Missile Defense Agency Overview

To: Huntsville Aerospace Marketing Association

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Director for Engineering
Missile Defense Agency
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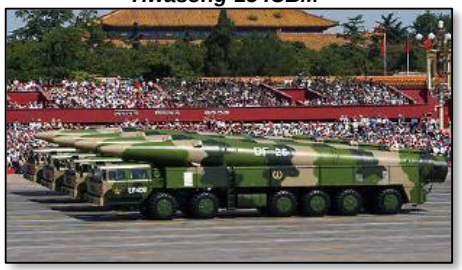
Missile Defense
Evolving Threat Environment

Adversaries are fielding diverse and expansive ranges of modern offensive missile systems

- **Developing new missiles & improving existing systems**
  - **Precision strike**
  - **Penetration aids (e.g., decoys, jamming devices)**
- **Capable of maneuvering in midcourse or terminal phase**
  - **Maneuvering Reentry Vehicle (MaRV)**
  - **Multiple Independent Reentry Vehicle (MIRV)**
  - **Hypersonic glide vehicles and cruise missiles**

North Korea
Hwasong-15 ICBM

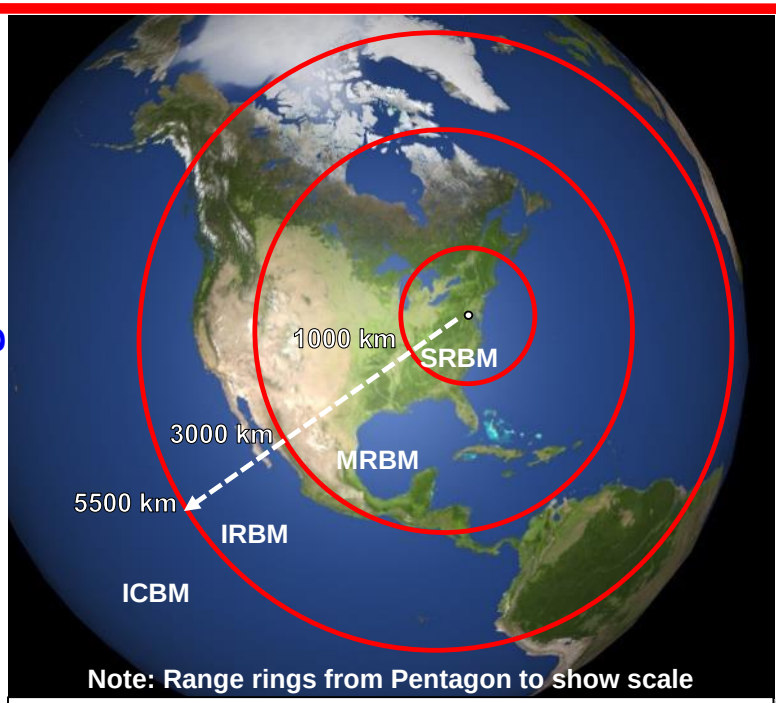
Iran
Emad-1 MRBM with MaRV



China
Dong Feng (DF-26) IRBM

Russia
Concept Hypersonic Glide Vehicle

Range



Note: Range rings from Pentagon to show scale

SRBM:	Short Range Ballistic Missile	(300-1000 km :: 621 mi)
MRBM:	Medium Range Ballistic Missile	(1000-3000 km :: 1864 mi)
IRBM:	Intermediate Range Ballistic Missile	(3000-5500 km :: 3418 mi)
ICBM:	Intercontinental Ballistic Missile	(5500+ km :: 3418+ mi)

Speed

Subsonic:	< Mach 1	(< 770 mph)
Supersonic:	Mach 1-5	(770-3,800 mph)
Hypersonic:	Mach 5-10	(3,800-7,700 mph)
High Hypersonic:	Mach 10-25	(7,700-19,200 mph)

Ref: 2019 Missile Defense Review

Missile Defense Agency Mission

To develop and deploy a layered Missile Defense System to defend the United States, its deployed forces, allies, and friends from missile attacks in all phases of flight









