Missile Defense Program Overview For The Washington Roundtable On Science And Public Policy

29 JAN 07

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Why Missile Defense

A nuclear strike on a city may result in millions of lives lost and economic losses in the trillions

20+ nations have ballistic missiles

Since 2002, there have been an average of 90 foreign ballistic missiles launches per year - last year, there were about 100

Many nations are working to increase missile range, lethality, and countermeasures

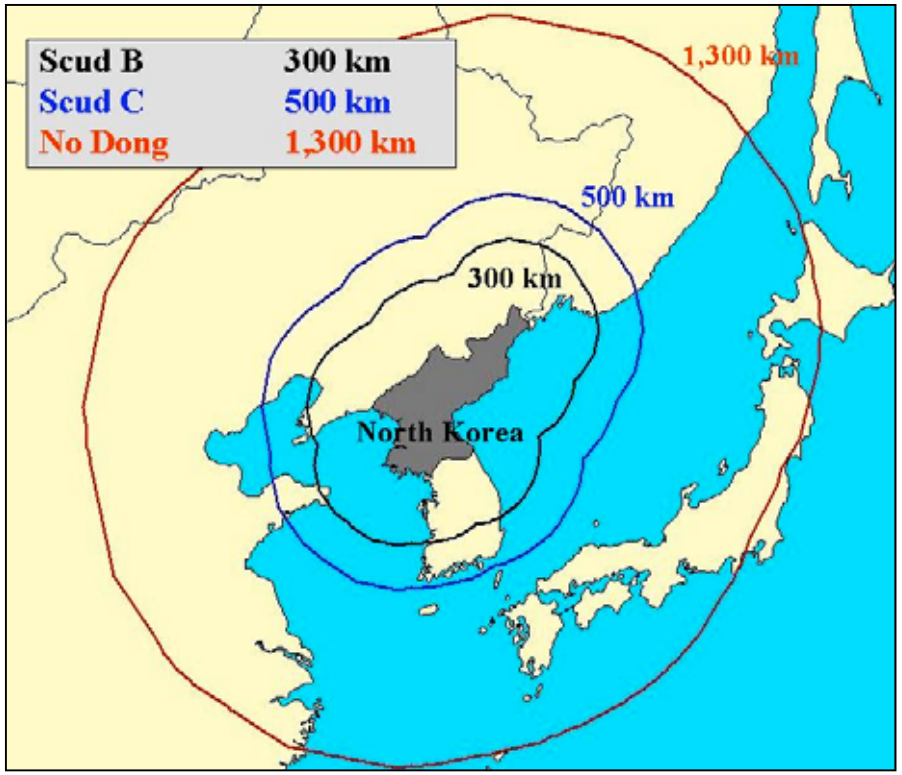
Nuclear, biological, and chemical weapons may be delivered by a ballistic missile

Ballistic Missiles Pose A Growing, Potentially Catastrophic Threat

North Korean Ballistic Missile Capabilities

- 500 Scuds (300-500 km)

- No Dong (1,300 km)
  - Reaches Japan and all South Korea
  - Scaled-up Scud technology
  - Flight-tested in May 1993 and July 2006



