U.S. Initiative for Integrated Air and Missile Defense (IAMD)*

Koichi Arie and Naohiko Yamaguchi**

Abstract

In light of recent years' increasing air and missile threats, both quantitatively and qualitatively, the United States, under its vision for integrated air and missile defense (IAMD), engages in programs for deterring air and missile attacks against the nation and its allies/partners and countering such attacks. IAMD explores the way to integrate attack operations, active defense, and passive defense by command and control (C2) systems against a range of air and missile threats, including attacks by ballistic missiles, cruise missiles, manned and unmanned aircraft, short-range rockets, artillery, and mortar. The IAMD vision, however, has many unknowns. The vision has been discussed extensively within the U.S. Forces, while the IAMD equipment system being developed by the U.S. Forces has made whirlwind progress. Moving forward with IAMD requires not only the integration of U.S. Force capabilities but also working with U.S. allies and partners. Japan will need to make ongoing efforts to integrate the air defense operations and ballistic missile defense of the Self-Defense Forces (SDF), while referring to the IAMD initiatives of the United States.

Introduction

The air and missile threats of recent years have tended to further increase in range, speed, diversity, and components, and finding effective measures that can address these threats is an urgent international security issue. Under its vision for integrated air and missile defense (IAMD), the United States engages in programs for deterring air and missile attacks against the United States and its allies/partners and countering such attacks. The IAMD vision underscores integrating counterair and missile defense assets possessed by the United States for their own operations, and international initiatives for unifying ally and partner assets with IAMD. First, with regard to U.S. assets, IAMD requires further integration of the U.S. Forces and systematization of equipment as well as the implementation of effective and efficient counterair and missile defense operations in all combat domains.[1] With regard to international initiatives, the U.S. Forces has established IAMD Centers in its theaters in the Middle East and the Asia-Pacific that promote the IAMD

* Originally published in Japanese in *Boei Kenkyusho Kiyo* [NIDS Security Studies], vol.20, no.1, December 2017. Some parts have been updated.

** Koichi Arie is Lieutenant Colonel, Government and Law Division, Security Studies Department and Naohiko Yamaguchi is Colonel, Inspector General, Northeastern Army Headquarters.

1 Joint Chiefs of Staff (hereafter JCS), *Joint Integrated Air and Missile Defense: Vision 2020*, December 5, 2013, http://www.jcs.mil/Portals/36/Documents/Publications/JointIAMDVision2020.pdf. The websites in this and subsequent footnotes were all accessed on June 14, 2018.

vision and provide education and training for military personnel of allies and partners.[2]

The air and missile threats envisaged in the U.S. vision for IAMD include attacks by various types of ballistic missiles, including intercontinental ballistic missiles (ICBMs), as well as cruise missiles, manned and unmanned aircraft, short-range rockets, artillery, and mortar. Countering these threats by assigning individual assets to them is inefficient. In addition, the proliferation of military technologies has made addressing these threats even more difficult, which in turn could motivate a potential enemy to attack and lead to the destabilization of deterrence. IAMD aims to integrate all counterair and missile defense assets deployed in a theater by a network, and thereby, allow individual assets to demonstrate their maximum performance. This requires units from all military services of the U.S. Combatant Commands possessing these assets to cooperate with each other in the theaters to mutually increase the effectiveness of operations and minimize each other's weaknesses.[3] The same applies to the assets of allies and partners in the theaters; their interoperability must be further improved. The U.S. concept for IAMD is promoted based on this understanding of issues and will likely become an effective measure against future air and missile threats.

However, as suggested by the reference to an "evolving approach,"[4] IAMD has many unknowns with respect to not only its future direction but also its current status. The question of where the IAMD vision currently stands and how it will evolve may be domestic issues that the United States itself should solve in relation to the reforms of the operations and equipment of the U.S. Forces, while at the same time being international issues regulated by the political and diplomatic relationship between the United States and its allies/partners or potential enemy countries. The fact that these variables will transform simultaneously and in parallel with each other will likely make the IAMD's evolution process uncertain. The United States' IAMD efforts have already begun, and it goes without saying that they will become a key issue for the future security of Japan. Therefore, it is necessary to analyze the current status of the United States' IAMD initiatives and distill the issues for the future. This paper will analyze IAMD from both the aspects of U.S. domestic issues and international issues.

1. The United States' IAMD Vision

(1) The Concept of IAMD and its Background

A. Concept

The concept of IAMD is formularized in the U.S. Forces' Joint Publication 3-01 revised in April 2017, *Countering Air and Missile Threats*. According to this publication, IAMD is an approach that synchronizes operations of counterair with global missile defense; homeland defense; global strike; and counter-rocket, artillery, and mortar. "Counterair" here refers to the foundational framework at the theater level and is a concept that integrates both offensive and defensive operations which neutralize or destroy enemy aircraft and missiles, before and after takeoff and launch. The purpose

---

2 U.S. Air Force, "PACAF Establishes Integrated Air and Missile Defense Center," November 17, 2014, http://www.af.mil/News/ArticleDisplay/tabid/223/Article/554401/pacaf-establishes-integrated-air-and-missile-defense-center.aspx.

3 JCS, *Countering Air and Missile Threats*, Joint Publication 3-01, April 21, 2017, I-4, https://fas.org/irp/doddir/dod/jp3_01.pdf.

4 Thomas Karako, ed., "Missile Defense and Defeat: Considerations for the New Policy Review," A Report of the CSIS Missile Defense Project, March 2017, pp. 2-3, https://csis-prod.s3.amazonaws.com/s3fs-public/publication/170228_Karako_MissileDefenseDefeat_Web.pdf?.oYEfXIARU6HCqtRN3Zuq7mKljU3jIlq.

of counterair is to attain and maintain the joint force commander's desired degrees of control of the air and of protection. Counterair operations can be broadly categorized into offensive counterair (OCA) and defensive counterair (DCA). The means used for these operations are aircraft, surface-to-surface and surface-to-air missiles, artillery, ground forces, special operations, space operations, cyber warfare, and electronic warfare.[5]

IAMD operations are conducted in close coordination with these counterair operations. First, IAMD operations at the theater level are executed with primary focus on DCA supported by OCA. In IAMD operations beyond the theater level, emphasis is placed on the integration of counterair operations with global missile defense, homeland defense, and global strike. With regard to global missile defense, the Commander of the United States Strategic Command (CDRUSSTRATCOM) is to coordinate the overall planning in collaboration with the geographic combatant commands.[6] In addition, the Command, Control, Battle Management and Communications (C2BMC) system is deployed to support global missile defense.[7]

Joint Publication 3-01 defines IAMD as "the integration of capabilities and overlapping operations to defend the homeland and US national interests, protect the joint force, and enable freedom of action by negating an enemy's ability to create adverse effects from their air and missile capabilities."[8] "Overlapping operations" here can be broadly categorized into:

1) Preventing an enemy's air and missile attack (prevent);
2) Defeating an enemy's aircraft and missiles after an attack is launched (defeat); and
3) Minimizing the impact on the operations of friendly forces if attacked (minimize).

1) consists of attack operations on the enemy's strategic base and is also referred to as left of launch operations.[9] 2) is equivalent to active defense, such as air defense operations and missile defense, and is also known as right of launch operations.[10] 3) refers to passive defense to limit the damages through measures such as deception and resilience.[11] "Capabilities" in the definition of IAMD include all military capabilities used in the above operations and correspond to kinetic weapons, such as fighter interceptor and interceptor missile, as well as non-kinetic weapons, such as cyber warfare, directed energy, and electronic warfare.[12]

B. History

According to Colonel Geoffrey F. Weiss of the U.S. Air Force, the beginning of IAMD can be

---

5 JCS, *Countering Air and Missile Threats*, I-1, I-3.

6 Ibid., I-11.

7 U.S. Government Accountability Office (hereafter GAO), "MISSILE DEFENSE: Opportunities Exist to Reduce Acquisition Risk and Improve Reporting on System Capabilities," Report to Congressional Committees, May 2015, pp. 56-60, http://gao.gov/assets/680/670048.pdf.

8 JCS, *Countering Air and Missile Threats*, I-10.

9 "Statement of RDML Edward Cashman, USN, Director Joint Integrated Air and Missile Defense Organization before the House Armed Services Committee," Subcommittee on Strategic Forces, April 14, 2016, http://docs.house.gov/meetings/AS/AS29/20160414/104621/HHRG-114-AS29-Wstate-CashmanE-20160414.pdf.

10 Andrew Futter, "The Dangers of Using Cyberattacks to Counter Nuclear Threats," *Arms Control Today*, July/August 2016, https://www.armscontrol.org/print/7551.

11 Kenneth Todorov, "Missile Defense: Getting to the Elusive 'Right Side of the Cost Curve'," *Real Clear Defense*, April 10, 2016, http://www.realcleardefense.com/articles/2016/04/11/missile_defense_getting_to_the_elusive_right_side_of_the_cost_curve_109241.html.