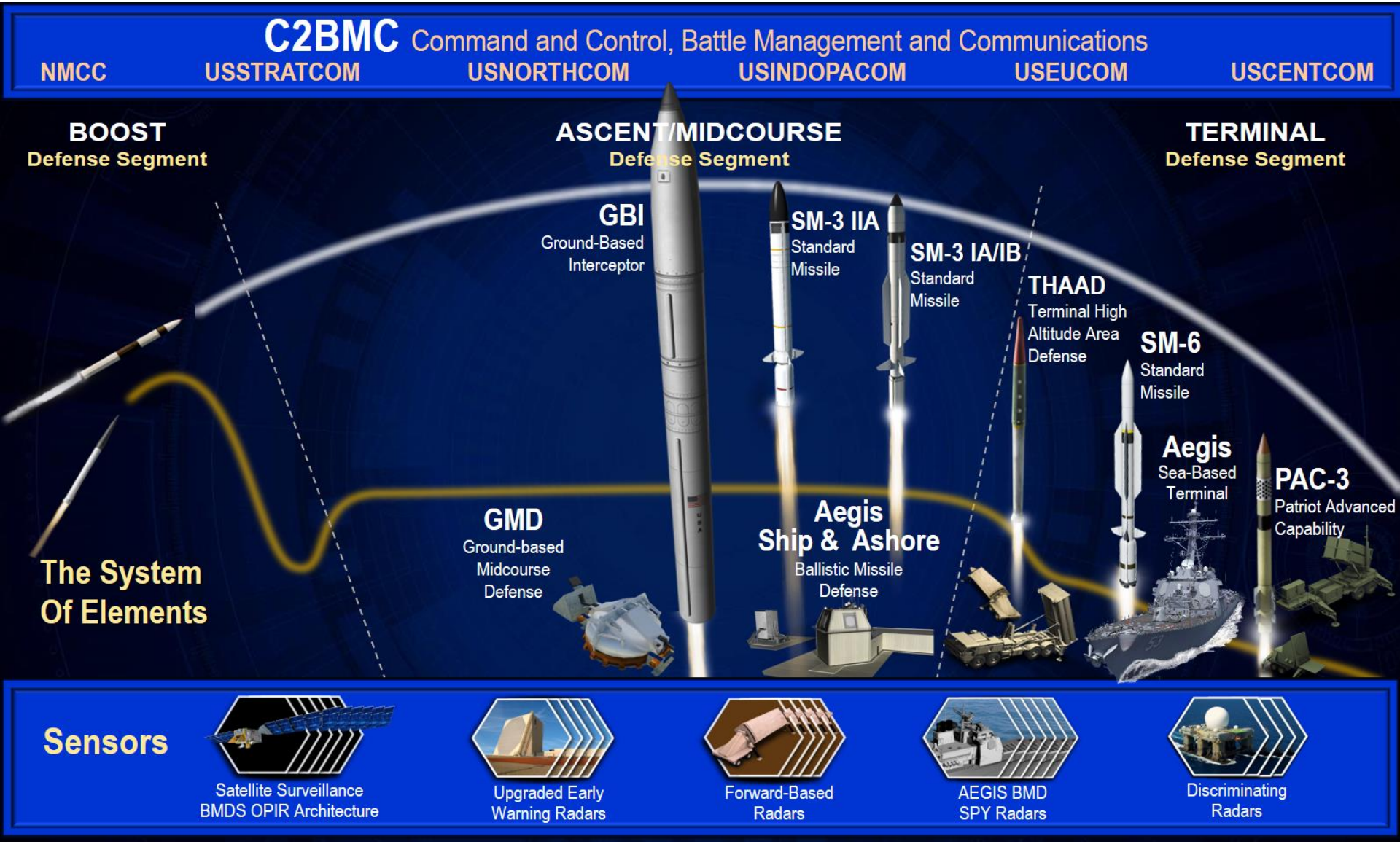
Missile Defense Capability Globally Deployed

Missile Defense Agency Lines of Effort
- In Support of the National Defense Strategy -

- **Build Warfighter confidence through focus on readiness and sustainment**
- **Increase engagement capability and capacity to outpace emerging threats**
- **Increase speed of delivery of new capability to address the evolving threat**

Today's Missile Defense System Meets Today's Threat but Requires Additional Capacity and Advanced Capability to Outpace the Evolving Threat

