

The Weapons of Ballistic Missile Defense



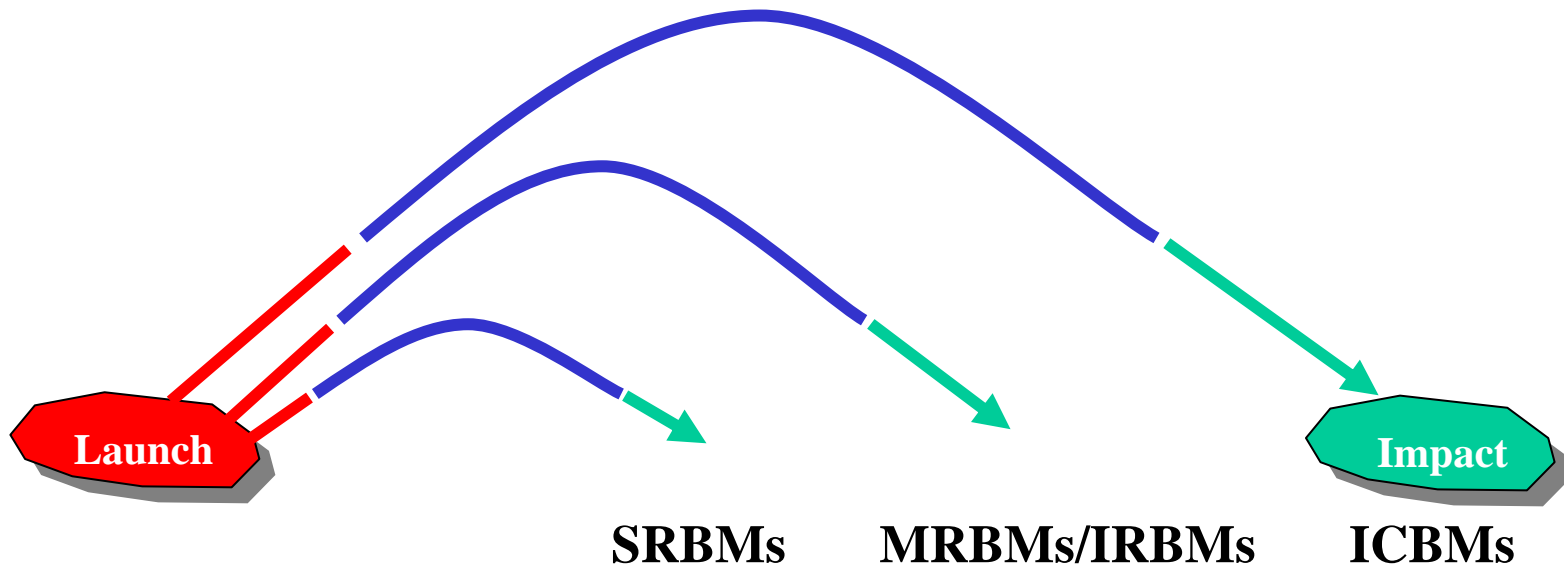
12 OCT 04

**Brig Gen Mark Shackelford, USAF
Acting Deputy Director
Missile Defense Agency**



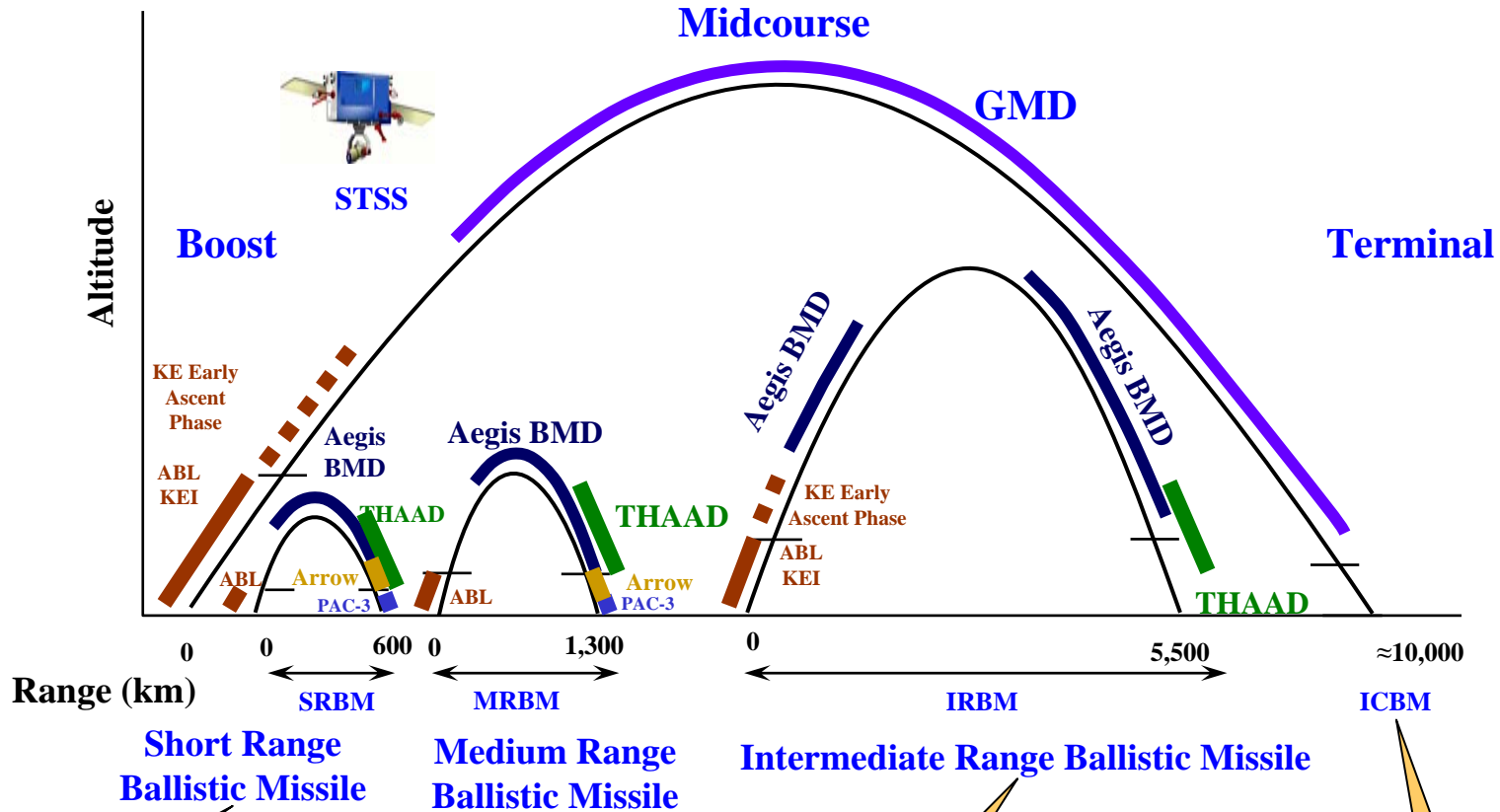
Mission

- **Develop An Integrated Layered Ballistic Missile Defense System**
 - **To Defend The United States, Its Deployed Forces, Friends And Allies**
 - **From Ballistic Missiles Of *All Ranges***
 - **Capable Of Engaging Them In *All Phases Of Flight***





Layered Defenses Against All Ranges Of Missiles



• Thousands Built, Widely Available
 • Commonly Land-Launched
 • Sea-Based Launch Demonstrated By Iran, India