North Korean Ballistic Missile Capabilities

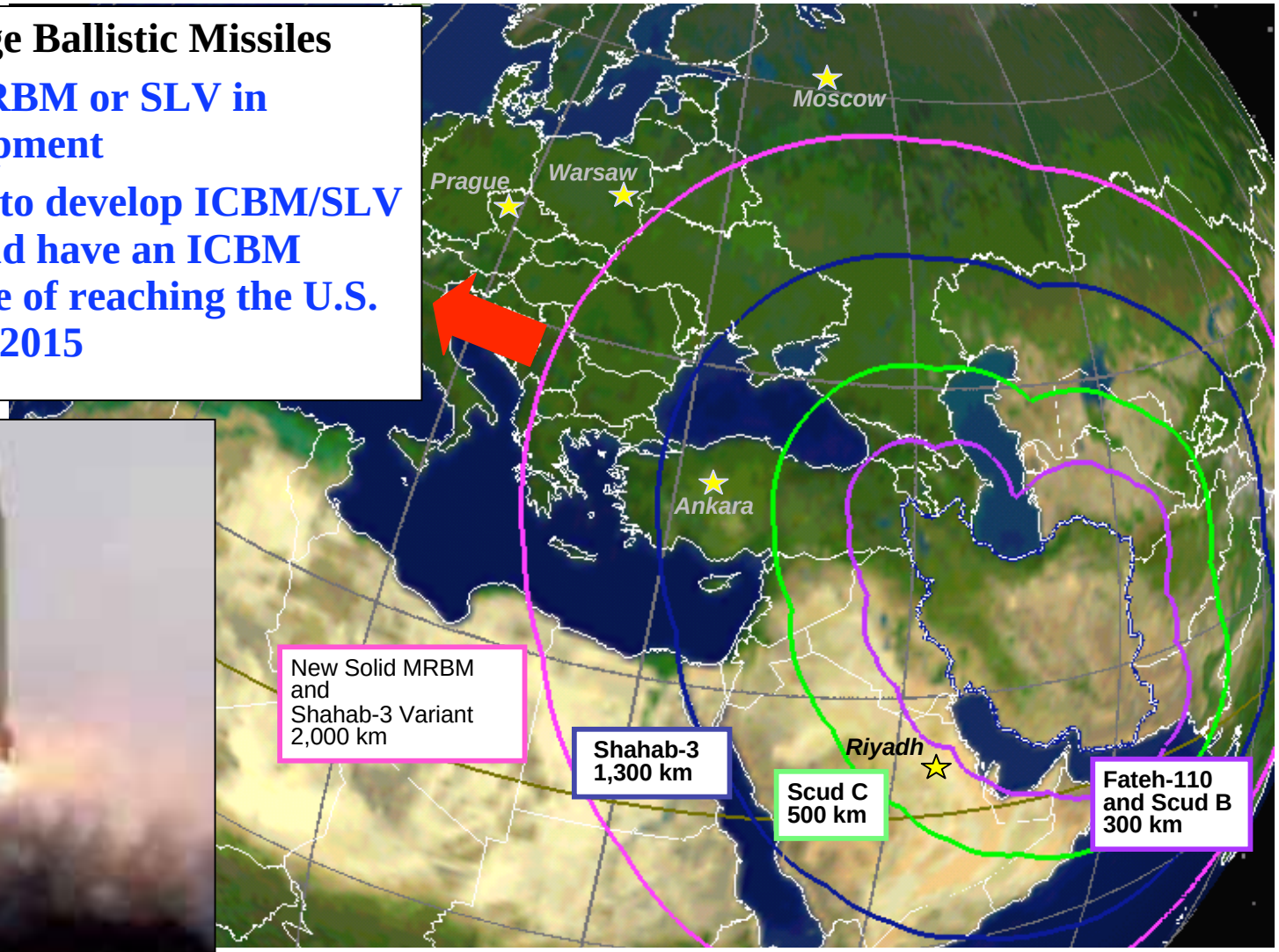
- **Taepo Dong-1 Space Launch Vehicle**
  - **Flight tested 1998**
  - **Third stage failed, but first two stages demonstrated several key technologies required for an ICBM, including stage separation**

- **Taepo Dong-2 SLV/ICBM**
  - **2-stage: 10,000 km**
  - **3-stage: 15,000 km**
  - **4 JUL 06 test failed shortly after launch**

- **North Korea is also developing an intermediate-range ballistic missile, approximately 3,200 km range. This IRBM represents a qualitative improvement in performance**

Iranian Ballistic Missile Threat

- **Long-Range Ballistic Missiles**
  - **New IRBM or SLV in development**
  - **Likely to develop ICBM/SLV … could have an ICBM capable of reaching the U.S. before 2015**



Source: NASIC, B&CM Threat 2006, Jacoby Testimony March 2005

Challenges And Uncertainties

- **Rogue states view ballistic missiles as a means for gaining or maintaining their own freedom of action and raising revenue**
  - **North Korea uses missiles for coercion, intimidation and deterrence – proliferates to other nations**
  - **Iran views ballistic missiles as element of asymmetric strategy against U.S. and allies – proliferates to both state and non-state actors**
- **Emerging Threats**
  - **Several nations are pursuing ballistic missiles of all ranges, increasing missile numbers and sophistication – emphasis on countermeasures**
  - **Future threats difficult to predict but likely to arise – both technical and political surprises**
- **Evolving role for ballistic missiles and possibly cruise missiles**
  - **Lebanon crisis demonstrated**
    - **Rogue state support of non-state actors**
    - **Use of ballistic missiles and rockets as terror weapons**

Ballistic Missile Defense Policy And Mission

Policy

"… The United States plans to begin deployment of a set of missile defense capabilities in 2004. These capabilities will serve as a starting point for fielding improved and expanded missile defense capabilities later."