Today's Layered Missile Defense System



2019 Missile Defense Review (MDR)

- **The MDR articulates a comprehensive approach to prevent and defeat adversary missile attacks through:**
  - **Deterrence**
  - **Active and passive missile defense**
  - **If deterrence fails and conflict ensues, attack operations to destroy regional offensive missiles/infrastructure**
- **MDR brings attention to and reinforces MDA's efforts to develop and deploy a layered missile defense system**
- **MDA's focus is in line with the principles governing missile defense policy as outlined in the MDR**
  - **Fielding defenses for the U.S. to stay ahead of rogue ICBM threats**
  - **Tailoring regional missile defenses to defend U.S. forces abroad and allies and partners from theater threats**
  - **Pursuing new missile defense concepts and technologies to address future threats**

President's Budget 2020 Request

- **MDA requests $9.4 billion in FY 2020 to strengthen and expand the deployment of defenses for our Nation, deployed forces, allies, and international partners against increasingly capable missile threats**
- **The FY 2020 budget:**
  - **Supports the Warfighter and needs of the Combatant Commanders with the development, testing, deployment, and integration of interceptors, sensors, and the command, control, battle management and communications system**
  - **Preserves homeland and regional missile defense priorities and invests in advanced technology development and future capabilities to counter the proliferation of increasingly complex threats**

PB20 Summary
(Changes from PB19 in Green)

FY 2020

$6.0B

- **Continue focus on increasing system reliability to build Warfighter confidence**
  - Sustain the BMDS 24/7 (Aegis, THAAD, GMD, AN/TPY-2, COBRA DANE, C2BMC)
  - Ground Based Midcourse defense development and upgrades
  - Sea-Based X-Band (SBX) Radar Extended Operations
  - COBRA DANE Life Extension
  - Aegis Weapon System upgrades, complete SM-3 Blk IIA missile development/deployment
  - Cyber Security upgrades
  - BMDS Test and Targets
  - 12 AN/TPY-2 radars

$2.1B

- **Increase engagement capability and capacity**
  - Missile Field – 4 with 20 silos
  - Long Range Discrimination Radar (LRDR), Clear AFB, Alaska, initial fielding 2020
  - Homeland Defense Radar – Hawaii Radar initial fielding in 2023
  - Pacific Radar initial fielding in 2026 (delayed from 2024)
  - Seven THAAD Batteries and interceptors
  - USFK Joint Emergent Operational Need (JEON)
  - Standard Missile (SM)-3 Blk IB Threat Upgrade, MYP, SM-3 Blk IIA S/W upgrade
  - SM-3 Blk IIA Procurement
  - Discrimination Improvements
  - EPAA Phase III – TCD 2020

$0.9B

- **Address the advanced threat**
  - Hypersonic Defense Program
  - Directed Energy, including DPALS laser scaling (accelerated development)
  - Integrate Space-based Kill Assessment (SKA) into BMDS Communications Network/PIA
  - Conduct advanced technology maturation efforts for current/future weapon system technologies
  - Other Advanced Technology

Note: excludes Israeli Programs ($500M/yr)

PB20 Summary – Homeland Defense

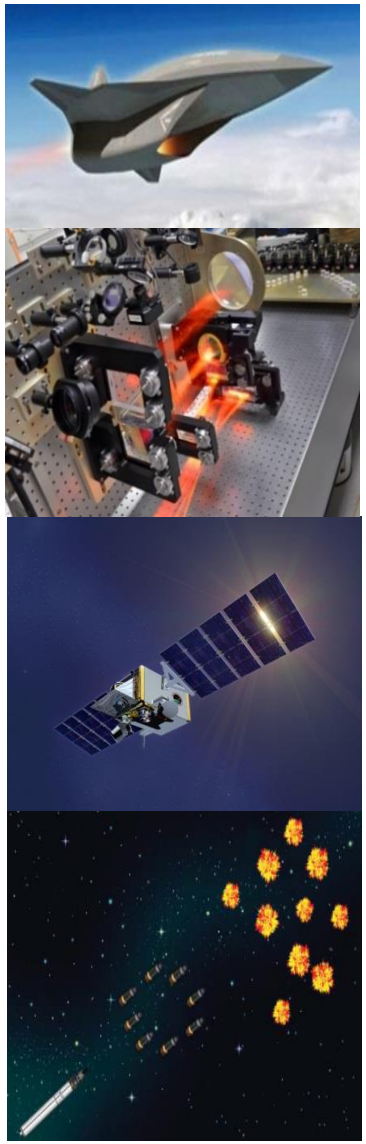
- **Ground-based Midcourse Defense (GMD) request is $1.8B**
  - Maintains deployment of 44 Ground-based Interceptors throughout the FYDP
  - Continues work to build a new missile field at Fort Greely, AK with 20 silos
  - Conduct next GMD flight test
- **Long Range Discrimination Radar request is $136M**
  - Radar available at Clear Air Force Station, Alaska by 2020
- **Sea-based X-band Radar request is $128M**
  - Continues extended number of days at sea
- **COBRA DANE Radar request is $20M**
  - Continues refurbishment and life extension
- **Homeland Defense Radar (HDR) – Hawaii request is $275M**
  - Available in 2023
- **Pacific Radar request is $7M**
  - Available in 2026

