Ballistic Missile Defense Overview

To: 16th Annual Space & Missile Defense Symposium

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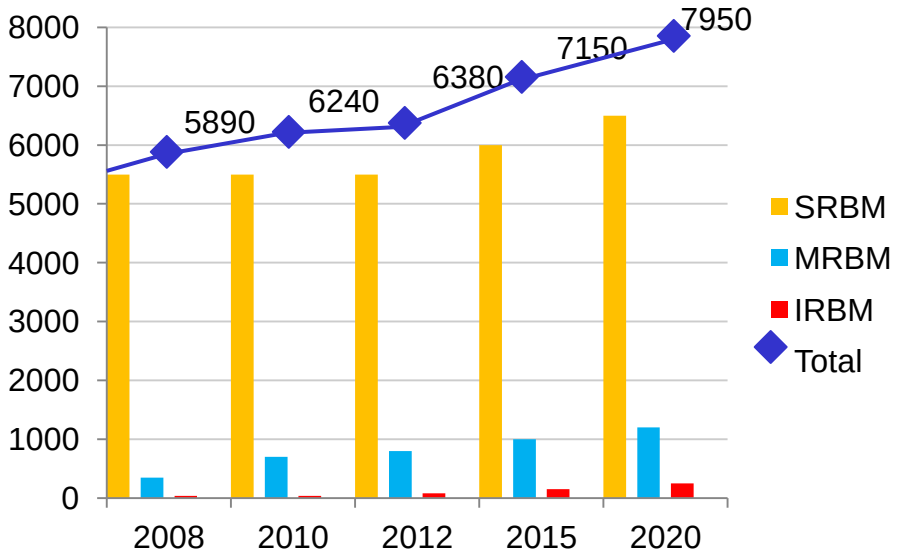
Director
Missile Defense Agency
August 14, 2013

The Increasing Ballistic Missile Threat

- **Increasing theater threat capabilities**
  - Accuracy & Range
  - North Korea developing new IRBM
- **Developing ICBM threat**
  - North Korea developing KN-08 ICBM
  - Iran may be technically capable of flight-testing an ICBM by 2015
  - Space Launch Vehicles (SLV) could serve as a test beds for ICBM technologies
- **Challenging Missile Defense**
  - Maneuver / Salvo firings / Countermeasures



