



Space, Missile Defense
and Computer Network Operations Challenges:
**Toward Integrated Air and Missile Defense:
Implications of the New Environment**

(First in a series of three Background Briefs based on information
provided by U.S. Army Space and Missile Defense Command)

The civilized world faces a grave threat from weapons of mass destruction. A small number of outlaw regimes today possess and are developing chemical and biological and nuclear weapons. They're building missiles to deliver them, and at the same time cultivating ties to terrorist groups. In their threat to peace, in their mad ambitions, in their destructive potential and in the repression of their own people, these regimes constitute an axis of evil and the world must confront them.

America, along with other nations, will oppose the proliferation of dangerous weapons and technologies. We will proceed with missile defenses to protect the American people, our troops and our friends and allies. And America will take the necessary action to oppose emerging threats.

President George W. Bush
Virginia Military Institute
17 April 2002

New Direction and Goals in Missile Defense

Incredible changes have occurred this year in the missile defense mission area, and it is important that we understand the new environment and how the Army is responding.

Under the leadership of Defense Secretary Donald H. Rumsfeld, the transformation of the services and the Department of Defense (DoD) has accelerated. The goal of Transformation is to make heavy forces lighter, make lighter forces more lethal, and streamline the acquisition system. A major element of the Transformation process is to take advantage of “leap-ahead” technologies—in materials, directed energy and propellants—and new warfighting concepts and doctrine that will bring the 20th century “Cold War” military into the 21st century.

In the conflicts of the future, the threat will prefer not to go head-to-head with U.S. forces. Those who would challenge the United States are therefore investing in means to degrade U.S. willingness to fight, deny our access to bases in theater, hinder or negate our precision engagement capabilities, and interfere with our information superiority. Such attempts by a future enemy might begin with terrorist or special operations against the U.S. homeland itself or our allies. However, the availability of weapons of

mass effect (WME)— with chemical, biological, radiological, nuclear or high-yield explosive (CBRNE) payloads—coupled with precision guidance capabilities, widely available commercial space-based surveillance systems and the ever-probing eye of the worldwide news media, make ballistic and cruise missiles the greatest emerging threat to deployed U.S. forces, U.S. interests overseas and U.S. allies, and perhaps the United States itself.

More than 5,000 ballistic missiles have been fired in various conflicts since 1944, more than 2,000 of those since 1987. The willingness of irresponsible regimes or terrorists to use them is unquestioned. Today the United States has only two options for responding to a missile attack—absorb the attack and negotiate afterwards, or absorb the attack and retaliate. Missile defenses give us another option—to negate or reduce an attack before it causes damage or casualties on the ground. The defensive systems we develop must be capable of evolving, as technology improves, to meet the projected growth in threat capability and proliferation.

The nation’s top missile defense priorities, as spelled out by the Secretary of Defense, are:

- to defend the United States, deployed forces, allies and friends from ballistic missile attack;
- to employ a layered Ballistic Missile Defense System (BMDS) to intercept missiles in all phases of their flight (i.e., boost, midcourse and terminal) against all ranges of threats;
- to enable the services to field elements of the overall BMDS as soon as practicable; and
- to develop and test technologies, use prototype and test assets to provide early capability if necessary, and improve deployed capabilities with new technologies as they become available or when the threat warrants an accelerated capability.

To meet these goals, and acknowledging that development of missile defenses is much more complex than the typical defense program, in January 2002 Secretary Rumsfeld redefined the way DoD would develop, test and procure these new systems. All of the Service Operational Requirements Documents (except the Patriot Advanced Capability 3, or PAC-3, ORD) were cancelled, most programs were restructured, and some have even been terminated. The Ballistic Missile Defense Organization was reorganized and renamed the Missile Defense Agency (MDA), and operational requirements are being redefined in the context of an overall BMDS. Most important, MDA shifted to a capabilities-based approach to acquisition that recognizes the need for a globally integrated, layered BMD system providing multiple engagement opportunities across the full range of threats to increase the likelihood of success.

Elements of the BMDS

MDA has three program elements focused on developing the technologies appropriate to different segments of flight of an approaching missile. Each is managed separately but integrated through a program integration office. The ***boost phase segment*** will engage and destroy missiles shortly after launch, regardless of their aim points and prior to the employment of countermeasures. Including systems such as the Airborne Laser and possibly sea- and space-based interceptors or directed energy weapons, this segment has potential for global defense.

The ***midcourse segment*** will provide regional defense and allow additional, longer-range engagement opportunities. This segment will include the Ground-based Midcourse Defense (GMD) to provide limited protection of North America, and the Theater High-Altitude Area Defense (THAAD) and Naval Theater Wide Defense systems for protection of troops, assets and population centers in theater.

The ***terminal defense segment*** will provide “final protective fires” for localized areas and critical assets. Terminal defenses include PAC-3; its successor, the Medium Extended Air Defense System (MEADS); THAAD; and possibly other elements.

As system elements mature, MDA will transition them to the services at Milestone C (approval of entry into the Production and Deployment phase of the acquisition process) for production, deployment, manning and support. In all cases, as elements of the BMD system evolve or new technologies become available, capabilities will be increased in a “spiral development” process to meet potential future threats and threat countermeasures.

