Standard Missile-3 is launched from Pearl Harbor–based Aegis cruiser USS *Lake Erie* enroute to intercept as part of Missile Defense Agency test of sea-based capability under development, yet tactically certified and deployed with U.S. Navy, November 2007 (U.S. Navy)

Expanding Zeus's Shield

A New Approach for Theater Ballistic Missile Defense in the Asia-Pacific Region

By Kevin Ayers

On September 17, 2009, President Barack Obama approved the creation of a "phased adaptive approach" to European missile defense, at the recommendation of Secretary of Defense Robert Gates and the Joint Chiefs of Staff.[1] As outlined in the original White House 2009 press release and in the 2010 Ballistic Missile Defense Report, the European Phased Adaptive Approach (EPAA) was developed to provide guidance on which and where certain ballistic missile defense capabilities would be deployed to the European theater. According to the overall plan, the approach would be executed in four phases. The first phase protected southern Europe from attack from Iran with sea-based Aegis Weapons Systems by 2011.[2] Phase two focused on deploying land-based missile defense capabilities to defend southern Europe by 2015. Phase three, scheduled for 2018, would deploy more capable systems against longer range Iranian missiles and have both a land- and sea-based capability.[3] The final phase was canceled in 2013 but was rescheduled for deployment in the 2020 timeframe and would have added defense capability against long-range ballistic missile threats from the Middle East.

In many ways, the European model is a unique situation. The components of a ballistic missile defense system (BMDS)

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have been developed by the United States and are being deployed within a longstanding multilateral security alliance. Other areas, like Southwest Asia or East Asia, lack such an alliance or even agreement on the utility of ballistic missile defenses. Therefore, the phased adaptive approach would require new diplomatic and security agreements for each region to meet its unique requirements. In the waning days of the Obama administration, no policy for how to deploy the BMDS in other regions has been clearly articulated.

To extend its protections to other regions, the phased adaptive approach should shift its focus from capability development to security alliance interoperability development. The United States continues to develop a multilayered ballistic missile defense capability against long-range missile threats from the Middle East. The need in the East Asian region, for example, is not to phase in a new BMDS capability but to create a strong security alliance structure that can deploy and execute the ballistic missile defense mission. This will maintain an extended deterrence capability for the United States and sustain regional security and stability. However, the key challenge will be to incentivize Japan and South Korea to join the United States in a new security alliance to effectively implement this approach.

Introduction

A ballistic missile defense architecture operates in three key phases. Ballistic missiles can be targeted before launch on the launcher. Once launched, the ballistic missile is under powered flight and considered to be in its boost phase. This phase will vary, depending on the size of the missile and how much fuel and oxidizer it has to burn. If a BMDS can intercept ballistic missiles either before they are launched or in this boost or early intercept phase, the missile cannot deploy its countermeasures. Once the ballistic missile has achieved its engine or motor cut-off point and is beginning to reach the apex of its ballistic arc, it has entered the mid-course phase. Depending on the range of the missile, this phase can be within the atmosphere—endo-atmospheric—or outside the atmosphere—exo-atmospheric. The Aegis Weapons System is primarily focused on short- to intermediate-range missiles in their mid-course and terminal phases.

Aegis is a sea-based air defense system based on phased array radar technology and linked to missile interceptors with advanced targeting seekers. The Aegis Weapons System—named after the shield used by the god Zeus in Greek mythology—was originally deployed by the U.S. Navy in 1983 on *Ticonderoga* (CG-47)-class cruisers and *Arleigh Burke* (DDG-51)-class destroyers.[4] The system's interceptor, the Standard Missile (SM), emerged from the Navy Theater Area Wide program in the 1990s as the SM-3.[5] The U.S. Missile Defense Agency (MDA) and the Japanese are developing the next generation of SM-3 interceptors, known as the Block IIA.