12 JCS, *Joint Integrated Air and Missile Defense: Vision 2020*, p. 1.

traced back to the emergence of long-range attack weapons in war since the dawn of history and the game of cat and mouse to address these weapons. Following the emergence of the bow and arrow in ancient wars, attempts were made at primitive passive defense as a means to limit the damages caused by arrows, such as shields or armor, movement, camouflage, concealment, and deception. Over time, passive defense alone could no longer keep up with the development of more powerful long-range attack weapons, such as firearms and rockets, and attack operations that detect the location of these attack weapons and units and then defeat them in advance was added to the menu of options.[13] Left of launch operations in IAMD is believed to originate from these attacks. The frequent use of the "attacking 'archers'"[14] metaphor in left of launch operations also hints at the IAMD's historical background tracing back to the bow and arrow period.

Active defense in IAMD is historically a new response option compared to attack operations and passive defense. Active defense by fighter interceptors, antiaircraft artillery, and other assets became possible with the advent of sensor technologies, such as radars which detect, track, and identify manned aircraft deployed to the battleground for the first time in World War I.[15] Kenneth R. Dorner et al. of the U.S. Pacific Air Forces give the Battle of Britain during World War II as an example of evolving IAMD, and note that Britain successfully executed active defense against the German air force by integrating air defense assets, such as fighter interceptor, with radar, a new technology at the time. However, Germany later newly developed the V-1 flying bomb, the first cruise missile in history, and the V-2 rocket that became the forerunner of ballistic missiles, which presented new difficulties for IAMD.[16] Notably, there were no means for active defense against the V-2 rocket that had a higher and faster trajectory than the V-1, and the only option the U.S.-British Allied Forces could take to reduce the V-2 threat was air strikes on the German mainland.[17] Taking this seriously, the United States began to review its active defense measures against V-2 ballistic missiles after the end of the war.[18] During the Cold War, the United States developed the anti-ballistic missile (ABM) to intercept the ICBMs of the Soviet Union, as well as a theater missile defense (TMD) system against ballistic missiles with ranges shorter than ICBM. With regard to the latter, the U.S. Army's Patriot system was employed in the 1991 Gulf War. In this manner, a foundation was laid for active defense in IAMD, including modern day missile defense.[19]

"The integration of capabilities and overlapping operations" in the definition of IAMD requires an advanced network. In particular, it is essential to integrate them with a system for

---

13 Geoffrey F. Weiss, "Seeing 2020: America's New Vision for Integrated Air and Missile Defense," *Joint Force Quarterly*, 76, December 30, 2014, http://ndupress.ndu.edu/Media/News/News-Article-View/Article/577599/jfq-76-seeing-2020-americas-new-vision-for-integrated-air-and-missile-defense/.

14 Thomas Karako and Ian Williams, "Missile Defense 2020: Next Steps for Defending the Homeland," A Report of the CSIS Missile Defense Project, April 2017, p. 120, https://csis-prod.s3.amazonaws.com/s3fs-public/publication/170406_Karako_MissileDefense2020_Web.pdf?rgfZJOoY5AJY5ScsfZQW8z7Bn7dtSlrr.

15 Weiss, "Seeing 2020".

16 Kenneth R. Dorner, Maj. William B. Hartman, and Maj. Jason M. Teague, "Back to the Future: Integrated Air and Missile Defense in the Pacific," *Air & Space Power Journal*, January-February 2015, p. 64.

17 Richard Dean Burns, *The Missile Defense Systems of George W. Bush: A Critical Assessment* (Santa Barbara, CA: Praeger, 2010), p. 10; Merrick E. Krause, "Attack Operations for Missile Defense," Occasional Paper no.28, Center for Strategy and Technology, Air War College, Air University, May 2002, pp. 8-9, http://www.dtic.mil/dtic/tr/fulltext/u2/a464558.pdf.

18 Missile Defense Agency (hereafter MDA), *Missile Defense: The First Seventy Years*, August 8, 2013, pp. 3-4, https://www.mda.mil/global/documents/pdf/first70.pdf.

19 For a historical background of the post-Cold War U.S. missile defense, see, for example, Burns, *The Missile Defense Systems of George W. Bush*, ch.1-7, pp. 10-153.

agile and flexible command and control (C2). Dorner et al. state that the "I" in IAMD is made possible by C2, and that the aforementioned Battle of Britain during World War II represents an early example of IAMD which set the stage for C2 integration with air defenses.[20] Furthermore, according to Weiss, in the U.S. Forces' Joint Publication 3-01.5, *Doctrine for Joint Theater Missile Defense*, released in February 1996, the United States established the concept of IAMD's "four pillars," including passive defense, active defense, attack operations, and C2 that integrate them.[21]

C. Background

The United States began to engage in IAMD against the backdrop of the changes in the international security environment surrounding air and missile threats. First, in terms of air-breathing threats, manned aircraft such as the fifth generation stealth fighter and stealth bomber have improved in performance. At the same time, the threat of unmanned aerial vehicles (UAVs) has been increasing, both in quality and quantity. Cruise missiles of various ranges have also been proliferating. For example, Russian cruise missiles launched from a fleet deployed to the Caspian Sea towards Syria in 2015 had a long range extending to 1,500 km,[22] raising concerns over the proliferation of such weapons technology to the international community. With regard to the threat of ballistic missiles, progress has been made in shortening the launch time and concealing the launch platform, such as the shift to solid fuel missiles and use of Transporter-Erector-Launchers (TEL). These developments, coupled with the adoption of lofted or depressed trajectories that differ from normal launch trajectories, have further increased the difficulties for missile defense systems to provide protection.[23]

Along with these long-range air and missile threats, it is considered that IAMD should also address the threat of unguided rockets, artillery and mortars (RAM) having short ranges between a few km to around 100 km. Due to their relatively inexpensive prices, these weapons have proliferated to not only national military forces but also non-state actors. For example, Lebanon's extremist group Hezbollah is thought to have acquired Katyusha multiple rocket launchers made in the former Soviet Union having a range of approximately 30 km. In the wake of Israel's aggression on Lebanon in 2006, the Hezbollah fired approximately 4,000 rockets into Israeli territory.[24]

The above changes in the international security environment have fueled an expansion of the battle space of the U.S. Forces, requiring operations not only in a single theater but across all domains including trans-regional and U.S. homeland operations. Meanwhile, now in an era of declining U.S. defense budgets, fulfilling the IAMD requirements of the U.S. Forces necessitates further force integration, demanding more interdependence among the Combatant Commands or the military services as well as the integration of new capabilities. Furthermore, an increasing allied and partner appetite for IAMD in response to the rising air and missile threats in the international

---

20 Dorner, Hartman, and Teague, "Back to the Future," pp. 64, 68.

21 However, Weiss states that the IAMD's "four pillars" did not become a formal doctrine. Weiss, "Seeing 2020".

22 Christopher P. Cavas, "Is Caspian Sea Fleet a Game-Changer?" *Defense News*, October 11, 2015, https://www.defensenews.com/naval/2015/10/11/is-caspian-sea-fleet-a-game-changer/.

23 TNO, *Missile Defence: An Overview*, Hague, 2012, pp. 16-21, http://publications.tno.nl/publication/100675/VLDsVa/2012-missile-defence.pdf. It is deemed that North Korea's ballistic missile test in February 2017 utilized a lofted trajectory. "North Korea Tests Ballistic Missile: 500km Lofted Trajectory Musudan MRBM?" *Analysans*, February 12, 2017, http://analysans.net/north-korea-tests-ballistic-missile-500km-lofted-trajectory-musudan-mrbm/.

24 TNO, *Missile Defence*, pp. 13-16.

community has also boosted the United States' IAMD efforts.[25]

(2) Status of U.S. Forces' Efforts

A. Combatant Commands

The Joint IAMD Organization (JIAMDO) of the U.S. Joint Staff J-8 Directorate (J-8) is at the heart of the United States' IAMD efforts. JIAMDO coordinates with the Combatant Commands and military services regarding all aspects of IAMD, including operational requirements, budgets, and acquisition. It is also involved in the realization of a comprehensive IAMD, working together with the Missile Defense Agency (MDA) of the U.S. Department of Defense (DoD) that oversees the development of U.S. missile defense systems. It is also JIAMDO's role to consult on IAMD with Congress, the Department of State, and the National Security Agency.[26] In addition, JIAMDO holds the Black Dart exercise once a year for verifying technologies that detect, shoot down, or disable UAVs. The 2016 exercise was conducted at Eglin Air Force Base in Florida in September, with the participation of DoD as well as the Department of Homeland Security (DHS), the Federal Bureau of Investigation (FBI), and the Federal Aviation Administration (FAA).[27]

The functional Combatant Command related to IAMD is the Joint Functional Component Command for Integrated Missile Defense (JFCC-IMD). JFCC-IMD was established under the Strategic Command in 2005. Its headquarters is co-located with MDA at Schriever Air Force Base in Colorado. JFCC-IMD is responsible for producing the Global Integrated Air and Missile Defense Assessment (GIAMDA).[28] Through GIAMDA, JFCC-IMD carries out risk assessments of the IAMD capabilities of the U.S. Forces deployed all around the world, and through such measures, supports the force management of IAMD.[29] JFCC-IMD is also in charge of conducting the Nimble Titan multilateral exercise which will be discussed later.

