

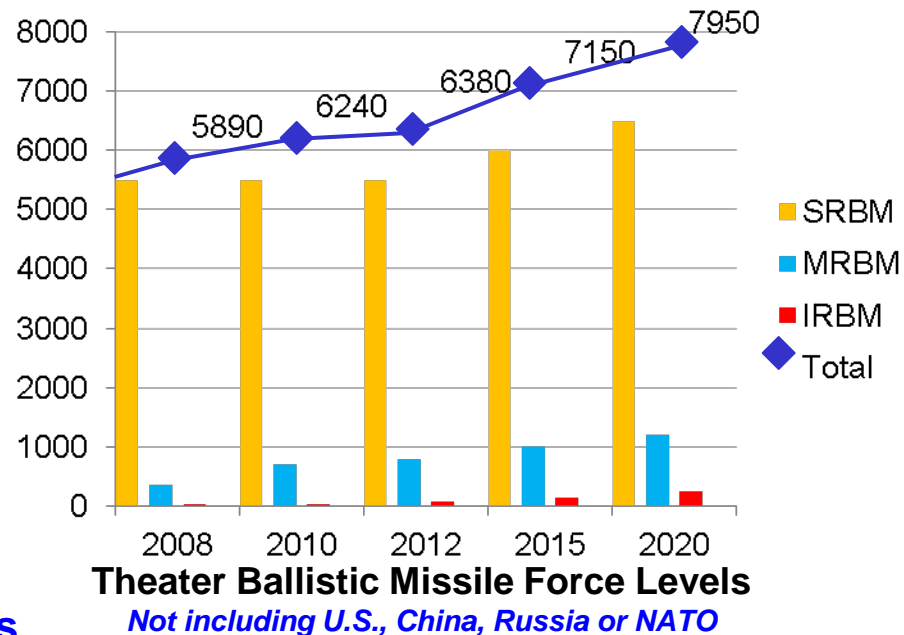


Missile Defense Agency Advanced Research Overview



The Increasing Ballistic Missile Threat

- **Increasing theater threat capabilities**
 - Accuracy & Range
 - North Korea developing new IRBM
- **Developing ICBM threat**
 - North Korea developing KN-08 ICBM
 - Iran may be technically capable of flight-testing an ICBM by 2015
 - Space Launch Vehicles (SLV) could serve as a test beds for ICBM technologies
- **Challenging Missile Defense**
 - Maneuver / Salvo firings / Countermeasures



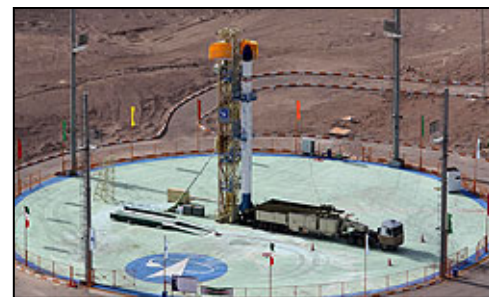
North Korean KN-08 ICBM Launcher on Parade, 2012



North Korean Mobile IRBM on Parade, 2010



NK Taepo Dong-2 SLV Launch, 2012



Iranian Safir SLV on Launch Pad, 2011

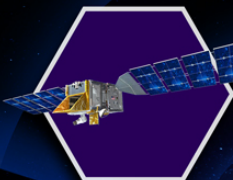
Sources: NASIC, Ballistic and Cruise Missile Threat, 2009; DIA, Iran's Military Power, Statement before the Senate Armed Services Committee, 14 APR 10; Annual Report on Military Power of Iran, April 2012; DNI, Remarks, Worldwide Threat Assessment to the Senate Select Committee on Intelligence, 12 March 2013; Full Update, DIA, Annual Threat Assessment 2008, 2012; MSIC, e-mail, RE: Unclassified Force Level Numbers, 6 April 2012; 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 2011; NSA-FCSS, e-mail, KN08 Classification, 20 Jan 2013; FARS News Agency, Korea Central News Agency, Yonhap News Agency



Today's Ballistic Missile Defense System

SENSORS

An effective layered defense incorporates a wide-range of sensors to detect and track threat missiles through all phases of their trajectory. Satellites and a family of land- and sea-based radars provide worldwide sensor coverage.