PB20 Summary – Regional Defense

- **Aegis Ballistic Missile Defense request is $1.7B**
  - Sustains deployed Standard Missile - 3 (SM-3) missiles
  - Procures 30 SM-3 Blk IB missiles for a total of 361 buys through FY 2020
  - Buys 7 SM-3 Blk IIA missiles for a total of 54 buys through FY 2020
  - Develops Aegis Weapon System 6.0 (AMDR/SPY-6 integration), SM-3 Blk IB Modernization and SM-3 Blk IIA Software Upgrade Program
- **THAAD request is $854M**
  - Sustains 7 batteries
  - Procures 37 interceptors for total of 568 buys through FY 2020
  - Continues software development and upgrades
  - Continues JEON to integrate missile defense capabilities in AOR
- **AN/TPY-2 radars request is $543M**
  - Sustains 12 radars
  - Continues software development for discrimination improvements
  - Supports BMDS testing
  - Supports transition to production of Gallium Nitride (GaN) Transmit/Receive Integrated Multichannel Modules (TRIMM)
- **Israeli Programs request is $500M as part of US-Israeli Memorandum of Understanding**
  - Procures and continues development of Israeli Programs to include Iron Dome Defense System, Arrow Weapon System, and David's Sling Weapon System
- **Aegis Ashore request is $64M**
  - Aegis Ashore Poland available in 2020
  - Aegis Ashore Missile Defense Test Complex (PMRF) capability improvements

PB20 Summary – Advanced Technology

- **Hypersonic Defense request is $157M**
  - Program initiated in FY 2018 in accordance with FY 2017 NDAA
  - Continues software modifications to current BMDS assets and defines requirements and architecture for future demonstrations
- **Technology Maturation Initiatives request is $304M**
  - Continues development and scaling of High Energy Lasers
  - Continues discrimination sensor demonstrator development
- **Space Tracking and Surveillance System (STSS) and Space based Kill Assessment request is $63M**
  - Continues operations of STSS satellites
  - On-orbit operations of space based kill assessment sensor network
- **Advanced Weapon System Technology request is $14M**
  - Conduct advanced technology maturation efforts for current/future weapon system technologies



PB20 Summary
C2BMC, Testing, and Systems Engineering

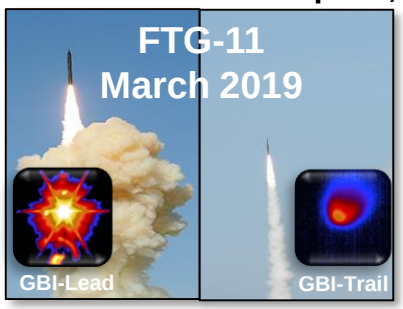
- **C2BMC request is $564M**
  - Sustains common C2BMC configuration (Spiral 8.2-3 including Aegis engage-on-remote) in USNORTHCOM, USINDOPACOM, USEUCOM, and USCENTCOM
  - Continues integration of Long Range Discrimination Radar control for homeland defense development efforts (Spiral 8.2-5)
  - Continues support and participation to the events in the Integrated Master Test Plan (IMTP)
- **BMDS Targets request is $554M**
  - Continues development of targets to support IMTP
- **BMDS Test request is $396M**
  - Conducts Missile Defense System flight tests, ground tests, and cybersecurity tests, exercises, and wargames