Geographic Combatant Commands are engaged in IAMD planning and execution which are tailored to their geographic area of responsibility and the nature of their duties. For example, in order to address the A2/AD threat, the U.S. Pacific Command identifies maintaining a ballistic missile defense posture by forward deploying assets as an IAMD priority and seeks to increase its capabilities, such as by deploying the Terminal High Altitude Area Defense (THAAD) to Guam and deploying state-of-the-art Aegis ships.[30] The Pacific Air Forces under it attaches importance to passive defense in IAMD. Specific measures include securing expeditionary, redundant fuel systems at all planned air bases, hardening facilities, dispersing basing and operation of combat aircraft, and recovering and reconstituting facilities damaged by an attack. For dispersing basing

---

25 JCS, *Joint Integrated Air and Missile Defense: Vision 2020*, p. 1.

26 Jesse A. Wilson, Jr., "Ricochets & Replies: Have Adversary Missiles Become a Revolution in Military Affairs?" *Air & Space Power Journal*, November-December 2014, pp. 100-101.

27 "Counter-Drone Exercise Black Dart Expands, Moves to Eglin AFB," *Breaking Defense*, September 2, 2016, http://breakingdefense.com/2016/09/counter-drone-exercise-black-dart-expands-moves-to-eglin-afb/.

28 U.S. Strategic Command, "Joint Functional Component Command for Integrated Missile Defense (JFCC IMD)," February 2016, http://www.stratcom.mil/Portals/8/Documents/JFCC%20IMD%20Fact%20Sheet.pdf.

29 U.S. GAO, "Regional Missile Defense: DOD's 2014 Report Generally Addressed Required Reporting Elements, but Excluded Additional Key Details," Report to Congressional Addressees, December 2014, pp. 12-13, http://www.gao.gov/assets/670/667237.pdf.

30 "Statement of Admiral Harry B. Harris Jr., U.S. Navy, Commander, U.S. Pacific Command, before the Senate Armed Services Committee on U.S. Pacific Command Posture," February 23, 2016, p. 21, http://www.armed-services.senate.gov/imo/media/doc/Harris_02-23-16.pdf.

and operation of combat aircraft , there is the Rapid Raptor concept that packages four F-22 stealth fighters and a C-17 transport aircraft, carrying the maintenance personnel and equipment for the F-22's operations, for deploying F-22 stealth fighters from the Hawaii or Alaska Air Force Base within the minimum time to the Asia-Pacific.[31]

B. U.S. Army, Navy, Air Force and Marine Corps

The U.S. Army is developing the IAMD Battle Command System (IBCS). IBCS integrates individual weapons systems, such as Patriot, and sensors, such as radars, by a network, and is intended to improve the effectiveness and efficiency of air defense and missile defense battle. Although IBCS is slated for use primarily at the theater level under the current plan, considerations are under way to link IBCS with the C2BMC system and use it globally.[32] The U.S. Army is also working to develop the Indirect Fire Protection Capability (IFPC) as a system to counter rockets, artillery, and mortar (C-RAM).[33] Furthermore, the Army is developing the Joint Land Attack Cruise Missile Defense Elevated Netted Sensor (JLENS), an airship equipped with sensors, such as long-range surveillance radar, to detect low-flying incoming cruise missiles and other threats from the sky. As will be explained later, JLENS development going forward has been subject to significant budget cuts.[34]

The U.S. Navy is developing the Naval Integrated Fire Control – Counter Air (NIFC-CA).[35] Its core pillar is the Cooperative Engagement Capability (CEC). Through CEC, sensors such as radars on Aegis ships and aircraft in the theater are networked together. This enables interceptor missiles launched at ranges beyond the horizon of radars on Aegis ships to be guided by other sensors and strike an enemy's aircraft or cruise missile, a concept known as engage on remote (EOR).[36] In a test conducted in 2015, NIFC-CA aboard an Aegis destroyer, USS John Paul Jones, successfully intercepted a missile from beyond the horizon.[37] It has been confirmed that there is also connectivity between NIFC-CA and the Army's JLENS noted earlier.[38]

Likewise, the U.S. Air Force recognizes the need to integrate sensors in the theater, including unmanned reconnaissance aircraft, and is considering the concept of Combat Cloud for this

---

31 National Institute for Defense Studies, *East Asian Strategic Review 2016* (Tokyo: National Institute for Defense Studies, 2016), pp. 268-269.

32 "Integrated Air and Missile Defense Battle Command System (IBCS)," *Missile Threat*, CSIS, November 3, 2016, https://missilethreat.csis.org/defsys/ibcs/.

33 Stefan Soesanto, "US Missile Defense in the Age of Everything: From BMDS to IAMD: Challenges, Opportunities, and Recommendations for the Asia-Pacific Theater," *Issues & Insights*, vol.16, no.6, April 2016, pp. 33-34, https://csis-prod.s3.amazonaws.com/s3fs-public/publication/issuesinsights_vol16no6.pdf.

34 Dan Goure, "Raytheon's JLENS: Building an American Anti-Access/Area Denial Capability," *National Interest*, April 22, 2016, http://nationalinterest.org/blog/the-buzz/raytheons-jlens-building-american-anti-access-area-denial-15891.

35 Dave Majumdar and Sam LaGrone, "Inside the Navy's Next Air War," *USNI News*, January 23, 2014, https://news.usni.org/2014/01/23/navys-next-air-war.

36 Paul N. Schwartz, "U.S. Navy Deploying New Measures to Counter Russian Cruise Missile Threat," CSIS, March 2015, pp. 1-6, https://csis-prod.s3.amazonaws.com/s3fs-public/legacy_files/files/publication/150311_russian_cruise_missiles.pdf.

37 "Marine Corps F-35B Integrates with NIFC-CA – Intercepts Cruise Missile Target," MDAA, September 14, 2016, http://missiledefenseadvocacy.org/missile-defense-news/marine-corps-f-35b-integrates-with-nifc-ca-intercepts-cruise-missile-target/.

38 "NIFC-CA Advances Could Allow the Navy to Use Cheaper 'Dumb' Weapons," *USNI News*, February 22, 2017, https://news.usni.org/2017/02/22/nifc-ca-advances-could-allow-the-navy-to-use-cheaper-dumb-weapons.

purpose.[39] However, some contend that the U.S. Air Force is better off cooperating with the Navy to jointly develop NIFC-CA, given that the Combat Cloud concept has not been adequately spelled out and little progress has been made on the equipment front.[40]

The U.S. Marine Corps conducted a test to link sensors on board its F-35B with the Navy's NIFC-CA in 2016.[41] For ground operations, to protect small dispersed units from aerial threats, the Marine Corps is considering using laser weapons that are newly being developed in combination with existing Stinger surface-to-air missiles, and it is expected that the laser weapons would be used primarily against UAVs.[42] For air operations, the Marine Corps is developing the Common Aviation Command and Control System (CAC2S).[43] CAC2S is operated by the Marine Corps Air-Ground Task Force (MAGTF). CAC2S consolidates information from various sensors in the MAGTF area of operations into one system. An operational test of CAC2S has been successfully carried out in 2016.[44]

2. Collaboration between the United States and its Allies/Partners on IAMD

(1) Overall

IAMD requires integration of the U.S. Forces' capabilities, as was already mentioned, and at the same time, must be implemented in collaboration with U.S. allies and partners. This collaboration necessitates significant time, such as for diplomatic efforts, partnership building, or treaty negotiation. Furthermore, the United States considers that its partners should be encouraged to invest in their own IAMD systems that are interoperable with U.S. and allied systems.[45]

For this reason, the United States engages in efforts to promote IAMD cooperation with allies and partners. These efforts include regional-based ones, which will be discussed later, as well as trans-regional ones. An example of the latter is the Nimble Titan exercise conducted by JFCC-IMD and hosted by the U.S. Strategic Command. In recent years, the exercise has been participated by not only the United States and European countries but also Middle Eastern and Asian countries,[46] and is a global IAMD effort that is not restricted to particular regions. Nimble Titan began as a classified exercise only involving the United States in 2002, based on a missile defense exercise conducted in the 1990s. From the following year, 2003, it became a bilateral exercise with the United Kingdom joining, and since 2006, has been a multilateral, unclassified exercise conducted every other year. As a result, the content of the exercise, initially limited to

---

39 "ACC Intel Head Seeks Help Creating the 'Combat Cloud'," *Breaking Defense*, October 28, 2015, http://breakingdefense.com/2015/10/acc-intel-head-seeks-help-creating-the-combat-cloud/.

