Ballistic Missile Defense Overview
– Phased Adaptive Approach –

To: 2011 Space And Missile Defense Conference

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Program Executive For Programs And Integration
Missile Defense Agency
August 17, 2011
Ballistic Missile Proliferation

**Threat**
- Real
- Growing
- Unpredictable
- Anti-ship ballistic missiles threaten flow of commerce
- Threatens regional stability

**Missile Defense Attributes**
- Provides extended deterrence
- Devalues missile proliferation
- Dissuades ballistic missile investment
- Enables international cooperation for regional defense

**2010 Ballistic Missile Force Levels Not Including U.S., China, Russia or NATO**

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
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<tbody>
<tr>
<td>SRBM</td>
<td>5,000-5,500</td>
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<tr>
<td>MRBM</td>
<td>500-700</td>
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<td>IRBM</td>
<td>&lt;40 IRBM</td>
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<td>ICBM</td>
<td>0-10 ICBM</td>
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<tr>
<td>Totals</td>
<td>5,550-6,250</td>
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</table>

**Sources:**
- NASIC, Ballistic and Cruise Missile Threat, 2009
- DIA, Iran's Military Power, Statement before the Senate Armed Services Committee, 14 APR 10
- DIA, Annual Threat Assessment 2008
- MSIC, e-mail, RE: Unclassified Force Level Numbers, 7 February 2011
- 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 2009
- FARS News Agency
- Open Source Center (OSC), Iranian TV shows footage of “underground launch silos” IAP20110627950192, 27 June 2011
Homeland Defense

Fort Greely Missile Field 2

- Missile Field 2 Construction – 2011
  - Provides 14 additional silos

- Fort Greely Power Plant – 2011
  - Provides stable, survivable, shielded power to mission critical facilities

- 2-stage GBI 1st flight – JUN 10
- Fort Greely 2nd Fire Control Node – 2011
- GBI fleet refurbishment and upgrade program
  - Sustains GBI life to 2032

- Thule Radar Upgrade – 2011
- Clear Radar Upgrade – 2015

- Ft Drum NY IFICS Data Terminal (IDT) – 2015
  - Better intercept opportunities across larger battle space
  - Improved handover accuracy
# GMD Return To Intercept

## Program Milestones

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<th>FY11</th>
<th>FY12</th>
<th>FY13</th>
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### Failure Review Board
- Design Review (DR) #1
- DR #2
- DR #3 (Contingent)
- Restart GBI Ops Prod
- FTG-06b

### Resolution Activities
- EKV Hot Fire Testing “Test E”
- E1A E1B E1C E2
- CTV-01
- FTG-06b EKV Integration
- First Ops Payload Delivery

### Manufacture / Qualification
- Pulse Code Modulation Encoder (PCME)
- Design Complete
- Delivery

### EKV Manufacture
- CTV-01 EKV Integration
- FTG-06b EKV Integration

### Approved for Public Release
11-MDA-6321 (16 August 11)
### European Phased Adaptive Approach To Developing And Deploying Missile Defense

<table>
<thead>
<tr>
<th>Phase I: Deploying Today’s Capability (By Dec 2011)</th>
<th>Phase II: Enhancing Medium Range Missile Defense (By 2015)</th>
<th>Phase III: Enhancing Intermediate Range Missile Defense (By 2018)</th>
<th>Phase IV: Early Intercept of MRBMs, IRBMs and ICBMs (By 2020)</th>
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</thead>
<tbody>
<tr>
<td><a href="#">Aegis BMD 3.6.1 with SM-3 IA</a></td>
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<td><a href="#">Aegis Ashore 5.1 with SM-3 IIB</a></td>
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<td><a href="#">AN/TPY-2 (FBM)</a></td>
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<td><a href="#">C2BMC Updates</a></td>
<td><a href="#">PTSS</a></td>
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<td><a href="#">ALTBMD Lower Tier</a></td>
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<td><a href="#">Potential EPAA Enhancements</a></td>
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<td><a href="#">THAAD</a></td>
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11-MDA-6321 (16 August 11)
European Phased Adaptive Approach
– Phase I: Deploying Today’s Capability (by December 2011) –

Phase I: Deploying Today’s Capability
(By Dec 2011)

Aegis BMD 3.6.1 with SM-3 Block IA

USS Monterey on Station, June 2011

AN/TPY-2 during FTM-15
April 2011

Aegis BMD 3.6.1 with SM-3 Block IA

ALTBMD and C2BMC Interoperability Testing
June 2010 – July 2011

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European Phased Adaptive Approach
– Phase II: Enhancing Medium Range Missile Defense (By 2015) –

Phase II: Enhancing Medium Range Missile Defense (By 2015)

Aegis BMD 4.0.1/5.0 with SM-3 IB

Aegis Ashore 5.0 with SM-3 IB (Romania)

AN/TPY-2 (FBM)

C2BMC Updates

ALTBMD Lower Tier

Potential EPAA Enhancements

THAAD

Vice Chief of Defense, Romania visits Aegis BMD June 2011

FTM-16 Event 2 (4Q FY11)

