

USAWC STRATEGY RESEARCH PROJECT

CRUISE MISSILE ATTACK: ARE WE PREPARED?

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ABSTRACT

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Is the United States prepared to defend against a low-altitude, WMD equipped cruise missile attack? Given the proliferation of WMD and cruise missile technology, the United States faces a critical defense challenge. The U.S. military has battle proven missile defense weapon systems that can augment National Missile Defense and help fill critical gap requirements. This research project answers the question of adequate missile defense by examining three supporting questions. First, will Islamic terrorists try to attack the homeland with WMD? Second, is the cruise missile a plausible means of delivery for weapons of mass destruction? Third, can we defend against this means with current capabilities? The paper ends with recommendations for a joint, interagency solution to enhance active defense of the homeland against a cruise missile attack.

CRUISE MISSILE ATTACK: ARE WE PREPARED?

The gravest danger our Nation faces lies at the crossroads of radicalism and technology. Our enemies have openly declared that they are seeking weapons of mass destruction, and evidence indicates that they are doing so with determination. The United States will not allow these efforts to succeed. ...History will judge harshly those who saw this coming danger but failed to act. In the new world we have entered, the only path to peace and security is the path of action.¹

—President George W. Bush
September 17, 2002

On 9 October 2006, North Korea shocked the world by testing a nuclear weapon joining nine other states known or suspected of having nuclear weapons. Days later, the head of the United Nations nuclear agency, Mohamed ElBaradei, warned that as many as 30 countries may have technology that would allow them to produce nuclear weapons in the near future.² There is grave concern that nuclear materials are leaving some of these countries, either knowingly or due to poor accountability, and may be in the hands of terrorists. In many cases the smuggled material could be used to build a nuclear weapon or a weapon designed to disperse radioactive material using conventional explosives known as a “dirty bomb.”

Furthermore, rapid advancement in technology provides terrorists with an increasing range of options, or means, to deliver weapons of mass destruction (WMD). It is no longer necessary to have an expensive, high-tech, missile program that only a nation-state can afford or maintain. Low-altitude cruise missiles are available at low cost on the world market. Technology even allows a group or individual to produce an accurate, low-altitude airframe capable of carrying WMD over long ranges to a target with devastating effects.

The merging of radicalism and technology demands that our nation take a hard look at our ability to defeat this new threat. Our air defenses are the finest in the world, however; there are limitations, especially in the area of low-altitude targets. The threat is upon us; we must act now.

An attack using cruise missiles equipped with weapons of mass destruction, specifically radiological or nuclear, is a very plausible and catastrophic scenario. The question is whether or not the United States is prepared to defend against a low-altitude, WMD equipped cruise missile attack? Three supporting questions are examined. First, will Islamic terrorists try to attack the homeland with WMD? This section briefly discusses the terrorist objectives (ends), the methods to achieve their objectives (ways), and the weapons they may use (means) to attack the United States. Second, is the cruise missile a plausible means of delivery for

weapons of mass destruction? And third, can we defend the homeland against a cruise missile attack with current capabilities? Recommendations are given for a joint, interagency solution to enhance active defense of the homeland against a cruise missile attack.

Target America: Ends, Ways, Means

Will Islamic terrorists try to attack the homeland with WMD? The actions of Al Qaeda on 11 September 2001, made it clear that radical Islamic terrorists want to destroy the United States and will stop at nothing, even mass murder, to achieve their aims. The intent to destroy America is seemingly universal among various Islamic terrorist groups. In 1997, a Palestinian Mufti, Sheikh Ikrama Sabri stated, "Oh Allah, destroy America, her agents, and her allies! Cast them into their own traps, and cover the White House with black!"³ Immediately following 9/11, Mullah Omar said, "the plan [to destroy] America is going ahead and God willing it is being implemented."⁴ The Al Qaeda Training Manual states: "We – with Gods help – call on every Muslim, who believes in God and wishes to be rewarded, to comply with God's order to kill the Americans and plunder their money wherever and whenever they find it."⁵ In a statement in 2004, Usama bin Laden referred to the confrontation with the United States as "a war of destiny between infidelity and Islam," and a "third world war."⁶ In January 2005, the affiliate Al Qaeda leader in Iraq, Abu Musab Al Zarqawi, stated that democracy is a rival religion to Islam and that practicing democratic principles such as freedom of speech and freedom of religion is equal to apostasy and punishable by death.⁷ The Federal Bureau of Investigation stated, "Al Qaeda and the international terrorists remain focused on the United States as their primary target."⁸ There is undeniable evidence both in words and action that Islamic terrorists want to destroy the United States. Intent is clear, it is not a question of whether or not they will attack again, it is a question of the method (ways) and weapons they will use (means).