40 Dave Majumdar, "Why the Air Force Must Adopt the Navy's Lethal New Weapon," *National Interest*, October 26, 2015, http://nationalinterest.org/blog/the-buzz/why-the-air-force-must-adopt-the-navys-lethal-new-weapon-14170.

41 "Marine Corps F-35B Integrates with NIFC-CA".

42 "Marines to Pair Laser Weapon with Stinger Missile for Mobile Ground Unit Protection," *USNI News*, June 23, 2016, https://news.usni.org/2016/06/23/walsh-directed-energy.

43 "2016 Major Automated Information System Annual Report: Common Aviation Command and Control System Increment 1 (CAC2S Inc 1)," Defense Acquisition Management Information Retrieval, March 2016, http://www.dtic.mil/dtic/tr/fulltext/u2/1019583.pdf.

44 "General Dynamics conducts operational test of US Marine Corps' CAC2S system," *Naval Technology*, September 25, 2016, https://www.naval-technology.com/news/newsgeneral-dynamics-conducts-operational-test-of-us-marine-corps-cac2s-system-5013349/.

45 JCS, *Joint Integrated Air and Missile Defense: Vision 2020*, p. 3.

46 U.S. Army, "NIMBLE TITAN Provides Multi-national Cooperation for Missile Defense," April 25, 2016, https://www.army.mil/article/166716/NIMBLE_TITAN_provides_multi_national_cooperation_for_missile_defense.

tactical issues of missile defense, has gradually shifted its focus to policy issues at the operational and strategic levels. In recent years, the exercise has begun to deal with IAMD challenges.[47] In particular, the exercise held in 2016 set topics focusing on IAMD,[48] and promoted the cooperation of allies and partners on IAMD.

(2) European Countries

The United States has been implementing IAMD-related programs with NATO European countries. One of them is the NATO Active Layered Theatre Ballistic Missile Defence (ALTBMD) that has been developed since 2006 and began operations in 2010. ALTBMD is aimed at protecting troops deployed to the European theater in contingencies, and is said to be able to address ballistic missiles with ranges of up to 3,000 km and air-breathing threats, such as cruise missiles. As ALTBMD is not capable of meeting the needs for protecting not only troops but also NATO territory from various types of ballistic missile threats, the United States proposed the European Phased Adaptive Approach (EPAA).[49]

EPAA represents a plan to deploy the U.S. missile defense system to Europe in phases in response to the advances in ballistic missile threats to the United States and NATO European countries. President Obama announced its concept in October 2009.[50] EPAA consists of four phases. In Phase 1, the goal is to provide initial defense capability against short-range ballistic missiles (SRBM) and medium-range ballistic missiles (MRBM). It was decided that by 2011, an Aegis ship carrying SM-3 Block IA interceptor missiles and ground-based mobile AN/TPY-2 radars would be deployed to Europe and C2BMC to control them in a centralized manner would be located at Ramstein Air Force Base in Germany.[51] Phase 2 of EPAA involves constructing an SM-3 Block IB missile ground-based Aegis system (Aegis Ashore) in Romania by 2015 to improve the defense capability against MRBM.[52] The Aegis Ashore constructed in Deveselu, Romania has begun operations in May 2016.[53]

EPAA is currently in Phase 3. With the objective of defending against intermediate-range ballistic missiles (IRBM), work is under way, such as plans to construct Aegis Ashore, the centerpiece of which is SM-3 Block IIA missiles, in Poland and upgrading the combat system

---

47 Andreas Schmidt, "Nimble Titan: Ballistic Missile Defence in a Regional, Cross-Reginal and Global Environment," *Journal of the Joint Air Power Competence Center*, ed. 22, Spring/Summer 2016, pp. 29-33, https://www.japcc.org/wp-content/uploads/JAPCC_Journal_Ed-22.pdf.

48 "Statement by Lieutenant General David L. Mann, USA, Commanding General, U.S. Army Space and Missile Defense Command/Army Forces Strategic Command and Joint Functional Component Command for Integrated Missile Defense before the Committee on Armed Services Strategic Forces Subcommittee, United States Senate," Second session, 114th Congress, April 13, 2016, p. 14, http://www.armed-services.senate.gov/imo/media/doc/Mann_04-13-16.pdf.

49 Luc Dini, "Air and Missile Defence in Europe: Building a Consensus," Friends of Europe, April 1, 2015, http://www.friendsofeurope.org/security/air-missile-defence-europe-building-consensus.

50 U.S. Navy, "Aegis Ashore Missile Defense System – Romania Operationally Certified," May 12, 2016, http://www.navy.mil/submit/display.asp?story_id=94662.

51 "Unclassified Statement by Lieutenant General Patrick J. O'Reilly, Director, Missile Defense Agency before the Senate Armed Services Committee, Subcommittee on Strategic Forces Regarding the FY2012 Budget Request for Missile Defense," April 13, 2011, pp. 7-8, http://www.airforcemag.com/SiteCollectionDocuments/Reports/2011/April%202011/Day15/041311oreilly.pdf.

52 "Statement of General Philip Breedlove, Commander U.S. Forces Europe," Senate Armed Services Committee, April 30, 2015, p. 22, http://www.armed-services.senate.gov/imo/media/doc/Breedlove_04-30-15.pdf.

53 U.S. Navy, "Aegis Ashore Missile Defense System – Romania Operationally Certified".

of Aegis ships.[54] Although Phase 3 was supposed to be completed in 2018, it is expected to be extended to 2020 due to factors such as delays in the construction of Aegis Ashore.[55] The plan for Phase 4 of EPAA was to upgrade Aegis Ashore under construction in Poland to SM-3 Block IIB missiles by 2022, but the United States announced the plan's cancellation in March 2013. If the latest missile is deployed as scheduled, ICBMs heading to the United States from Iran could be intercepted from Europe, and this caused strong opposition from Russia on the grounds that its ICBMs would be intercepted in a similar manner.[56] Some contend that the ongoing Phase 3 will also deteriorate relations with Russia and should be cancelled.[57]

In addition, the United States has established plans to jointly develop Medium Extended Air Defense System (MEADS) with Germany and Italy since 1995. MEADS is a system for intercepting SRBMs and cruise missiles in the middle layer of missile defense between the Stinger missile and THAAD, and was considered a successor of the Patriot system.[58] Because of rising development costs and repeated delays in the deployment schedule, the United States announced the cancellation of the MEADS plan in 2011. While Germany and Italy have kept the MEADS plan, its future is uncertain.[59]

(3) Middle Eastern Countries

IAMD programs in the Middle East are primarily conducted through cooperation with the Gulf Cooperation Council (GCC) countries. The U.S. Air Forces Central Command maintains limited cooperation on missile defense with GCC countries through the Combined Air Operations Center (CAOC) at Al Udeid Air Base in Qatar and the Gulf Air Warfare Center (GAWC) at Al Dhafra Air Base in the United Arab Emirates (UAE). Notably, the UAE operates the IAMD Center at Al Bateen Air Base in the UAE with the U.S. Forces[60] and is thought to lead GCC countries in the development of an IAMD system.[61] This IAMD Center conducts education and training for both ballistic missile and cruise missile defense using approaches based on simulation and modeling.[62]

Meanwhile, the Middle East has seen constant military operations that put IAMD to the test. In the Yemen civil war, for example, ever since Saudi Arabia entered the war in March 2015, a

---

54 "The European Phased Adaptive Approach at a Glance," Fact Sheets & Briefs, Arms Control Association, July 2017, https://www.armscontrol.org/print/4392.

55 "Crucial Polish Missile Defense Site Delayed Two Years: MDA," *Breaking Defense*, March 23, 2018, https://breakingdefense.com/2018/03/crucial-polish-missile-defense-site-delayed-two-years-mda/.

56 "The Administration Yanks a Missile That Upset Russia," *Washington Post*, March 29, 2013, https://www.washingtonpost.com/opinions/the-administration-yanks-a-missile-that-upset-russia/2013/03/19/aec6da52-90ca-11e2-bdea-e32ad90da239_story.html?noredirect=on&utm_term=.b78d20aa61a6.

57 Tytti Erästö, "Press Pause on Missile Defense in Europe," Ploughshares Funds, November 15, 2016, https://www.ploughshares.org/issues-analysis/article/press-pause-missile-defense-europe.

58 "Medium Extended Air Defense System (MEADS)," *Missile Threat*, CSIS, June 16, 2016, https://missilethreat.csis.org/defsys/meads/.

