



# AEGIS BALLISTIC MISSILE DEFENSE FTM-16 FACT SHEET

## The Ballistic Missile Threat

It is difficult to make confident predictions about the future of the ballistic missile threat. However, there are a number of regional and global trends in the development, deployment and proliferation of ballistic missiles and their associated technologies that are of concern to the United States. According to the Ballistic Missile Defense Review Report, ballistic missile “proliferators are increasing the number of deployed systems, shifting from liquid to solid fueled systems and deploying missile defense countermeasures.”

## Threat Background

The basis of Aegis BMD’s contribution to the Phased Adaptive Approach (PAA) Phase II is the second generation Aegis BMD system, Aegis BMD 4.0.1 and SM-3 Block IB missile. This Aegis BMD system enables the engagement of increasingly longer range and more sophisticated ballistic missiles launched in larger raid sizes. FTM-16 is the first of a series of intercept firings to validate the operational capability of Aegis BMD 4.0.1 and the SM-3 Block IB missile against an increasingly complex set of targets and scenarios.

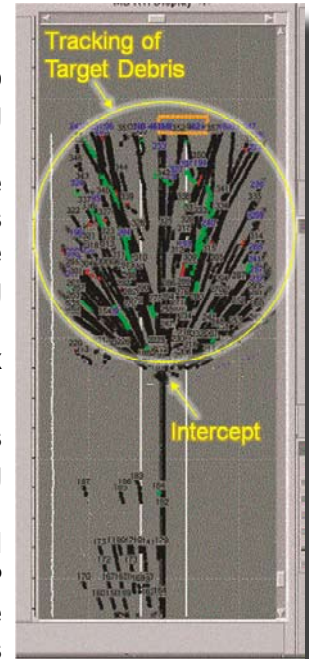
## Aegis BMD 4.0.1 and SM-3 Block IB Improvements

Aegis BMD’s 4.0.1 improvements include the addition of the Aegis BMD Signal Processor and a new kill vehicle engine, seeker and processor on the SM-3. The Aegis BMD Signal Processor (BSP) provides a real-time identification capability through signal processing. Such processing enables tracking of individual objects and identification through the use of advanced algorithms. Two-color sensor technology in the SM-3 seeker provides the capability to sense

infrared (IR) information in two distinct wavebands, improving the identification of multiple, closely spaced objects. The two-color seeker improves sensitivity for longer range targets, high speed processing for multiple tracks and improved performance against complex threats.

When tracking multiple objects associated with a separating target, each object is identified and eliminated until the lethal object (LO) is found. The BSP provides a highly accurate location of the LO, which is transmitted to the SM-3 Kinetic Warhead (KW), assisting the IR seeker to acquire the LO. The two-color IR seeker provides additional identification capabilities. After receiving the latest uplinked LO position via the SPY-1 radar, the KW is ejected from the third stage. The two-color seeker acquires the LO, distinguishing the LO from the other objects. The seeker information is transmitted to the guidance section which directs the KW to maneuver to intercept the LO.

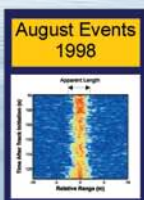
Besides the two-color IR seeker, the SM-3 Block IB KW’s signal processor and divert engine system have been upgraded over the SM-3 Block IA. The Advanced Signal Processor increases data processing capability to sort-out and analyze the information gathered by the upgraded seeker. The new divert engine, the Throttleable Divert and Attitude Control System (TDACS), provides enhanced divert capability to maneuver the KW to intercept.



Aegis BSP Post-Intercept Tracking

## “Build a Little, Test a Little, Learn A Lot”

Previous BMDS events which tested Aegis BMD’s engineering of the PAA Phase II System (BMD 4.0.1 / SM-3 Block IB)



High Range Resolution Target Imaging



BSP: Demonstrated Real-time Discrimination  
Seeker: Detected & Tracked Target



BSP: Target Tracking



BSP: Tracking data checked by Project Hercules Sidecar and found to be accurate



At-Sea Tracking Exercises

BMD 4.0.1 with BSP successfully detected, tracked, and conducted simulated SM-3 Block IB engagement against a variety of different ballistic missile targets

