C4ISR Enables the BMDS

Sensors
- Overhead Persistent Infrared
- UAV Based Sensor
- Precision Tracking Space System
- Sea-Based Radars
- Early Warning Radar
- Midcourse X-Band Radar
- AN/TPY-2
- SPY-1

GLOBAL STRATEGIC

REGIONAL STRATEGIC

OPERATIONAL

TACTICAL
- Command and Control, Battle Management & Communications
- NMCC
- STRATCOM
- NORTHCOM
- PACOM
- EUCOM
- CENTCOM

PLANNING
- SURVEILLANCE/DETECTION
- TRACKING / ID
- THREAT EVALUATION
- SENSOR & WEAPONS ASSIGNMENT

ENGAGE
ASSESS

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11-MDA-6270 (19 Jul 11)
C2BMC (MDA/BC)

- 24/7/365 world-wide operations
- Develop and incrementally field global C2BMC capabilities
  - Situational Awareness
  - BMDS System Level Planner
  - Global Engagement Manager
- Provide BMDS Communications Network, depend on DISA for long-haul communications
- Perform concurrent operations and test of the BMDS

C2BMC provides means for integrating BMDS for warfighters, with a layered defense, and optimizing sensors and weapons

- Ties all Elements together to form the BMD System
- Enables integrated BMDS across all phases of flight: Early Intercept, Midcourse, and Terminal
- Deliberate, collaborative, and crisis action BMD planning at all echelons
- Situational Awareness at all command levels
- Global Engagement Management (GEM) – support for Regional sensor management and engagement coordination
- Survivable global communications network (MILSATCOM & leased fiber optic cable)
- Provides communications and interfaces (fixed and/or mobile) and remotely controls deployed AN/TPY-2 radars (e.g., Japan, Israel)

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C2BMC Future Technology Areas

• Spiral 8.2
  – Sensor management, Track Management, Weapon Assignment
  – Other areas could be addressed with LM

• Spiral 8.4
  – Debris mitigation, Integrated Discrimination, RF/IR sensor management, Sensor planning, weapons allocation, data allocation techniques
  – S8.4 to be competed, opportunities to partner with competitors

R&D opportunities will address evolving C2BMC mission
BMDS Radars (MDA/SN)

Missions & Functions

AN/TPY-2 Radar

Terminal Mode (TM) Mission
- Part of THAAD Weapon System
- Detects, tracks, and discriminates
- Communicates with THAAD fire control and interceptor to destroy threatening missile

Forward-Based Mode (FBM) Mission
- Detection close to threat origin
- Tracks & reports to C2BMC
- Target destroyed by Ground-Based Interceptor or Standard Missile

Sea-Based X-Band Radar (SBX)

Mission
- GMD Midcourse Sensor
- Cued search, acquisition, track, discrimination, and hit/kill assessment
- Performs precision track
- Provides data on all target complexes to GMD interceptors

Upgraded Early Warning Radars (UEWR)

Missions
- ITW/AA: Provides early warning of Ballistic missile attack
- SSN: Detects, identifies & tracks man-made objects in earth orbit
- BMDS: GMD Midcourse Sensor
  - Acquisition
  - Tracking
  - Classification

GBR-P Radar

Mission
- BMDS test program asset
- Performs truth data collection

COBRA DANE Upgrade Radar (CDU)

Missions
- Data collection on ICBM/SLBM tests in support of START2 & INF treaties and other scientific and technical efforts
- Space Surveillance
- GMD Midcourse Sensor

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SN Technology Needs

• Algorithms to track and classify threat objects in a dense scene background

• Enhancements to tracking algorithms and signal processing to minimize radar resources in a dense scene background and/or raid scenario

• Tools for evaluating and determining optimal radar presets and performance for a variety of environmental and tactical considerations

• Modeling and simulation of complex environmental and target phenomenology sensed by the radars for use in digital and HWIL applications
**Objective:** Incrementally demonstrate the military utility of early precision tracking of ballistic missiles by airborne sensors

**Approach**
- Experiments to prove raid size capability
- Pod solution to incorporate early operational concepts
- Develop advanced sensor
- Establish transition plan and CONOPS with a joint MDA/AF/Navy support cell
ABIR Technology Needs

• Methodologies for Accurate Scene Generation of Target Characteristics as Seen by an Airborne Platform through Dynamic Atmospheric Conditions

• Methodologies for Accurate Scene Generation of Complex Target Plume Characteristics

• Methodologies for Developing Extremely Large IR Scene Projectors

• Methodologies for Partial Frame Correlation of Multiple Sensors

• Smart Infrared Focal Plane Arrays and Advanced Electronics
**Objective:** Incrementally demonstrate the military utility of precision tracking of ballistic missiles by space sensors

**Approach**
- Experiments to demonstrate OPIR sensor fusion, sensor cuing, registration, & system track integration
- Evaluate CONOPS, TTPs, web services & data standards
Space Technology Needs

• Methodologies for High Fidelity Simulation of Background and Complex Target Scenes

• Improved Target Signature Modeling (with Plumes)

• Develop automated analysis, registration, sensor and data management, & mission planning/tasking tools

• Improved Clutter Rejection Algorithms

• Establish CONOPS, TTPs, web services & data standards