Test Highlights
Since August 2018

As of September 2019

18 Flight Test Events

- **JFTM-05: Joint test campaign with Japan supporting updated Japanese Aegis Weapon System**
  - **Successful intercept of SRBM with SM-3 Block IB Threat Upgrade from Japanese Aegis ship**
- **FTI-03: Operational test of the European Phased Adaptive Approach Phase 3 architecture**
  - **Successful intercept of IRBM utilizing the Aegis Weapon System's Engage-on-Remote capability based on C2BMC system track with SM-3 Block IIA by Aegis Ashore site; supports technical capability declaration**
- **FTG-11: First salvo engagement of ICBM-class target**
  - **Successful intercept of a threat representative ICBM-class target with countermeasures by a salvo of two Ground Based Interceptors; supports DOT&E assessment of Enhanced Homeland Defense**
- **Formidable Shield 2019: Live-fire integrated Air and Missile Defense exercise; Naval Striking & NATO forces**
  - **13 ships, over 10 aircraft, and approximately 3,300 personnel from 12 different countries**
- **FTA-01: Arrow-3 full intercept of a target**
  - **Joint multi-event campaign with Israel to demonstrate the Arrow Weapon System's ability to achieve high altitude and high velocity hit-to-kill engagements**
- **FTM-31 Event 2: Successful intercept of an air-breathing target with one SM-6 Dual II in anti-air warfare mode**
  - **Supports the SM-6 Dual II Engineering Change Proposal production decision and subsequent delivery to the fleet**
- **FTT-23: Successful intercept of a MRBM-class target using THAAD remote launcher capability**
  - **First intercept in the THAAD extended battlespace; supports technical capability declaration decisions**



Note: Flight Test total does not include non-baselined events with MDA participation (e.g., Glory Trips)

FTA: Flight Test Arrow Weapon System
FTG: Flight Test GMD Weapon System
FTI: Flight Test Integrated
FTM: Flight Test Aegis Weapon System
FTT: Flight Test THAAD Weapon System
JFTM: Japan Flight Test Aegis Weapon System

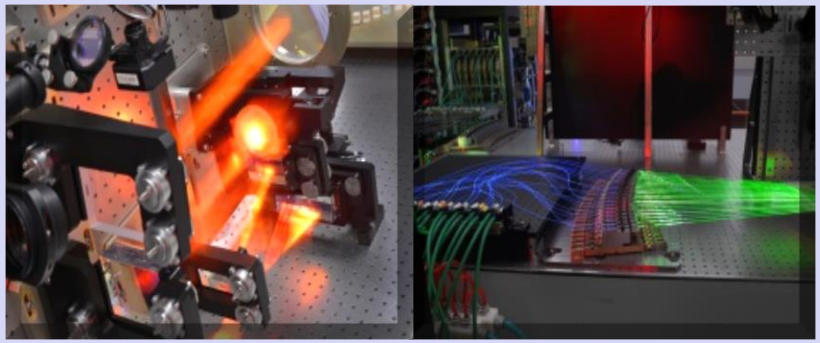
Missile Defense Agency Video

Video

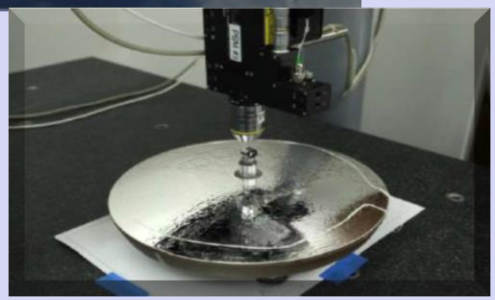
Advanced and Game Changing Technology for the Future

Advanced Technology

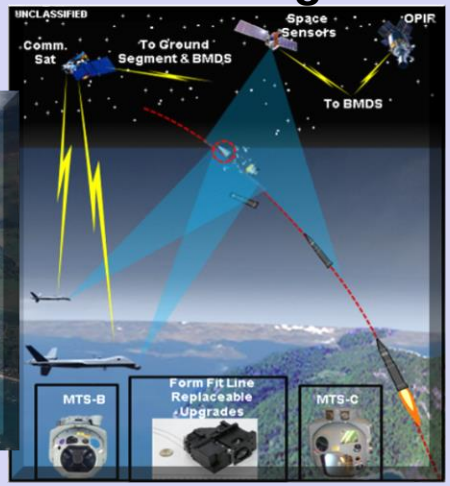
Directed Energy



Hypersonic Defense Weapon System Concepts & Component Technologies



Sensor & Communication Resilient Network Technologies



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