-band radars (AN/TPY-2(FBM)) in Japan, Israel, Turkey, and United States Central Command. All of these radars contribute to regional defense, and some, including the second AN/TPY-2 radar deployed to Japan last year, also provide a significant contribution to the defense of the U.S. homeland. Last year we also continued our AN/TPY-2 (Terminal Mode) support to warfighters on Guam. We accepted AN/TPY-2 Radar #9, providing it to THAAD Battery #4, and AN/TPY-2 Radar #10. We also awarded a production contract for AN/TPY-2 Radar #12, and for additional spares. In FY 2016 we plan to develop and test advanced discrimination algorithms to counter evolving threats to provide additional capability to the Combatant Commanders as well as close Materiel Release conditions for the Terminal Mode and Forward-Based Mode AN/TPY-2 radars. We plan to deliver Radar #10 to THAAD Battery #6, start production of an Antenna Equipment Unit Float, and complete production of AN/TPY-2 Radar #12, which will be allocated to THAAD Battery #7.

We request $536.5 million in FY 2016 to develop, deploy and test BMDS sensors (includes $138 million for the continued development of the Long Range Discrimination Radar), and $187.5 million to sustain the nine AN/TPY-2 radars and support the UEWRs and Cobra Dane radar. We will continue communications support for the AN/TPY-2 radars and C2BMC upgrades. We request $450.1 million in FY 2016 to develop, test, field, sustain, and operate all C2BMC spirals. We also will integrate

additional space sensors into the BMDS and enhance the track and discrimination capabilities of C2BMC to provide fire control quality data to BMD weapon systems in support of homeland and regional defense. We request $31.6 million for continued operation of the Space Tracking and Surveillance System in FY 2016.

Developing New Capabilities

MDA is developing fiscally sustainable, off-setting technologies to address gaps in the BMDS and extend our dominance in missile defense. MDA's goal for these investments is to deploy a future BMDS architecture more capable of discriminating and destroying a reentry vehicle with a high degree of confidence.

In 2014 and 2015, the warfighters emphasized the importance of improving discrimination capability, the missile defense function that distinguishes between lethal and non-lethal objects, in order to reduce the need for large, unaffordable interceptor inventories. Radars and electro-optical/infrared (EO/IR) sensors are central to this capability. However, sensors require sufficient sensitivity and resolution to measure features useful for inferring which objects are lethal or non-lethal. Between now and 2020, we will use available technology to improve existing sensors, battle management and fire control, and kill vehicles. After 2020, our plan is to field new advanced EO/IR sensors and upgrade discrimination capabilities based on our new technology investments.

Relying purely on terrestrial radars for precision tracking and discrimination of the threat is a potential weakness the enemy could exploit in the future. Adding persistent electro-optical sensors to the BMDS architecture is a high payoff solution for this gap. Last fall during FTM-25 we accelerated the Discrimination Sensor Technology flight test

program by nearly six months to prove that our Aegis Weapon System could launch a Standard Missile based solely on tracks generated by remote sensors on Unmanned Aerial Vehicles (UAVs). MDA requests $28.2 million for our Discrimination Sensor Technology development and test plan to provide a cost-effective, stepping stone towards our goal of achieving persistent discrimination coverage of enemy missiles in all theaters, including ICBMs targeting the homeland. In FY 2016, we plan to upgrade UAV-borne sensors and demonstrate even greater discrimination capability in conjunction with Aegis flight testing in the first quarter FY 2017 as a precursor to the development and test of a prototype advanced sensor under our Technology Maturation Initiatives program element.

We request $45.4 million in Weapons Technology to continue development, integration, and testing of our high-powered directed energy program to build the foundation for the next-generation UAV-borne laser system. A UAV-borne laser would be capable of acquiring, tracking and eventually destroying an enemy missile at a much lower cost than the existing BMDS. Within the Directed Energy project, we will develop and demonstrate the technology necessary to scale laser power jointly with our Air Force and DARPA partners. The Massachusetts Institute of Technology's Lincoln Laboratory (MIT/LL) Fiber Combining Laser achieved 34 kilowatts continuous power in October 2014, a record for fiber combined lasers. The Lawrence Livermore National Laboratory (LLNL) achieved similar success with their Diode Pumped Alkali Laser system, reaching five kilowatts last year. In our effort to mature high altitude, low Mach UAVs for directed energy applications, we successfully completed five Phantom Eye flights at the Air Force's Edwards Flight Test Center in California. The Phantom Eye

demonstrator achieved a record altitude of 53,241 feet and collected over 33 hours of data from launch to landing.

In FY 2016, MIT/LL will conduct a Fiber Combining Laser critical design review and begin fabrication and integration of a lighter, more compact Fiber Combining Laser system, driving the weight of the system down from five kilograms per kilowatt to one kilogram per kilowatt. LLNL will demonstrate a DPAL system at 30 kilowatts average power, six times more powerful than ever achieved by a hybrid laser.