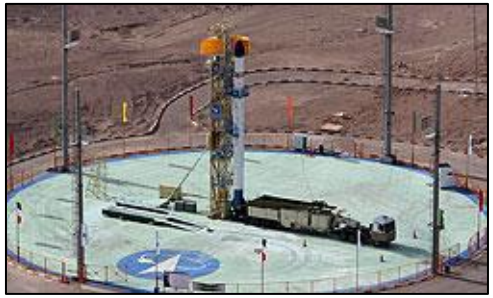
Theater Ballistic Missile Force Levels

Not including U.S., China, Russia or NATO

North Korean KN-08 ICBM Launcher on Parade, 2012

North Korean Mobile IRBM on Parade, 2010

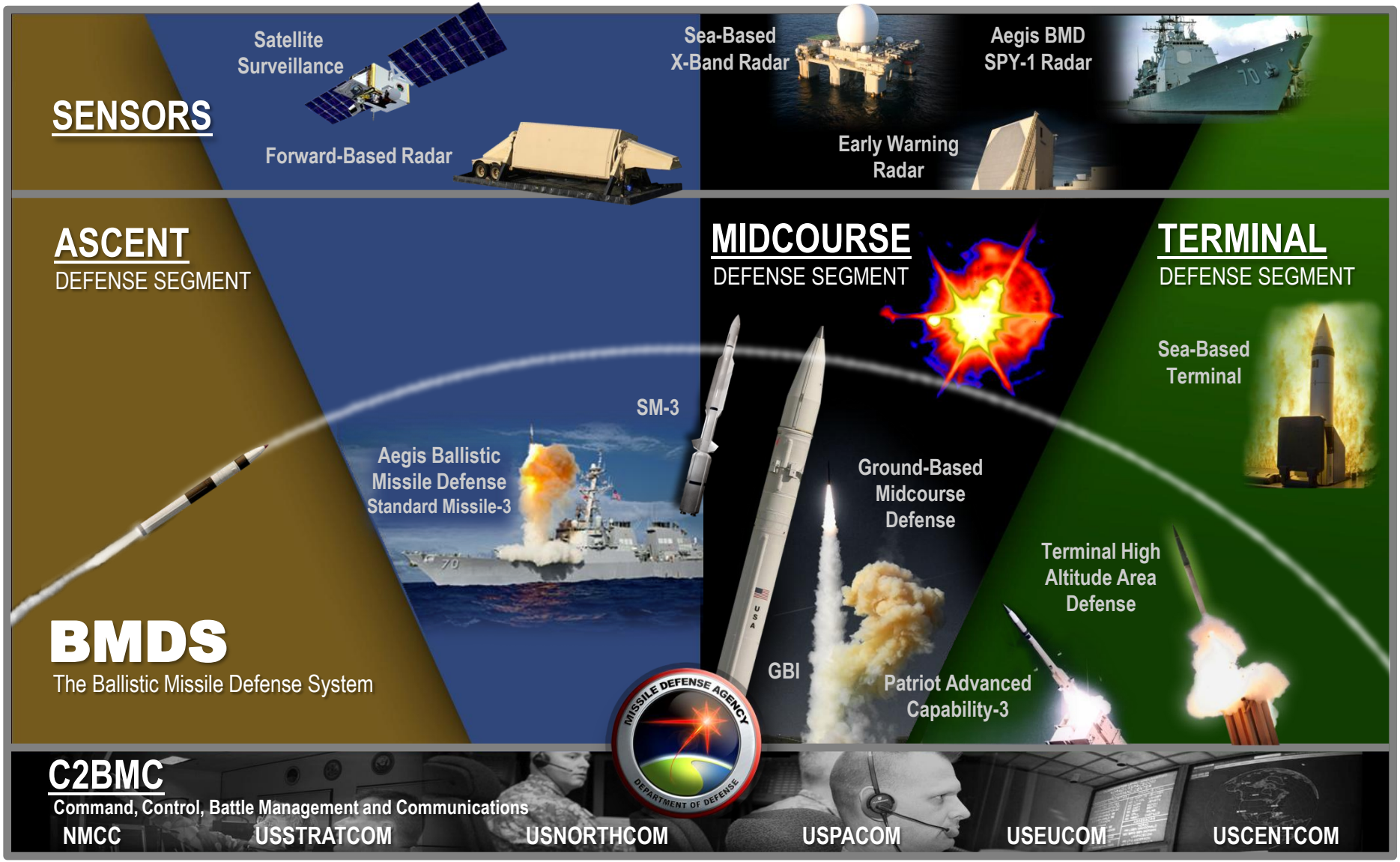
NK Taepo Dong-2 SLV Launch, 2012



Iranian Safir SLV on Launch Pad, 2011

Sources: NASIC, Ballistic and Cruise Missile Threat, 2009; DIA, Iran's Military Power, Statement before the Senate Armed Services Committee, 14 APR 10; Annual Report on Military Power of Iran, April 2012DNI, Remarks, Worldwide Threat Assessment to the Senate Select Committee on Intelligence, 12 March 2013; Full Update, DIA, Annual Threat Assessment 2008, 2012; MSIC, e-mail, RE: Unclassified Force Level Numbers, 6 April 2012; DNI, Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, Covering 1 JAN to 31 DEC 2011; NSA-FCS5, e-mail, KN08 Classification, 20 Jan 2013FARS News Agency, Korea Central News Agency, Yonhap News Agency

Today's Ballistic Missile Defense System



Missile Defense Announcement
– March 15, 2013 –

- **Secretary of Defense Hagel announced the following changes to the Department's Missile Defense Program**
  - ***"We will strengthen homeland missile defense by deploying 14 additional Ground Based Interceptors (GBIs) at Ft. Greely, Alaska."***
  - ***"With the support of the Japanese government, we are planning to deploy an additional radar in Japan."***
  - ***"We are conducting Environmental Impact Studies for a potential additional GBI site in the United States."***
  - ***"We are restructuring the SM-3 IIB program."***
- **We are taking these steps to stay ahead of the challenge posed by Iran and North Korea's development of longer-range ballistic missile capabilities**

What Has (And Has Not) Changed

What Has NOT Changed

- Priority on Homeland Defense
- BMD Capability is deploying
  - U.S. remains committed to fielding the European Phase Adaptive Approach Phases 2 and 3
  - U.S. will continue to deploy assets to USPACOM to improve regional defense
  - Homeland Defense is improving
- Iranian strategic and regional threat advancing
- Pacific regional threats are increasing

What Has Changed

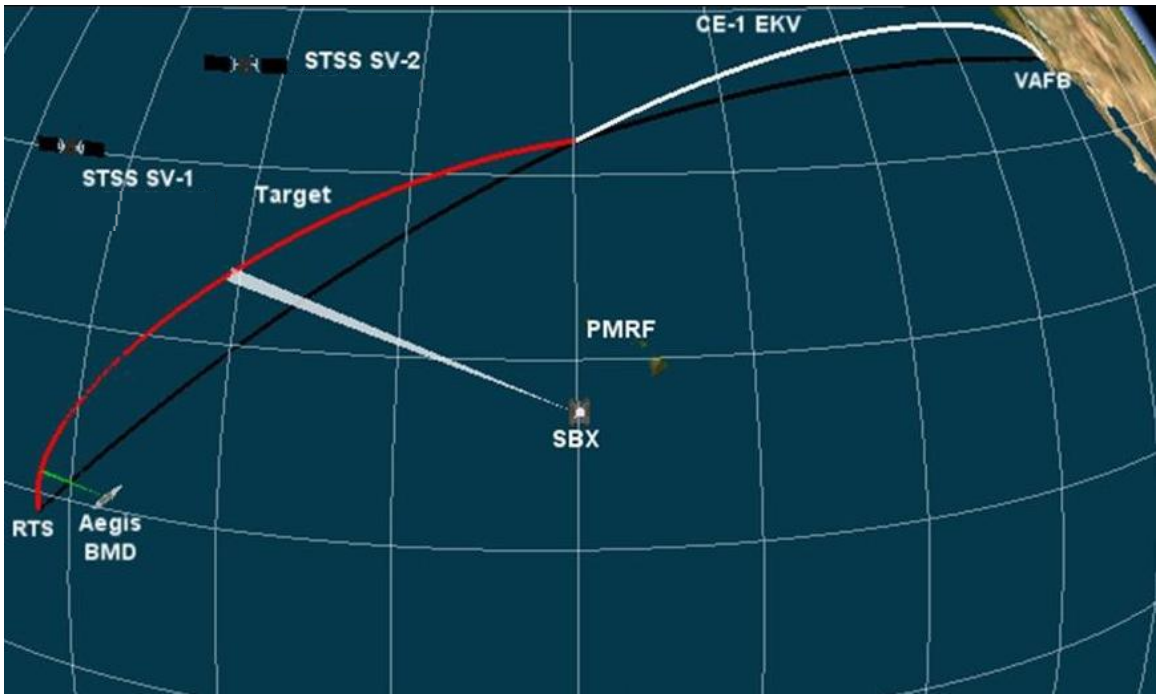
- Increased attention to Homeland Defense
- Emergence of North Korean Road Mobile ICBM
- Changes to MDA Program of Record
  - Cancellation of PTSS
  - SM-3 Block IIB restructured into common kill vehicle technology program
- Widespread fiscal pressure within DoD

FTG-07 Mission Overview
– July 5, 2013 –

Aegis
Ballistic Missile Defense

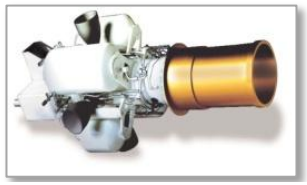
Command, Control, Battle Management and Communications

Sea-Based X-band Radar



<u>Primary Objective</u>:

Demonstrate a long interceptor time-of-flight, medium closing velocity engagement of an Intermediate Range Ballistic Missile class target by a Capability Enhancement-I Ground-Based Interceptor, and perform all Exo-atmospheric Kill Vehicle functions to discriminate and intercept a lethal object from a representative ICBM target scene



Exo-atmospheric Kill Vehicle

Ground-Based Interceptor

FTG-07 Results

- The Ground-Based Interceptor (GBI) was successfully launched, but the target was not intercepted
- The target met all requirements
- Space Based Infrared System (SBIRS) detected target and reported as planned
- Aegis acquired the target and transmitted track data to Command, Control, Battle Management & Communications (C2BMC) over SATCOM
- C2BMC forwarded SATCOM track data to GMD Fire Control (GFC)
- Using Aegis provided track data, GFC planned the mission and provided a cue to Sea-Based X-band Radar (SBX)
- Commander, U.S. Northern Command (NORTHCOM) granted Weapons Free
- SBX acquired the target and discriminated the Re-entry Vehicle (RV) as a lethal object with required track accuracy
- A Failure Review Board has been initiated

