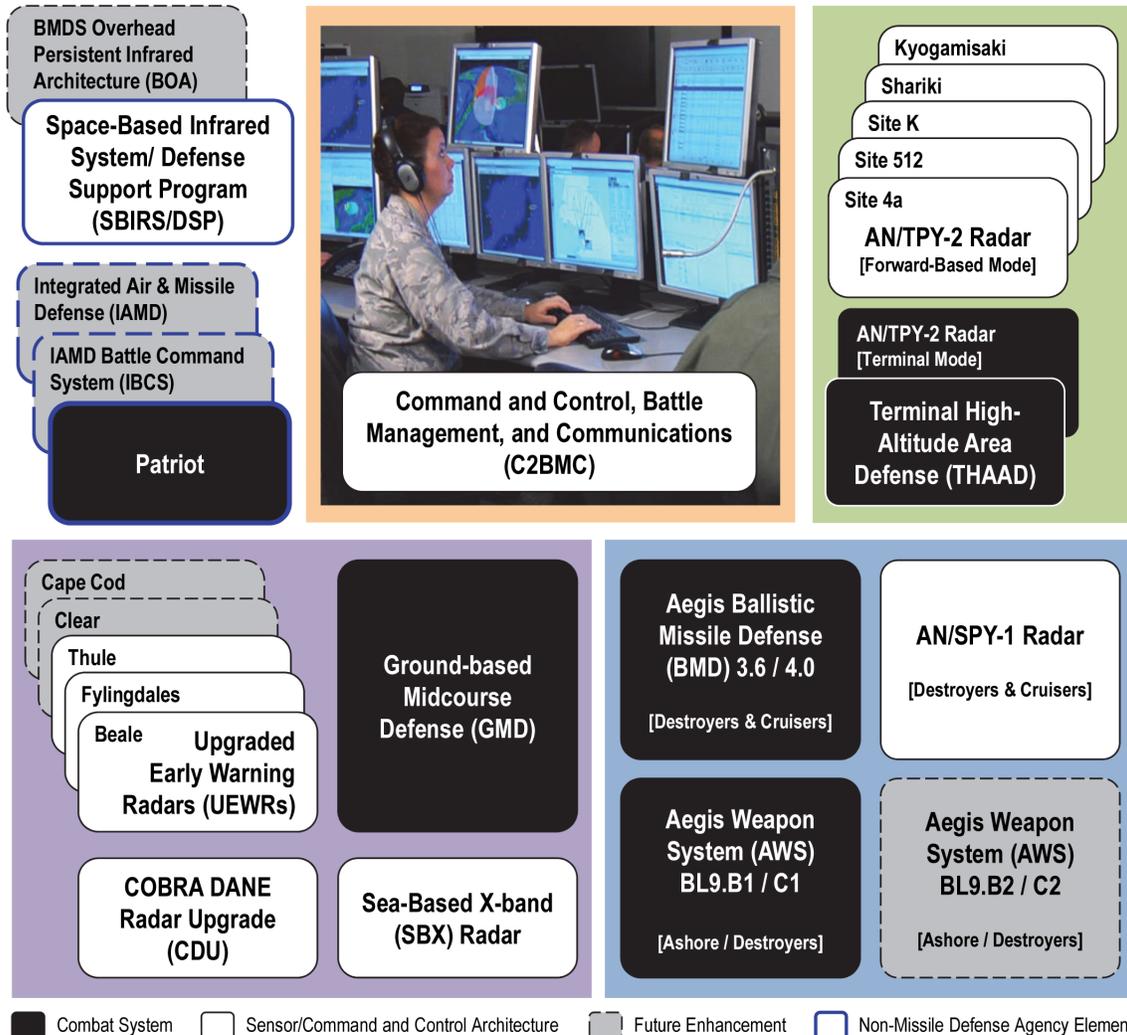


## Ballistic Missile Defense System (BMDS)



### Executive Summary

- The Flight Test, Operational-02 (FTO-02) Event 2 and Event 2a test demonstrated that the Ballistic Missile Defense System (BMDS) capability against theater/regional threats increased during FY15. The BMDS demonstrated layered defense against two threat-representative ballistic missile targets. However, the Standard Missile (SM)-3 Block IB Threat Update guided missile failed early in flight; an engineering Failure Review Board investigation is underway. Full assessment of the FTO-02 Event 2 and Event 2a test mission data with respect to BMDS operational effectiveness, operational suitability, and interoperability is ongoing.
- With no flight testing in FY15, the Homeland Defense assessment remains unchanged. The Ground-based Midcourse Defense (GMD) combat system demonstrates a limited capability to defend the U.S. Homeland from small numbers

of intermediate-range or intercontinental ballistic missile threats launched from North Korea or Iran.

