

Leading the Way in **Ballistic-Missile Defense**

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For the U.S. Navy and a growing number of its partners, the key word is 'Aegis.'



The United States has put in place an integrated—if still embryonic—national-level ballistic-missile defense system (BMDS). All elements of the land, sea, air, and space system are linked together to provide the best affordable defense against a growing threat of ballistic missiles, some armed with weapons of mass destruction (WMD). The U.S. Navy’s contribution is based on the Aegis weapon system and has been on patrol in guided-missile cruisers and destroyers since 2004. Aegis BMD has grown in importance based on its proven performance as well as its long-term potential.¹ Indeed, at this time Aegis BMD may well be the first among equals based on its multimission capabilities as well as its ability to integrate with the emerging BMD capabilities of allied and partner nations.

And, in that, it appears history is repeating itself. In his July 2009 *Proceedings* article, “Put the Navy in the Lead,” Commander Bart Denny surfaced a radical suggestion to focus more of the nation’s efforts to provide ballistic-missile defense on the Navy and less on ground-, air-, and space-based assets.² Four years later, Commander Denny seems to have been more than just forward-thinking: He was prescient regarding what is now a shift in the focus of the nation’s—and our allies’ and friends’—efforts to defeat a growing threat. Aegis BMD is clearly in the van.

An Indispensable Element

The first priority of the BMD implementation strategy—establishing a limited defensive capability against North Korean ballistic missiles—has largely been achieved with Patriot Advanced Capability-3 batteries, the Ground-based Mid-course Defense (GMD) system, the forward-deployed AN/TPY-2 radar, and Aegis BMD long-range search, cueing, and engagement warships. Aegis BMD interoperates with other assets, including the Terminal High-Altitude Area Defense (THAAD) system, as well as ground-, air-, and space-based sensors.

Good enough, to be sure. But in his 2009 *Proceedings* article, Commander Denny argued for Aegis to serve as a *primary* national BMD asset:

The United States should place a higher priority on its sea-based systems than on land-based or airborne weapons or sensors. In particular, the Department of Defense should further modify and upgrade the Aegis weapon system to a full national missile-defense asset. This capability will come at a fraction of the price of other weapon systems where the Defense Department must build the system infrastructure from scratch.³

The author built his case on a steady groundswell of opinion from the policy and technical communities. More than a decade ago, the National Defense University’s comprehensive maritime-security assessment *Globalization and Maritime Power* noted, “Events of the past 18 months have created new possibilities for the U.S. Navy to contribute to defense against intercontinental ballistic missiles (ICBMs).”⁴ Also in 2002, a report issued by the NDU Center for Technology and National Security Policy, *Toward Missile Defenses from the Sea*, highlighted opportunities for Navy BMD:

Using missile interceptors based at sea to defend the United States against ICBMs offers several advantages, the most important of which are flexibility and control. The most cost-effective option for a potential seaborne deployment is the use of upgraded Aegis radars and modified SM-3 missiles for boost-phase intercepts on board existing combat ships stationed near the Korean Peninsula and the eastern Mediterranean. In addition to providing a layer of boost-phase defense, ships at these locations would provide radar coverage early in the flight of an ICBM—a valuable asset to the midcourse defense layer.⁵

Four years later, then—Missile Defense Agency (MDA) Director Air Force Lieutenant General Henry Obering stated, “I have a lot of confidence in the ability of the sea-based system to be able to execute an operational mission.”⁶

U.S. NAVY

The *Ticonderoga*-class guided-missile cruiser USS *Lake Erie* (CG-70) launches an SM-3 Block 1B during joint Missile Defense Agency/U.S. Navy testing in the Pacific in May. It was the third consecutive successful intercept test of the SM-3 Block 1B. With their Aegis systems, the *Ticonderogas* and the *Arleigh Burke*-class destroyers are at the center of America’s new “phased adaptive approach” to ballistic-missile defense policy.

He also conceded ground-based systems were “a little less mature than that.” These themes were reinforced by then–Aegis BMD Program Director Rear Admiral Alan B. Hicks, both in his 2007 *Proceedings* article that framed the current and future BMD/WMD threat, as well as in an article in *Joint Force Quarterly* that put the contribution of Aegis BMD in context as a critical element of national BMDS.⁷ And in July 2013, MDA Director Vice Admiral James Syring noted Aegis BMD is being considered for use on a “third site” for homeland defense in addition to the current sites at Fort Greely, Alaska, and Vandenberg Air Force Base, California.⁸