14 Additional Ground Based Interceptors At Ft. Greely, Alaska

FGA

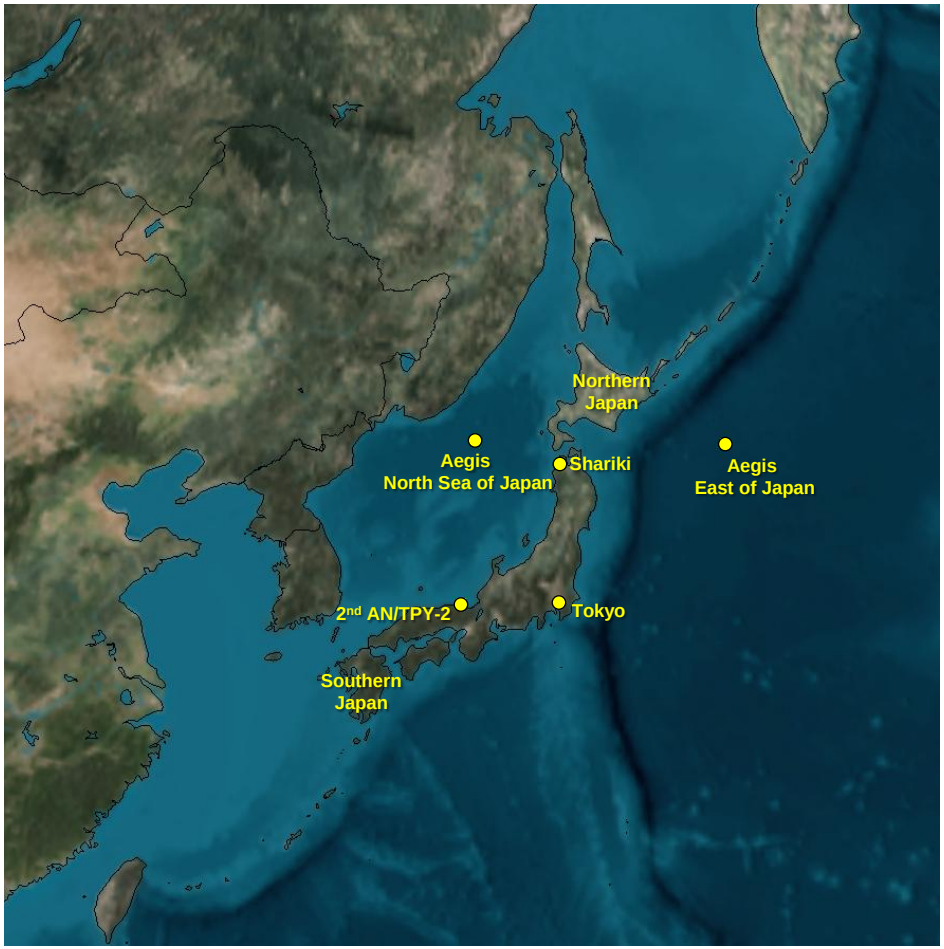
- **Increase operational fleet of Ground Based Interceptors (GBIs) from 30 to 44 in 2017**
  - **Add 14 GBIs to the operational fleet at Fort Greely, AK**
  - **Purchase first 6 of planned 14 additional GBIs (two per year beginning in FY 2016)**
- **Refurbish Missile Field 1**

Ground Based Interceptors	Number of GBIs:
Emplaced at FGA	26
Emplaced at VAFB	4
Available GBIs	30

Additional GBIs Available For Emplacement	Number of GBIs:
Missile Field 2 Silos available at FGA	8
Missile Field 1 Refurbished Silos at FGA	6
Total Emplaced GBIs (End of FY17)	44

2nd AN/TPY-2 Radar In Japan

- **Enhances defense of Japan, U.S. forward deployed forces, and the U.S. homeland from North Korean ballistic missiles**
- **Bolsters regional security allowing flexibility in deploying Aegis BMD ships**
- **Technical Capability Declaration (TCD) expected twelve months after U.S. access to the proposed site**
- **Discussions between the U.S. Government and the Government of Japan on a proposed site are ongoing**



CONUS Interceptor Site Study

– 2013 National Defense Authorization Act –

The 2013 National Defense Authorization Act (NDAA), Section 227, directs:

A. EVALUATION. – Not later than December 31, 2013, the Secretary of Defense shall conduct a study to evaluate at least three possible additional locations in the United States, selected by the Director of the Missile Defense Agency, that would be best suited for future deployment of an interceptor capable of protecting the homeland against threats from nations such as North Korea and Iran. At least two of such locations shall be on the East Coast of the United States.

B. ENVIRONMENTAL IMPACT STATEMENT REQUIRED. – Except as provided by subsection (c), the Secretary shall prepare an environmental impact statement in accordance with the National Environmental Policy Act of 1969 (42 U.S.C. et seq.) for the locations the Secretary evaluates under subsection (a).

C. EXCEPTION. – If an environmental impact statement has already been prepared for a location the Secretary evaluates under subsection (a), the Secretary shall not be required to prepare another environmental impact statement for such location.

D. CONTINGENCY PLAN. – In light of the evaluation under sub-section (a), the Director of the Missile Defense Agency shall –

1. **Develop a contingency plan for the deployment of a homeland missile defense interceptor site that is in addition to such sites that exist as of the date of the enactment of this Act in case the President determines to proceed with such an additional deployment; and**

2. **Notify the congressional defense committees when such contingency plan has been developed.**

U.S. Regional Missile Defense Capability

Missile Defense Sensors

- Aegis SPY-1 Radars
- AN/TPY-2 Radars – Forward-Based Mode

Command, Control, Battle Management and Communications (C2BMC)

Aegis Ballistic Missile Defense

- Standard Missile-3 (SM-3) Block IA / IB / IIA

Terminal High Altitude Area Defense

Patriot

(Army Program)

European Phased Adaptive Approach To Developing And Deploying Missile Defense

Phase I: Operational (DEC 2011)

Aegis BMD 3.6.1 with Standard Missile

SM-3 IA

AN/TPY-2 (FBM)

C2BMC AOC Ramstein

NATO BMD Interim Capability

Phase II: Enhanced Medium-Range Missile Defense (2015 Timeframe)

Aegis BMD 4.0/5.0

SM-3 IB

Aegis Ashore 5.0 (Romania)