• Many Exist In Third World
 • More On The Way

• A Few Exist In Third World
 • Not Yet Tested As Ballistic Missiles



MDA Goals

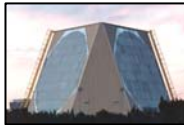
- **Complete development, fielding, and transition to alert of Block 2004**
- **Provide warfighter support and sustainment for BMDS**
- **Develop a totally integrated BMDS for Block 2006 and beyond**
- **Conduct an increasingly complex integrated test program concurrent with operations**
- **Build a robust international foundation for missile defense**



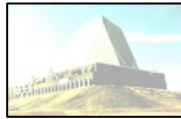
Block 2004 Implementation

Ballistic Missile Defense System (BMDS)

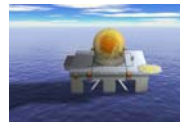
BMDS Radars



Beale



Fylingdales



SBX



SPY



Defense Support System (DSP)

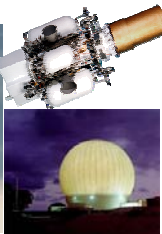
Boost Defense Segment (BDS)

Midcourse Defense Segment (MDS)

Terminal Defense Segment (TDS)



Launch



Ground-Based Midcourse Defense (GMD)

- 16 GBI at Fort Greely
- 4 GBI at VAFB

- Aegis Ballistic Missile Defense
- 12 DDGs (S&T Only)
 - 3 CGs
 - 10-20 SM-3s



PATRIOT

- GEM & GEM+ (6 Bn / 340 Missiles)
- PAC- 3 (4 Bn / 308 Missiles)



Impact



Command, Control / Battle Management / Communications (C2BMC)

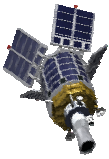
- C2BMC Suites: NORTHCOM, STRATCOM, PACOM, USFK
- GMD Fire Control Nodes: Ft Greely and JNIC
- C2BMC Display: NCR



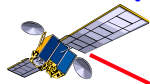
Ballistic Missile Defense System Configuration 2004-2005