Within the Interceptor Technology project, MDA develops technology to enhance the hit-to-kill capability within current and future BMDS architectures. MDA will invest in cutting edge technology for the competitive development of the next generation, solid Divert and Attitude Control System (DACS) for the Multi-Object Kill Vehicle. We will also investigate the suitability of rail gun technology for missile defense missions.

MDA requests $96.3 million for Technology Maturation Initiatives to build on the successes in weapons technology and discrimination sensor technology. Airborne discrimination sensors and low power tracking lasers are sufficiently mature to develop flight prototypes that address complex tracking and discrimination challenges from evolving threats to the homeland. In FY 2016, MDA will incorporate an advanced sensor into the tactically proven Multispectral Targeting System and MQ-9 Reaper combination to prove precision track and discrimination performance of airborne sensors at strategic ranges, or thousands of kilometers. MDA will also contract with industry for the design of a UAV-borne laser demonstrator to quantify the target acquisition, tracking, and handover performance required for boost phase missile defense under realistic conditions.

MDA requests $46.7 million for the Common Kill Vehicle Technology effort. Last year, we began the first phase of a two phase, development strategy for the next generation of our exo-atmospheric kill vehicles. In that first phase, we defined concepts and developed requirements for a new Redesigned Kill Vehicle for our ground-based interceptor program. In FY16, we are implementing phase II of that strategy during which we will work jointly with industry to define concepts for deploying multiple kill vehicles from a single booster. This year we plan to award several contracts with industry to define concepts for Multi-Object Kill Vehicles (MOKV). In parallel, we will reduce technical risk in several areas that are critical to making this revolutionary concept a reality. For example, we will develop and test, by 2017, MOKV command and control strategies in both digital and Hardware-in-the-Loop venues that will prove we can manage the engagements of many kill vehicles on many targets from a single interceptor. We will also invest in the communication architectures and guidance technology that support this game changing approach. Ultimately, these Multi-Object Kill Vehicles will revolutionize our missile defense architecture, substantially reducing the interceptor inventory required to defeat an evolving and more capable threat to the Homeland.

MDA requests $17.4 million for Advanced Research and development that capitalizes on the creativity and innovation of the Nation's small business community and academia to enhance the BMDS. We are also fostering research between U.S. and foreign universities of allied nations through international cooperative science and technology projects. We awarded 216 new contracts for innovative new research in eight missile defense related topics last year.

MDA also requests $12.1 million for the Advanced Concepts & Performance Assessment effort, which models the capability of advanced BMD technology to address evolving threats to the warfighter. The request will fund the digital simulation and hardware-in-the-loop framework and models required for testing of the Airborne Advanced Sensor, Kill Vehicle Modular Open Architecture test bed, and maturing sensor fusion algorithms.

International Cooperation

The FY 2016 budget request includes funding for regional missile defense capabilities in order to protect U.S. forces, reassure allies and partners, and build cooperative regional security architectures. MDA is engaged with over twenty countries and international organizations, such as NATO. MDA remains committed to expanding work with our international partners, to include conducting joint analyses to support partner missile defense acquisition decisions, cooperative research and development projects, deployments, Foreign Military Sales (FMS), and co-production. Our major international efforts reflect the Department's goals in the Asia-Pacific, Middle East, and Europe and will help implement EPAA, build partner BMD capacity, and support the strategic shift to Asia-Pacific.

As allies and partners invest in their own missile defense capabilities, this will enable us to build more effective regional security architectures and complement U.S. regional missile defense capabilities. MDA is currently executing an FMS case with the United Arab Emirates for two THAAD batteries and accompanying launchers, radars, and interceptors. This calendar year, we will deliver the first THAAD battery to our UAE partners to begin New Equipment Training. We continue to be actively engaged with

several nations, particularly those in the Gulf region, to provide program information and cost data that may inform future decisions to procure THAAD.

We continue to have a very strong cooperative missile defense partnership with Israel. In FY 2014 the Israel Missile Defense Organization (IMDO) and MDA achieved a second successful intercept using the David's Sling Weapon System to defeat shorter-range ballistic missiles and conducted the second fly-out of the Arrow-3 upper tier interceptor, demonstrating its key functional capabilities in-flight. Arrow-3 is intended to intercept longer-range threats. The Arrow Weapon System 2 is a currently fielded capability operated by the Israeli Air Force. This past September, IMDO and MDA conducted an intercept test of the Arrow-2 interceptor missile against a MRBM target over the Mediterranean. The Department also reached agreement in March 2014 with Israel regarding coproduction of the Iron Dome defense system. The agreement garnered approximately $263 million in U.S. work share for coproduction of Iron Dome components. We are requesting $55.0 million to procure Iron Dome radars and associated equipment.