C2BMC Updates

NATO BMD Interim Capability

Potential EPAA Surge

THAAD

Phase III: Enhanced Intermediate-Range Missile Defense (2018 Timeframe)

Aegis BMD 5.1

SM-3 IIA

Aegis Ashore 5.1 (Poland and Romania)

C2BMC Updates

NATO BMD Territorial Missile Defense

Potential EPAA Surge

THAAD Launch on Remote

Aegis Ashore Accomplishments
– Supporting EPAA Phases II And III –

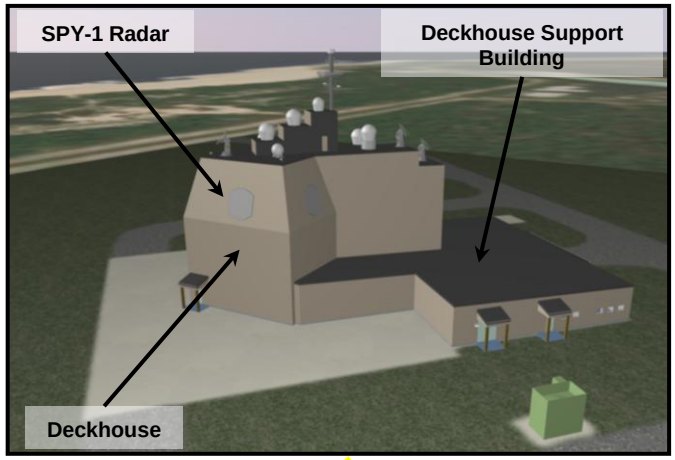
Deckhouse at Moorestown, NJ

- Construction complete
- Aegis Light Off for Hawaii Test Facility Equipment conducted on 31 May, 2013
- Successful aircraft tracking with all four arrays on 25 June, 2013

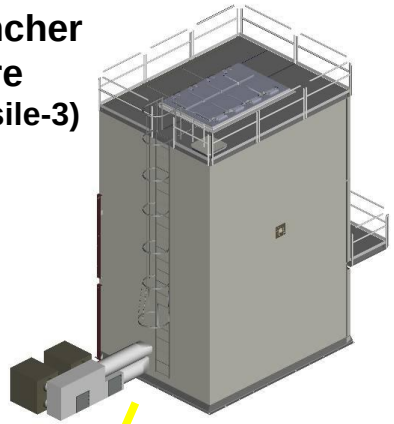
Pacific Missile Range Facility, HI

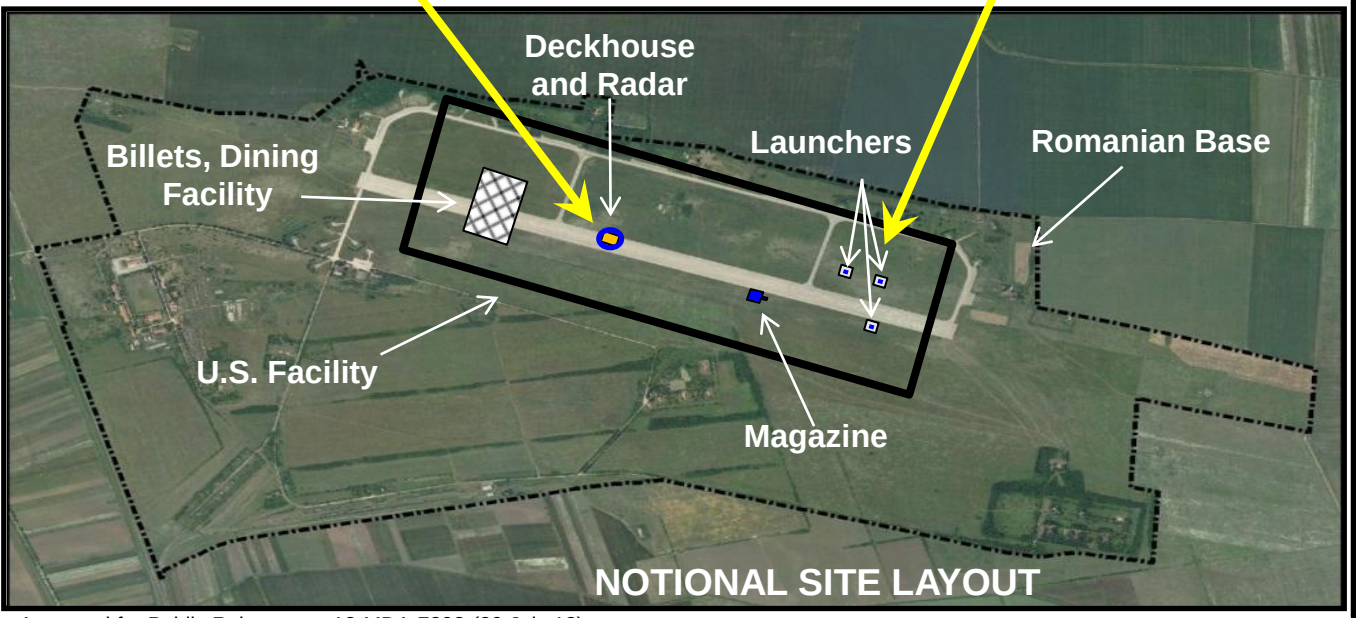
- Construction completes August 2013
- Commence weapon system components load out November 2013
- Aegis Light Off December 2013
- Complete testing April 2014
- Live fire flight test scheduled 3QFY14

Aegis Ashore Site – Deveselu Base, Romania



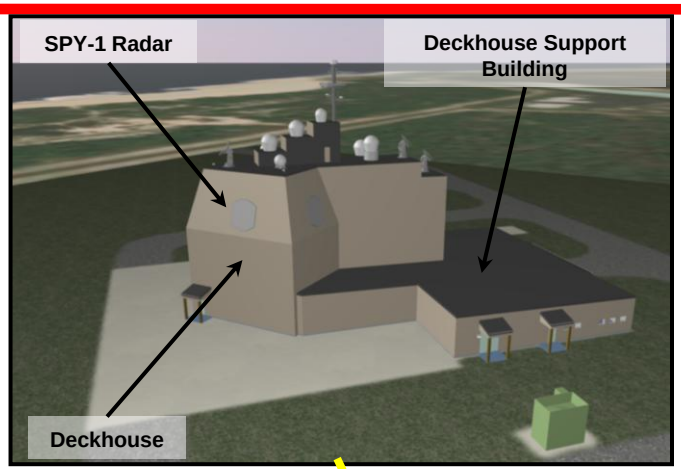
Vertical Launcher Enclosure
(Standard Missile-3)