59 "Beyond Patriot? The Multinational MEADS Air Defense Program," *Defense Industry Daily*, March 9, 2018, https://www.defenseindustrydaily.com/34b-development-contract-signed-for-meads-0639/.

60 Lynn E. Davis and David E. Thaler, "The Days after a Deal with Iran: Implications for the Air Force," *Perspective*, RAND, 2015, pp. 4-5, https://www.rand.org/content/dam/rand/pubs/perspectives/PE100/PE137/RAND_PE137.pdf.

61 Jon B. Alterman and Kathleen H. Hicks, "*Federated Defense in the Middle East*," A Report of the Federated Defense Project, CSIS, September 2015, p. 35, https://csis-prod.s3.amazonaws.com/s3fs-public/legacy_files/files/publication/150909_Alterman_FederatedDefMiddleEast_Web.pdf.

62 Marc V. Schanz, "Curtain Up at AFCENT's Air Warfare Center," *Air Force Magazine*, January 12, 2015, http://www.airforcemag.com/Features/Pages/2015/January%202015/Curtain-Up-at-AFCENT%E2%80%99s-Air-Warfare-Center.aspx.

Saudi-led coalition has continued air raids on the Houthi rebel group, which took effective control over Yemen's capital of Sana'a with the support of Iran. The consecutive air raids have killed and wounded not only Houthi fighters but also many Yemeni civilians and have been strongly condemned by the international community. The United States thus announced that it would review its support for Saudi Arabia, its ally.[63]

The Houthis has also repeatedly carried out small-scale attacks around the border since Saudi Arabia's entry into the war. In June 2015, it fired a Scud missile into Saudi Arabian territory for the first time and escalated the attacks. While the Scud attack was intercepted by Patriot missiles of Saudi forces, it demonstrated that the coalition's air raids have failed to sufficiently destroy the Houthis' stocks of ballistic missiles and other assets.[64] Moreover, the Houthis' missile attacks have also been directed at the United States that backs Saudi Arabia. In October 2016, a U.S. vessel was attacked by anti-ship missiles fired from Houthi-controlled areas. Although the attack on the U.S. vessel ended in failure, the U.S. Navy deemed that coastal radars in Houthi-controlled areas were involved in the attacks, and upon receiving the authorization of President Obama, fired cruise missiles on these radar sites and destroyed them.[65]

(4) Asia-Pacific Countries

The United States' IAMD initiatives have also been expanded to the Asia-Pacific region. The U.S. Pacific Command and U.S. Air Forces Pacific established the Pacific IAMD Center in Hawaii in October 2014, and have sought to increase multilateral IAMD capabilities in the Asia-Pacific and enhance related education and training.[66] With regard to ballistic missile defense, Aegis ships of the U.S. Navy regularly work with the Japan Maritime Self-Defense Force and the Republic of Korea (ROK) Navy to maintain the necessary posture. At the same time, the U.S. Army has deployed Patriot units in the ROK and Okinawa and monitors North Korea's missile launches using AN/TPY-2 radars.[67] In addition, THAAD units have been deployed to Guam since 2013, and their deployment to the ROK was also decided in 2016.[68]

Aside from Japan and the ROK, the United States has IAMD cooperation with Australia. The United States supports IAMD capacity-building of the Australian forces, including a new C2 system and air and missile defense system.[69] In 2015, the United States conducted a briefing and exchanged views on IAMD with the officers of the Armed Forces of the Philippines who

---

63 "US Says Support for Saudi Arabia Not a 'Blank Cheque' after Yemen Air Raid," *The Guardian*, October 9, 2016, https://www.theguardian.com/world/2016/oct/09/saudi-arabia-investigate-air-raid-on-funeral-in-yemen.

64 "Saudi Arabia Shoots Down Missile Fired from Yemen," *New York Times*, June 6, 2015, https://www.nytimes.com/2015/06/07/world/middleeast/saudi-arabia-shoots-down-missile-fired-from-yemen.html?_r=0.

65 "U.S. Military Strikes Yemen after Missile Attacks on U.S. Navy Ship," *Reuters*, October 13, 2016, http://www.reuters.com/article/us-yemen-security-missiles-idUSKCN12C294.

66 Ian E. Rinehart, Steven A. Hildreth and Susan V. Lawrence, "Ballistic Missile Defense in the Asia-Pacific Region: Cooperation and Opposition," *Congressional Research Service*, R43116, April 3, 2015, p. 14, https://fas.org/sgp/crs/nuke/R43116.pdf.

67 Dorner, Hartman, and Teague, "Back to the Future," pp. 69-70.

68 "With Eye on North, U.S. to Deploy THAAD Missile Defense System in South Korea," *Pacific Daily News*, July 11, 2016, https://www.guampdn.com/story/news/2016/07/10/eye-north-us-deploy-thaad-missile-defense-system-south-korea/86925116/.

69 U.S. Army, "Sea Dragon 6 Talks PACOM IAMD Opportunities/Initiatives at AUSA," February 10, 2017, https://www.army.mil/article/182268/sea_dragon_6_talks_pacom_iamd_opportunitiesinitiatives_at_ausa.

were visiting Hawaii, focusing on U.S. missile defense in the Asia-Pacific theater.[70] Through such efforts, the United States proactively promotes its IAMD initiatives to its allies and partners in the Asia-Pacific.

It should be noted that these initiatives primarily concern active defense in the IAMD concept and do not include attack operation initiatives. While Dorner et al. state that the United States works with allies such as Japan and the ROK on active defense, including missile defense, they note that the United States conducts attack operations "at the time and place of its choosing" and do not touch upon the involvement of U.S. allies.[71] In the aforementioned Yemen civil war, although the United States seeks to review its support for Saudi Arabia, a U.S. ally, the U.S. Forces conducts retaliatory attacks against the Houthis at U.S. discretion. This is one of the issues of the IAMD concept that are discussed below.

3. Issues Inherent in IAMD

(1) Issues for the United States

A. Offense/defense integration

The United States explains the objective of IAMD as: to first deter an enemy's use of air and missile assets.[72] Missile defense, as a means of deterrence by denial, seeks to deny coercion by the enemy and deter their use of air and missile assets by placing doubt in the minds of the enemy about achieving their objective.[73] Missile defense is a means for defensive counterair (DCA); it is believed that DCA integrated with offensive counterair (OCA) would make a significant contribution to deterrence by denial. In *Deterrence Operations: Joint Operating Concept* released in 2006, the U.S. DoD notes that enabling offense/defense integration by incorporating long-range offensive weapons into the intelligence, surveillance and reconnaissance (ISR) and C2 systems of missile defense, and integrating them with attacks on the enemy's strategic bases, will increase the deterrent effect by denying benefits for the enemy.[74]

While the concept for IAMD enshrines integration between DCA and OCA, there has been insufficient discussion in the United States on the specifics of how the two would be integrated in the IAMD architecture and how deterrence would be achieved through their integration. Stefan Soesanto contends that the United States has fallen short on linking the existing missile defense system for homeland defense with offensive forces.[75] Furthermore, Air University in the United States points out that, since 2004, most IAMD-related projects have been focused on missile

---

70 U.S. Army, "Sea Dragons Share IAMD Vision with AFP CGSC," September 3, 2015, https://www.army.mil/article/155006/sea_dragons_share_iamd_vision_with_afp_cgsc.

71 Dorner, Hartman, and Teague, "Back to the Future," pp. 69-74. The ROK develops its own capabilities to deter North Korean nuclear and missile attacks, such as kill chain, Korea Air and Missile Defense (KAMD), and Korea Massive Punishment & Retaliation (KMPR). However, their relationship with the U.S. IAMD is unclear. "South Korea Mulls Ballistic Missile Test," *The Diplomat*, February 16, 2017, https://thediplomat.com/2017/02/south-korea-mulls-ballistic-missile-test/; National Institute for Defense Studies, *East Asian Strategic Review 2016*, pp. 98-104.

72 JCS, *Joint Integrated Air and Missile Defense: Vision 2020*, p. 2.

73 S. Edward Boxx, "Building a Ballistic Missile Defense," *Indo-Asia-Pacific Defense Forum*, January 11, 2016, http://apdf-magazine.com/building-a-ballistic-missile-defense/.

74 Department of Defense, *Deterrence Operations Joint Operating Concept*, Version 2.0, December 2006, p. 37, http://www.jcs.mil/Portals/36/Documents/Doctrine/concepts/joc_deterrence.pdf?ver=2017-12-28-162015-337.