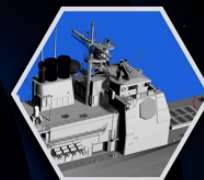
SATELLITE SURVEILLANCE



FORWARD-BASED RADAR



UPGRADED EARLY WARNING RADAR



AEGIS BMD SPY-1 RADAR



SEA-BASED X-BAND RADAR

BOOST/ASCENT Defense Segment

Potential New Technologies

USNORTHCOM
SM-3
Standard Missile-3

USPACOM
AEGIS ASHORE

USCENTCOM
Vertical Launch System

Deckhouse

AEGIS
Ballistic Missile Defense

MIDCOURSE Defense Segment

USEUCOM
EKV
Exoatmospheric Kill Vehicle

USSTRATCOM
GBI
Ground-Based Interceptor

GMD
Ground-Based Midcourse Defense

TERMINAL Defense Segment

AEGIS
Sea-Based Terminal

PAC-3
Patriot Advanced Capability-3

THAAD
Terminal High Altitude Area Defense

THE SYSTEM OF ELEMENTS

C2BMC Command and Control, Battle Management, and Communications

The Command and Control, Battle Management, and Communications (C2BMC) program is the hub of the Ballistic Missile Defense System (BMDS). It is a vital operational system that enables the U.S. President, Secretary of Defense and Combatant Commanders at strategic, regional and operational levels to systematically plan ballistic missile defense operations, to collectively see the battle develop, and to dynamically manage designated networked sensors and weapons systems to achieve global and regional mission objectives.

NMCC

USSTRATCOM

USNORTHCOM

USPACOM

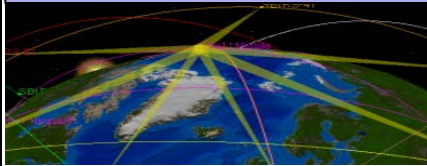
USEUCOM

USCENTCOM



Representative Technology Topics

Space and Sensor Technology



Advanced Cognition Processing and Algorithms for Improved Identification

System Communications

Command and Control Human-to Machine Interface

Improved Track Accuracy for Missile Engagements

Open Framework Planner with Embedded Training

Improvements in Spacecraft Manufacturing Efficiency

Innovative Antenna Arrays Enabling Continuous Interceptor Communications

Directed Energy Technology



Power Sources and Thermal Management for High Energy Lasers

High Power Optical Fibers

Quick Recovery High Energy Diodes

Ultra low SWaP Diode Pump Modules

Large Stroke, High Spatial Bandwidth, Deformable Mirrors

Light Weight, Dampened Optical Benches

Optics & Coatings for Alkali Environments

Interceptor Technology



Interceptor Thermal Protection Systems

Lethality Enhancements

Multi-Object Payload Deployment

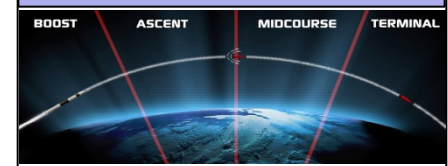
Advanced Reserve Battery Technologies

MENS IMU Solutions for Missile Defense Applications

Lithium Oxyhalide Battery Separator Material

High Temperature Material Manufacturing Improvements

Future BMDS Concept Development



Expand Digital, Constructive, and HWIL Tools

Aerospace Vehicle Target Tracking and Discrimination

Radar Interferometric Processing for EMG

Radiation Hardened Mirror & Focal Plane Array Technology

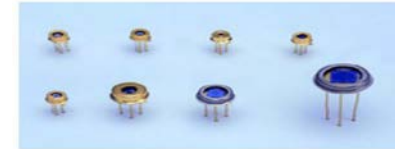
Low Light Short Wave Infrared Focal Plane Arrays