National Security Presidential Directive / NSPD-23
16 DEC 02

Direction

- **Establish a single program to develop an integrated system under a newly titled Missile Defense Agency**
- **Apply a capability-based requirements process for missile defense**

SecDef Memorandum
Missile Defense Program Direction, 2 JAN 02

Mission

- **Develop an integrated layered Ballistic Missile Defense System**
  - **To defend the United States, its deployed forces, allies and friends**
  - **From ballistic missiles of all ranges**
  - **Capable of engaging them in all phases of flight**

Missile Defense Program Strategy

- **Field an initial increment (2004-2005) of capability to provide**
  - **Initial protection of entire U.S. from North Korea, partial protection of the U.S. from Middle East threat**
  - **Protection of deployed forces, allies and friends with terminal defenses**
- **Field next increment (2006-2007) of capability to provide**
  - **Complete protection of U.S. from Middle East**
  - **Expand coverage to allies and friends**
  - **Increase countermeasure resistance, and increase capability against shorter-range threats**
- **Follow on increments (2008+) begin to increase robustness of interceptor inventory and sensors**
  - **Addresses unconventional attacks**

Integrated Ballistic Missile Defense System

Sensors

Defense Support Program

Space Tracking And Surveillance System

Sea-Based Radars

Forward-Based Radar With Adjunct Sensor

Midcourse X-Band Radar

Early Warning Radar

Boost Defense Segment

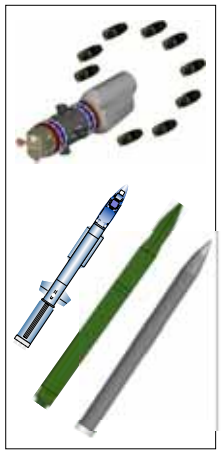
Midcourse Defense Segment

Terminal Defense Segment

Airborne Laser

Kinetic Energy Interceptor

Aegis Ballistic Missile Defense / Standard Missile-3



Multiple Kill Vehicle

Ground-Based Midcourse Defense

Terminal High Altitude Area Defense

Sea-Based Terminal

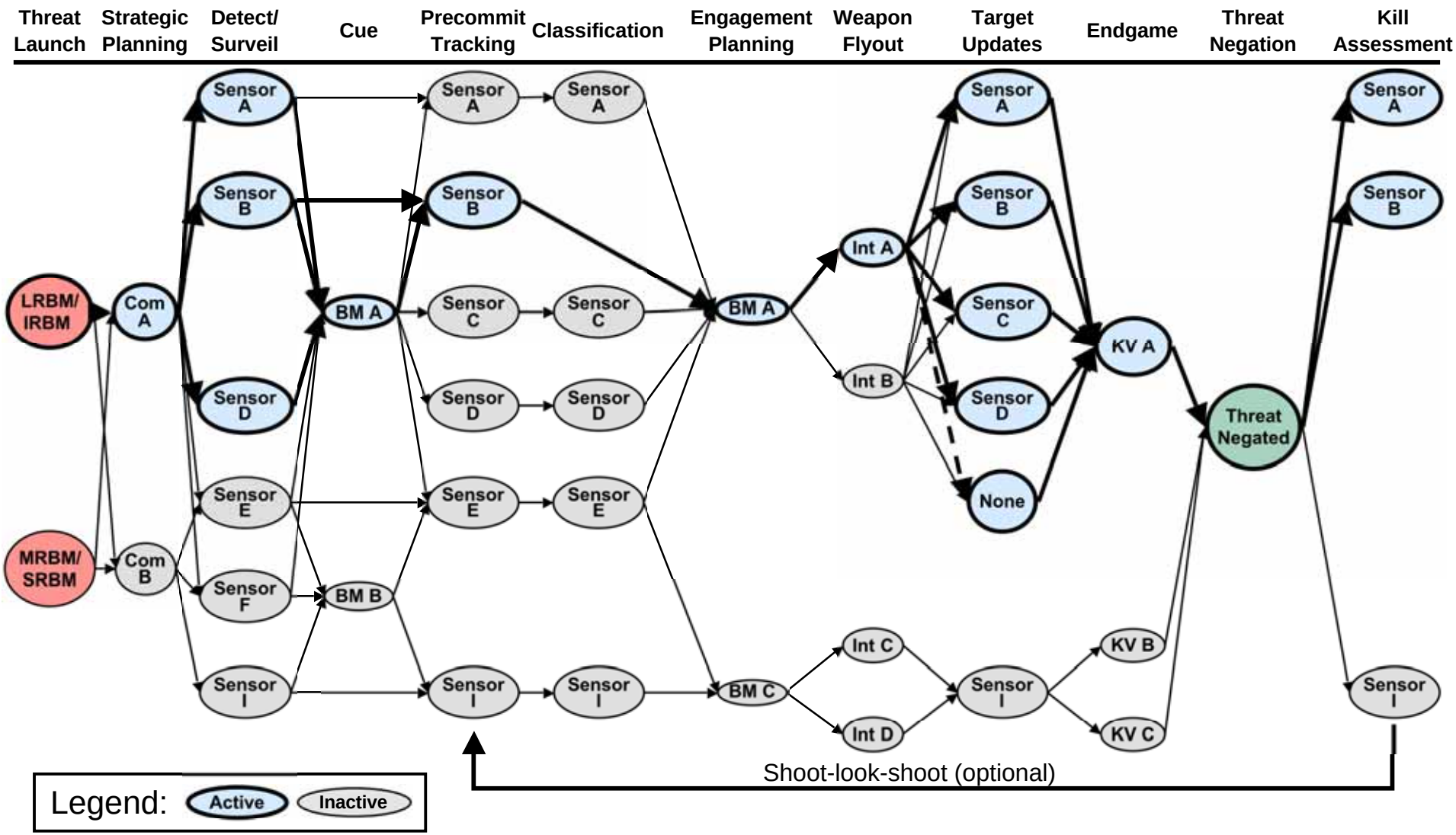
Patriot Advanced Capability-3

Command, Control, Battle Management & Communications

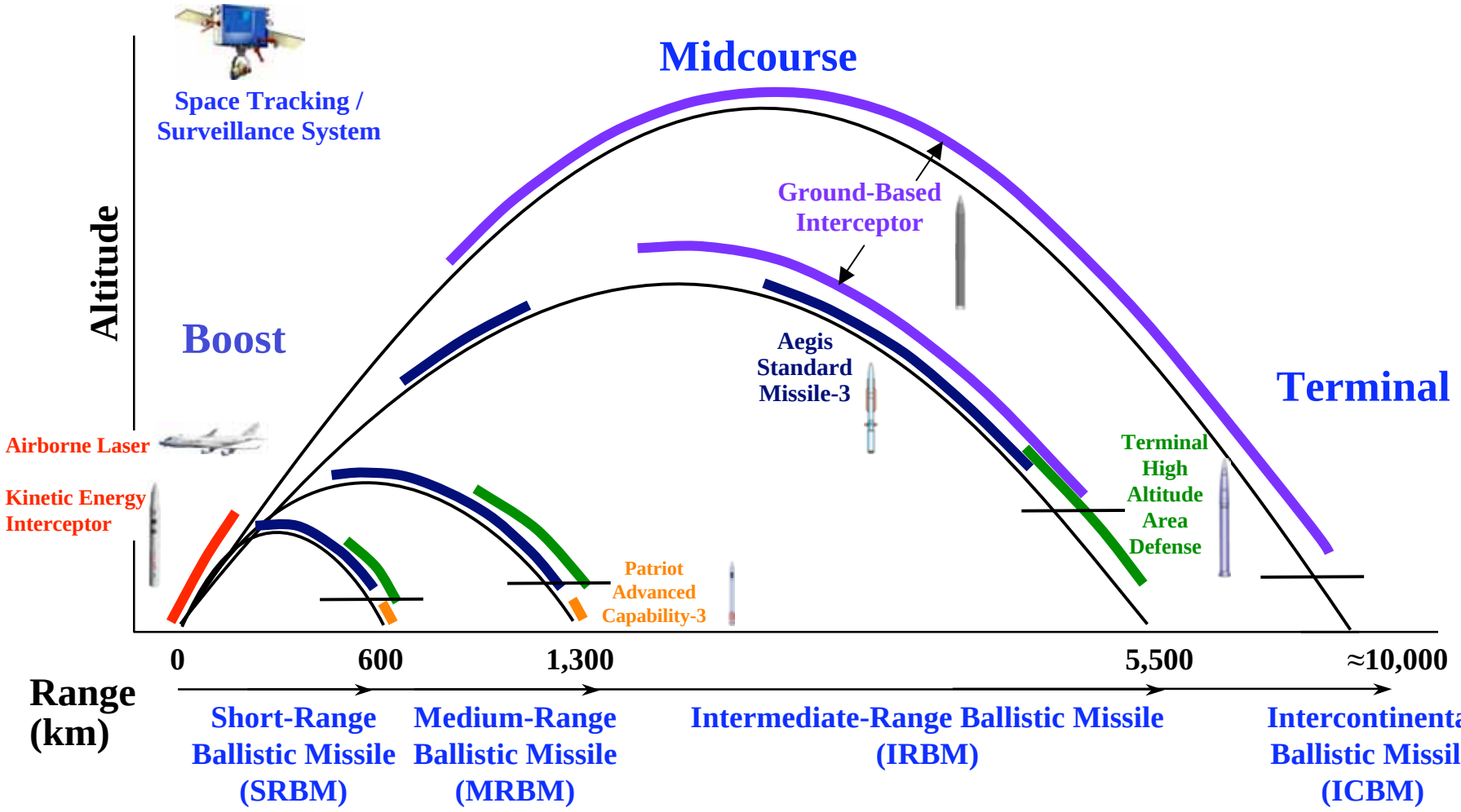
NMCC USSTRATCOM USNORTHCOM USPACOM EUCOM CENTCOM

Integrated BMDS "Kill Web"