75 Soesanto, "US Missile Defense in the Age of Everything," p. 28.

defense, expressing the view that IAMD is a concept that attaches importance only to DCA.[76] A similar view is found in the lessons learned about IAMD presented by the U.S. Air Forces related to the Key Resolve 2010 U.S.-ROK combined military exercise held in 2010. It states that considering the very short flight time of North Korea's ballistic missiles targeted at the ROK, coupled with North Korea's robust air force power, attention should be given to addressing IAMD not only as missile defense but also as DCA on the whole, including air defense, and as OCA aspects.[77]

Meanwhile, the U.S. Forces is considering the option of IAMD attack operations. The U.S. Navy promotes Distributed Lethality, a concept that seeks to deter an enemy by arming all vessels deployed across a wide area with offensive weapons and complicating the enemy's situational decision-making.[78] Sydney J. Freedberg, Jr. notes that the U.S. Army ultimately intends to incorporate offensive weapons into the IBCS network. By doing so, "the same sensors that warn defensive systems of an incoming attack can also cue offensive systems" within IBCS.[79]

Under the concept, both kinetic and non-kinetic weapons are included in IAMD capabilities. It is thus conceivable that as an attack option, the C2 of an enemy's missile base is incapacitated before a missile launch using non-kinetic weapons, for example, cyber weapons. However, because the concrete capabilities of cyber weapons have not been declassified, it is difficult to discuss how such capabilities could be used to hack and incapacitate an enemy's C2 network. Freedberg notes that not even the U.S. Forces necessarily have IAMD staff with sufficient knowledge on cyber weapon capabilities.[80]

B. Operational and equipment issues

Achieving the IAMD concept requires integrating all U.S. IAMD assets by a network. However, issues have been raised over the arrangements of the U.S. Forces that are a prerequisite for the networking of assets. For example, while it is technically feasible for the aforementioned NIFC-CA of the U.S. Navy to connect the various aircraft assets possessed by the Navy, this requires mutual coordination between the Naval Sea Systems Command (NAVSEA) that owns NIFC-CA and Naval Air Systems Command (NAVAIR) that owns aircraft. While such coordination has begun between the two sides, NAVSEA and NAVAIR have their own kill chains employing anti-air assets and anti-surface assets, respectively, and integrating these kill chains into a single kill chain of the Navy first requires mutual understanding of their respective requirements. At present, no vision has been set out based on this process.[81]

The Army's IBCS was to achieve initial operational capabilities in 2018 under the initial

---

76 "Doctrine Advisory on Counterair and Integrated Air and Missile Defense (IAMD)," Air University, January 15, 2015, http://www.doctrine.af.mil/Portals/61/documents/doctrine_updates/du_15_01.pdf.

77 "A Look at Integrated Air and Missile Defense," Office of Air Force Lessons Learned (HQ USAF/AL9) & 7 Air Force, July 13, 2010, pp. 5-6, https://info.publicintelligence.net/USAFmissiledefense.pdf.

78 Scott C. Truver, "Navy's Distributed Lethality Will Reshape Fleet," *Breaking Defense*, October 9, 2015, https://breakingdefense.com/2015/10/navys-distributed-lethality-will-reshape-fleet/.

79 Sydney J. Freedberg, Jr., "Army Explores New Missile Defense Options," *Breaking Defense*, February 18, 2015, https://breakingdefense.com/2015/02/army-explores-new-missile-defense-options/.

80 Sydney J. Freedberg, Jr., "Cyber, EW are Secret Missile Defense Weapons Too Secret to Use," *Breaking Defense*, December 4, 2015, https://breakingdefense.com/2015/12/cyber-ew-are-secret-missile-defense-weapons-too-secret-to-use/.

81 "Navy Expanding NIFC-CA to Include Anti-Surface Weapons, F-35 Sensors," *USNI News*, June 22, 2016, https://news.usni.org/2016/06/22/nifcca-expands-sm6-f35.

plan. This has been extended to 2022, and there are concerns about further delays.[82] An IBCS operational test conducted in 2016 found numerous problems, such as erroneous display of target tracks due to software problems and delays in anti-air combat due to workstation malfunctions. In response, the Army decided to hold off the transition to the IBCS production phase scheduled for October 2016.[83] IBCS must include the Army's existing assets such as PAC-3 and THAAD as well as systems under development like IFPC and future weapons technologies like laser weapons. This has led to repeated reviews of the IBCS development plan tailored to new operational requirements, causing rising development costs and deployment postponements.[84]

With regard to the Army's JLENS, in 2015, the blimp that had been moored in the skies of Maryland drifted to Pennsylvania, dragging its tether cable, and caused power outages by cutting off power lines in Pennsylvania. Following this incident, Congress, which had been skeptical of JLENS' development from the start, made major cuts to its budget.[85] Some, on the other hand, emphasize the usefulness of JLENS in U.S. homeland defense. Dan Goure notes that the 2015 incident in Pennsylvania had nothing to do with the essential function fulfilled by JLENS and that JLENS is necessary to defend the U.S. capital of Washington, D.C. by detecting low-flying cruise missiles and aircraft.[86]

Even if these issues of IAMD system development are resolved and an IAMD network is established, there still remain issues relating to network maintenance and operations. It is always possible that an enemy's attack in the battlefield disconnects some or a large part of the IAMD network. Networking assets could also lead to excessive interference by senior leadership. In the NIFC-CA example, there is the alleged risk that if an enemy's jamming causes partial damage to the network, it could result in serious impacts on the data transmission of NIFC-CA. In addition, there is concern that since the common operational picture (COP) provided by NIFC-CA enables the visualization of the battlefield, this could lead senior leadership to micro-manage the tactical actions of units from locations far away from the battlefield.[87]

Moreover, as the missile defense system, which forward deploys assets such as PAC-3, THAAD, and Aegis ships, is exposed to attacks of the enemy, measures are needed to protect the system from these attacks. In some cases, it is conceivable that additional units are assigned to protect these systems. In this light, Soesanto states that it is not desirable from a cost-effectiveness perspective for the United States to keep investing more in strengthening missile defense.[88]

---

82 Dan Goure, "U.S. Army Could Build an Integrated Air and Missile Defense Now," *Real Clear Defense*, May 10, 2018, https://www.realcleardefense.com/articles/2018/05/10/us_army_could_build_an_integrated_air_and_missile_defense_now_113427.html.

83 Jen Judson, "Army Falls behind with New Anti-Missile Command System," *Defense News*, February 6, 2017, https://www.defensenews.com/land/2017/02/06/army-falls-behind-with-new-anti-missile-command-system/.

84 Sydney J. Freedberg, Jr., "Army IBCS Missile Defense System Tracks Jets despite Jamming," *Breaking Defense*, December 12, 2017, https://breakingdefense.com/2017/12/army-icbs-missile-defense-system-tracks-jets-despite-jamming/.

85 Jen Judson, "Congress Nails Runaway Blimp's Coffin Shut," *Defense News*, May 27, 2016, https://www.defensenews.com/land/2016/05/27/congress-nails-runaway-blimp-s-coffin-shut/.

86 Goure, "Raytheon's JLENS".

87 Majumdar and LaGrone, "Inside the Navy's Next Air War".

88 Stefan Soesanto, "Throwing Money at Missile Defense Won't Fix It," *Defense One*, May 6, 2016, https://www.defenseone.com/ideas/2016/05/throwing-money-missile-defense-wont-fix-it/128093/.

(2) International Issues

A. Relationship with allies and partners

IAMD involves multilateral operations including allies and partners. Therefore, the relationship between IAMD and diplomacy is sometimes manifested in the form of international negotiations regarding operational requirements. For example, the joint force commander of the U.S. Forces may negotiate with relevant countries regarding the rules of engagement (ROE) and combat identification (CID) related to air and missile defense.[89] It is thought that the commanders of the geographic Combatant Commands of the U.S. Forces usually negotiate with allies and partners in their theater and tailor IAMD to the characteristics of the operations in their respective areas of responsibility (AOR). In the case of cross-AOR envisioned by IAMD,[90] more complex negotiations are expected as the number of countries involved increases.

Such negotiations are also needed to develop international IAMD arrangements. The United States seeks to pursue an Asia-Pacific Phased Adaptive Approach (APPAA) following EPAA in Europe, and it is reported that the weapons (e.g., PAC-3, Aegis interceptor system) and sensors necessary for Phase 1 of APPAA have already been deployed. To pursue an APPAA, the United States must negotiate with its allies and partners in the Asia-Pacific to resolve ROE and various C2 issues related to missile defense.[91] Colonel S. Edward Boxx in charge of the U.S. Pacific Command's IAMD notes that "their [these weapons and sensors'] overall effectiveness is severely reduced if not integrated in planning and execution."[92] U.S. efforts to promote its vision for IAMD among allies and partners, such as through the Nimble Titan exercise and IAMD Centers in a variety of regions, are considered to be meaningful as preparations to smoothly carry out the above international negotiations.