- The Missile Defense Agency (MDA) enhanced the Integrated Master Test Plan (IMTP) by including direct linkage between the BMDS test program and future capability enhancements.
- The MDA conducted numerous ground tests, wargames, and exercises. The capability to produce BMDS-level simulation-based performance assessments was limited. The MDA should increase the development priority and associated funding for the BMDS high-fidelity, end-to-end, digital modeling and statistically significant simulation capability.

### System

The BMDS is a distributed system currently including five elements: four autonomous combat systems including dedicated

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sensors and one global/regional sensor/command and control architecture.

- GMD (shooter), COBRA DANE Radar Upgrade (sensor), Upgraded Early Warning Radars (sensor), and Sea-Based X-band Radar (sensor).
- Aegis BMD (shooter), Aegis Ashore Missile Defense System (AAMDS) (shooter), and AN/SPY-1 Radar (sensor).
- Terminal High-Altitude Area Defense (THAAD) (shooter) and AN/TPY-2 Terminal Mode Radar (sensor).
- Patriot (shooter). Since Patriot is an Army program instead of an MDA program, testing of the Patriot is discussed in the Army section of this FY15 Annual Report.
- Space-Based Infrared System/Defense Support Program (SBIRS/DSP) (global sensor); AN/TPY-2 Forward-Based Mode (FBM) Radar (regional sensor); and Command and Control, Battle Management, and Communications (C2BMC) (command and control). SBIRS and DSP are currently Air Force operational assets. Due to hardware and software similarity to the AN/TPY-2 (Terminal Mode) Radar, testing of the AN/TPY-2 (FBM) Radar is covered in the THAAD annual report.

## Mission

- U.S. Northern Command (USNORTHCOM), U.S. Pacific Command (USPACOM), U.S. European Command (USEUCOM), and U.S. Central Command (USCENTCOM) employ the assets of the BMDS to defend U.S. territory, deployed forces, and allies against ballistic missile threats of all ranges.
- The U.S. Strategic Command (USSTRATCOM) synchronizes operational-level global missile defense planning and operations support for the DOD.

## Activity

- The MDA conducted all testing in accordance with the DOT&E-approved IMTP.
- The BMDS Operational Test Agency and the MDA attempted FTO-02 Event 1 in June 2015 at the Pacific Missile Range Facility on Kauai, Hawaii. The MDA intended to demonstrate the operational capability of the regional/theater European Phased, Adaptive Approach Phase 2 BMDS, anchored by the AAMDS, to defend Europe against medium-range ballistic missiles. The test was to be the first target intercept by the AAMDS and the first flight for the SM-3 Block IB with threat update guided missile. Due to a target malfunction, the test was not completed and the SM-3 guided missile was not launched. This test is scheduled to be attempted again in December 2015.
- The BMDS Operational Test Agency and the MDA conducted FTO-02 Event 2 and Event 2a in September and October 2015 at Wake Island and the broad-ocean area surrounding it. The Operational Test Agency designed the test mission to demonstrate a layered BMDS with multiple combat systems

- All Combatant Commanders use the C2BMC element of the BMDS to maintain situational awareness. USEUCOM, USCENTCOM, and USPACOM also use the C2BMC to provide sensor management of regional AN/TPY-2 (FBM) radars.