2005

Defense Support Program



Defense Satellite Communication System

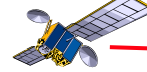


Ground-Based Interceptors



Ground Fire Control Suite

Defense Satellite Communication System



UK Fylingdales Upgraded Early Warning Radar

Satellite Tadil-J



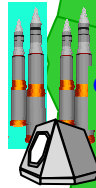
Aegis Surveillance And Track

Cobra Dane Radar



Sea-Based X-Band Radar

Beale Upgraded Early Warning Radar



Ground-Based Interceptors



USSTRATCOM



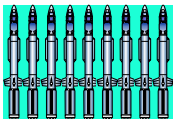
USNORTHCOM



National Capital Region

USFK

USPACOM



Aegis SM-3 Interceptors



BMDS Block 2004 Test Bed





Midcourse Segment Elements

Ground-Based



Space Based Infrared System / Low Component



Defense Support Program / Space Based Infrared System High Component

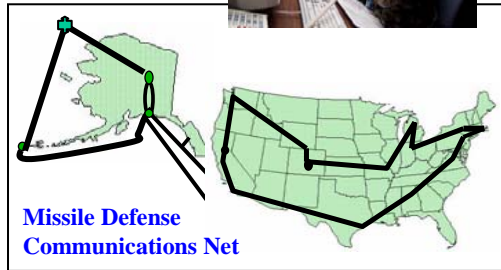
Early Warning Radars



Battle Management / Command, Control



Kill Vehicle



Missile Defense Communications Net

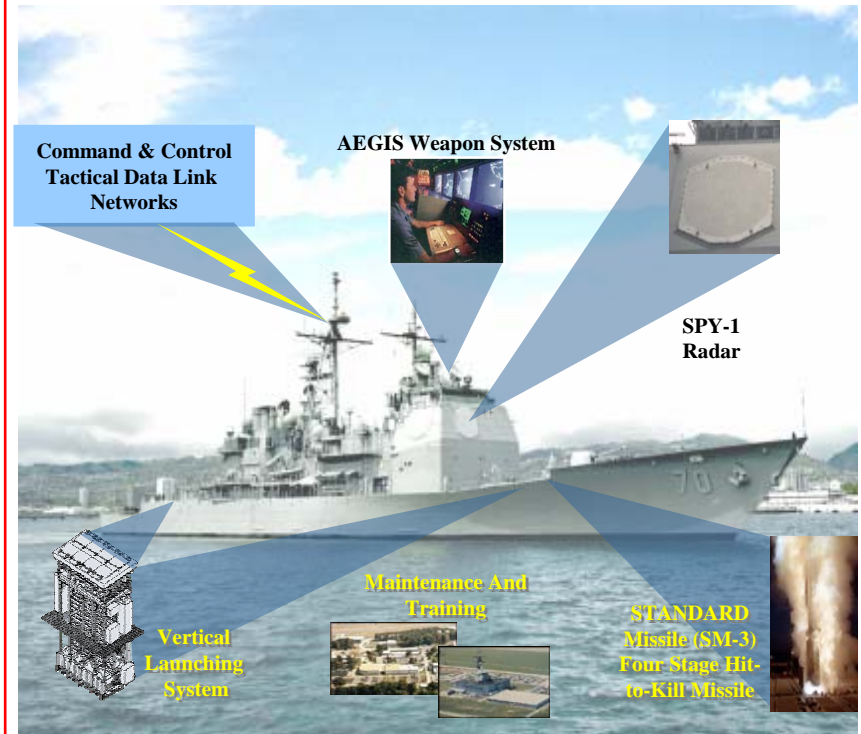


SBX Radar



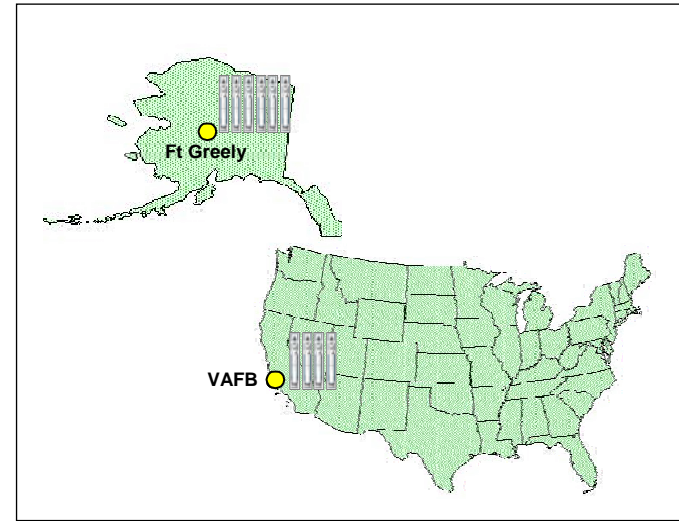
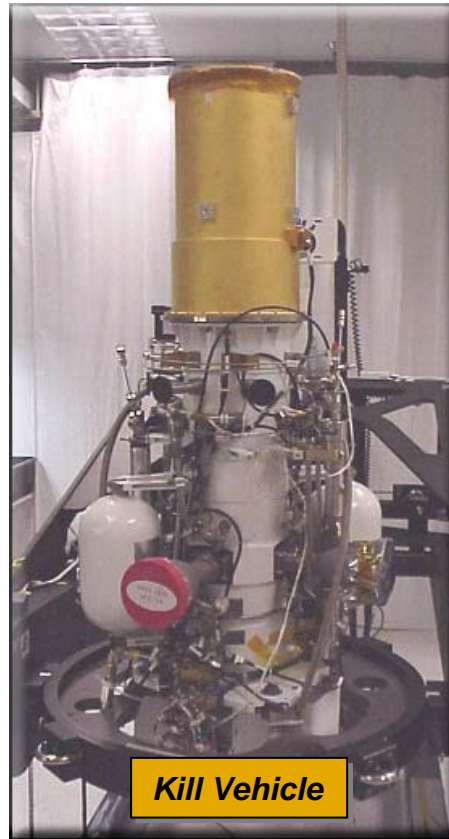
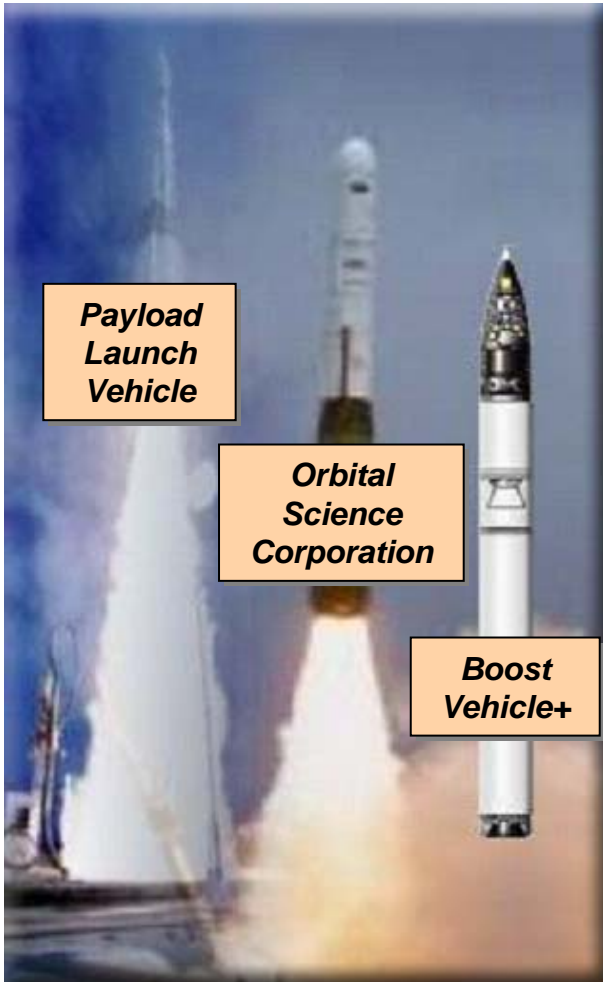
Interceptor