A contested issue in international IAMD negotiations is likely the integration of C2 systems. Their integration is essential for implementing efficient and effective joint operations while avoiding duplicative fire against the same target and fratricide. To achieve this, the C2 systems of the United States and allies/partners need to be integrated by a common network, and data necessary for the creation of COP and common tactical picture (CTP) must be shared among the countries.[93] Different C2 systems cannot be integrated by a network if there is no interoperability among the C2 system of each country. Further still, data sharing requires countries to coordinate their foreign disclosure policies.[94]

B. Relationship with Russia and China

Advances in U.S. IAMD could have adverse effects on strategic stability with Russia and China. Some have already pointed out that the deployment of the U.S. missile defense systems to Europe

---

89 JCS, *Countering Air and Missile Threats*, II-17, II-18.

90 Ibid., I-7.

91 Rinehart, Hildreth and Lawrence, "Ballistic Missile Defense in the Asia-Pacific Region," pp. 3-4.

92 Boxx, "Building a Ballistic Missile Defense".

93 Bogdan Grenda, "Modernisation of the Polish Air Force Command and Control System," *Zeszyty Naukowe*, AON nr 4 (101), 2015, pp. 5-11, http://yadda.icm.edu.pl/yadda/element/bwmeta1.element.baztech-4b9b4d9a-dd80-45d3-8de5-9675d7b0a522/c/Grenda.pdf.

94 JCS, *Countering Air and Missile Threats*, II-18.

and Asia has presented a security dilemma with China and Russia.[95] Thomas Karako emphasizes evolving NATO's current EPAA plans into a European IAMD. According to Karako, NATO's missile defense system having limited capabilities from the start is not targeted at Russia's strategic nuclear forces, and even if EPAA were evolved into a European IAMD, it would remain "purely defensive" in nature.[96] In contrast, Vyacheslav Trubnikov, former Director of the Russian Foreign Intelligence Service, warns against NATO's unilateral pursuit of IAMD with no regard for Russian interests, and contends that IAMD in Europe should be pursued in cooperation with Russia.[97]

In Europe, there is also debate that NATO's IAMD could provide a means for using conventional weapons to prevent a crisis (escalation control) to counter the threat of Russia's limited nuclear use. There is rising concern among NATO member states over Russia's "de-escalatory use of nuclear weapons," i.e., that Russia would resort to limited use of nuclear weapons to end a regional conflict in a manner favorable to Russia, by undermining the resolve of NATO.[98] On the other hand, an Estonian researcher suggests that even if Russia launched a single "de-escalatory" shot, it would not undermine the resolve of NATO if IAMD effectively intercepts the nuclear weapon.[99] In such a scenario, NATO retains the option of nuclear retaliation, and therefore, can prevent Russia from further escalating the situation. Such discussions indicate, however, that Russia's threat is included in the scope of NATO's IAMD and could cause Russia to become wary.

The fact that the IAMD concept encapsulates attack operations may be another destabilizing factor in U.S.-China and U.S.-Russia relations. Missile defense is already being discussed in connection with attack options. For example, Andrew Korybko stresses that the anti-satellite weapons, laser weapons, and railguns being developed by the United States as "missile defense technology" function as a "first-strike enabler," and that the United States is considering not missile defense but preemptive attacks against Russia using these weapons.[100] While Korybko's discussion concerns missile defense and does not refer to IAMD, this type of discussion regarding the IAMD vision that encapsulates attack operations is expected to become more radical.

To counter the United States' promotion of IAMD, both China and Russia are strengthening their own IAMDs. In December 2012, Valery Gerasimov, Chief of the General Staff of the Armed Forces of Russia, announced that the Collective Security Treaty Organization consisting of six

---

95 Robert A. Pape, "Soft Balancing against the United States," *International Security*, vol.30, no.1, Summer 2005, pp. 7-45; Reuben Steff, *Strategic Thinking, Deterrence and the US Ballistic Missile Defense Project: From Truman to Obama* (Farnham: Ashgate, 2013), ch.6, pp. 117-138.

96 Thomas Karako, "Looking East: European Air and Missile Defense after Warsaw," CSIS, July 14, 2016, https://www.csis.org/analysis/looking-east-european-air-and-missile-defense-after-warsaw.

97 Trubnikov refers not to IAMD but to AMD (air and missile defense). Vyacheslav Trubnikov, "EuroAMD: Cooperation or confrontation?" *Anti-Ballistic Missile Defense*, Moscow 2012, pp. 142-144, http://stat.mil.ru/files/Anti-ballistic/19_Trubnikov_eng.pdf.

98 Michito Tsuruoka, "NATO ni okeru Kaku Taisei no Shintenkai: Warushawa Shunokaigo Comyunike wo yomu [New Developments in NATO's Nuclear Posture: An Analysis of the Warsaw Summit Communiqué]," NIDS Commentary, no.54, October 6, 2016, p. 3, http://www.nids.mod.go.jp/publication/commentary/pdf/commentary054.pdf.

99 Tomas Jermalavičius, "NATO's Ballistic Missile Defence System and Dialogue with Russia: From 'Talking Past Each Other' to Facing down a Bully?" in Andris Sprūds and Diāna Potjomkina, eds., *Riga Dialogue Afterthoughts 2016: Building Bridges for Euro-Atlantic Security*, Latvian Institute of International Affairs, 2016, pp. 62-70, http://liia.lv/en/publications/riga-dialogue-afterthoughts-2016-building-bridges-for-euro-atlantic-security-542?get_file=1.

100 Andrew Korybko, "US 'Missile Defense': Satellites, Lasers, and Electromagnetic Railguns," Russian Institute for Strategic Studies, September 22, 2015, https://en.riss.ru/analysis/18912/. Korybko is an American political analyst with Russia's Sputnik News.

former Soviet Union countries plans to build an IAMD system.[101] In addition, Russia is moving forward with the deployment of the new S-350 and S-500 surface-to-air missile systems with IAMD capabilities to replace the current S-300 and S-400 systems.[102] With regard to China, some view that its unique IAMD system is included in the country's A2/AD capabilities. Michael Green et al. state that a considerable number of high performance aircraft, such as the B-2 bomber, would be needed to penetrate China's sophisticated air defense system and execute an attack operation from faraway.[103] Jason D. Ellis notes that China has been increasing its non-nuclear ballistic missile and cruise missile assets and strengthening its IAMD system. He states that for the United States to curb China's actions, it would help not only to enhance U.S. military capabilities but also to seek to strengthen the military capabilities of its allies and partners through arms exports and security cooperation as well as improve interoperability through combined exercises and other measures.[104]

C. Response to non-state actors

Along with the inter-state relations discussed so far, responses to air and missile attacks by non-state actors are also emerging as international issues. Since the 9.11 incident in 2001, terrorism has come to be seen as no longer a domestic issue but an international security issue. With respect to IAMD, addressing air and missile threats by so-called violent non-state actors (VNSAs)[105] has become an urgent issue. For example, at the Prague Summit in November 2002, NATO set out military activities it could conduct for anti-terrorism, which included maintaining the integrated air defense system and providing missile defense.[106] It is believed that responses to air and missile threats by VNSAs were deemed necessary following 9.11, considering that it was a terrorist attack utilizing aircraft.

Air and missile threats by VNSAs are becoming a reality in the Middle East. In response to Israel's military operation against the Gaza strip in 2012, Islamic fundamentalist organization Hamas launched 1,500 rockets towards Israel over the course of eight days. However, Israel's short-range missile defense system Iron Dome intercepted and destroyed 84% of the rockets.[107] Mark E. Vinson and John Caldwell assess that against VNSAs with improving missile technologies, Israel successfully conducted an IAMD operation combining active defense through Iron Dome; passive defense through measures to protect the people, such as early warning and protective shelters; and

---

101 "Post-Soviet military alliance reaffirms missile defense plan," *Kazinform*, December 5, 2012, https://www.inform.kz/kz/post-soviet-military-alliance-reaffirms-missile-defense-plan_a2515825.

102 Dave Majumdar, "Russia's Deadly S-500 Air-Defense System: Ready for War at 660,000 Feet," *National Interest*, May 3, 2016, http://nationalinterest.org/blog/russias-deadly-s-500-air-defense-system-ready-war-660000-16028.

103 Michael Green, et al, "Asia-Pacific Rebalance 2025: Capabilities, Presence, and Partnerships," CSIS, January 2016, pp. 4, 122, https://csis-prod.s3.amazonaws.com/s3fs-public/legacy_files/files/publication/160119_Green_AsiaPacificRebalance2025_Web_0.pdf.

104 Jason D. Ellis, "Seizing the Initiative: Competitive Strategies and Modern U.S. Defense Policy," Center for Global Security Research, Lawrence Livermore National Laboratory, January 2016, p. 18, https://cgsr.llnl.gov/content/assets/docs/J_Ellis_Seizing_the_Initiative_1_16.pdf.