Shorter range theater-based ballistic missile defense has focused on the final phase of the missile's trajectory, the terminal phase. Work on intercepting shorter range systems stems back to 1949 with Project Pluto, which eventually evolved into the Army Air Defense System in the 1970s and the Phased Array Tracking Radar Intercept on Target (PATRIOT) program in 1976.[6] The PATRIOT system made a name for itself when Iraqi Scud short-range ballistic missiles were fired at Saudi Arabia and Israel during the Gulf War in 1991. While the new PATRIOT Advanced Capability–2 (PAC-2) interceptors demonstrated mixed results in intercepting the incoming Scuds in their terminal phase, they did highlight the requirement for theater ballistic missile defense capabilities for Army units in the field. Current systems such as the PAC-3 and Theater High-Altitude Area Defense (THAAD) systems provide a layered defense capability for the terminal phase. THAAD is capable of intercepting ballistic missiles earlier in the terminal phase at higher altitudes than PAC-3 systems.

Core to the success of any BMDS is the ability to identify, track, target, and intercept ballistic missile threats. The core system for tracking incoming missile raids is the AN/TPY-2 mobile radar, as well as fixed terrestrial and space-based assets. These sensors are integrated into the global Command and Control, Battle Management, and Communication (C2BMC) system. C2BMC ties together these BMDS capabilities into a coherent whole with the ground-based, mid-course defense system that is used for defending against limited intercontinental ballistic missile attack on the United States.

While many countries around the world have developed theater ballistic missiles—including Iran and North Korea, the countries against which the BMDS is designed to defend—China's sophistication in ballistic missile technology is second to none. In a BMD context, its history of regionally ranged missile proliferation and technology-sharing would reasonably make its regional-missile developments a primary concern. According to the Department of Defense (DOD) 2015 annual report to Congress, China has developed the technology to hold maritime forces at significant threat through its land-, sea-, space-, cyber-, and electromagnetic-based weapons; a significant portion of those threats come from China's robust theater and strategic ballistic missile force.[7] China's primary threat is regionally based, though, and likely focused on protecting what it views as its center of influence. Both Japan and South Korea have seen the need to protect themselves from China's increasing theater ballistic missile capability over the years, as its aggressive moves in the South China Sea have increased their concern. What would entice Japan and South Korea to partner with the United States in the BMDS?

Developing Co-Production Incentives: An SM-3 Block IIA Case Study

If we assume that a trilateral security alliance built around a BMDS provides enhanced security, technology, geographic, and economic value to the United States, then there must be significant incentives for Japan and South Korea to agree to enter into such an alli-

ance. Both countries have demonstrated at least an interest in U.S. BMDS, have existing bilateral security alliances with the United States, and have developed defense industry relationships within the framework of each bilateral alliance. Therefore, creating a trilateral alliance for ballistic missile defense should be self-evident from these relationships. However, in fact, such an alliance has not grown organically from the current security environment.

Much of South Korea's and Japan's preference for remaining in bilateral security alliances with the United States appears to originate from historical and diplomatic issues that have created suspicion between the two countries.[8] To create a trilateral security alliance, it is imperative that the United States create an incentive framework for both countries to work together in an integrated and interoperable ballistic missile defense architecture. The United States has deep experience working with Japan on co-development projects, including the SM-3 Block IIA interceptor program, and has similar co-development experience with South Korea in other defense industry projects. Therefore, if a segment of the BMDS can be identified that complements South Korea's comparative advantage within its defense industrial base and provides added value to the ballistic missile defense architecture with Japan and the United States, then the system will create enhanced deterrence in other security domains. The process for how the United States struck a deal with the Japanese to co-develop the SM-3 Block IIA interceptor provides a useful case study on this issue.

The Japanese first expressed an interest in U.S. ballistic missile defense research activities in the 1980s with their participation in the Western Pacific Missile Defense Architecture Study (WestPac) with U.S. defense companies.[9] The WestPac study looked at potential ballistic missile threats to Japan and likely system solutions.[10] By the mid-1990s, the United States and Japan were working through possible dual-use technology deals in the "Technology for Technology" program.[11] The hope for the United States was to create a two-way technology transfer between Japanese commercial and U.S. defense companies. However, by that time, the United States was more interested in Japan developing ballistic missile defense than the Japanese government was for itself.[12]