Sea-Based





Ground-Based Interceptors





Ground-Based Long-range Interceptors In Production



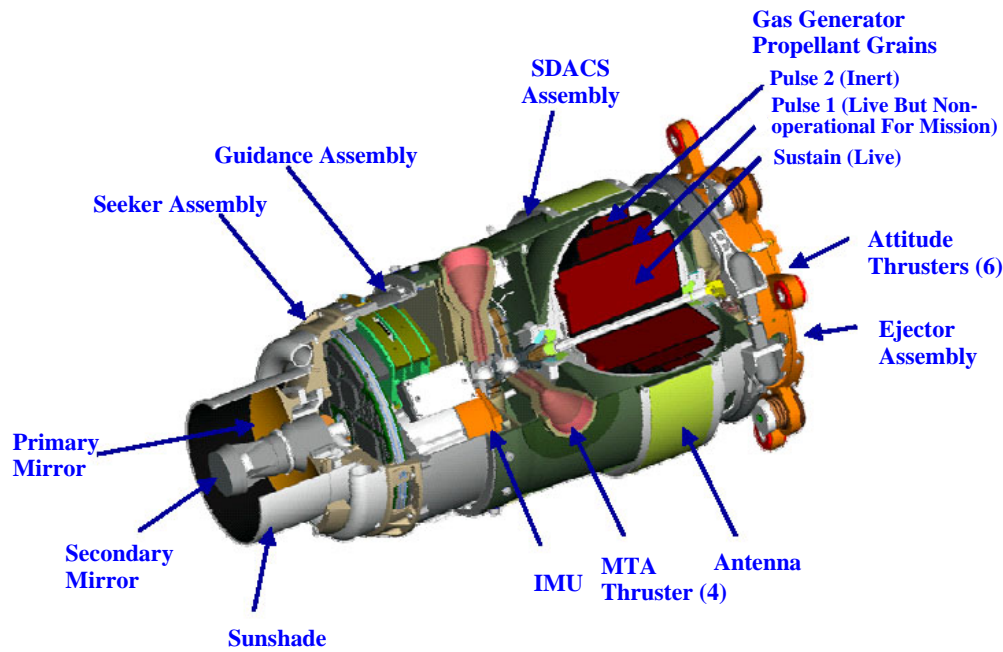


Video Clip GMD Engagement





Sea-based Interceptors





Terminal Segment Elements



THAAD



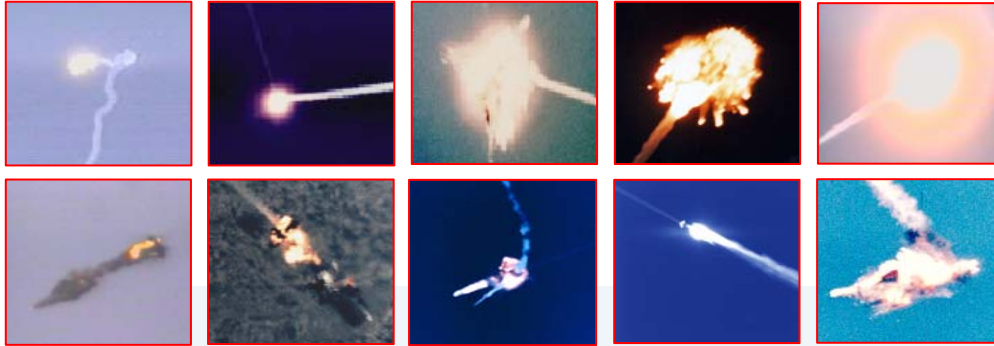
PATRIOT PAC-3



Medium Extended Air Defense System (MEADS)



PAC-3 Missile



- Combination Of**
- High-Resolution Active Seeker
 - Aerodynamic / Thrust Maneuvering Systems
 - Moment Control Algorithms
 - High-Speed Processors
 - Lightweight, Quick, Agile Airframe



Length: 5,205 mm (205 in)
Width: 255 mm (10 in)
Weight: 321 kg (708 lb)



Terminal High Altitude Area Defense (THAAD)