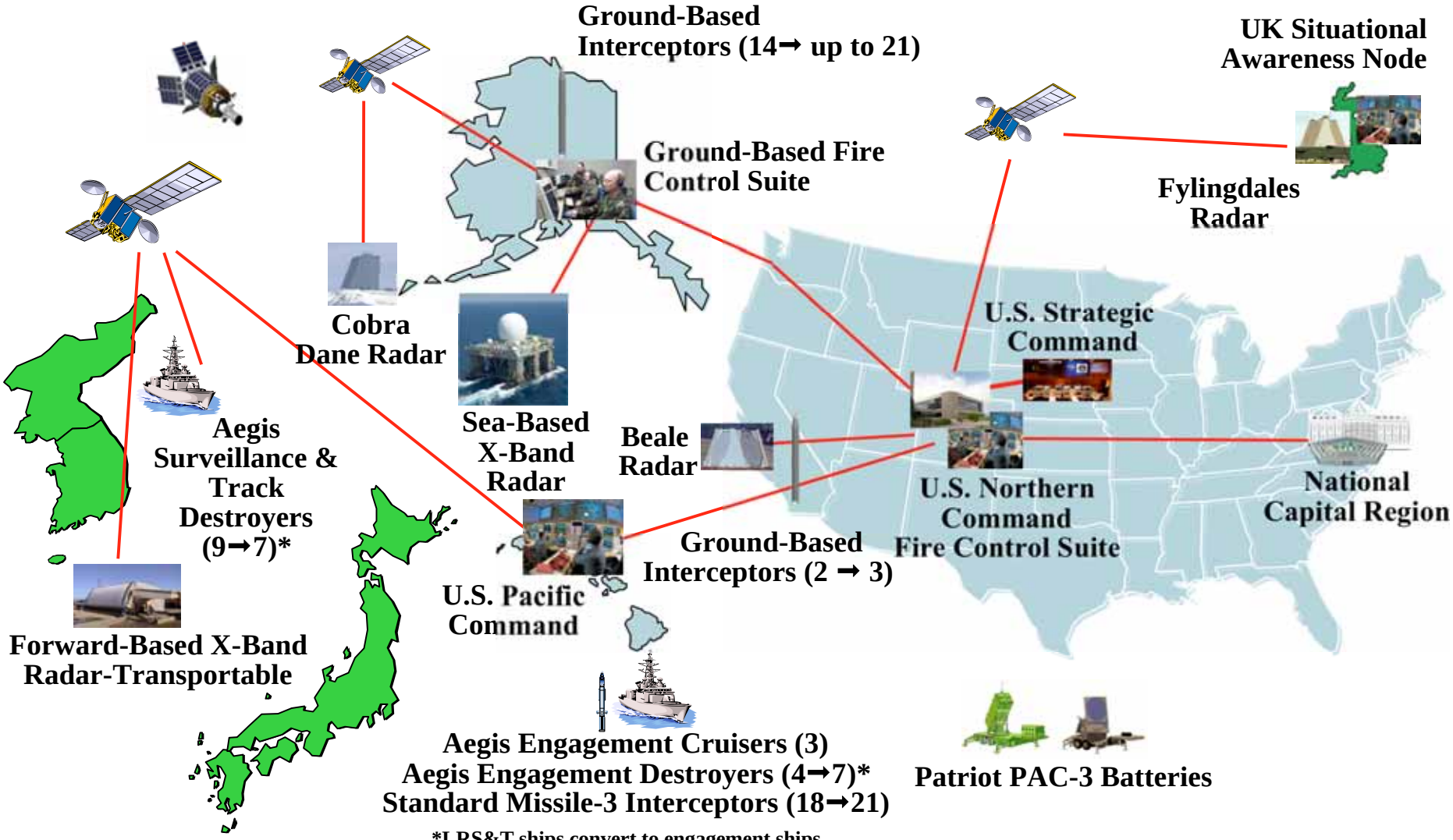
"Mixing And Matching Sensors And Interceptors"



Current Planned BMD System



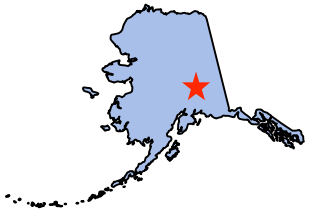
System Configuration
End February 2007 ➞ End 2007