In 1998, the Japanese suffered what is known as the "Taepodong shock"; North Korea launched a developmental long-range ballistic missile over Japan's main island, Honshu.[13] From that point on, Japan's public and government officials were acutely aware of the potential ballistic missile threat from North Korea and actively sought a ballistic missile shield. By December 2003, Japan had agreed to move from just research and development with the United States to active development of a two-tiered ballistic missile defense system with PAC-3 firing units, the Aegis Weapons System, and SM-3 interceptors.[14] These capabilities were purchased through foreign military sales from Lockheed Martin and Raytheon and deployed between 2006 and 2007.[15] The dramatic shift in emphasis by the Japan Defense Agency was highlighted in their National Defense Program Outline—similar to the U.S. Quadrennial Defense Review—in December 2004, which focused attention on ballistic missile shields as the highest military priority and on China and North Korea as their primary security threats.[16] In addition, Japan also saw an advantage to lifting its ban on military exports to the United States, which would facilitate the co-development deals in the negotiation stage.[17] Elements within the Japanese government viewed the shift in focus as violating the interpretation of the Japanese constitution's provisions for collective self-defense.[18]

On the commercial side, Japan's largest defense corporations were looking to gain significant revenue from these potential missile defense research and production contracts. By 2005, Japan was preparing to invest $1.2 billion into missile defense, much of which would flow to Mitsubishi Heavy Industries and Kawasaki Heavy Industries, which combined made up 35 percent of the total defense market in Japan.[19] While Mitsubishi Heavy Industries likely had the most experience in systems integration, it also had a long history in dealing with the United States in co-development, beginning with the FS-X aircraft program in the 1980s.[20] Therefore, by 2007, a memorandum of agreement between Lockheed Martin and Mitsubishi Heavy Industries for licensed production of the PAC-3s had been signed, PAC-3 firing units purchased through foreign military sales had been deployed, and the Aegis Weapons System along with the SM Block I capability had been purchased for $458 million.[21] The next stage in this process was to create a more capable interceptor for the Japanese to defend against longer-range North Korean missiles.

The Japan Defense Agency and DOD signed a memorandum of understanding in December 2004 agreeing to develop a BMDS for Japan, which led to the co-development agreement to produce the next generation of SM-3 interceptors in 2006.[22] According to the agreement, Mitsubishi Heavy Industries and Raytheon would be the prime contractors for each country and responsible for overall management. Both the United States and Japan would split the overall development costs of what was to be the SM-3 Block IIA interceptor.[23]

Beginning with fiscal year (FY) 2007, the Japanese Ministry of Defense appropriated approximately ¥2 billion a year for the Joint Cooperative Development Program to produce the next generation SM-3 interceptor, the Block IIA.[24] By FY16, according to MDA budget submission documents, the program had an average cost of $273 million for research and development in the United States. Overall, the development program was estimated to cost $3.1 billion total (once Lockheed Martin's Multiple Kill Vehicle program had been canceled, which increased technology development costs for the SM-3 Block IIA).[25]

Flight testing for the SM-3 Block IIA began in 2015, with two tests of the system's operations in June and December.[26] To meet the EPAA schedule for deployment, the system will need to be tested for intercepts against at least

USS *Donald Cook* transits Black Sea as part of President Obama's European phased adaptive approach to ballistic missile defense in Europe, April 2014 (U.S. Navy/Edward Guttierrez III)

medium- and intermediate-range target missiles before 2018, when the next combined MDA integration test is scheduled.[27] In addition, the system will need to be tested for interoperability between the U.S. and Japanese navies, which have had previous success with joint operations during similar integration tests.

Four key themes led to the success of the SM-3 Block IIA Joint Cooperative Development Program. First, Japan's national interests were realigned from a conservative constitutional interpretation of its right for collective self-defense toward a more progressive interpretation. Much of this realignment was driven by North Korea's nuclear declarations in 1993 and its Taepodong 1 launch in 1998. Once Japan Defense Agency Director-General Gen Nakatani was replaced with Shigeru Ishiba—a supporter of the right of collective self-defense and ballistic missile defense—in the fall of 2002, the formal organizational inertia in Japan began to fall away.[28] By 2003, the majority of the general public believed that North Korea was a threat, and members of the opposition party saw the feasibility of a missile defense system for Japan.[29] Therefore, by 2003, Japan's national interests shifted toward ballistic missile defense.