Ways to Achieve the Ends

Some argue that terrorists are an irrational and unpredictable enemy. While it is difficult to predict exactly which US assets they may attack, history demonstrates that terrorists are fairly rational thinkers. With the intent to destroy America, the method (ways) used in 9/11 was an asymmetric attack on our economic, military and governmental/political hubs: the New York World Trade Center, the Pentagon, and Washington D.C. The enemy demonstrated the ability to plan and execute an attack on several elements of American national power. Furthermore, Al Qaeda has stated objectives of attacking American economic, military, and energy infrastructure. A rational actor knows that an asymmetric strike on high value, lucrative targets

is the best method (ways) of accomplishing the objective of damaging or destroying American way of life (ends).

Weapons of Mass Destruction as the Means

Given the ends and ways, the obvious means that a terrorist network may use are weapons of mass destruction (WMD). While biological and chemical weapons are certainly critical, our national leadership is most concerned with nuclear and radiological weapons due to their immediate and catastrophic potential. The State Department identifies nuclear terrorism as “today’s most serious national security threat.”⁹

Our leadership is concerned for good reason. Terrorists have repeatedly declared their intent to use nuclear weapons against the U.S. Not satisfied with murdering thousands of Americans and citizens from other countries including Muslims on 9/11, “Osama Bin Laden has declared his intentions to acquire and use nuclear weapons against the United States with the potential to kill hundreds of thousands.”¹⁰ Prior to 9/11 an Al Qaeda spokesman stated: “It’s easy to kill more people with uranium.”¹¹ In 2003, a Saudi cleric issued a fatwa, or religious ruling, “authorizing the use of a nuclear weapon against U.S. civilians as permissible under Islamic law.”¹² In 2004, the Director of Central Intelligence testified that Osama Bin Laden believed that acquisition of WMD was a religious obligation.¹³

Actions speak louder than words. The International Atomic Energy Agency reports that between 1993 and 2004, “there were 650 confirmed cases of illicit trafficking in nuclear and radiological materials.”¹⁴ Both the 9/11 Commission and the President’s WMD Commission conclude that Al Qaeda is actively trying to acquire a nuclear weapon and materials from the black market.¹⁵ The first known incident of Al Qaeda attempting to obtain nuclear material was in 1992 when an operative tried to purchase what he thought was enriched uranium.¹⁶ In 1998, an Al Qaeda operative was captured in Germany for attempting to purchase enriched uranium.¹⁷ Again in 2001, another Al Qaeda agent tried to acquire uranium. And in 2002, Jose Padilla was arrested on suspicion of plotting a dirty bomb attack within the U.S. After the liberation of Afghanistan, CNN uncovered a 25-page document describing the fundamentals of nuclear weapons design.¹⁸

While there is debate as to whether or not Al Qaeda actually has succeeded in obtaining a nuclear weapon or radiological materials to use in a dirty bomb, there are certainly numerous documented attempts demonstrating intent. Given the catastrophic nature of the threat and the evidence to date, we must plan for the worst case and assume they possess nuclear weapons, or at least radiological material for a dirty bomb, and that they will use them against the United

States. As stated by the Under Secretary for Arms Control and International Security, Robert G. Joseph, "To be wrong once is to have lost one of our cities. We do not have a second chance; we must take steps now to avert that dark future."¹⁹

In The National Security Strategy of the United States, the President identifies the essential task of preventing our enemies from threatening the U.S., our allies, and our friends with weapons of mass destruction.²⁰ This task is further refined in The National Defense Strategy of the United States of America, which gives implementation guidelines for an active, layered defense.²¹ The Strategy for Homeland Defense and Civil Support breaks down the active, layered defense concept into four areas: the global commons, the forward regions, the approaches, and the homeland.²² This paper's focus is on defense of the homeland and, within that, the core capability of intercepting and defeating national security threats in the air operational domain.²³

Cruise Missile as the Delivery Vehicle

Is the cruise missile a plausible means of delivery for weapons of mass destruction? There are several possible means ranging from a "back-pack" nuke to a device smuggled in a sea-land van at a seaport, or a device flown to the target by a low altitude airplane, unmanned aerial vehicle or a cruise missile. While all are plausible and must be taken seriously, a low altitude aerial attack may be the most attractive means for terrorists.