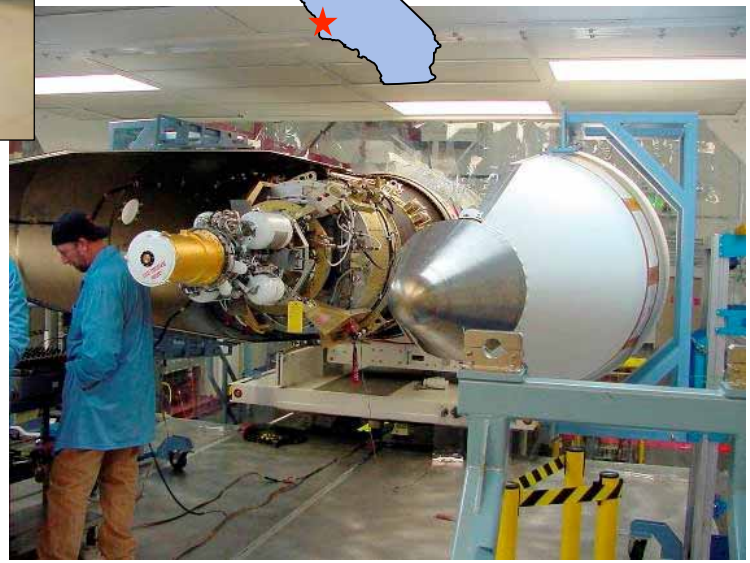
*LRS&T ships convert to engagement ships

Ground-Based Midcourse Defense

Ft. Greely, Alaska



Vandenberg Air Force Base



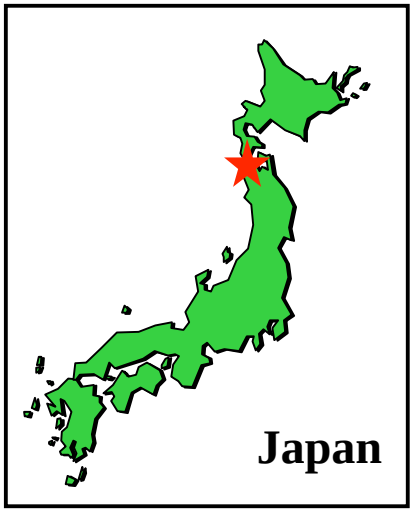
Aegis Ballistic Missile Defense

Long-Range Surveillance & Track

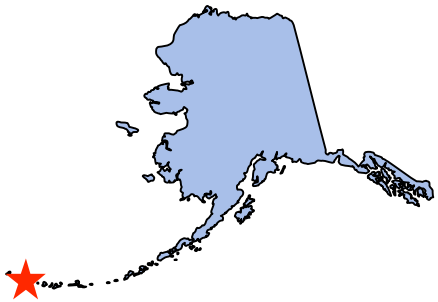
Engagement Cruisers

Engagement Destroyers

Forward Based X-Band Radar



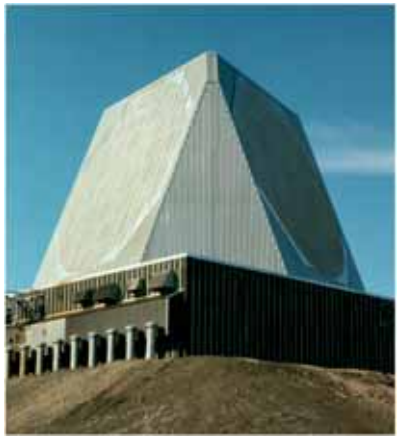
Early Warning Radars

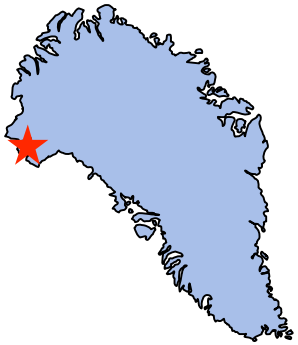


Cobra Dane (Alaska)

Beale (California)

Fylingdales (United Kingdom)

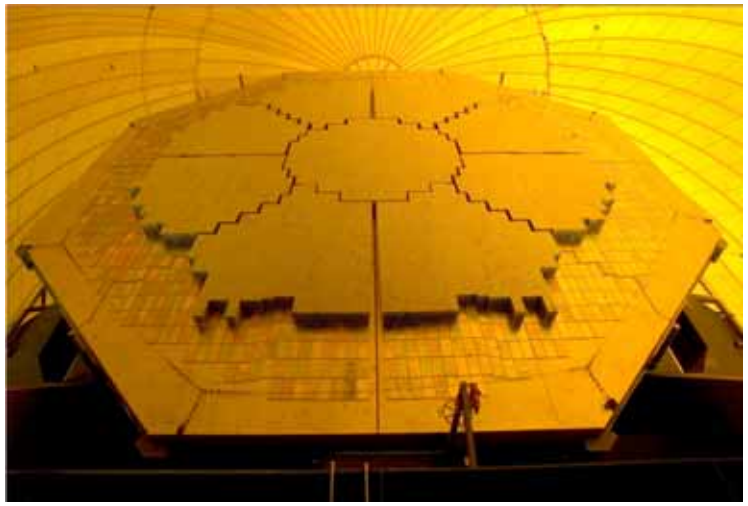




Thule (Greenland)

