FTM-20 in the Ballistic Missile Defense System

Background

Today, forward deployed American Soldiers, Sailors, Airmen and Marines are at risk from short to intermediate range ballistic missiles. The dire consequence of a ballistic missile, armed with Weapons of Mass Destruction, reaching our Homeland or deployed forces demands that we have multiple intercept opportunities. No single Service system can engage ballistic missiles of all ranges through all phases of flight. To provide such a capability, the U.S. Armed Forces need to conduct ballistic missile defense warfare through integrated, layered defense.

Integrated Ballistic Missile Defense System (BMDS) capabilities draw on space-, land-, and sea-based assets operated by multiple Services to provide the best sensor information on the threat track and a more diverse and effective set of weapon options for the Combatant Commander to defeat the attack - all connected by a unified Command and Control, Battle Management, and Communications (C2BMC) system.

The Missile Defense Agency (MDA) is currently developing next-generation missile defense capabilities to counter future projected threats. These advanced capabilities include;

- Intercepting long-range missiles early in their flight
- Launching interceptors based on remote sensor information, also referred to as Launch on Remote (LoR)
- Strengthening ballistic missile sensor networks

LoR is the capability to sense a threat remotely, transmit tracking information to a BMD weapon system in order to launch a guided missile earlier and farther downrange than the weapon system organic radar's detection range.

Geography Counts

Stationing, or the location, of missile defense assets is critical to defeating the threat. Due to the uncertainty of the threat, we may not know when and where the enemy will strike. Thus, it is advantageous if the missile defense assets are mobile and easily transportable. Aegis BMD ships are mobile; they operate in international waters and can reposition in response to a crisis.

Integration of space-based sensors into the BMDS allows for detection and tracking of threats up close and over a larger area than ground based assets. MDA's Space Development Center (MDSDC) operates the Space Tracking and Surveillance System-Demonstrators (STSS-D) as an experimental space layer of the BMDS.

The STSS-D constellation consists of two satellites, capable of detecting visible and infrared light and provides tracking data of ballistic missiles through C2BMC to BMD weapon systems. STSS-D has participated in earlier BMD flight tests supporting risk reduction activities on a not to interfere basis.

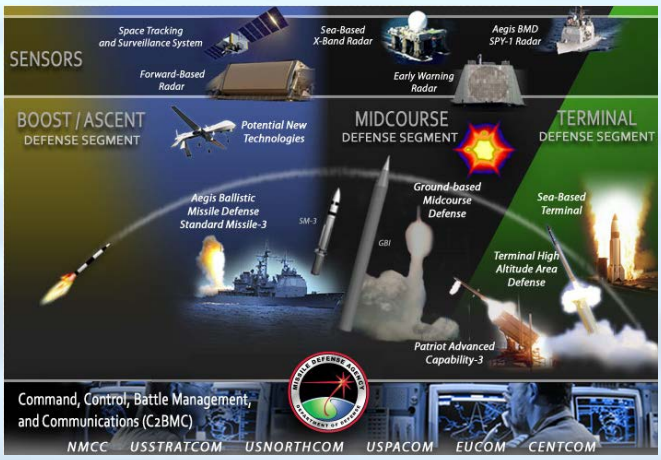
The Farther Forward Your Sensors, the More Battlespace You Have

Within 30 minutes, an intercontinental ballistic missile could be launched from any location in the world and strike the U.S. To defeat a regional or theater ballistic missile, you would have even less time. Space-based sensors, such as STSS-D, would provide early warning of a ballistic missile launch, thereby increasing situational awareness. Tracking ballistic missiles and transmitting track data to the BMDS extends the battlespace, permitting earlier detections by other sensors or the launching of weapons based on remote track data, winning back critical reaction time.