C2BMC

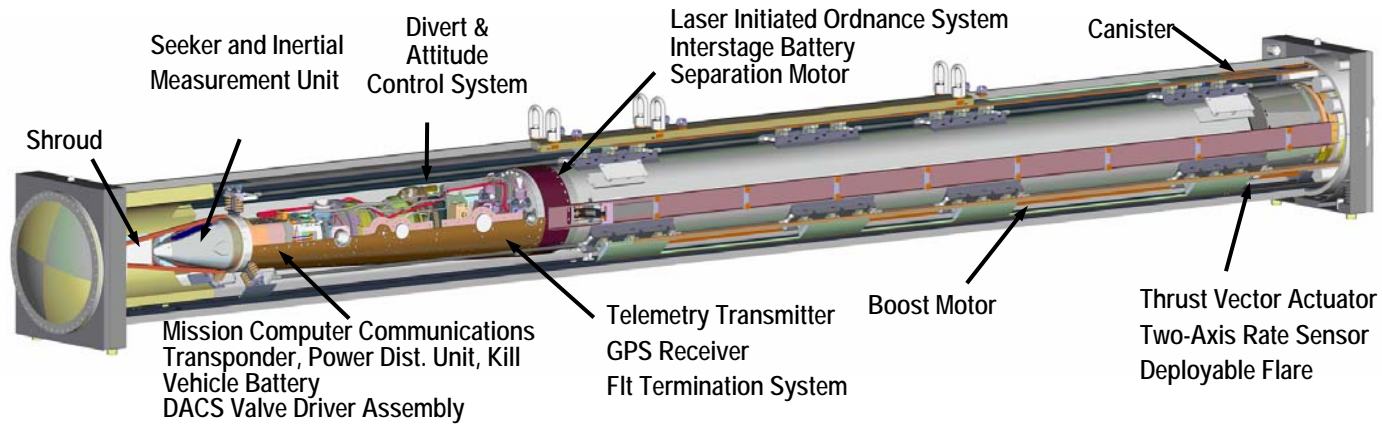


- High Fire Power / 8 Per Launcher
- Highly Mobile / Transportable
- Low Cost / Highly Produicable
- Only Exo / Endo BMDs Missile
- Defeats Ballistic Missiles of all Types and Ranges

Launcher



Radar



	Mass (kg)	Length (m)	Height (m)	Width (m)
Missile Round	1,044	6.6	0.7	0.6
Missile as flies	662	6.2	Max diameter (m) = 0.4	