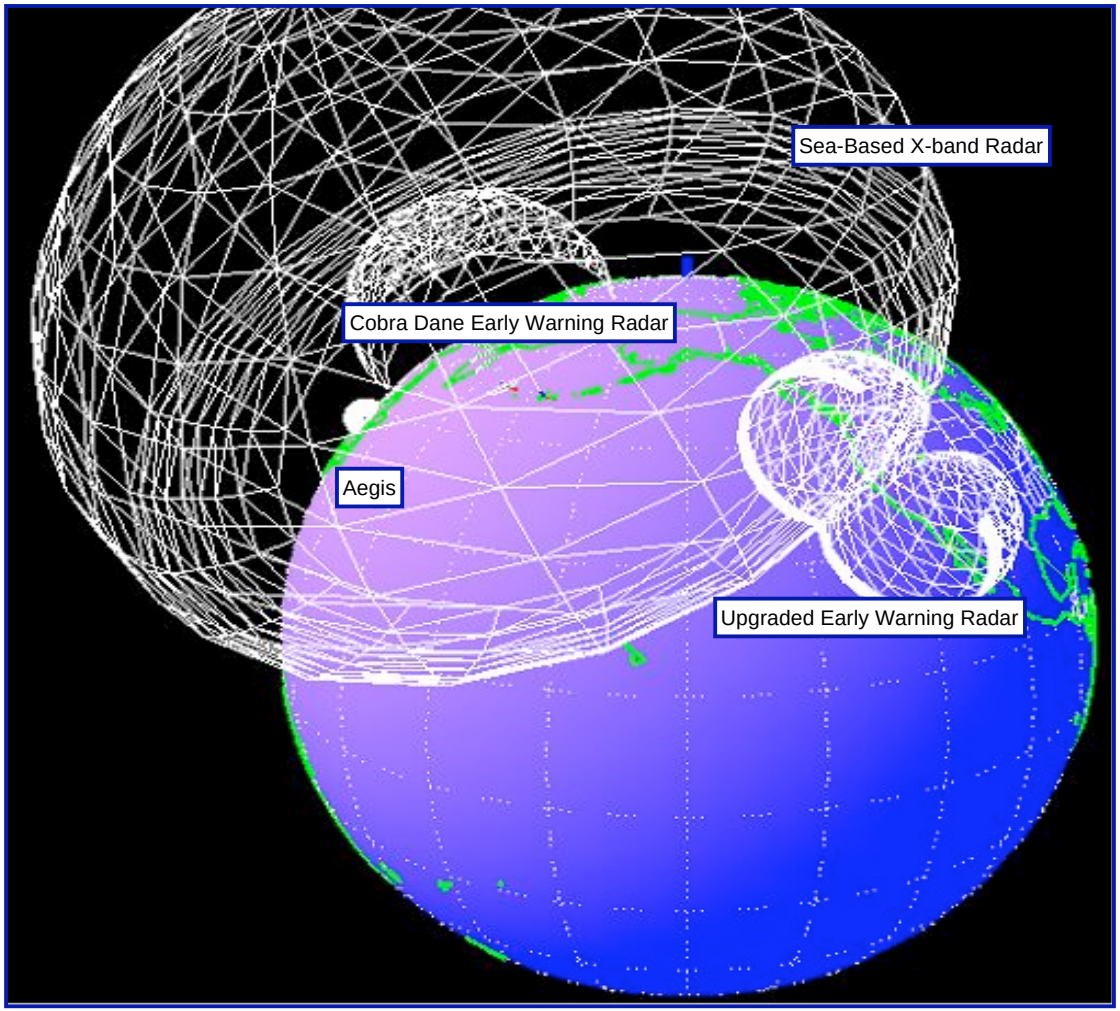
Sea-Based X-Band Radar (SBX)

SBX Under Way



SBX Interior

Sensor Viewing Comparisons



Real World Events

- **On 4-5 JUL 06, North Korea conducted seven ballistic missile tests**
  - **The six short-range tests appeared successful, landing in Sea of Japan**
  - **The test of the long-range Taepo Dong-2 missile, of most interest to the U.S., failed shortly after launch**
- **BMDS handed over to the operators**
- **Aegis BMD radar surveillance ships were stationed east and west of Japan to track trajectory and identify either space or missile track**
- **Positioning of Forward-based X-band Radar in Japan was accelerated for data collection**
- **Sea-based X-band Radar off Hawaii was similarly standing by for data collection**

We are Confident The Ballistic Missile Defense System Would Have Operated As Designed Had The Taepo Dong-2 Threatened The U.S.

