Ballistic Missile Defense System (BMDS)

This report provides an unclassified assessment of the adequacy and sufficiency of the Ballistic Missile Defense System (BMDS) element test programs during FY03. Classified discussions of these topics will be included in the annual Operational Test & Evaluation Assessment of the BMDS Test Program submitted in February 2004.

The BMDS is intended to provide a layered defense for the entire United States, deployed U.S. forces, friends, and allies from all ranges of threat ballistic missiles during all phases of flight. The BMDS will consist of land-, sea- and space-based sensors (both optical and radar), battle management systems, communications networks, long- and short-range interceptors, and directed-energy weapons.

On December 17, 2002, the President directed the Secretary of Defense, "…to proceed with plans to deploy a set of initial missile defense capabilities beginning in 2004." The Missile Defense Agency (MDA) is working to develop a set of Initial Defensive Capabilities (IDC), which can be deployed to conduct Initial Defensive Operations (IDO), using Ground-based Midcourse Defense (GMD), Aegis Ballistic Missile Defense (Aegis BMD), and other BMDS elements. Each of these elements' support of the IDO is discussed in its respective section.

It is prudent to identify and exploit defensive capabilities inherent in the BMDS infrastructure during the development phase. However, it is important to understand that assessments of these capabilities are based primarily on modeling and simulation, developmental testing of components and subsystems, and analyses – not end-to-end operational testing of a mature integrated system. Due to the immature nature of the systems they emulate, models and simulations of the BMDS cannot be adequately validated at this time. Confidence in assessed capabilities will improve as more system performance data is gathered to anchor the simulations or directly demonstrate these capabilities.

Planned operational assessments of IDO capability will focus on system performance against nation specific threats, as documented in a series of Defense Intelligence Agency (DIA) threat assessments. MDA is designing BMDS based on the capabilities of broad threat classes. MDA and the operational test agencies (OTAs) are working to connect the MDA threat capability document to the DIA threat assessment. IDO capability will be assessed for four engagement sequence groups consistent with North Korean Intercontinental Ballistic Missile (ICBM) attack scenarios. The Command and Control, Battle Management and Communications (C2BMC) element will integrate the other BMDS elements into a system capable of providing integrated, layered defenses against all types of ballistic missile threats. For Block 2004 and IDO, C2BMC is planned to provide enhanced situational awareness for the warfighter. Specifically, this will consist of a common operating picture that provides early launch warning and impact point predictions to the warfighter and voice authorization for weapons release provided through an appropriate concept of operations. Plans call for enhancing C2BMC capabilities in Block 2006.

Due to immature BMDS elements, very little system level testing was performed by the close of FY03. Therefore, BMDS capabilities assessed for IDO will be based on test events planned for FY04. The OTAs are involved in the planning of these events and DOT&E is reviewing and approving operational test objectives for combined developmental test/operational test events. These tests will be executed using simulated or theoretical performance characteristics for some elements. Scenarios are still being developed for the system level integrated ground-test (IGT-2), planned to support the initial deployment of BMDS. Flight tests planned to support validation of the ground-testing and modeling efforts have slipped to the point that data will not be available prior to IGT-2. Data from flight testing and ground testing is needed to support extensive validation, verification, and accreditation efforts currently underway. Without the results of the flight testing, the ground-testing efforts are at risk. If models accurately reflect flight test performance, IGT-2 results will be validated after the fact. At this point in time, it is not clear what mission capability will be demonstrated prior to IDO.

GROUND-BASED MIDCOURSE DEFENSE (GMD)

The Ground-based Midcourse Defense (GMD) element is an integrated collection of components that perform dedicated functions during an ICBM engagement. As planned, the GMD element includes the following components:

- GMD Fire Control and Communications. The communications network links the entire element architecture via fiber optic links and satellite communications. For IDO, all fire control will be conducted within the GMD element.
- Long-range sensors, including the Upgraded Early Warning Radar, the COBRA DANE radar, and the Ground-Based Radar Prototype. In December 2005, a sea-based X-band (SBX) radar is to be incorporated.
- Ground Based Interceptors and emplacements, consisting of a silo-based ICBM-class booster motor stack and the Exoatmospheric Kill Vehicle (EKV). The plan for the 2004 Test Bed plan places six Ground Based Interceptors at Fort Greely, Alaska, and four at Vandenberg Air Force Base, California. In 2005, plans are to place ten more at Fort Greely.

GMD soon plans to interface with other BMDS elements and existing operational systems through external system interfaces. Through FY06, these plans include GMD interfacing with the Aegis SPY-1B radars and satellite-based sensors and communications.

To date, the GMD program has demonstrated the technical feasibility of hit-to-kill negation of simple target complexes in a limited set of engagement conditions. The GMD test program in FY03 was hindered by a lack of production representative test articles and from test infrastructure limitations. Delays in production and testing of the two objective booster designs have put tremendous pressure on the test schedule immediately prior to fielding. The most significant test and infrastructure limitations and mitigation plans are described in the table below.

Major GMD Test Limitations and MDA Mitigation Plans

Limitation	Comments	MDA Mitigation Plan
Lack of a deployable boost vehicle	The Orbital booster has been tested in developmental flight tests without attempted intercepts. The Lockheed booster testing has slipped such that it may not be available for IDO.	MDA is proceeding with deployment plans emphasizing the Orbital booster. Testing will continue with both designs as Lockheed booster production resumes.
Lack of a realistically placed midcourse sensor	The GMD test radar is collocated at the interceptor launch site. The FPQ-14 radar, a non-deployable asset that tracks a transmitter attached to the test target, currently accomplishes the midcourse tracking and discrimination functions.	GMD is developing a mobile, sea-based radar. The scheduled employment of this radar in the GMD Test Bed occurs in the post-2005 time frame.
Fixed intercept point	All of the flight tests to date have had similar flyout and engagement parameters. This limitation includes range constraints and a requirement not to create space debris.	The 2004 Test Bed expands the flyout range and engagement conditions. Space debris creation remains a problem.[a] Transitioning between testing and operations is a concern.

[a] These factors constrain test engagements to relatively low target intercept altitudes and downward directed velocities for both the target and interceptor.