Support for Aegis BMD as a central component of national BMDS is growing beyond the Navy and the Department of Defense. In 2009 the Institute for Policy Analysis report on *Missile Defense, the Space Relationship, & the Twenty-First Century* recommended limiting fixed ground-based missile-defense deployments based on GMD in favor of expanding theater/regional defenses centered on sea-based missile-defense deployments (along with Aegis Ashore, Land-Based Standard Missile (SM)-3, and THAAD radars), recommending, “Equip additional U.S. vessels with the Aegis anti-missile system. Encourage U.S. allies equipped with Aegis/SM to do the same.”⁹

In 2010 the DOD published its first-ever *Ballistic Missile Defense Review (BMDR)* and acknowledged the efficacy of Aegis BMD in a new approach to dealing with the threat of WMD-armed ballistic missiles. The *BMDR* explained:

The United States will continue to defend the homeland from limited ballistic-missile attack. The United States will defend U.S. deployed forces from regional missile threats while also protecting our allies and partners and enabling them to defend themselves. . . . The United States will seek to lead expanded international efforts for missile defense. It will work more closely with allies and partners to provide pragmatic and cost-effective capacity.¹⁰

The *BMDR* also spoke directly to the importance of Aegis BMD and the strong potential for an “Aegis BMD International” coalition:

Other allies already own or are working with the United States to acquire specific capabilities, such as naval vessels equipped with the Aegis defensive system that could be adapted to include a missile defense capability. . . . A primary U.S. emphasis is on ensuring appropriate burden sharing and there is general recognition of a growing threat and the need to take steps now to address both existing threats and emerging ones.¹¹

The Aegis weapon system’s adaptability has made it possible for the Navy to add improved hardware and software in successive Aegis spiral upgrades. The system in 2013 consists of four major components: the AN/SPY-1 radar system, the Aegis combat system, the Mk-41

vertical-launch system, and standard surface-to-air missiles. Aegis BMD capability is developed and delivered in two-year “block upgrades” providing increased capabilities at every step. The late 2013 configuration of Aegis BMD—the Aegis 3.6 weapon system—is teamed with the advanced SM-3 Block 1A. Meanwhile, Aegis BMD 4.0—which was being groomed for entry into service—is adding improved target discrimination, tracking, and engagement ranges. This version of Aegis BMD relies on the SM-3 Block 1B.

The decades-long success of Aegis, as well as more than \$50 billion invested in the system, contributes to the notion that Aegis could evolve into an even more important component of national BMD. This has also been underscored in the system’s comprehensive and increasingly complex testing program. Since the first intercept test in January 2002, Aegis BMD has enjoyed unprecedented—and unequaled—success: 25 intercepts out of 31 at-sea firings, including dual hits by two interceptors during a single test event. Conversely, the GMD system has not had a successful test since December 2008, the most recent failure coming in July 2013.¹²

More Than Just a New START

On 17 September 2009, President Barack Obama announced a sea change in U.S. ballistic-missile defense policy.¹³ He terminated the previous plan to place dedicated ground-based interceptors and missile-defense radar sites in Poland and the Czech Republic. In their stead, he announced a “phased adaptive approach” (PAA) for a global sea-based missile-defense capability centered on the Aegis BMD system as fitted in the *Ticonderoga*- and *Arleigh Burke*-class guided-missile cruisers and destroyers. An “Aegis Ashore” component would follow, providing enhanced BMD protection from both the sea and land.¹⁴ Important particularly for the near term, the most effective “leg” of the nation’s BMD capability was already at sea and on patrol when the President delivered his watershed speech.

The PAA includes several variants of the SM-3 to thwart the preponderant short- to intermediate-range ballistic-missile threat from rogue nations. The President and his national-security team determined that the Aegis/SM-3-centered BMD option, complemented by ground-based missile-defense systems, was sufficiently mature for near-term operations and had the growth potential to perform this critical mission as missile-defense requirements increase in complexity.

Centered on the Aegis BMD system, the PAA will be carried out in three phases: In Phase 1 (since 2012), in-service Aegis missile-defense ships and radars are deployed to defend against short- and medium-range ballistic missiles in Southern Europe. In Phases 2 (2015) and 3 (2018), the Aegis SM-3s will be upgraded to provide coverage against medium- and intermediate-range missiles, as well as ICBMs, and extend protection to other world regions.

The President's decision to make this major shift in policy and defer the planned fixed-site, ground-based system in Europe in favor of Aegis BMD afloat and ashore was a direct response to the clear and present danger of short- to intermediate-range Iranian ballistic missiles. He was able to do so because the Aegis BMD weapon system was fully operational and in production. The President was able to call on a scalable fleet of Aegis ships, delivering what then-Secretary of Defense Robert Gates deemed "a very real manifestation of our continued commitment to our NATO allies in Europe—iron-clad proof that the United States believes the alliance must remain firm."¹⁵

And while cost was not a primary factor in the President's decision, the Government Accountability Office (GAO) that year published estimates of the cost of a land-based system in Europe, which substantially exceeded the original cost estimate of more than \$4 billion. This made taking Aegis BMD ashore an even more affordable and cost-effective short- and long-term option, particularly when paired with the emerging THAAD radar system as well as space and airborne sensors.