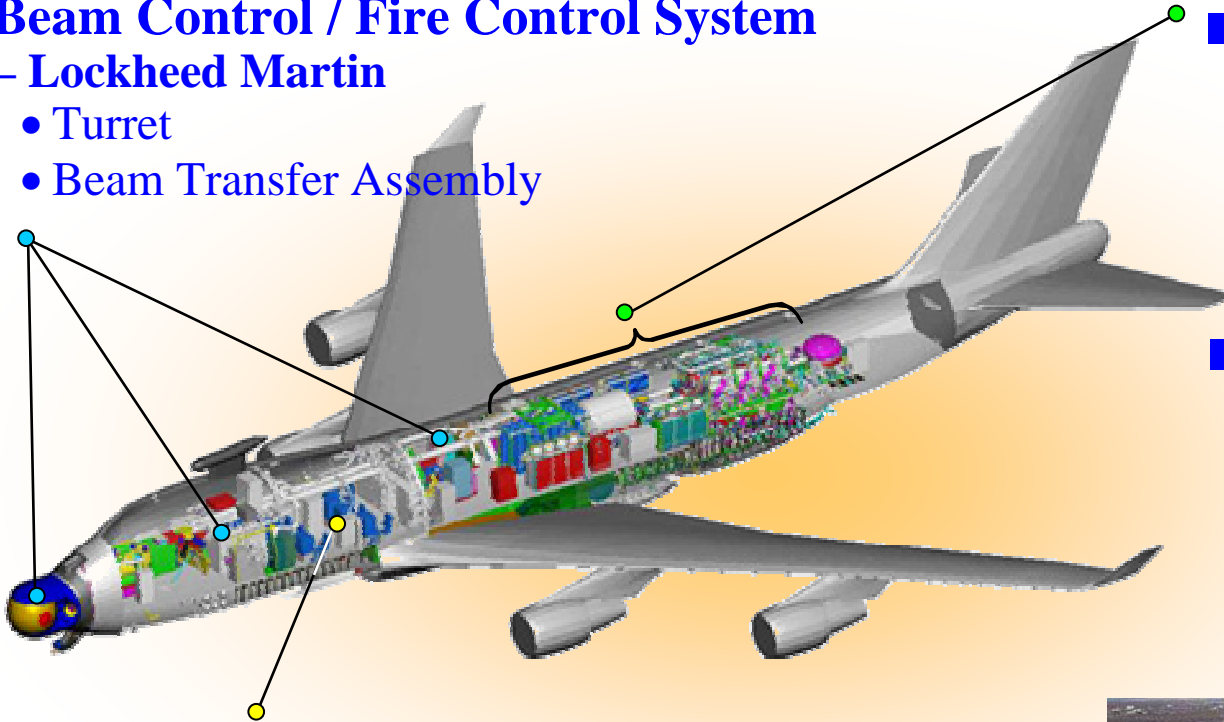


ABL Weapon System Elements

■ Beam Control / Fire Control System

– Lockheed Martin

- Turret
- Beam Transfer Assembly



■ Laser

– Northrop Grumman

- Laser Modules
- Beam Optics
- Fluid Supplies

■ Aircraft 747-400F

– Boeing

- New Nose
- Modified Belly Skin
- Installations / Provisions

■ Battle Management

– Boeing

- Mission Consoles
- Flight Displays
- Surveillance / Ranger
- Communications

■ AVIT / Ground Support

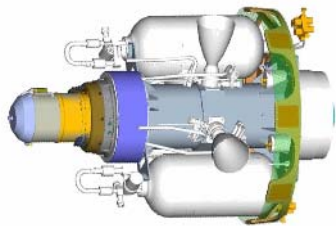
– Boeing

- Ground Infrastructure
- Test Plan / Conduct



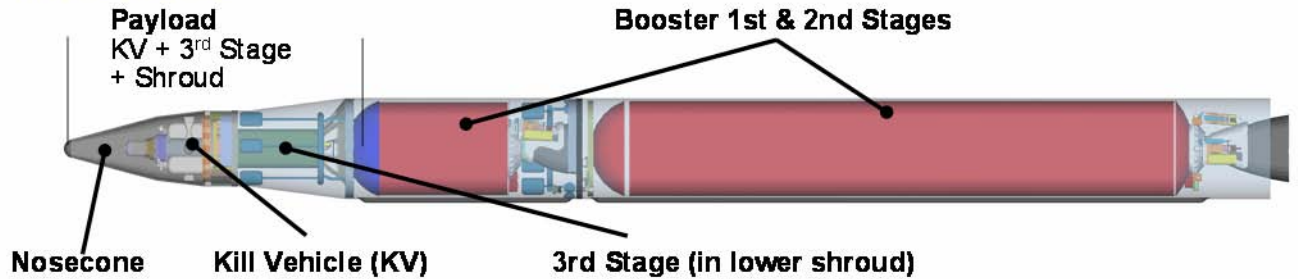


Kinetic Energy Interceptor

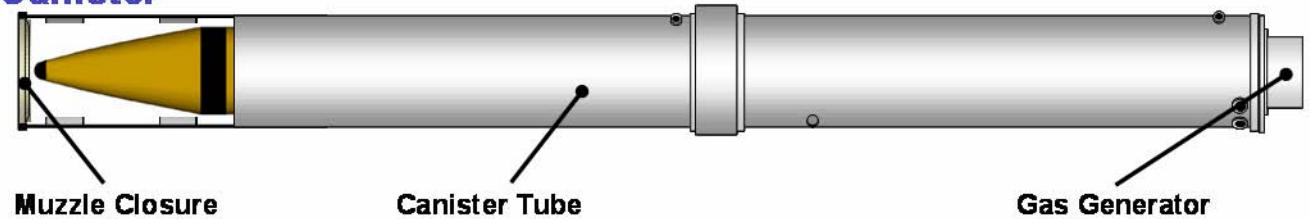


Kill Vehicle

Interceptor



Canister





Interceptor Comparison



Side by Side Comparison

PAC-2
Diameter: .41 m
Length: 5.2 m
Mass: 900 kg

THAAD
Diameter: .37 m
Length: 6.2 m
Mass: 600 kg

SM-3
Diameter: .53 m
Length: 6.6 m
Mass: 1,504 kg

KEI
Diameter: .9 m
Length: 11 m
Mass: 7,435 kg

OSC GBI
Diameter: 1.27 m
Length: 16.5 m
Mass: 22,300 kg



Layered Defenses



Take Aways

- **We are fulfilling the mission given us for BMD**
- **Comprehensive testing – M&S, ground, and flight – gives us confidence in system capability**
- **Robust testing requires Test Bed deployment**
- **A deployed Test Bed has inherent operational capability**
- **Evolutionary spiral development keeps options open to capitalize on technology and meet threat**
- **Fielding assets with continual enhancement keeps pace with rogue nation threat**