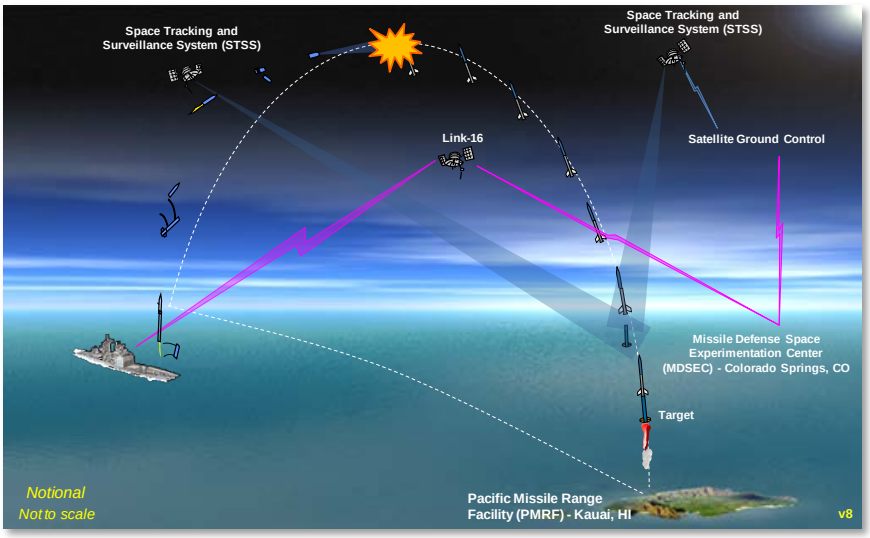
The Farther Forward You Attack, the More Advantageous it is

Building upon the second axiom, increased battlespace makes earlier fire control solutions possible, permitting the defender to attack earlier, at longer ranges, and provides the opportunity to re-engage, increasing depth of fire and decreasing the likelihood of a ballistic missile penetrating the defense.

Flight Test Mission-20 (FTM-20) demonstrates the BMDS capability for a sea-based missile (Standard Missile-3) to be launched based on track data from a forward-based sensor (STSS-D), thereby extending the battlespace, winning back critical reaction time, and conducting longer range intercepts.



Flight Test Mission (FTM)-20 Fact Sheet



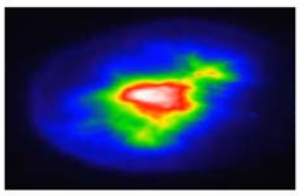
SM-3 Block IA Firing

The primary objective for FTM-20 flight experiment is to conduct a live fire Aegis BMD and SM-3 Block IA intercept of a Medium Range Ballistic Missile (MRBM) target using Launch on Remote doctrine with STSS-D as the remote sensor. The remote track data from STSS-D satellites is processed and forwarded to the Aegis BMD ship by the Command and Control, Battle Management, Communications (C2BMC) system via Link-16.

The unitary MRBM target is launched from the Pacific Missile Range Facility (PMRF), Barking Sands, Kauai, Hawaii. STSS-D satellites detect the target after launch, and acquires the target, tracks and transmits the track data to the BMDS via C2BMC. The C2BMC suite located at Pacific Command Headquarters in Hawaii associates the STSS-D track data to the launch of an MRBM, and C2BMC reports the track data to the Link 16 network. The Aegis BMD Weapon System processes the Link 16 messages and computes a fire control solution for intercepting the target.

The target flies a ballistic trajectory. If not detected by the SPY-1 radar, the Aegis BMD Weapon System continuously processes STSS-D track data via Link 16 and computes updated fire control solutions. The ship's crew fires the SM-3 Block IA missile using STSS-D (remote) track data, and as designed the SPY-1 radar acquires and tracks the SM-3 missile throughout its flight as it conducts a cued search for the MRBM target.

As the target continues along its trajectory, the SPY-1 radar detects and acquires the ballistic missile target after the SM-3 launch. The Aegis BMD Weapon System correlates Aegis BMD tracks with STSS-D tracks. Based on SPY-1 (local) track data, the weapon system uplinks updated track information continuously to the SM-3 missile. After ejection of the SM-3's Kinetic Warhead (KW), the KW's control system fires to maintain the necessary heading for its seeker to acquire and track the target. Refinement of the intercept calculations are made by the KW and final intercept divert maneuvers are executed. The KW collides with the target, destroying it with the sheer force of impact (inset below).



SM-3 Block IA Intercept

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Launch on Remote (LOR)

FTM-20 is the second real time Aegis BMD LOR firing with an offboard sensor. The first firing was FTM-15, April 2011, where Aegis BMD reacted to remote AN/TPY-2 track data to successfully intercept a separating Intermediate Range Ballistic Missile (IRBM). FTM-15 verified the BMDS axioms, increasing the battlespace, winning back critical reaction time and extending by three times the Aegis BMD's original design intercept range with the use of netted sensor information.