Aegis BMD 4.0.1 engagement using a SM-3 Blk IB interceptor against an SRBM

SM-3 Block IB

Target

Aegis BMD

PMRF

Target Ground Range: ~925 km

Aegis Ashore Site In Romania

Geotechnical Analysis Team July 2011

THAAD

Aegis Ashore Testing Complex
Pacific Range Missile Facility - Hawaii

Vice Chief of Defense, Romania visits Aegis BMD June 2011

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Phase 3/4 Architecture Trade Parameters

**Phase 3/4 Attributes**

- Large Raid Size
- Large Adaptable Battle Space
- Intercepts Full Spectrum of Threats (SRBM to ICBM)
- Addresses Increased Threat Sophistication
- Assured Persistent Global Threat Tracking

<table>
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<tr>
<th>Trade Drivers</th>
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<tr>
<td>• Highest $P_E$ at Minimum Cost</td>
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<tr>
<td>• Maintain Deployed Advantage over Increasing Threat</td>
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</table>

**Phase 3/4 BMD System**

- SM-3 Block IIA
  - Containment (Boost/Endgame) (Divert+FOR)
  - Time to Intercept
  - Acquisition/Discrimination Ranges
  - KW Comm Range, Update Rate

- SM-3 Block IIB
  - Containment (Boost/Endgame) (Divert+FOR)
  - Time to Intercept
  - Acquisition/Discrimination Ranges
  - KW Comm Range, Update Rate

- Aegis 5.1
  - Weapon Op Area
  - # RV's Negated in Raid
  - # Simultaneous Engagements
  - Firing Rate
  - Reaction Time
  - Communication Range to Interceptor, Update Rate

- C2BMC 8.4
  - Track Accuracy (Boost and Post Boost) as f(time)
  - Latency (Comm and Processing time, Bandwidth)
  - # objects Correctly Discriminated as f(time, Threat Complex)
  - # of Unengaged Threats and Missed Threats (Leakers vs Raid Size)
  - # Of Independent shots per Threat Launch Event (Depth of Fire)
  - Update Rate

- PTSS
  - Tracking Accuracy as f(time)
  - Latency (Task Response Time, Bandwidth)
  - # of Simultaneous Objects in Track
  - Max track range (Sensitivity)
  - Resolution

- Legacy SPACE
  - Tracking Accuracy as f(time)
  - Burn Out State Vector Accuracy as f(time)
  - Latency (Initial/Update/Task Response Time, Bandwidth)
  - Update Rate
  - Object Separation in Feature Space as f(time)

*Phase 2 Architecture and Elements are the Foundation*
## Phase 3/4 Architecture Trade Schedule

### BMDS Reviews

<table>
<thead>
<tr>
<th>Event</th>
<th>Program</th>
<th>FY10 FY11</th>
<th>FY11</th>
<th>FY12</th>
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### Phase 3/4 Element Milestones

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**System Parameter Trades** → **SRR**
**Element Parameter Trades** → **PDR**
**Source Selection** → **Cont Awd**
**Complete Product Development**
European Phased Adaptive Approach
– Phase III: Enhancing Intermediate Range Missile Defense (By 2018) –

**Precision Tracking Space System (PTSS)**
- Awarded 6 Manufacturing and Readiness Studies contracts – March 2011
- Awarded 2 Focal Plane Risk Reduction contracts – March 2011

**Airborne Infrared (ABIR)**

**SM-3 Block IIA**

**Raytheon Groundbreaking for Standard Missile Production Factory in Huntsville, AL**

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European Phased Adaptive Approach
– Phase IV: Early Intercept MRBMs, IRBMs, And ICBMs (By 2020) –

U.S.-Poland Bilateral Missile Defense Signing
Krakow, Poland
July 3, 2010

Command Control Battle Management and Communications (C2BMC)

Acquisition Cue and Launch on Remote with AN/TPY-2 and STSS

FTM-15
April 2011

Potential EPAA Enhancements

SM-3 BLOCK IIB

Aegis BMD 5.1 with SM-3 1B/IIA
Aegis Ashore 5.1 with SM-3 IIB (Poland) and SM-3 IB/IIA (Romania)
AN/TPY-2 (FBM)
C2BMC S8.4
PTSS
THAAD
ABIR

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International Activity Update

Japanese Aegis Flight Test

Support for EPAA and NATO Territorial Defense

Joint U.S.-Israel Arrow Weapon System Test

Foreign Military Sales

U.S./NATO - Russian Federation BMD Cooperation Discussions

Romanian Aegis Ashore Site Announcement

JFTM-4

NATO Lisbon Summit

USFT-4

OCT 2010

NOV 2010

FEB 2011

JUL 2011

MAY 2011
## Flight Test Schedule

<table>
<thead>
<tr>
<th>System</th>
<th>FY11</th>
<th>FY12</th>
<th>FY13</th>
<th>FY14</th>
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- **Near-Term PAA Phase 1/CD-04 Flight Test**
- **Mid-Term PAA Phase 2/CD-06 Flight Test**
- **Far-Term PAA Phase 3/CD-07 Flight Test**
- **International Tests**
- **Operational Flight Test**

- SRBM
- MRBM
- IRBM
- ICBM

*Non-TC Target*  |  *No Target*
Summary

• Defend the homeland against limited ballistic missile attack
• Defend against regional missile threats
• Test new capabilities under realistic operational conditions
• New capabilities must be fiscally sustainable
• Missile defense must be flexible to adapt as threats change
• Expanded international efforts for missile defense