Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR)

21 July 2011

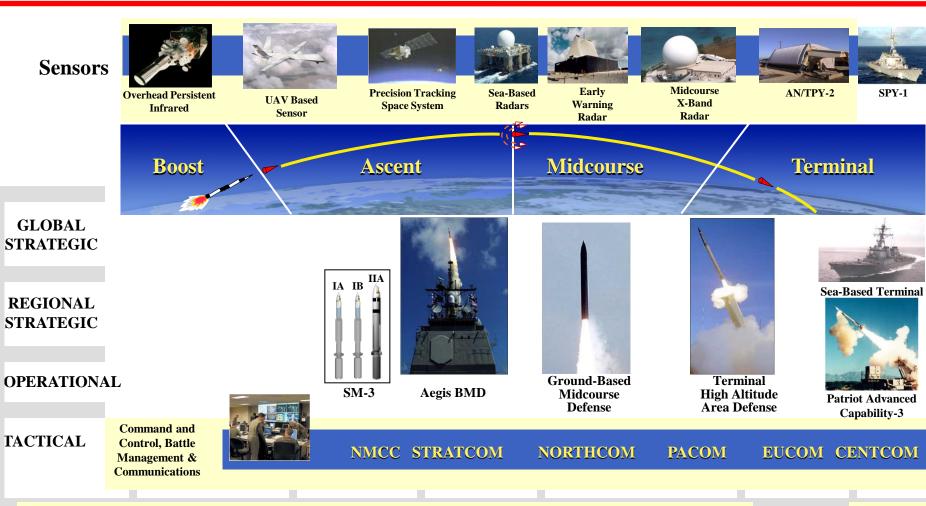**Mr. Richard Ritter**
Program Executive for C4ISR

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 |

Boost   **Ascent**   **Midcourse**   **Terminal**

GLOBAL STRATEGIC

REGIONAL STRATEGIC

OPERATIONAL

SM-3   IA   IB   IIA

Aegis BMD

Ground-Based Midcourse Defense

Terminal High Altitude Area Defense

Sea-Based Terminal

Patriot Advanced Capability-3

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 |

C2BMC (MDA/BC)

- **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)**

- **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

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)
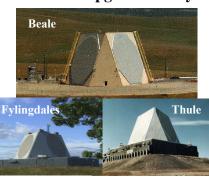## Missions & Functions

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

Upgraded Early Warning Radars (UEWR)

Beale

Fylingdales   Thule

Clear   Cod

FY16   FY17

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

Sea-Based X-Band Radar (SBX)

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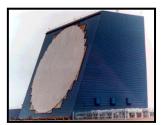- Provides data on all target complexes to GMD interceptors

GBR-P Radar

Mission
- BMDS test program asset
- Performs truth data collection

COBRA DANE Upgrade Radar (CDU)

Eareckson AFS, Shemya AK

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

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**

ABIR (MDA/CA)

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**
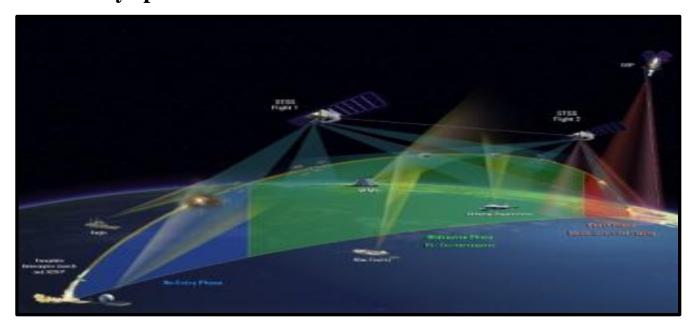
ABIR Technology Needs

- **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**

Space

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**

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