105 Mark E. Vinson and John Caldwell, "Violent Nonstate Actors with Missile Technologies: Threats beyond the Battlefield," National Defense University Press, January 1, 2016, http://ndupress.ndu.edu/Media/News/Article/643227/violent-nonstate-actors-with-missile-technologies-threats-beyond-the-battlefield/.

106 Alaa A. H. Abd Alaziz, "Balance of Threat perception and the prospects of NATO Mediterranean Dialogue," Final Report for the institutional research fellowship programme 2001-2003, June 2003, p. 26, https://www.nato.int/acad/fellow/01-03/alaziz.pdf.

107 TNO, *Missile Defence*, p. 16.

attack operations such as air raids on the Gaza strip.[108]

In addition to missiles, the use of UAVs by VNSAs is becoming a salient threat in the Middle East. It is reported that the Islamic State of Iraq and the Levant (ISIL) used UAVs to conduct battlefield reconnaissance and collected target information on enemies such as Peshmerga, security forces of the autonomous Kurdish government, while in Syria, Hezbollah attached bomblets to UAVs and attacked rebel forces.[109]

Air and missile threats by VNSAs are not an exception in Asia. Some have noted the danger of nuclear weapons and ballistic missiles being developed by North Korea proliferating to international terrorist groups that target the United States and its allies.[110] Vinson and Caldwell state that air and missile threats by VNSAs are not confined to the Middle East and are spreading worldwide, and that to respond to these threats, the United States should strive to develop "international and regional security cooperation partnerships for IAMD" with its allies and partners.[111]

4. Impact on Japan's Ministry of Defense and Self-Defense Forces

(1) Impact of U.S. Progress in IAMD on the Japan-U.S. Alliance

As has been discussed, progress in U.S. efforts for realizing IAMD, in turn, requires allies and partners to engage in concrete efforts to advance IAMD. With increasing air and missile threats in the international community, the United States recognizes the growing appetite of its allies and partners for IAMD, and considers building interoperable IAMD systems with allies and partners as being favorable from a cost-sharing perspective.[112] Based on this recognition, it is expected that the United States will seek greater understanding and cooperation from its ally, Japan, on building an interoperable IAMD system with the United States. Such developments are already in the works; in November 2015, then Minister of Defense Gen Nakatani exchanged views regarding IAMD with the Commander of the U.S. Pacific Air Forces.[113]

Specifically, these developments are anticipated to impact aspects of IAMD such as Japan-U.S. joint operations as well as defense equipment and technology cooperation. First, with regard to joint operations, as was already mentioned, the integration of C2 systems will likely become a contested issue in international IAMD negotiations. Under the Japan-U.S. Alliance, it is expected that Japan and the United States would need to set out concrete measures on integrating their C2 systems in accordance with the U.S. vision for IAMD. This requires that the two countries constantly share awareness of the situation of the air and missile threats to Japan, in order to ensure, for example, that exposure of a U.S. base in Japan to air and missile threats would not interfere with the power projection of the U.S. Forces, which are to support the defense of Japan. To this end, it is necessary to make sure that Japanese and U.S. C2 systems related to IAMD are linked together and then further promote information sharing between the two countries, including COP and CTP data.

---

108 Vinson and Caldwell, "Violent Nonstate Actors with Missile Technologies".

109 "Counter-Drone Exercise Black Dart Expands, Moves to Eglin AFB".

110 Robert G. Sutter, *The United States and Asia: Regional Dynamics and Twenty-First Century Relations* (Lanham, MD: Rowman & Littlefield, 2015), p. 137.

111 Vinson and Caldwell, "Violent Nonstate Actors with Missile Technologies".

112 JCS, *Joint Integrated Air and Missile Defense: Vision 2020*, pp. 1, 5.

113 Extra Press Conference by the Defense Minister Nakatani, Ministry of Defense, November 25, 2015, http://www.mod.go.jp/j/press/kisha/2015/11/25.html.

With regard to defense equipment and technology cooperation, the United States is developing sophisticated IAMD equipment systems, such as the Navy's NIFC-CA, and Japan will likely be asked to provide cooperation tailored to these systems. IAMD equipment systems such as NIFC-CA are developed by a "System of Systems (SoS)" method, characterized by evolutionary development where the functions and purposes of the equipment system are added, removed, or modified during the development process.[114] This demonstrates that IAMD itself is considered an evolving approach and that efforts on the equipment front will involve many unknowns. For instance, the adoption of the SoS method for the introduction or joint development of IAMD equipment systems could increase the risk of rising development costs or deployment postponements, as was the case for the U.S. Army's IBCS and MEADS in Europe.

In view of the expected impacts noted above, it is important that the Ministry of Defense (MOD) and the Self-Defense Forces (SDF) of Japan cooperate with U.S. efforts to realize IAMD in a way that helps strengthen the Japan-U.S. Alliance. Karako foresees that the development of a European IAMD would deter military attacks, improve assurance under the alliance, avoid alliance splintering, and lower Russia's potential threat.[115] Similarly, in the case of the Japan-U.S. Alliance, if the existing Japan-U.S. ballistic missile defense cooperation could be developed into a Japan-U.S. IAMD, it is expected that it would contribute to deterring not only ballistic missile attacks but also a range of air threats against Japan. In this process, it is essential that consideration be given to ensure that Japan-U.S. intentions are not misunderstood by China.

(2) Implications for the Development of Japan's Future IAMD System

It goes without saying that IAMD is part of the broader spectrum of operations, and the future IAMD system should be developed as part of the review of the future system of the whole SDF. Meanwhile, it is envisioned that IAMD operations would begin ahead of other operations and would have impacts on the success and failure of Japan's overall defense. Moreover, the air and missile threats addressed by IAMD have tended to further increase in range, speed, diversity, and components in recent years, in turn expanding the battle space to include not only existing territorial land, waters, and airspace but also cyber space. The United States pursues a vision for IAMD to deal with these threats, but developing a future IAMD system will not be a smooth process. An example is the aforementioned relationship between the U.S. Navy's NAVSEA and NAVAIR. In the case of the SDF, while a joint operations system is established for ballistic missile defense, such a system has not been established for air defense. In this regard, the development of a future IAMD system in the United States is anticipated to offer suggestions for developing a similar system in Japan.

Such systems cannot be established without personnel, equipment, and budgetary support. In particular, SDF personnel who will engage in IAMD cannot be secured overnight; it will require education and training as well as an HR system. Hideaki Kaneda of the Okazaki Institute notes that while the SDF's "Air and Ballistic missile Comprehensive Defense (ABCD)" to be established in the future is likely based on the guidelines regarding ballistic missile defense, the staff organization for this system "is comparable to the joint defense task force for ballistic missile defense, and

[114] Renee Stevens, *Engineering Mega-Systems: The Challenge of Systems Engineering in the Information Age* (Boca Raton, FL: Auerbach Publications, 2011), pp. 40-41.

[115] Karako, "Looking East".

efforts are needed to enhance and strengthen it."[116] On this point, given that the United States provides education and training to its IAMD personnel as well as the personnel of U.S. allies and partners at the IAMD Centers in the UAE and Hawaii, it is desirable to establish a similar scheme in Japan. This would allow SDF's IAMD personnel to actively participate in multilateral exercises on IAMD, including Nimble Titan, and further enrich the multilateral discussions on IAMD.

Conclusion

This paper examined the IAMD programs of the United States in light of the recent years' air and missile threats that have increased in range, speed, diversity, and components. In order to deter air and missile attacks against the United States and its allies/partners, and to counter attacks if they occur, the United States promotes a vision for IAMD which integrates attack operations, active defense, and passive defense. C2 is to achieve their integration, and a variety of equipment systems have been developed to materialize C2 in IAMD. These systems are comprised of an array of elements, ranging from global systems like the United States' C2BMC that supports long-range ballistic missile defense, to tactical systems like IFPC designed to intercept artillery shells and other short-range threats.

However, the vision for IAMD has many unknowns, and the IAMD equipment system being developed by the U.S. Forces is making whirlwind progress. This can probably be attributed to IAMD's evolving approach and the development of the equipment system by a similar method. For this reason, it is extremely difficult to gauge the overall picture of IAMD, and its implementation is expected to be a succession of trial and error. Meanwhile, IAMD also presents a "holistic" solution to address air and missile threats of the present and future.[117] Japan must continue its efforts to unify the SDF's air defense operations and ballistic missile defense, while referring to the IAMD initiatives of the United States. The United States' IAMD efforts acutely demonstrate the importance of C2 that meld air and missile defense.

---

[116] Hideaki Kaneda, *Ima Sugu Soko ni aru Saidai no Kyoi ni Sonaeyo: BMD (Dando Misairu Boei) ga Wakaru* [Be Prepared for the Largest Immediate Threat: Understanding Ballistic Missile Defense (BMD)], Revised (Tokyo: Ikaros Publications, 2016), p. 209.

[117] Weiss, "Seeing 2020".