If all goes as planned, the US on Oct. 1 will throw the switch on its first true ballistic missile defense.

YEAR OF THE MissiLe shield

After decades of research, billions of dollars in investments, and vast amounts of energy spent in both support and protest, the US is poised to activate its first defense against long-range missile attack. All signs are that, by year’s end, Washington finally will have in place the means to shoot down a ballistic missile fired at the American homeland.

The Pentagon has set a date for “IDO”—for initial defensive operations. It is Oct. 1.

This system will not be the robust “shield” that President Reagan envisioned on March 23, 1983, when he startled the nation with a televised address that laid out his hope for missile defenses. On that occasion, Reagan spoke of negating the threat of a massive Soviet nuclear strike with technology that would, in his
The goal is to protect not only US-fired from anywhere on the globe. Geared to defeat missiles of all ranges into a layered and integrated system sophisticated over time, say Bush Administration officials. It will evolve and control network. It probably will be able to defeat, at best, a handful of intercontinental ballistic missiles, which would most likely be fired from North Korea.

Even so, the contiguous 48 states, Alaska, and Hawaii will not stand naked against a missile fired at them in anger—for the first time in the nuclear age. If diplomacy fails and the threat of a devastating response does not dissuade an attacker, the United States can call on its Ballistic Missile Defense System (BMDS) as a last line of protection.

**Through Thin and Thick**

This line admittedly will be thin at first but will grow thicker and more sophisticated over time, say Bush Administration officials. It will evolve into a layered and integrated system geared to defeat missiles of all ranges fired from anywhere on the globe. The goal is to protect not only US soil but also large concentrations of forward-based US troops and assets, as well as friends and allies.

Will even this thin, initial defensive system be ready for prime time by the end of 2004?

“Yes,” said Army Maj. Gen. John W. Holly, director of the so-called Ground-based Midcourse Defense (GMD) element developed by the Pentagon’s Missile Defense Agency (MDA). The GMD—previously known as the National Missile Defense system—will form the bedrock of the overall missile shield.

“We have a lot of challenges ahead of us,” noted Holly, “but the people working on this program, in industry as well as government, are the most talented and dedicated people in this nation, and they are going to make it happen.”

Holly compared the BMDS that will go on alert this year to a basic, serviceable Honda automobile. It will lack the “frills” of later BMDS configurations—which he equated to the sophisticated Lexus—but it will be “reliable” and do the basic job well. Not everyone is convinced that the initial system will be ready to handle even an unsophisticated North Korean missile. “They don’t have a Honda yet,” said Philip E. Coyle, a former Defense Department official.

In general, critics believe the Bush Administration’s deployment decision has been driven by political considerations—not by the emergence of mature and proven capabilities.

Ballistic missile defense has been an urgent DOD priority ever since the Bush Administration came to power in early 2001. Under President Bush, Washington withdrew from the 1972 Anti-Ballistic Missile Treaty, effective June 2002. Among that pact’s constraints was a prohibition on defending one’s entire national territory from missile attack. The intent was to fortify Soviet–American mutual deterrence by eliminating any chance that one side might attack first and use defenses to ward off a weakened counterstrike.

In 1991, however, the Soviet Union vanished, leaving in its place democratic Russia and a host of former Soviet republics. The Bush Administration entered into a new strategic relationship with Russia, anchored by the Moscow Treaty. It calls for significant reductions in deployed nuclear forces. Further, the US conducted a new Nuclear Posture Review, which enshrined missile defense as one leg of a new US strategic “triad”—along with nuclear and non-nuclear strike forces and a more-responsive infrastructure.

Then came the Sept. 11 terrorist attacks in the US. The attacks proved to be a defining event for the nation’s missile defense project. President Bush made the decision to place the BMDS on alert by December 2004, consistent with the National Missile Defense Act of 1999 that made it US policy to deploy a system “as soon as is technologically possible.”

“Sept. 11, 2001, underscored that our nation faces unprecedented threats, in a world that has changed greatly since the Cold War,” said the President in a Dec. 17, 2002, statement explaining his decision.