Innovative Ways to Shorten System Level Simulation Integration Time

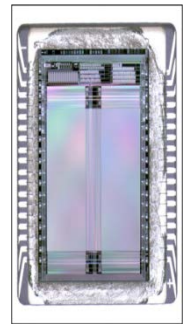


MDA Small Business Innovation Research (SBIR) / Small Business Technology Transfer Program (STTR) Focus

- Pursue a broad range of high-risk technologies
 - To search out revolutionary technologies
 - Transform new technologies into actual applications for insertion into the BMDS
 - Benefit from commercialization
- Technology insertion into the BMDS is critical
- 4th largest program in the Department of Defense



Ultra Sensitive Detector
Focal Plane Arrays



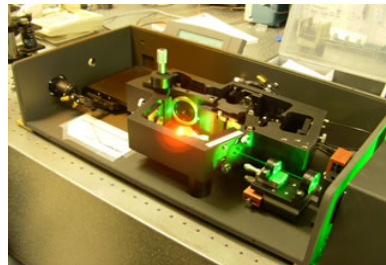
Ruggedized
Electronics



Advanced IMU
Technology



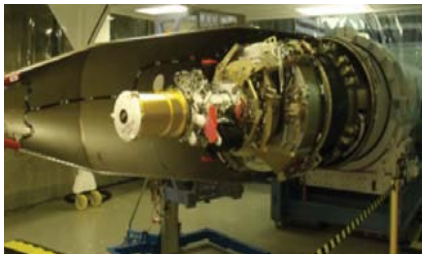
Advanced Battery Technology



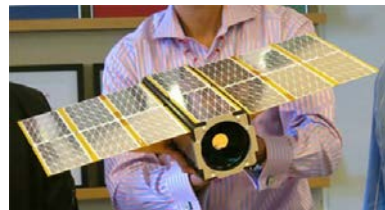
High Energy Laser



Multi Static Radar
Technology



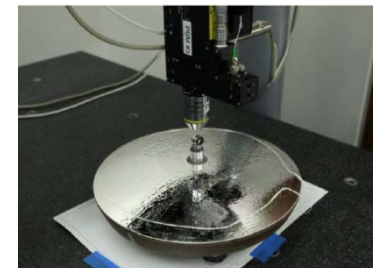
Seeker Technology



Nanosat Technology Demonstrations



Lightweight Composite



Rad-hardened Mirror
Technology



SBIR / STTR Phase I Overview

- **Proposals:**

- Twenty pages
- Three criteria;
 - Technical merit, feasibility of the concept and approach
 - Qualifications of team
 - Commercialization/Transition potential and approach
- Must identify all foreign nationals and level of involvement
- Most recent SBIR and STTR topics and awards are available on the DoD SBIR / STTR website (<http://www.dodsbir.net>)

- **Contracts:**

- Topics typically Export Control restricted
- Unclassified
- Currently \$125,000 (no options); 7 Months



SBIR / STTR Phase II Overview

- **All Phase I awardees under a particular solicitation are allowed to submit a proposal for Phase II award**
- **Phase II proposals:**
 - Accepted only during announced open period
 - Announcement on web page with email notification to current Phase I awardees
 - Two-year award to further concept development to the prototype stage
 - Submitted for an amount not to exceed \$1,000,000
 - MDA may later consider enhancing Phase II contract funding depending on BMDS relevance and program needs

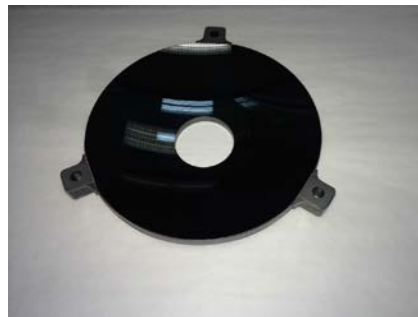


Commercialization and Transition Office Initiatives

- Encourage transition of SBIR and STTR projects into the BMDS
 - Facilitates transition planning
 - Oversees all Phase III projects
 - Coordinates with primes and program offices
 - Conducts workshops and industry days
 - Recommends Phase II projects for enhanced funding



Advanced IMUs



Thermally Insensitive Silicon Carbide Mirrors



Lithium Reserve Battery Technology



Suggested Resources

MISSILE DEFENSE AGENCY
U.S. DEPARTMENT OF DEFENSE

HOME ABOUT US BMD BASICS NEWS / RESOURCES CAREERS DOING BUSINESS

Dec. 5, 2008 - A ground-based interceptor is shown shortly after liftoff from Vandenberg Air Force Base, Calif.