## Major Contractors

- The Boeing Company
  - GMD Integration – Huntsville, Alabama
- Lockheed Martin Corporation
  - Aegis BMD, AAMDS, and AN/SPY-1 Radar – Moorestown, New Jersey
  - C2BMC – Gaithersburg, Maryland
  - SBIRS – Sunnyvale, California
  - THAAD Weapon System and Patriot Interceptors – Dallas, Texas
  - THAAD Interceptors – Troy, Alabama
- Northrop Grumman Corporation
  - DSP – Redondo Beach, California
  - GMD Fire Control and Communications – Huntsville, Alabama
- Orbital Sciences Corporation
  - GMD Booster Vehicles – Chandler, Arizona
- Raytheon Company
  - GMD Exo-atmospheric Kill Vehicle and Standard Missile-3 Interceptors – Tucson, Arizona
  - Patriot, AN/TPY-2 Radar, Cobra Dane Radar, Sea-Based X-band Radar, and Upgraded Early Warning Radars – Tewksbury, Massachusetts

- sharing common defended areas and shot opportunities against two threat-representative ballistic missiles. The primary test objective was to assess Aegis BMD system capability to prosecute a ballistic missile threat engagement in the presence of non-organic post-intercept debris, while simultaneously conducting Anti-Air Warfare. The THAAD combat system, using Lot 4 interceptors for the first time, generated the non-organic post-intercept debris scene for Aegis BMD.
- The MDA did not conduct Homeland Defense flight testing in FY15.
- During FY15, the MDA conducted four major ground tests.
  - Ground Test, Distributed-04e (GTD-04e) Part 2 and Ground Test, Integrated-06 (GTI-06) Part 3 in January and July 2015. These tests focused on USNORTHCOM and USPACOM scenarios, respectively.
  - GTI-06 Part 1 and GTD-06 Part 1 in May and October 2015. These tests focused on USEUCOM and USCENTCOM scenarios, respectively.

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- The MDA also conducted several wargames and exercises designed to enhance Combatant Command BMD readiness and increase Service member confidence in the deployed elements of the BMDS.

## Assessment

- The MDA, in collaboration with DOT&E, updated the IMTP to incorporate BMDS element maturity, program modifications, and fiscal constraints. The MDA included in the IMTP a much closer tie between individual tests and the planned BMDS technical capability increment deliveries.
- FTO-02 Event 2 and Event 2a demonstrated that the BMDS capability against theater/regional threats increased during FY15. THAAD interceptors hit one short-range and one medium-range threat-representative ballistic missile targets while Aegis BMD simultaneously engaged an air-breathing threat with SM-2 Block IIIA guided missiles. However, the SM-3 Block IB Threat Update guided missile also targeting the medium-range ballistic missile target, failed early in flight; an engineering Failure Review Board investigation is underway. Full assessment of the FTO-02 Event 2 and Event 2a test mission data with respect to BMDS operational effectiveness, operational suitability, and interoperability is ongoing.
- With no flight testing in FY15, the Homeland Defense assessment remains unchanged. The GMD combat system demonstrates a limited capability to defend the U.S. Homeland from small numbers of intermediate-range or intercontinental ballistic missile threats launched from North Korea or Iran.
- Ground testing was able to demonstrate interoperability and some command and control capabilities for Combatant Command architectures.
  - C2BMC tasked and managed the two USPACOM AN/TPY-2 (FBM) radars for the first time and exercised

cross-area of responsibility data sharing between USEUCOM and USCENTCOM.

- Ground tests also identified several tasking problems between C2BMC and AN/TPY-2 (FBM), which are under evaluation.
- Many of the models and simulations used in the ground tests have no accreditation, which limits the MDA's capability to produce BMDS-level performance assessments. The MDA is developing a high-fidelity, end-to-end, digital performance assessment modeling and simulation capability for the BMDS; this effort will take several more years.

## Recommendations

- Status of Previous Recommendations. The MDA has addressed most previous BMDS recommendations. The following recommendations from FY14 remain outstanding:
  1. The MDA should continue to address recommendations made in the DOT&E FTO-01 assessment found in the classified DOT&E February 2014 BMDS Annual Report, Appendix E.
  2. The MDA should increase the development priority and associated funding for the BMDS simulation-based performance assessment capability. The ability to produce high-fidelity and statistically significant BMDS-level performance assessments is critical.
- FY15 Recommendation.
  1. The MDA should include Patriot in system-level operational flight test events in order to assess interoperability and integration between all of the BMDS combat systems and sensors.

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