**The Nightmare**

A chief concern is that the United States could be devastated by a nuclear, biological, or chemical attack carried out with missiles in the hands of states such as North Korea and Iran or even a stateless terrorist organization. For the Administration, the issue is not in doubt. Senior officials have repeatedly argued that the nation’s adversaries eye these capa-
bilities as an asymmetric means to check US conventional military power and coerce Washington or its allies in a crisis.

The threat is no fantasy. Navy Vice Adm. Lowell E. Jacoby, director of the Defense Intelligence Agency, recently told Congress that North Korea’s Taepo Dong 2 missile “could target parts of the US [meaning Alaska and Hawaii] with a nuclear weapon-sized payload in the two-stage configuration. The missile has the range to target all of North America if a third stage were used.”

In August 1998, North Korea successfully flew its three-stage Taepo Dong 1 design over Japan. Since then, North Korea has abided by a self-imposed flight moratorium. However, in a 2003 report to Congress, the CIA claimed Pyongyang “may be ready for flight testing.”

Iran, too, is believed to have a covert nuclear weapons program and is working on ballistic missiles at a feverish pace; yet its capabilities are not as advanced as North Korea’s, according to US intelligence officials.

China, which some in the Administration view as an emerging threat, also continues to evolve its ballistic missile fleet.

This new threat environment differs “fundamentally” from that of the Cold War and “requires a different approach,” noted a May 20, 2003, White House statement that sets down Administration policy on missile defense. “To deter such threats, we must devalue missiles as tools of extortion and aggression.”

While missile defenses will not replace offensive strike capabilities, “they are an added and critical dimension of contemporary deterrence,” the document stated, and will assure allies and friends and dissuade adversaries “from pursuing ballistic missiles in the first instance by undermining their military utility.”

The initial BMDS is clearly intended to check the emerging North Korean Taepo Dong family of long-range missiles. Most of the system’s fixed assets will be positioned in the Pacific Ocean area looking toward East Asia. Future upgrades will increase the BMDS ability to deal with missiles launched from other regions, such as the Middle East.

Now under way is a vast effort to integrate the operational elements of the defense system with a test bed that MDA has established in the Pacific. The test bed builds upon existing BMD test infrastructure at the Ronald Reagan Ballistic Missile Defense Test Site at Kwajalein Atoll in the Marshall Islands, Pacific Missile Range Facility in Hawaii, other sites in and around that state, and Vandenberg AFB, Calif.

The Test Bed
Before the President’s deployment decision, the agency’s efforts were concentrated on creating the test bed so that the agency could conduct robust testing and evaluation of new and maturing BMD concepts. This included establishing a base for interceptor missiles at Ft. Greely, Alaska; expanding a launch site on Kodiak Island, Alaska, to accommodate BMD target missiles; and upgrading the Cobra Dane surveillance radar on Shemya island at the western end of the Aleutian chain. The US placed the radar on the strategically located island to monitor Soviet missile launches during the Cold War.

The test bed was to have a limited operational capability for use in a crisis. In such an emergency, five test silos at Ft. Greely could have launched their interceptors in an attempt to bring down a missile.

With the President’s deployment mandate, the agency’s efforts—and, in particular, Holly’s activities—have expanded not only to complete the test bed but also to get in place the operational assets that will remain on continuous alert. The test bed will support the operational elements.

At Ft. Greely, the initial plan for five test silos has morphed into a requirement for six operational silos that will house GMD’s combat-ready ground-based interceptor. Similarly, the agency will station four operational interceptors at Vandenberg, for a total of 10 interceptors on alert at IDO.

The ground-based interceptor consists of a three-stage booster atop which sits Raytheon’s Exoatmospheric Kill Vehicle. The booster carries the EKV to a point in space where it detaches and searches for a missile. Once it has identified the missile’s warhead, it homes in and smashes it, destroying the warhead by the sheer kinetic force of the impact.

MDA is pursuing two boosters for the interceptor: the Lockheed Martin Boost Vehicle Plus (BV Plus) and an Orbital Sciences design. In November 2003, the agency an-
nounced that the availability of the BV Plus will be affected by accidents in preparing its solid rocket propellant.

Originally, MDA planned to field six Orbital Sciences interceptors at Ft. Greely and four BV Plus interceptors at Vandenberg. In the wake of the mishaps, the agency is accelerating the pace of the Orbital booster program. It is likely that the Orbital booster will be used in all 10 initial interceptors.