Mobile and Seaborne

Even with delivery of the innovative Aegis Ashore, sea-based BMD will remain a core element of any defense against ballistic missiles—overseas as well as to safeguard the homeland. The inherent flexibility and mobility of Navy BMD assets provides an option combatant commanders count on as part of their defensive arsenal. Indeed, surging Aegis BMD has become standard operating procedure in any crisis where defense against ballistic missiles is needed. U.S. and Japanese Aegis BMD warships—as well as South Korean Aegis destroyers—have been deployed for every North Korean ballistic-missile launch.

The European PAA is moving ahead quickly, often in spite of strident protests from Russia. The United States

announced in February 2012 that two BMD-capable *Arleigh Burke* destroyers, the *USS Ross* (DDG-71) and *Cook* (DDG-75), will arrive at their new homeport of Rota, Spain, in Fiscal Year 2014, with the *USS Carney* (DDG-64) and *Porter* (DDG-78) following in FY 15. In his *Navigation Plan for 2014–2018*, Chief of Naval Operations Admiral Jonathan Greenert emphasized the importance of this forward basing. It is clear that Congress intends to continue to monitor the Navy's commitment of Aegis ships to the

European PAA. In hearings on the Navy's FY 13 budget request, Senate Armed Services Committee Chairman Carl Levin (D-MI) questioned Secretary of the Navy Ray Mabus and Admiral Greenert regarding the Navy's commitment to provide Aegis BMD ships in the Eastern Mediterranean, with Mabus reaffirming that commitment, while adding that the Navy also intended to make more Aegis ships BMD-capable.

The strong links between the ongoing development of ship-based Aegis BMD and the evolving PAA plan for Europe were highlighted in a 2010 GAO report that noted the importance of synchronizing the development and testing of all missile-defense components as well as in statements by DOD officials emphasizing the ways that the acquisition of elements of the PAA are inextricably linked to current sea-based Aegis BMD acquisitions.¹⁶ Additionally, as noted in the Missile Defense Agency's *Aegis Ballistic Missile Defense Program Review*, "The President's decision



The *Arleigh Burke*-class destroyer *USS Donald Cook* (DDG-75) gives her vertical-launch missile system a workout during underway qualifications in the Atlantic in October. She will be joined at her new homeport of Rota, Spain, by sister DDGs as part of the European phased adaptive approach, which is "moving ahead quickly," the authors note, "often in spite of strident protests from Russia."

to deploy the European PAA accelerates fielding of proven technologies like the Aegis weapon system and promises improved long-term protection of our NATO allies as well as the U.S. homeland," providing a window on *why* Aegis BMD became the foundation for the PAA. The report continues: "The PAA for BMD in Europe will leverage several elements of the BMDS, including forward-deployed sensors as well as sea- and land-based variants of the SM-3 interceptor."¹⁷

An important aspect of the success of the European PAA is system-testing. As one indication of how the Obama administration is fast-tracking Aegis Ashore, earlier this decade the MDA announced plans to allocate \$428 million to an Aegis Ashore test site at the Pacific Missile Range Facility in Barking Sands, Kauai, Hawaii. The Aegis Ashore Missile Defense Test Complex will support flight-testing of Aegis Ashore capabilities in an operational configuration. Construction is under way, and the complex will be available to conduct the first Aegis Ashore test-firing in FY 14. Meanwhile, the United States and NATO have begun construction on a pair of Aegis Ashore installations in Romania and Poland.

Aegis Global Enterprise and BMD

In all of this, collaboration with U.S. allies and partners will be critical to operational success. In a July 2010 briefing, MDA Director Army Lieutenant General Patrick O'Reilly stated, "The United States will seek to lead ex-

to purchase the SM-2.¹⁹ In his 17 July testimony, MDA Director Vice Admiral James Syring emphasized the importance of international cooperation in missile defense, much of it focused on Aegis BMD:

MDA is engaged either bilaterally or multilaterally with nearly two dozen countries and international organizations, such as NATO and the Gulf Cooperation Council We continue to develop collaboratively the SM-3 IIA to enable U.S. and Japanese Aegis BMD ships to engage MRBMs [medium-range ballistic missiles] and IRBMs [intermediate-range ballistic missiles] and, when coupled with the upgraded Aegis BMD weapon system, more sophisticated ballistic missile threats. . . . In the Middle East, U.S. BMD capabilities continue to expand in defense of forward-deployed U.S. armed forces, allies, and partners. Major MDA activities in the Middle East involve relationships with regional partners expressing interest in procuring U.S. systems.²⁰