Quick Links
 2009 MDA Math Challenge Week
 Proposed European Assets
 2009 BMDS Booklet (pdf)
 Budget Information
 Technology Transfer
 Environmental Information
 MDA Safety and Quality Information
 RSS Feeds

Latest News

16 APR 09 [SECOND SUCCESSFUL ROCKET MOTOR TEST OF NEW TARGET](#) (pdf)
 The two-stage launch vehicle, or LV-2, is MDA's newest target system and will be used as an intermediate-range target in a flight test later this year

13 APR 09 [KINETIC ENERGY INTERCEPTOR PREPARES FOR FLIGHT TESTING WITH SIMULATED LAUNCH COUNTDOWN](#) (pdf)
 A simulated launch countdown was executed as a risk reduction effort in preparation for the first flight test of the high-acceleration vehicle

7 APR 09 [MISSILE DEFENSE AGENCY HOSTS MATH CHALLENGE WEEK](#) (pdf)
 MDA will provide speakers along with engineers and scientists who have volunteered to educate students on math, science and engineering as it directly relates to the Agency's mission.

1 APR 09 [MISSILE DEFENSE AGENCY PRESENTS RONALD W. REAGAN AWARD TO GENERAL LARRY D. WELCH](#) (pdf)
 General Welch received the award for his commitment and dedication associated with defending the U.S. against ballistic missile attack.

[NAVY COMPLETES AIR AND BALLISTIC MISSILE](#)

It is the policy of the United States to deploy as soon as is technologically possible an effective National Missile Defense system capable of defending the territory of the United States against limited ballistic missile attack (whether accidental, unauthorized, or deliberate) with funding subject to the annual authorization of appropriations and the annual appropriation of funds for National Missile Defense.

— National Missile Defense Act of 1999 (Public Law 106-38)

DEPARTMENT OF DEFENSE *Resource Center*
Small Business Innovation Research
 www.dodsbir.net

SEARCH
 AWARDS
 DoD SBIR & STTR Awards

TOPICS
 Current DoD SBIR & STTR Topics

SITIS
 Interactive Topic Info System

INTEREST

- ABOUT SBIR/STTR
- CURRENT SOLICITATION
- SELECTION LISTINGS
- CONFERENCES
- DESK REFERENCE
- MAJOR ACQUISITION LIAISONS
- SUCCESS STORIES
- FIRMS IN THE NEWS
- SBIR ANNUAL REPORT
- STTR ANNUAL REPORT
- FAST TRACK/PHASE II ENHANCEMENT
- COMMERCIALIZATION PILOT PROGRAM

SUBMISSION
 DoD SBIR/STTR Proposal Submission

HELP

HELPDESK
 Answers Questions About DoD SBIR & STTR

WEBSITE
 Main Website for More Information

LISTSERV
 Subscribe to Receive Program Notices and Updates

CONTINUOUS LEARNING
 A library of SBIR Program Resources



For More Information

www.mda.mil

- **Missile Defense News, Images, Videos, Fact Sheets**
- **BMDs Overview, BMD Basics**
- **MDA Business Opportunities**
(http://www.mda.mil/business/advanced_research.html)

[To Contact MDA](#)

- **SBIR / STTR** **256-955-2020** [**sbirsttr@mda.mil**](mailto:sbirsttr@mda.mil)
- **University / BAA** **256-450-3800** [**Advanced Research@mda.mil**](mailto:Advanced_Research@mda.mil)
- **Commercialization** **256-450-5343** [**SBIR-PhaseIII@mda.mil**](mailto:SBIR-PhaseIII@mda.mil)