“That appears right now to be where we will end up,” said Holly. Nonetheless, he said, MDA remains “absolutely committed” to maintaining a dual-booster strategy. “We will bring Lockheed Martin back on line as soon as we can start pouring motors again,” he said.

Diversity Needed

The Orbital design is slightly larger and faster. It flies at about 3.7 miles per second, compared with 3.4 miles per second for the BV Plus, according to MDA. Orbital’s system made a successful nonintercept flight test in 2003.

“Having a faster booster and a slightly slower booster is a very good thing,” said Holly. “If you can match the right weapon with the target that you are going after, ... you are much more efficient in your engagement.”

The US eventually will deploy both types of boosters at Ft. Greely, said Holly. It also plans to test both designs from Vandenberg over the Pacific Ocean against targets launched from Kwajalein and Kodiak. There are no plans to fire test interceptors from Greely, he noted.

The initial BMDS sensor network will include USAF’s Defense Support Program infrared early warning satellites, the enhanced Cobra Dane radar on Shemya, and an upgraded early warning radar at Beale AFB, Calif.

These systems have limitations. Only a portion of Cobra Dane’s field of view can pick up North Korean missile launches. While the Beale radar’s software and hardware enhancement should be completed by September, the radar will not have completed all of its operational testing by then, said Holly.

The system will also rely on forward deployed Navy Aegis destroyers that have been upgraded with Spy-1 radars. They will offer early target-track data to the system.

“Launching on Aegis [cues] is absolutely integral to our approach,” said Holly.

The Navy expects to have three Aegis-equipped destroyers available for BMDS use no later than Oct. 1. These will be used for forward based surveillance and tracking, said Lt. Cmdr. Tate Westbrook, MDA’s deputy program manager for the Aegis BMD element. By the end of this year, the Navy will have fitted one Aegis cruiser, Lake Erie, with up to five Standard Missile (SM-3) interceptors. Lake Erie will be a dedicated test bed asset, but will be available for combat in a crisis.

While Aegis tracking data can contribute to the intercept of a long-range missile, the SM-3 is capable of engaging only short- and medium-range ballistic missiles, said MDA officials.

The Army’s Patriot Advanced Capability 3 (PAC-3) system is also considered part of the initial BMDS. It is already serving with forward deployed troops in South Korea and the Persian Gulf, protecting them from air and short-range missile threats.

The heart of the BMDS is its vast Command and Control, Battle Management and Communications network that will be headquartered at Schriever AFB, Colo.

Fiber-Optic Highways

Connecting the various GMD nodes will be a vast fiber-optic network spanning the contiguous 48 states and running underwater to Alaska and then spreading out over the state. In August 2003, the MDA completed, ahead of schedule, the 10,000-mile fiber-optic ring for the continental US. Plans called for a late 2003 completion of the Alaska ring. Eventually, the network will cover some 20,000 miles when it incorporates links to nodes outside the US, said Holly.

In an actual engagement, DSP satellites would pick up a threat missile’s plume shortly after launch. They would alert the GMD fire-control network, which would begin planning an intercept, based on the satellite data, while simultaneously cueing Cobra Dane, Aegis, and any other sensors to track the missile.

Upon receiving higher quality track data from these sensors, operators would launch one or more interceptors. The radars would continue to track the target and provide updated data to the kill vehicle once it deploys in space. This data would come via a ground-based In-flight Interceptor Communications System Data Terminal. Using the updates and its own sensors, the kill vehicle would then acquire the missile’s warhead, home in on it, and stage a body-on-body collision. The radars then would assess whether the warhead had been stopped. If not, the system could launch additional interceptors.

MDA already has completed much of the construction work. Next comes installation of new mission equipment.

Last October, MDA conducted a successful test of the linkages between the GMD fire control and communications suite, Aegis, and the BMDS command and control setup—the three major elements that will be present for IDO.

“That was a significant event,” said Holly.

Also in October, the Army activated the brigade of approximately 200 soldiers that will operate the GMD element. It is headquartered in Colorado Springs, Colo. A battalion will be located at Ft. Greely. Training of these soldiers, who are predominantly Army National Guard troops, is continuing.