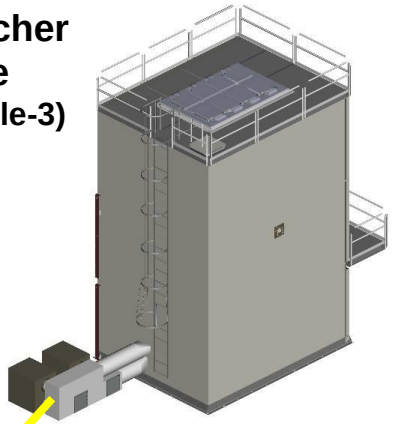


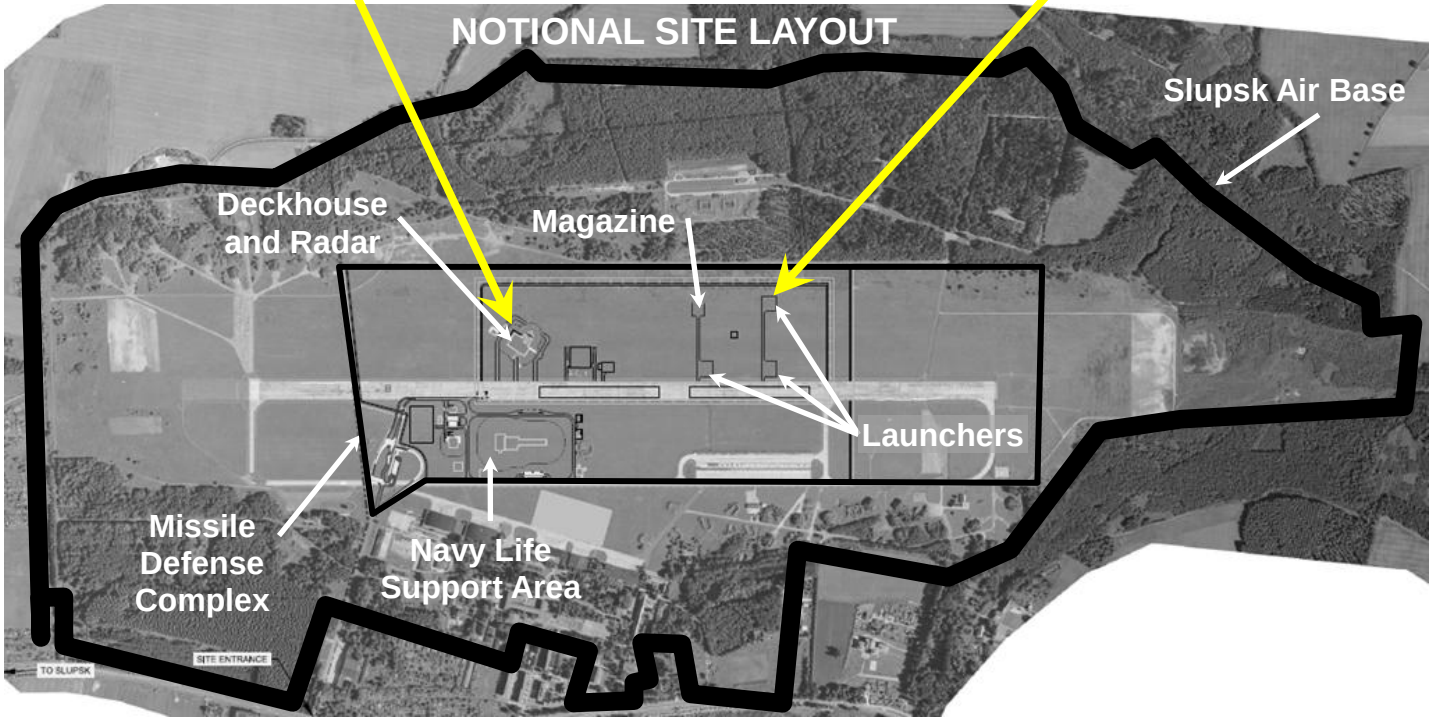
- **Implementing Arrangement Negotiations**
  - √February 2012
  - √March 2012
  - √May 2012
  - √June 2012
  - √July 2012
  - √November 2012
  - √December 2012
  - √April 2013
- **Romania Industry Days**
  - √June 2012
- **Signed Implementing Arrangements**
  - √Land Use
  - √Airspace
  - √Amendment to Real Estate
  - √Amendment to Security
  - √Amendment to Joint Committee
  - √Amendment to Communications
  - √US Forces, Contractors, Dependents Reporting
  - √Intelligence Sharing
- **On site activities**
  - √Temporary facility construction start April 2013
  - ❑Groundbreaking September 2013
  - ❑MILCON construction start September 2013

Aegis Ashore Site – Redzikowo, Poland



Vertical Launcher Enclosure
(Standard Missile-3)





- Implementing Arrangement Negotiations
  - √October 2010
  - √January 2011
  - √November 2011
- Technical Interchange Meetings (HERP, HERO, Windfarms)
  - √March 2010
  - √June 2011
  - √October 2011
  - √February 2012
  - ❑ June 2013 (T)
- Radar Horizon Site Survey
  - √February 2011
- Executive Planning Charrette
  - √December 2012
- Detailed Planning Charrette
  - √February 2013
- Geotech and Environmental Site Surveys
  - ❑ May – December 2013

Flight Test Integrated (FTI-01) Results
– October 2012 –

Command, Control & Engagement Support

Overhead Sensors

Hickam AFB, Hawaii
UTCO / ADAFCO
PACFLT / 94th AAMDC
(Upper/Lower Tier Coordination)

AN/TPY-2 Forward-Based Mode (Cueing Sensor)

Weapon Systems

AEGIS (Broad Ocean Area)

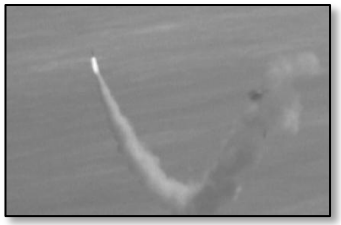
THAAD (Meck Island)

Patriot (Omelek Island)

Targets

ARAV-B (Wake Island)

BQM-74 (G-1)



MRBM (C-17)

SRBM (MLP)

MQM-107 (Roi Namur)

SCORECARD

✓	Engaged: Intercept Not Confirmed
✓	Successful Intercept
✓	Successful Intercept
✓	Successful Intercept
✓	Successful Intercept

FTO-01Mission Overview
– On Track For 4th Quarter FY13 –

Upper Tier Coordination Officer/
Air Defense Artillery
Fire Control Officer
(ADAFCO/UTCO)
Hickam Air Ops Center

Demonstrate regional-theater BMDS ability to defeat, in a layered architecture, a raid of two threat-representative medium range ballistic missiles, each flying challenging and realistic attack profiles.