Testing—Key to New Strategy

A key tenet of MDA’s strategy is robust, realistic testing. The BMD System Test Bed, with elements at Fort Greely and Shemya Island in Alaska, Kwajalein Atoll, Vandenberg Air Force Base in California, and elsewhere in the Pacific and the western United States, will support development and demonstration of an integrated, layered missile defense system including ground-, sea- and air-based elements. Over the next few years, the Test Bed will be used to validate the boost phase, midcourse and terminal defense elements of the BMDS, including supporting sensors and battle management/command, control and communications. It will enable testing against faster, longer-range target missiles than are in use today, and it will allow testing using different geometric, operational and element configurations. Prototypes and test assets could also provide an emergency defensive operations (EDO) capability, if needed. Five precursor Ground-Based Interceptors and an operationally representative kill vehicle are projected to be available to give GMD an EDO capability by 30 September 2004.

Changing Roles and Missions

The missile defense roles of the combatant commanders and the services are also changing. In the global environment, commanders will be linked from the continental United States (CONUS) to forward theaters through command and control systems that will allow them to use the BMDS to engage threats launched at any target, through all phases of flight. Under the latest Unified Command Plan (UCP), which directs the merger of U.S. Strategic Command and U.S. Space Command, the new USSTRATCOM will be responsible for global missile defense planning. USSTRATCOM will also assume many of Space Command’s missile defense functions, including developing and advocating missile defense and missile warning requirements, identifying and managing space-based support for missile defense, and providing missile attack warning to other regional commands. The new UCP also created the U.S. Northern Command (NORTHCOM), whose commander is dual-hatted as Commander, North American Aerospace Defense Command (NORAD). As a regional combatant command, NORTHCOM’s missions include the air and missile defense of North America, sharing many of the same space-based and ground-based sensors required by other regional commanders. The Joint Air and Missile Defense Organization (JtAMDO) has been charged with developing, with the services, a Joint Operational Concept and Architecture for this global environment.

Evolving IMD to IAMD

All of this—operational concepts and doctrine, systems and organizations—must be carefully integrated to maximize defense effectiveness, which brings us to the concepts of Integrated Missile Defense (IMD), evolving to *Integrated Air and Missile Defense (IAMD)*.

IMD, defined in JtAMDO’s draft near-term (2004) Joint Concept of Operations (CONOPS), encompasses a layered architecture of *active* ballistic missile defense systems integrated through a battle management/command and control network. This CONOPS does not include *attack operations* and *passive defenses*, long considered “pillars” of the mission area; offensive actions against missile launch sites and infrastructure and passive means of protection from the effects of a missile attack are assumed under current doctrine, and will be fully incorporated in the future objective concept and

architecture. However, the 2004 CONOPS promotes centralized, collaborative planning and decentralized execution, and recommends a battle management/command, control, communications, computers and intelligence (BM/C⁴I) baseline tied to MDA's development of the BMDS. This baseline accommodates multitheater threats through predetermined courses of action, preplanning, and worldwide sensor netting permitting near-real time defense changes in a rapidly developing environment. It also allows for future missile defense contributions by U.S. allies.

Developing a near-term IMD CONOPS is a first step toward fielding and operating a viable BMDS. The groundbreaking work done at the U.S. Army Air Defense Artillery School (USAADASCH) in its recently published Operational and Organizational (O&O) Plan for Army air and missile defense (AMD) forces provides a key document for Army AMD operations in joint and coalition environments. It has been a major Army input to the overall Joint IMD Concept. U.S. Army Space and Missile Defense Command is working closely with USAADASCH and JtAMDO to ensure Army concepts are embedded in the near term and Objective Joint Operational Concepts wherever possible. This work has laid the foundation for Army support to the development of JtAMDO's *Integrated Air and Missile Defense (IAMD)* Operational Architecture scheduled for completion in the summer of 2003.

IAMD will combine the full IMD mission area with air-, sea- and ground-based air defenses and terrestrial- and space-based sensors to protect the U.S. homeland, deployed forces, friends and allies against the entire spectrum of air and missile threats—intercontinental and theater-range ballistic missiles, cruise missiles, manned and unmanned aircraft, surveillance platforms and other aerial threats.

Conclusion

Critics will gladly point out that the preponderance of existing ballistic missiles have ranges of less than 1,000 kilometers, placing only U.S. forward-deployed forces and U.S. allies and friends—not the continental United States—at risk. However, the proliferation of technological improvements in missile guidance, unmanned aerial vehicles, surveillance capabilities and use of space, not to mention WME, is rapidly enabling increases in ranges, accuracy and lethality that will place the U.S. homeland at greater risk in the near future. Seamlessly integrated, globally deployed air and missile defenses must be able to deal with both the short- and medium-range threat the United States and its allies face today (and will continue to face tomorrow) and the longer-range threat we will soon face. Coupled with space systems, the BMDS will directly enable the employment of a responsive, agile, versatile, deployable, lethal, sustainable and survivable Objective Force on the Army's future battlefields.