Second, Japan's defense industrial base was technologically advanced and had experience working with the United States in weapons technology co-development. According to the U.S. Government Accountability Office, Japan was a world leader in aeronautics subsystem manufacturing and had the best developed aeronautical research, development, and production infrastructure in Asia.[30] Japan's experience with Lockheed Martin during the FS-X program led to deeper expertise in system design, development, and integration.[31] The corporation that gained the most from this experience was Mitsubishi Heavy Industries, which would become the lead co-producer of the SM-3 Block IIA interceptor.

Third, the flexibility of the ballistic missile defense architecture in the 1990s and early 2000s allowed for the integration of foreign partners. MDA's flexible acquisition capability, outside the normal Defense Department acquisition process, enabled flexible contracting for emerging defensive systems.[32] In addition, the Japanese agreed to participate in research, development, and procurement of an existing capability that they had been helping with since the program

was known as the Navy Theater Wide Defense program.[33]

Finally, the presence of U.S. military bases in Japan and their geographic proximity to key threats in Asia-Pacific provided incentives for both countries to collaborate over ballistic missile defense. In the event of a ballistic missile attack against Japan, potential targets include U.S. forces and Japanese civilian and military targets. The impetus to create a more integrated and interoperable system likely gave both countries added incentives to create the cooperative development program. Also, deploying PAC-3 and Aegis systems within Japan extended and expanded the range and number of available ships and units to intercept potential ballistic missile threats.

South Korea's Theater Missile Defense Orientation and the Prospects of Partnership

The United States and the Republic of Korea have been allied in a security partnership since the 1953 Mutual Defense Treaty was signed. Under that treaty, the United States continues to deploy 28,500 troops on the Korean Peninsula and provides for the collective defense of the republic.[34] The collective defense capabilities that the United States has deployed in South Korea include ballistic missile defense assets such as the PAC-3 system and potentially THAAD in the near future.[35] And even though South Korea has been active in purchasing point defense capabilities, such as the PAC-2 system, and developing indigenous capabilities to counter a potential invasion from North Korean conventional forces, it has depended on its diplomatic solutions in the face of the North's development of long-range ballistic missiles and nuclear warheads for those missiles.[36]

On January 12, 2016, North Korea conducted a nuclear test.[37] On February 8, 2016, North Korea launched a satellite with its long-range missile system.[38] The first event seemingly did not push South Korea from its preference for diplomatic solutions with the North; South Korean officials continued to be noncommittal toward purchasing enhanced ballistic missile defense assets, such as THAAD, from the United States. However, North Korea's space launch seemed to push the conversation with the United States toward purchasing and deploying South Korea's own and/or U.S. THAAD units on the peninsula.[39]

Up until February 2016, South Korea procured and developed air and missile defense systems for its point and area defense requirements, while balancing its perceived diplomatic needs for the region. South Korea has made significant investments in building three KDX-III cruisers with the Aegis Weapons System and has approved the upgrade of its PAC-2 batteries to PAC-3 by 2020. In addition, South Korea's Agency for Defense Development has developed a medium-range surface-to-air missile system with capabilities against ballistic missile and air targets—based on the Russian S-300 and S-400 surface-to-air missile systems—known as the Cheongung.[40] The Cheongung is intended for South Korea's multi-tiered and integrated Korean Air and Missile Defense system.[41]

South Korea's balance toward indigenous systems is likely due to its sensitive economic relationship with China and its goal of taking overall defensive command of the United Nations units still stationed in the South against North Korean invasion.[42] Also, South Korea has been reluctant to cooperate with Japan on ballistic missile defense. Creating its own indigenous capability gives them the option to avoid a reliance on Japan. Much of that reluctance has stemmed from historical legacies of the Japanese occupation of Korea before and during World War II, as well as the current geopolitical and economic relationships between China, Japan, and South Korea.[43] In November 2015, however, all three countries agreed to resume regular trilateral meetings on security and economic issues.[44]

Therefore, South Korea's defense industrial base has demonstrated its ability to work with foreign partners to develop military capabilities oriented toward air and missile defense, has shown recent sensitivity to potential threats from North Korea, and has demonstrated an opening toward future discussions with both Japan and China. South Korea also has a longstanding bilateral partnership with the United States in defending its homeland. For example, South Korea participated in co-development agreements with the United States in the Korean Fighter Program in the late 1980s. In that particular case, South Korea gained from the transfer of aerospace manufacturing and assembly know-how.[45] Much like with the Japanese co-production programs, the Koreans benefitted from their in-depth and invaluable experience working with U.S. aerospace firms. All of these elements appear to parallel Japan's situation in the late 1990s and early 2000s with regard to ballistic missile defense co-production partnerships.