MDA and our Japanese counterparts continue to make significant progress with the SM-3 IIA interceptor, our largest co-development effort. This development work, which remains on track for first delivery in the 2018 time frame, would expand extended deterrence to our friends and allies and establish an important vehicle for closer defense cooperation ties. These cooperative activities enable U.S. partners to be less vulnerable to coercion and ballistic missile attack. In addition, our strong partnership with Japan enabled a technical capability declaration of the second AN/TPY-2 radar now located at the Japan Air Self-Defense Force (JASDF) base in Kyogamisaki, Japan

in just over two years from the initial announcement to proceed. We are also working with other strategic partners in the region.

In addition to implementing our EPAA commitments to our NATO Allies, we continue to work with NATO to ensure U.S. C2BMC and NATO command and control networks are fully interoperable. We have successfully demonstrated interoperability between NATO and the U.S. command and control networks. MDA will continue to engage our NATO Allies to address international cooperation in missile defense.

Cybersecurity/ Supply Chain Risk Management

We are very cognizant of the growing cyber threat and aggressively working to ensure the Nation's missile defenses will be able to operate in a highly contested cyber environment. Potential adversaries are developing cyber forces as part of their military structure and integrating them into their overall strategy. We are working with the Armed Services, the Combatant Commands, especially Strategic Command's USCYBERCOM, and other agencies in DoD and the Federal Government to counter this growing threat.

We are improving the cyber hygiene of our missile defense capabilities by ensuring our cybersecurity infrastructure has the latest security upgrades. We are assessing our systems, suppliers, and acquisition processes and ensure our critical software and hardware are strongly configured and trusted to lessen the risk of malicious activities. We have a rigorous cyber and Supply Chain Risk Management inspection program to examine everything about our systems from the trusted supply chain to the fielded capability. This helps us ensure the highest possible compliance levels. In May 2014, DISA Field Security Operations conducted a USCYBERCOM-

directed Command Cyber Readiness inspection on MDA's classified networks at MDA's Missile Defense Integration and Operations Center in Colorado. MDA received an "Excellent" score. In June 2014 the MDA Computer Emergency Response Team (CERT) was inspected as a Tier 2 Computer Network Defense Service Provider by USCYBERCOM/DISA Field Security Operations. The MDA CERT received a "Commendable" rating (second highest rating possible) and was awarded another three year Authorization to Operate. Over the last year we conducted four Enterprise Cyber Range Environment experiments with independent, DOT&E red team penetration testing on the Joint Information Operations Range. The purpose of these experiments is to better understand the cyber robustness of BMDS capabilities to insider threats. MDA also has one scheduled for May 2015. MDA completed 62 cybersecurity inspections worldwide to ensure DoD and MDA compliance. We follow up on these inspections to ensure remediation of any identified cyber risks.

We must build resilient cyber defenses that are capable of detecting and mitigating threats without impeding operations in order to "fight through" the cyber threat. MDA collaborates with the Director of Operational Test and Evaluation to conduct cyber penetration testing on key missile defense capabilities. We then use the results of those tests to conduct risk assessments to prioritize cybersecurity improvements, develop mitigation strategies, and improve cyber training. We are also working to develop better cyber CONOPS to ensure every network defender in every location knows how to quickly react to cyber challenges.

We are working hard to incorporate cybersecurity requirements early into our acquisition lifecycle to ensure we are building cybersecurity into missile defenses, not

just bolting it on after the fact. In addition, we are working with our Industry Partners in the Defense Industrial Base to ensure they can protect any missile defense program sensitive information from getting into the hands of potential adversaries. We have seen too many instances where malicious cyber actors attempt to exfiltrate information from them, especially from their unclassified, commercial networks that have exposure to the internet. We will continue to work with Industry and the FBI to identify these issues and raise the costs of this type of behavior to those responsible in coordination with National authorities and in accordance with policy.

Conclusion

This budget balances investment in homeland and regional missile defense capabilities while pursuing advanced technology to pace the emerging threat. We will do this by improving current system capabilities and investing in the most promising technology to reverse the adversary's numerical advantage. MDA continues to aggressively pursue cost reduction measures through competition, partnering, and cooperation. MDA is on track with the Department's schedule for financial improvement and audit readiness, ensuring full accountability of resources and processes.

Mr. Chairman, we have several critical developmental and operational flight tests coming up this year and next. We will adhere to our "fly before you buy" approach, testing elements of the system to demonstrate they work before we commit to their fielding in order to ensure the warfighter will have cost-effective and reliable weapon systems. With the successful GMD intercept this past June, continued emphasis on GMD reliability and commitment to increase GBI inventory, planned RKV investments, and renewed focus on improved tracking and discrimination, I believe we are turning the

corner with our homeland defenses. We remain on track with our EPAA deployments and continue to make good progress with our international partners across the globe. I am also committed to investing in advanced technologies to defeat the threat of the future and to looking for new and innovative ways to deliver missile defense capability to protect our nation, our forward deployed forces and our friends and allies at lower cost to the government and the taxpayers.

I look forward to answering the committee's questions. Thank you.