Missile Defense Tests

- **14 test successes in last 15 flight tests (with one no test)**
  - **Aegis Standard Missile-3 intercepts separating warheads (November 2005 and June 2006)**
  - **Successful Terminal High Altitude Area Defense (THAAD) intercepts of unitary targets (July 2006, January 2007)**
  - **Successful intercept of target with long-range interceptor (September 2006)**
- **Upcoming tests in 2007**
  - **Two intercept flight tests (1 endo-atmospheric, 1 exo-atmospheric) of THAAD interceptor at Pacific Missile Range Facility against short-range unitary targets in middle and late 2007**
  - **Three Aegis Standard Missile-3 intercepts against short-and medium-range targets in middle and late 2007**
  - **Two intercept tests of long-range ground-based interceptors in late Spring and early Fall 2007**

24 Hit-to-Kill Intercepts In Low And High Endo-atmosphere, Midcourse And Terminal Exo-atmosphere Since 2001

Aegis Ballistic Missile Defense
FTM 04-1 – 24 FEB 05

- **Engages**
  - **Short- to medium-range ballistic missiles**
  - **From the sea**
  - **In midcourse phase of flight**

Terminal High Altitude Area Defense
FTT-03 – 12 JUL 06

- **Engages**
  - **Short- to intermediate-range ballistic missiles**
  - **From the ground**
  - **In terminal phase of flight**

VMA030aFTT03QL

Terminal High Altitude Area Defense
FTT-06 – 27 JAN 07

- **Engages**
  - **Short- to intermediate-range ballistic missiles**
  - **From the ground**
  - **In terminal phase of flight**

VM300 THAAD 27 JAN 07

Ground-Based Midcourse Defense
FTG-02 – 1 SEP 06

- **Engages**
  - **Intermediate- to long-range ballistic missiles**
  - **From the ground**
  - **In midcourse phase of flight**

Capabilities Through 2011

- **Increased capability against rogue nations**
  - Up to 44 Ground-Based Interceptors in U.S.
  - First of 10 Ground-Based Interceptors in European Missile Defense Site
  - Large X-Band radar in Europe
  - Thule radar (Greenland) fully integrated
- **Improved defense against asymmetric and improved capability against regional threats**
  - 3 Aegis cruisers and 15 Aegis destroyers with 83 Standard Missile-3 interceptors
  - 48 Terminal High Altitude Area Defense interceptors with 2 X-band radars
  - Adding near-term sea-based terminal capability using Navy's SM-2 Block IV
- **Greater mobility to address surprise threats**
  - Two surveillance and tracking satellites
  - Up to 4 forward-based radars available including one to support European site
- **Battle management and global integrated fire control for Middle East and Southwest Asia**








Baseline Development Program

Airborne Laser

- Over 70 successful laser firings
- Atmospheric compensation and tracking test against target, Summer 2007
- Lethal shootdown FY09

Kinetic Energy Interceptor

- Successful 1st and 2nd stage static fire
- Booster flight test in FY08
- Operational avail 2014

Multiple Kill Vehicle

- Successful kill vehicle seeker test
- Hover test to 2009
- First flight 2012

SM-3 Block IIA 21" Interceptor

- Agreement with Japan signed June 2006
- First flight 2014
- Operational avail 2015

Space Tracking and Surveillance System

- First launch of 2 demonstration satellites in 2007

Sea-Based Terminal

- Initial far-term program definition in work

Knowledge Points Drive Development Progress

International Activity Highlights

Framework Partners

Japan: Forward-based X-Band radar siting, 21" Missile Development

UK: Fylingdales UEWR, lethality studies system-level analyses, advanced technology programs, target development

Australia: Science and technology cooperation

Denmark: Upgrade Thule Early Warning Radar, Technology Discussions

Italy: Framework MOU near completion, MEADS partner, architecture analysis study

Continuing Activity

Israel: Arrow Deployed, Arrow System Improvement Program

Germany: MEADS Partner, Laser Cross-Link Technology

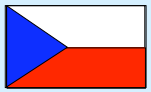
Netherlands: PAC-3, Trilateral Frigate Program Maritime Cooperation

NATO: Active Layered Theater BMD Program Office, Missile Defense Feasibility Study

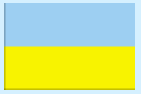
New Relations / Emphasis

Spain: U.S. -Spain Missile Defense Technical Group established

Poland: Missile Defense Consultations and Workshops; expressed interest in hosting missile site



Czech Republic: Missile Defense Consultations; expressed interest in hosting midcourse radar



Ukraine: Exploring possible cooperative projects

India: Missile Defense Discussions and Workshops ongoing

Russia: Theater Missile Defense Exercise Program

France: Exploring interest

Summary

- **Major progress towards meeting Presidential Direction**
- **Capabilities are in the warfighters' arsenal while concurrently supporting further development efforts**
- **We will build on the current system to close performance gaps and improve its capabilities over time**