AN/TPY-2
Forward Based Mode (FBM)
(Cueing Sensor via C2BMC)

Target 1
MRBM #1

AEGIS 3.6.2
Engages MRBM #1

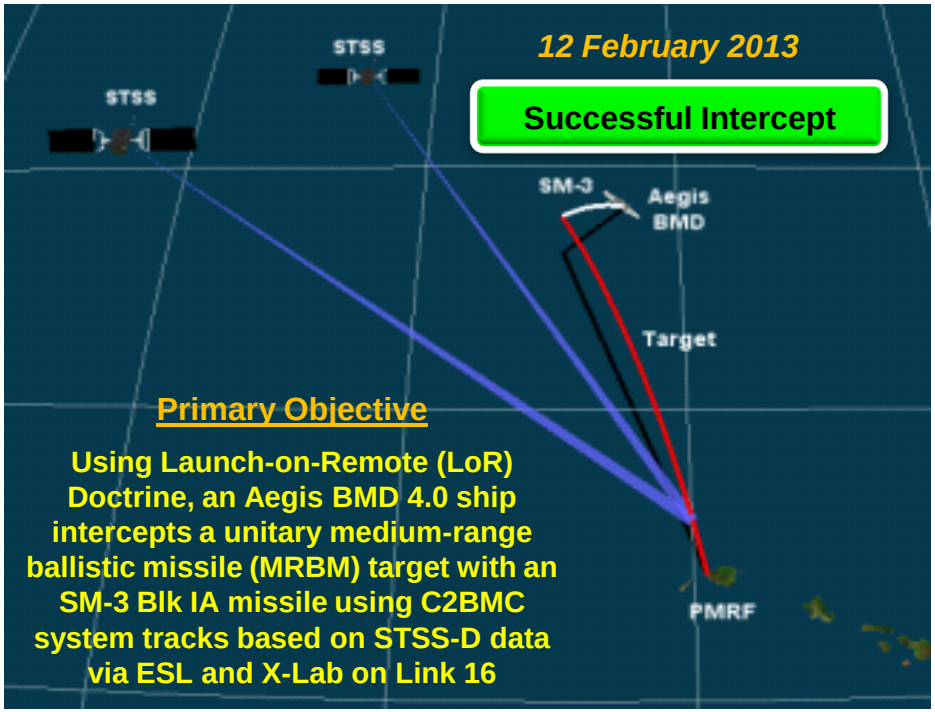
Target 2:
MRBM #2

THAAD
Engages MRBM #2
Engages MRBM #1 (if required)

Flight Test Standard Missile (FTM)-20

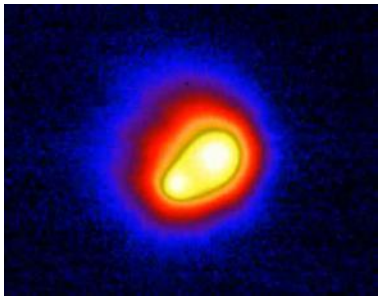
- Aegis BMD 4.0 and SM-3 Block IA Intercept -

- **Mission Firsts**
  - Successful intercept with BMD 4.0 and SM-3 BLK IA missile
  - Launch-on-Remote based on Satellite data
- **Mission Insight**
  - Off board Sensor data – fire control quality
  - Integrated Link architecture
  - Use of satellite track data to Launch-on-Remote expands battlespace and ship operating area



Target Launch
Pacific Missile Range Facility

Standard Missile-3 Block IA
USS LAKE ERIE

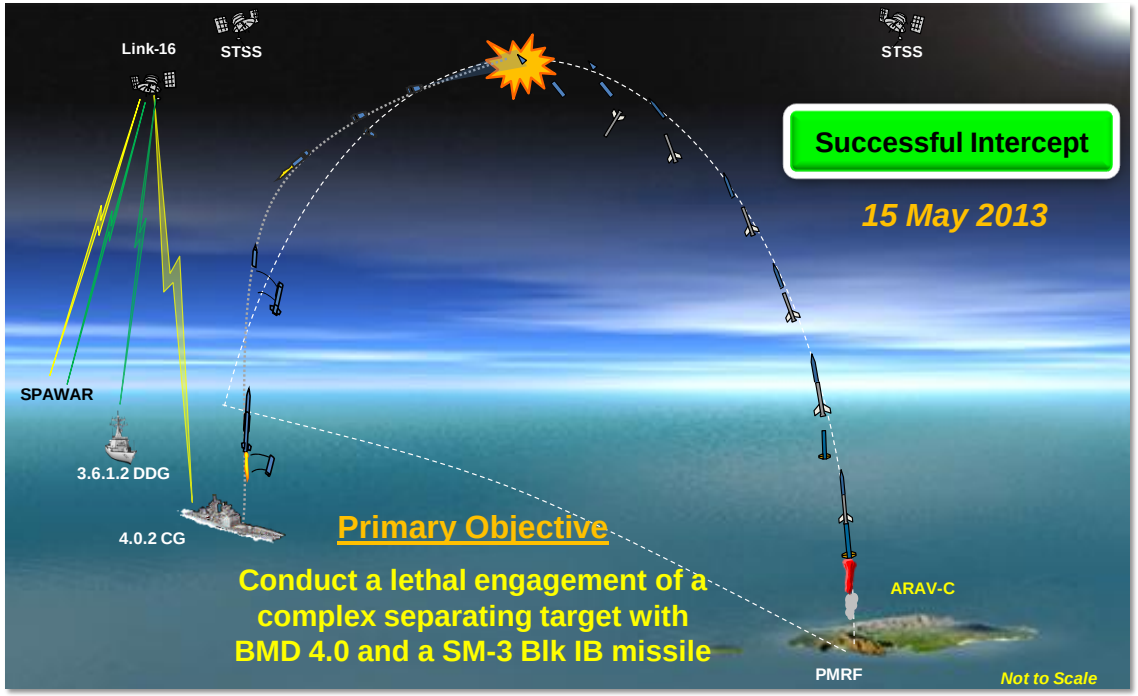


Intercept

Flight Test Standard Missile (FTM)-19

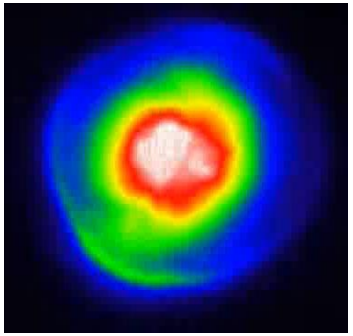
- Aegis BMD Weapons System (AWS) 4.0.2 and SM-3 Block IB Intercept -