South Korea's Comparative Advantage and the Needs of the Theater Ballistic Missile Defense Enterprise

According to IHS Jane's, South Korea's defense industrial base has developed and expanded like its commercial markets.[46] It is still dominated by large corporations—known as *chaebols*—that produce in a wide array of market segments. For example, almost all of the naval construction contracts are handled by Hyundai or Daewoo.[47] Its indigenous capabilities are capable of producing naval platforms, aircraft, armored vehicles, and tanks. South Korea's chaebols also have made significant— ₩1.5 trillion—financial investments in air and missile defense.

South Korea's experience with developing domestic high-end electronics for the commercial sector has paid dividends for its ability to manufacture command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) and battle management capabilities. On its Web site, LIG Nex1—formerly known as LG Precision—advertises long-range surveillance radar systems, maritime radar systems, and overhead sensors.[48] Given the maturity of the ballistic missile defense architecture with regard to interceptor technology, it makes sense

to leverage South Korea's expertise in C4ISR and battle management. South Korea, in collaboration with the United States, could make significant contributions to the integration and foreign interoperability in the C2BMC system. According to the director of the Office of Testing and Evaluation, C2BMC Spiral 8.2—scheduled to be deployed in fiscal years 2017 and 2018—does not have an engagement management capability.[49] Since U.S. systems operate over the Link-16 system, the South Koreans could be employed to develop a parallel standard for our foreign partners that seamlessly fuses their data into the overall C2BMC architecture.

The added bonus of creating a C4ISR and battle management development niche for South Korea is that it could integrate South Korea more closely in the architecture without immediately exacerbating its fragile relationships with Japan. South Korea's relationship with the Chinese may be fraying as well. South Korea's retort to the Chinese over the THAAD issue in March 2015 could be a sign of that tension.[50] Given the events with North Korea in January and February 2016, the impetus to provide a more advanced multi-layered capability within its missile defense system may incentivize South Korea to develop the next generation of command and control systems for the BMDS.

A New Approach for the Asia-Pacific Phased Adaptive Approach

Ballistic missile defense is about security. By employing these defensive capabilities, countries intend to reduce their risk of being attacked by adversaries with ballistic missiles. Therefore, it makes sense to incorporate these allies into the defensive architecture within the realm of their comparative advantages to share costs and capabilities. If the phased adaptive approach, as articulated in 2009, truly realizes the deployment of the Aegis Weapons System with SM-3 Block IIA interceptors by 2018, complemented by PATRIOT PAC-3, THAAD, and C2BMC spiral upgrades, then the ballistic missile defense architecture will have the defensive assets to globally deploy an integrated air and missile defense system by 2018.

In the Asia-Pacific region, two of our closest allies, Japan and South Korea, have demonstrated high technological competency and have a history of working with the United States in co-developing aerospace and defense systems. Also, they have demonstrated a long history of not working well together.[51] A phased approach with significant economic incentives should be sufficient to attract and retain Japan and South Korea in such an alliance. If the phased adaptive approach policy is going to be applied to the Asia-Pacific theater in the post-Obama administration, however, the new policy iteration should reflect the needs of the region. An integrated trilateral alliance structure between the United States, Japan, and South Korea would maximize the BMDS extended deterrence against countries with advanced or advancing ballistic missile capabilities such as North Korea and, in a regional context, China.