Rear Admiral Randall Hendrickson, program executive for Aegis BMD, speaks during the installation of the Aegis Ashore Missile Defense Center in Hawaii in late 2012. While sea-based BMD "will remain a core element of any defense against ballistic missiles," the Obama administration is fast-tracking Aegis Ashore, an innovation that will provide further "enhanced BMD protection from both sea and land."

panded international efforts for missile defense."¹⁸ This cooperation is being instantiated *today* by the engagement of allied navies in the Aegis program—Japan, Spain, Norway, Australia, and South Korea—and this has laid the foundation for an Aegis global enterprise. Key allies are increasing their commitment to missile defense. As one example, South Korea announced plans to spend more than 13 percent of its defense budget on missile defense, much of it to support its three KDX-III ships, as well as

Based on the positive response to the European PAA, the United States announced its desire to build regional missile shields in Asia and the Middle East, with the U.S. Assistant Secretary of Defense for Global Strategic Affairs Madelyn Creedon noting:

The U.S. push for new anti-missile bulwarks includes two sets of trilateral dialogues—one with Japan and Australia and the other with Japan and South Korea.

Such shields could help counter perceived threats to their neighbors from Iran and North Korea and help defend the United States from any future long-range missiles that the two countries might develop. . . . In the Middle East, Washington will work to promote “interoperability and information-sharing” among members of the Gulf Cooperation Council—Saudi Arabia, Kuwait, Bahrain, Qatar, the United Arab Emirates, and Oman—as they acquire greater missile-defense capabilities.²¹

The foundation for a global maritime-security architecture has emerged with the construction and operation of allied Aegis warships. The Japan Maritime Self-Defense Force has the Aegis system on the *Kongo* and *Atago* destroyer classes. The Spanish Navy has the Aegis on board the *F-100* frigates. And the Spanish model has migrated to the Norwegian and Australian navies, where Spanish shipbuilders have combined with U.S. weapon integrators to put Aegis aboard the Norwegian *F-310* frigates and the Royal Australian Navy’s *Hobart*-class destroyers. South Korea has announced plans to build six 5,600-ton KDX-III Aegis destroyers to complement the three *Sejon-Daewan* KDX-III destroyers currently in service. The foundation for a “sensor-shooter” mix for a global air- and ballistic-missile defense enterprise is in place. The shooter component can be shared, as well as partners’ agreed-upon rules of engagement.

Into the Future

The U.S. Navy will continue to install BMD capabilities in its Aegis cruisers and destroyers, despite increasingly constrained fiscal resources as a result of sequestration. Plans call for the Fleet to increase the number of Aegis BMD-capable ships from 28 in mid-2013 to 36 ships by 2018, to as many as 60 ships by 2024, in addition to Aegis Ashore.²² And, as Rear Admiral Frank Pandolfe, then-Director of the Navy’s Surface Warfare Division, noted in 2010, “Over time we will have a much larger and more capable BMD force, with all 62 destroyers already built or under construction as BMD-capable units.”²³ Concurrently, U.S. friends and allies continue Aegis and Aegis BMD shipbuilding and buying programs.

And the Navy continues to organize for Aegis BMD. The Navy Air and Missile Defense Command is at the forefront of “operationalizing” the Navy’s Aegis BMD



An SM-3 Block 1A launches from the Japan Maritime Self-Defense Force *Kongo*-class destroyer *Kirishima* during joint U.S./Japanese exercises. “The engagement of allied navies in the Aegis program—Japan, Spain, Norway, Australia, and South Korea—. . . has laid the foundation for an Aegis global enterprise.”

capability and will mature proven ballistic-missile capability while moving toward a new level of integrated air- and missile-defense dominance in the maritime domain. And the Navy has stood up the BMD enterprise to coordinate and synchronize Navy actions as well as interactions with other services, the Joint Staff, and interagency and international partners.

The Navy will also continue to align efforts to better support BMD as a core naval capability, and integrated air and missile defense will gain more prominence as a core mission. But in the face of the nation’s ongoing economic woes and the concomitant cuts in the DOD budget, no system, no matter how vital and successful, is immune to budget pressures. Still, Aegis BMD is

a critical element of the nation's defense in the 21st century.

In short, Aegis BMD continues to push the envelopes of national and global BMD capabilities against a growing threat. More than any other missile-defense system fielded, Aegis BMD is a key facilitator of integrating partner nations' BMD capabilities into an "any sensor, any shooter" architecture. This system is effective, survivable, and affordable. More important, as you read this, Aegis BMD is at sea . . . on patrol . . . fulfilling Commander Denny's prescription. Whether *de jure* or not, the fact is Aegis BMD is leading U.S. ballistic-missile defense. ✨

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