Under the Army’s concept of operations, the battalion fire direction center at Ft. Greely would launch interceptors and control the engagement, said Holly. The brigade headquarters at Schriever will have a duplicate set of hardware and software to serve as an immediate backup. Otherwise it likely will be used to do the planning and prepare the defense for the next potential attack, he said.

Despite the progress, many tasks remain.

“We have a lot of software development yet to do,” said Holly. “We have flight testing, ground testing. We have to complete construction of the facilities. We have to complete the training of the warfighter. And we need to go through a series of integration interoperability checkouts to make sure that the system works as advertised. We have a great deal to accomplish.”

MDA plans call for carrying out a major integrated ground exercise with the BMDS operators around April or May. “This is a significant ground test for us,” said Holly. “Everybody
focuses on flight testing. ... but we gain the greatest benefit overall ... from our ground testing.”

**Final Tests**

The agency expects to place the first interceptors in silos in June and will stage four or five flight tests before the arrival of IDO. To date, the GMD element has scored hits in five of eight intercept attempts. After the demonstration flight of BV Plus using motors finished before the propellant mishap, the agency early this year will conduct Integrated Flight Test 13b, a nonintercept test of the Orbital booster out of Kwajalein. It will carry and deploy a mock EKV as in an actual mission.

That will be followed by IFT 13c, a nonintercept phenomenology test that lets BMDS sensors collect data on certain types of targets. IFT 14 will be an actual intercept attempt using the Orbital booster, this spring. IFT 15, another intercept mission, may or may not occur prior to IDO. IFT 16a will be a “radar characterization” mission around October. A target missile launched from Kodiak will fly along the West Coast so that the Beale radar and an Aegis ship can assess their upgraded software.

Holly said there will be no time to rest. As soon as IDO occurs and the system goes on alert, he will be looking toward a new flight test in November and the next software upgrades.

MDA plans to have on alert, by the end of 2005, 10 more ground-based interceptors at Ft. Greely. Moreover, it will have completed an upgrade of an early warning radar in Britain, along with fiber-optic connections.

It will also integrate into the BMDS a deployable sea-based X-band radar produced by Raytheon. The agency considers the radar’s higher resolution capabilities to be key for distinguishing warheads from decoys or countermeasures that a missile may also deploy. The radar will use Adak, Alaska, in the Aleutian chain, as its home base initially.

A prototype of the Air Force’s Airborne Laser (ABL) system is also scheduled to be available in 2005. The ABL is a modified 747 freighter aircraft that features a megawatt-class directed energy laser in its nose to shoot down boosting missiles.

MDA plans to incorporate major improvements into the BMDS on a biennial basis in block increments. The capabilities that it will field in 2004 and 2005 will be part of the Block 2004 BMDS.

The agency’s long-term goal is to build a system that will defeat any missile threat, however sophisticated. It wants the defense to have multiple shots at a missile from different angles and during all phases of the missile’s trajectory—in the boost phase, post-boost as it traverses space and deploys its payload, and re-entry.

Having multiple sensors of varying types, such as infrared or radar, viewing the missiles from different locations mitigates the chances of being fooled by a decoy or countermeasure, noted agency officials.

“If you can achieve an integrated, layered defense, that is a lot harder to overcome and defeat as an attack strategy than if you have one element to try to overcome,” said Air Force Maj. Gen. Henry A. Obering III, MDA deputy director.

Overall, the agency will take both an evolutionary and a revolutionary approach to incorporating new capabilities, said Obering.

“We will add [evolutionary pieces to the initial BMDS] in terms of adding numbers of interceptors ... and expanding coverage by adding additional sensors,” he said.

At times, however, “revolutionary” pieces such as the ABL will be added. “These are pieces that will cause a giant [leap] in capabilities,” he noted, adding that the agency must be vigilant in designing the interfaces that will allow for the easy incorporation of these revolutionary capabilities into the system.

MDA has no ultimate BMDS architecture in mind, but will instead continue to build upon the foundation of the initial system with capabilities that allow it to stay ahead of the threat and take advantage of the most promising breakthroughs in technology.

A capability must not be perfected before fielding, officials say. Rather it must demonstrate a military utility making it suitable for deployment, said Obering. Thereafter it can be refined.

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