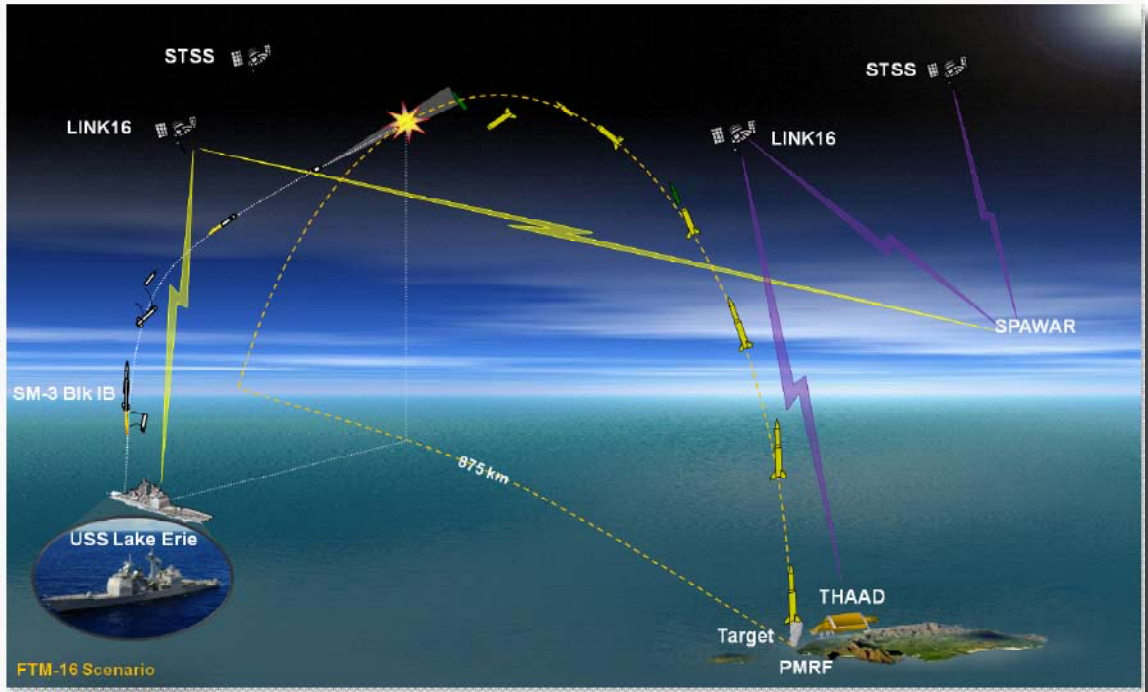


**FTM-16 Event 2**

The primary objective of FTM-16 is to conduct a lethal engagement of a separating ballistic missile target with the Aegis BMD 4.0.1 Weapon System and an SM-3 Block IB missile. Test participants include *USS LAKE ERIE* (CG 70), Aegis BMD 3.6.1 laboratory at Space and Naval Warfare Center (SPAWAR), Terminal High Altitude Area Defense (THAAD) system and Space Tracking and Surveillance System (STSS). A secondary objective is to exchange Link 16 tracks and simulated engagement status messages over a different tactical data link between the Aegis BMD 3.6.1 laboratory and THAAD. Leveraging FTM-16, STSS sends target tracking data via the same tactical data link as THAAD and the Aegis BMD laboratory.

FTM-16 Event 2 begins with the target launch from the Pacific Missile Range Facility, Barking Sands, Kauai, Hawaii. The BMDS radar systems search and detect the target as it enters each radar's search sector. Aboard *LAKE ERIE*, the Aegis BMD Weapon System acquires the target, tracks and transmits the track data to the BMDS. The weapon system computes a fire control solution for intercepting the target. The target follows a ballistic trajectory. After booster motor burnout occurs, the target warhead is ejected resulting in a cloud of separation debris. Shortly after the target is declared engageable by the weapon system, *LAKE ERIE's* crew fires a SM-3 Block IB missile. The system tracks the SM-3 missile throughout the remainder of its flight.

The weapon system uplinks track information to the missile, providing Aegis target and object track data. Through uplinked guidance commands, the weapon system positions the SM-3 missile so that the target warhead is in the center of the IR seeker's field of view. After ejection of the KW from the missile, the KW's new TDACS fires to maintain the necessary heading for the two-color IR seeker to acquire the target warhead (**inset A**). The SM-3 KW performs track correlation between the SPY-1 radar tracks and the KW's IR seeker data, identifying the target warhead.



Upon acquiring the target warhead, the KW performs divert maneuvers to approach the target. Additional refinement of the intercept calculations are made by the KW and final intercept divert maneuvers are conducted. The KW impacts the target, destroying it with the sheer energy of impact (**inset B**).



**Certification**

Aegis BMD 4.0.1 Weapon System has successfully completed an engineering assessment and is undergoing certification testing for delivery to the fleet. Certification is an independent assessment of the readiness of BMD 4.0.1 to perform not only the BMD mission, but also a readiness assessment for operational use, sustainment and ability to perform other Aegis ship missions (e.g. AAW, Strike, ASW, ASUW, etc.). Testing is accomplished at land-based test sites (LBTSS). Whenever possible, actual at-sea event data is used to supplement the LBTSS results and contributes to the technical evaluation of the system. In order to thoroughly evaluate the Aegis BMD 4.0.1 capability to operate in an operational, multi-warfare environment, such as Anti-Air Warfare and BMD, and obtain actual tracking and firing data to support certification testing, FTM-16 engagement data will be used. Certification of BMD 4.0.1 and SM-3 Block IB missile is scheduled for 2<sup>nd</sup> quarter FY 2012. After certification, the system is ready to be used and supported by operational forces.