- **Mission Firsts**
  - Lethal engagement of a complex separating SRBM target
  - Return to flight of IB missile with screened pintles
  - Exercise of updated SM-3 IB missile Inter Pulse Delay (IPD) look-up Tables
- **Mission Insights**
  - Integrated Weapons System approach for complex threats
  - Ability to conduct multi-warfare



Target Launch
Pacific Missile Range Facility

Standard Missile-3 Block IB
USS LAKE ERIE

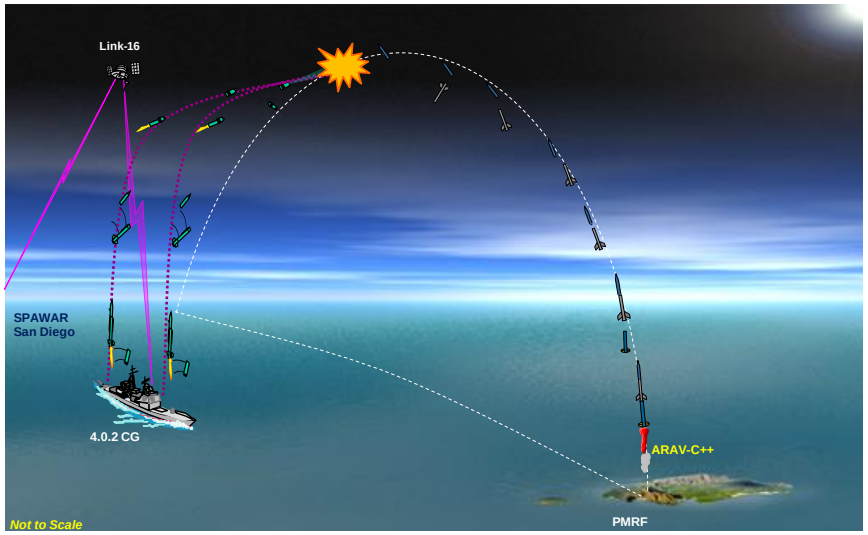


Intercept

FTM-21 And FTM-22

- Initial Operational Test & Evaluation -

FTM-21 (4th Quarter FY2013)



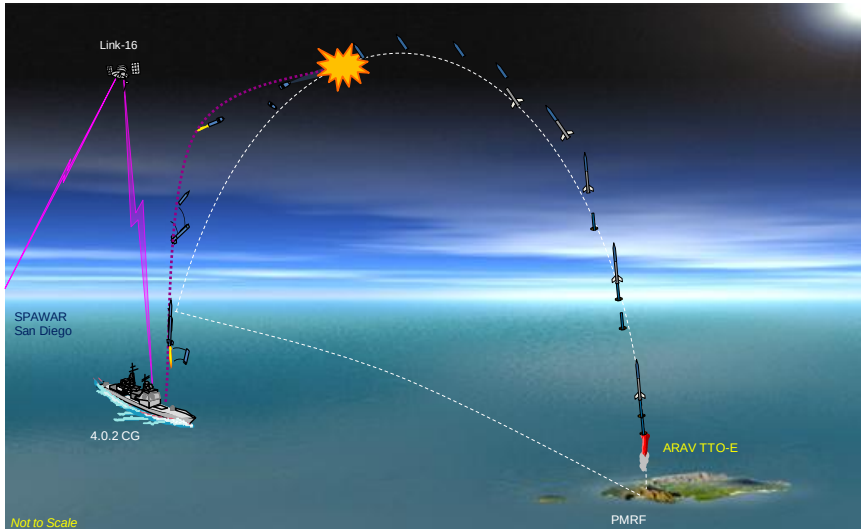
Primary Objective:

- Conduct a lethal engagement of a complex SRBM target with BMD 4.0.2 and a SM-3 Block IB missile using Salvo firing policy

Secondary Objective:

- Assess Capability of Aegis BMD 4.0.2 to deploy and conduct a BMD mission
- Verify voice and data communication links are in accordance with the OPTASKLINK and are adequate to maintain situational awareness

FTM-22 (1st Quarter FY2014)



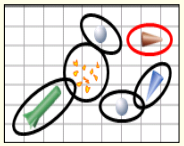
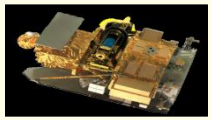
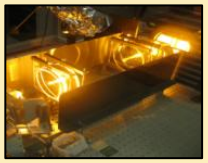
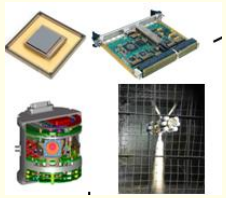
Primary Objective:

- Conduct a lethal engagement of an MRBM target with Aegis BMD 4.0.2 and a SM-3 Block IB Missile

Secondary Objective:

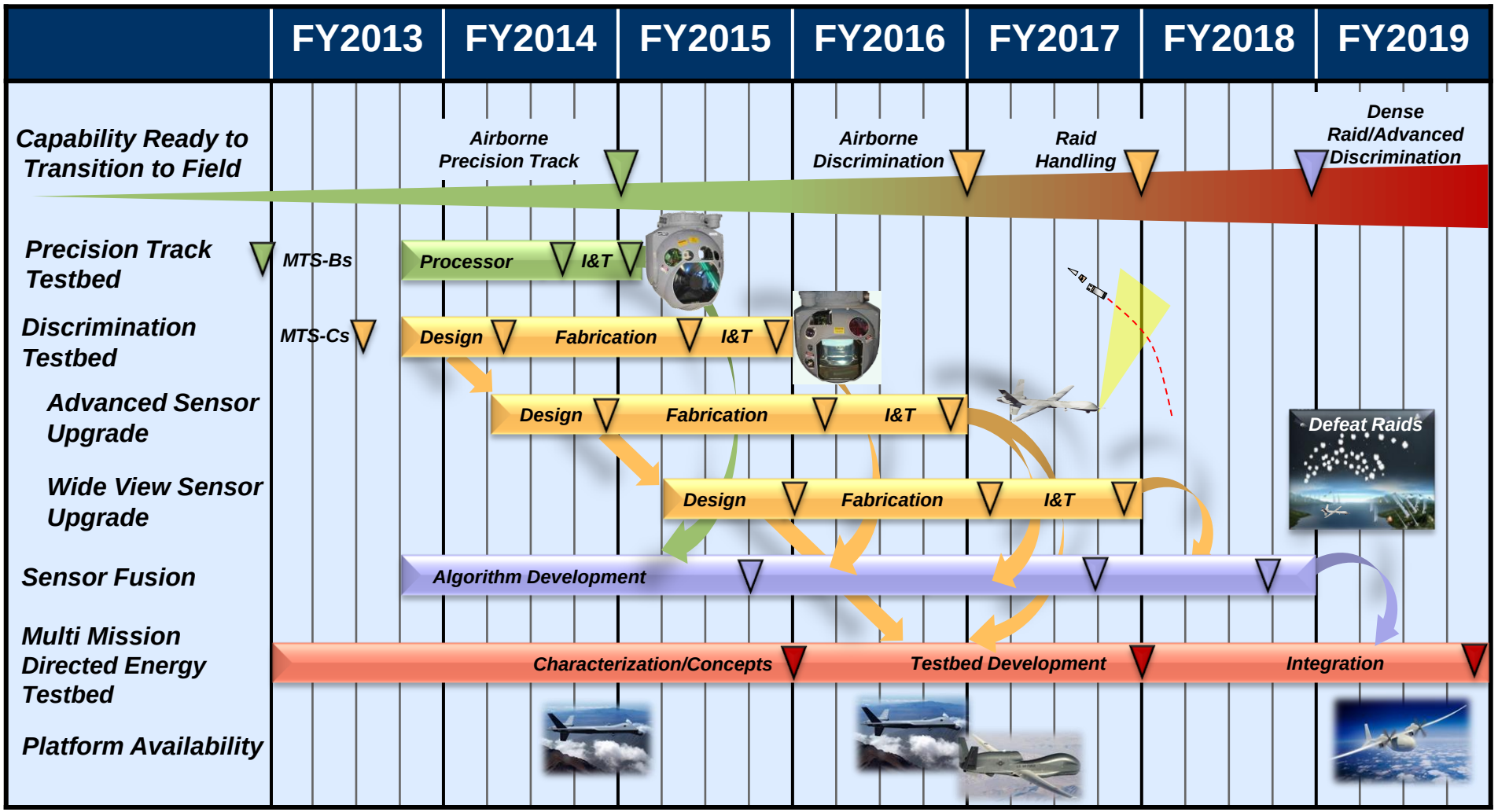
- Assess Capability of Aegis BMD 4.0.2 to deploy and conduct a BMD mission
- Verify voice and data communication links are in accordance with the OPTASKLINK and are adequate to maintain situational awareness

Priority Technology Investments

Investment Area	Vision	Investment Roadmap
Persistent Discrimination 	Capitalize on persistent, multi-phenomenology sensors to maximize the discrimination capability of our BMDS architecture 	• Precision tracking experiments • Discrimination demonstrations • Deploy Airborne or Space-based Prototypes
High Power Lasers 	Integrate high power lasers into the BMDS architecture for a broad range of missile defense missions 	• Lab scale up ~ 30kW • UAV-borne Laser Flight tests • Develop & Deploy Next Generation ABL
Common Kill Vehicle Technology 	Develop common kill vehicle technology for insertion into GBI and SM-3 programs that addresses the future threat 	• Component R & D • Demonstrate prototypes • Develop and Deploy Discriminating and Multi-object kill vehicles
Airborne Interceptor Layer	Highly mobile, survivable BMD; Autonomous and integrated 	• Concept and component R&D • Integrated Demonstrations • Flight test in the BMDS
Rail Gun 	Low-cost solution to the regional threat to interceptor trade	• Analysis of Alternatives • End-to-End Feasibility Testing • Develop & test Rail Gun Prototype in the BMDS

Experimentation → **Proof of Concept** → **Development**

Discrimination Technology Roadmap



MTS - Multi-Spectral Targeting System
I&T - Integration & Test

International Partners

Europe

NATO: NATO BMD Interim Capability ALTBMD, IOC & FOC and BMD (Territorial Missile Defense)

Czech Republic: BMD Framework Partner; R&D Cooperative Project

Denmark: BMD Framework Partner; Thule Upgraded Early Warning Radar; RDT&E Cooperative Project

France: University to University

Germany: PAC-3; PA on Laser Communications Experiment

Italy: BMD Framework Partner

Netherlands: PAC-3; Maritime BMD studies

Poland: Agreed to host Aegis Ashore

Romania: Agreed to host Aegis Ashore

Spain: Hosting BMD-capable ships to support NATO BMD and other missions

Turkey: AN/TPY-2 radar host, R&D Cooperative Project

UK: BMD Framework Partner; Fylingdales Upgraded Early Warning Radar, Joint Project Arrangements for Cooperative Projects

Middle East

Israel: Arrow Deployed, Arrow System Improvement Program; development of David's Sling Weapon System; Iron Dome

Kuwait: Missile defense discussions

Qatar: Missile defense discussions

Saudi Arabia: Missile defense discussions; PAC-3 purchase

United Arab Emirates: Foreign Military Sales cases for THAAD and PAC-3

Asia / Pacific

Australia: BMD Framework Partner; R&D Cooperative Project

Japan: BMD Framework Partner; AN/TPY-2 radar host, 21" Missile Development; 4 Aegis BMD capable ships

ROK: Missile defense discussions

Engagement / Outreach	Missile Defense Analysis	Cooperative Missile Defense Projects	Co-development	Deployment

This Year's Focus

- Continue strong support of the warfighter
- Fix what needs to be fixed
- Support what we have deployed
- Deliver more capability to the Combatant Commanders
- Continue a robust, cost-effective flight test program
- Return the GBI to flight testing
- Continue to develop fiscally sustainable advanced BMD technologies, with a focus on discrimination capability
- Continue to expand our International missile defense partnerships

Missile Defense Capability – Globally Deployed

Summary

- **Balance of capabilities, requirements, and risks to deter aggression, project power, and protect U.S. and allied interests**
- **Deployment of capabilities ongoing to respond to warfighter requirements**
- **Developing, building and using a global C2 and sensor network**
- **Operationally realistic, integrated testing**
- **Continued cooperation with allies and partners for interoperable missile defense**

Missile Defense Capability – Globally Deployed