The value of this new approach focuses on enhancing the extended deterrence provided by a trilateral ballistic missile defense architecture, while lowering the cost through co-development partnerships and burdensharing. While per-unit costs of the SM-3 Block IIA are higher than those of the Block IB, the added capability of the new system enhances its marginal value. Also, using one integrated command, control, battle management, and communication system with multiple radar and electro-optical tracking systems on land and sea creates a vastly superior capability than if deployed by just the United States. Lastly, the symbolic deterrence of a trilateral alliance structure for the defensive architecture may be the greatest value proposition for this new policy. The inclusion of Japan and South Korea in developing and deploying a system sends a clear message to China regarding the unity of effort and command in the region for integrated air and missile defense.[52]

To communicate the superior deterrent value of this approach, partner countries will need to actively use integrated training and testing as the primary communications channel. A trilateral security alliance will consolidate capabilities, leverage comparative advantages, and create formal channels of communication among all three countries' diplomatic, political, military, and industrial spheres. Closer communication channels in these areas greatly enhance the unity of effort and command. When coupled with the symbolic impact of a trilateral security alliance deploying ballistic missile defenses in the area, these communication channels could dramatically improve the influence of a theater ballistic missile defense system. A unilateral effort by the United States would demonstrate a unity of effort and command militarily, but could not have the same impact diplomatically, politically, or industrially.

Assessment of New Approach

This Asia-Pacific–oriented phased adaptive approach presents some key strengths, weaknesses, opportunities, and threats. The primary strength of a trilateral security alliance for ballistic missile defense between South Korea, Japan, and the United States is the deep working relationship our militaries and defense industrial bases have established over the decades. Also, formal channels enable tighter integration and interoperability between all three countries when conducting tests and joint operations in the region. Ultimately, this creates a more powerful force multiplier for ballistic missile defense.

The weakness of the approach is its assumption that South Korea and Japan will continue to have the incentive to provide key components for major systems in the architecture. The alliance would have a certain amount of assumed interdependency that would be uncomfortable for the United States. It seems to make sense that the United States would prefer to maintain an independent ballistic missile defense capability in the region to hedge its bets. However, the power of a formal trilateral security alliance that relies upon an interdependency model creates a level of deterrent credibility for the system that would be absent in an informal confederation of nations. Also, the level of risk introduced with more participating

Sea-Based X-Band radar successfully traveled from Pearl Harbor, Hawaii, to waters off Aleutian Island chain of Alaska, February 2007 (Missile Defense Agency)

countries would increase. The number of resources required to maintain the diplomatic, political, economic, military, and informational flows involved in such an alliance will be significant.

The new approach creates significant opportunities to test the concepts of a federated defense structure in the Asia-Pacific region. By establishing a trilateral security alliance, the United States can help better integrate Japan and South Korea into the BMDS. Both have sought better integration and interoperability in the midst of their respective historical issues, and co-development opens up possibilities for advanced technology transfer from and to each member of the alliance.[53] For example, South Korea can learn better integration techniques for battle management electronics systems. The largest opportunity for this new approach is enhancing security in all regions of Asia. The establishment of a regional ballistic missile shield focused on two destabilizing nations with advanced ballistic missile capabilities has the potential to nullify or weaken their coercive capabilities against weaker countries.

Finally, the threats to the phased adaptive approach are based in national interests. With three different countries united in a security alliance to counter aggressive behavior by North Korea and China, three different sets of national interests will find ways to complement and clash with each other. South Korea's tendency toward economic partnerships with China may create friction in the alliance.[54] Japan's historical tension with South Korea will continue to be a seam that China or North Korea could exploit. China will use all of its instruments of power—diplomatic, informational, military, and economic—to break apart or negate the effectiveness of the security alliance. Also, it is entirely possible that new capabilities or threats may emerge in the region that render ballistic missile defense irrelevant. Even though the alliance presents a flexible framework regardless of capability, transitioning to a new defensive capability may create costs that Japan and South Korea may not want to bear.

Conclusion

The main theme of this discussion has been on creating an appropriate policy recommendation for the Asia-Pacific implementation of the ballistic missile defense architecture. The development of a trilateral security alliance focused around a ballistic missile defense system seems to be the correct answer. The United States must be prepared to deploy appropriate BMDS assets and resources to build this capability. It is likely that the implementation of this new approach could incur high costs and require increased attention and resources to maintain. However, the unknown factor is the amount of willingness within the three countries to make those investments. In recent months, both Japan and South Korea have appeared to be willing to move forward in that direction. However, the outcome of the U.S. election will determine how willing we are to make that kind of investment with our Asia-Pacific partners. What is clear is that the future will be increasingly complex and that the implementation of this new policy recommendation will take time and energy. **JFQ**

Notes

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