Since 9/11, the United States has gone to great lengths to prevent illicit nuclear weapons and radiological material from entering the country. Using the active, layered approach, The Department of Energy, through the National Nuclear Security Administration (NNSA), created the Second Line of Defense (SLD). The purpose of the SLD is to strengthen the ability of foreign governments to detect illicit nuclear and radioactive materials crossing international borders and in maritime shipping. Through two programs, the Core Program and Megaports Initiative, SLD is installing radiological detection devices at borders, airports and strategic feeder ports in foreign countries. The NNSA works closely with the Departments of Defense, State, and Homeland Security to monitor international and domestic ports and borders.²⁴ Shortly after 9/11, the U.S. Customs Service began expanding its radiological detection program along U.S. borders. Agents are now equipped with radiation detection monitors at ports of entry and mail facilities.²⁵ Furthermore, the United States Coast Guard has significantly increased patrols throughout America's territorial waters.

As border security and radiological monitoring methods improve, terrorists become deterred from approaching our borders with radiological material and consider other means.

There is growing concern over terrorists launching WMD equipped missiles from a sea-based platform outside U.S. territorial waters. This method significantly reduces their risk and increases chances of success. Additionally, most U.S. hubs of power, including high concentrations of people, are located along our shores. This is not a new concern. In 1996, Dr. Robert Gates, former Director of Central Intelligence and current Secretary of Defense, testified before the Senate that intelligence “did not give nearly enough attention on the potential for land-attack cruise missiles launched from within several hundred miles of U.S. territory.”²⁶ The 2002 National Intelligence Estimate (NIE) on the missile threat to the U.S. draws attention to the scenario of a cruise missile launched at the United States from a container ship. Al Qaeda is suspected of possessing at least 15 freighters.²⁷

Four factors make cruise missiles an attractive means to the terrorist. First, they are widely available on the world market. At least 70 countries have deployed more than 75,000 ASCMs.²⁸ At least 12 industrialized countries have exported cruise missiles of which some have fallen in the hands of belligerents. U.S. made Harpoons were exported to Iran, Egypt, Pakistan and Saudi Arabia. The Soviets have flooded world markets with older cruise missiles and sold to countries including Iraq, Libya, North Korea, Somalia, Syria and Yemen.²⁹ The second factor is that cruise missiles are inexpensive to obtain or build. Congressional studies demonstrate that a belligerent can build a Global Positioning System (GPS) guided cruise missile “with a range and payload capability roughly equivalent to the Tomahawk, for about \$250,000.”³⁰ Third, new guidance systems technologies such as GPS and the Russian counterpart, Global Orbiting Navigation Satellite System (GLONASS) are easily available, highly accurate and affordable.³¹ Fourth, low altitude aircraft like cruise missiles pose a significant challenge to air defense systems. Surface radars have difficulty detecting and tracking low altitude targets due to curvature of the earth, terrain, and clutter. Given proliferation of missile technology, availability, low cost, and the inherent difficulty that air defense systems have in detecting and tracking low altitude targets, the cruise missile is a very plausible means of delivery for WMD.

Defending the Homeland against a Cruise Missile Attack

Can we defend the homeland against a cruise missile attack with current capabilities? Cruise missiles present serious challenges to air defense forces. To intercept any aerial threat, low, medium or high altitude, you have to detect, track, classify, identify, and intercept the target. To detect the track, a sensor must have line of sight. Then, the sensor must continue tracking the object while the computer and/or operator determine the type or classification.

Generally, the track can be classified as a fixed wing, rotary wing, tactical ballistic missile (TBM) or anti-radiation missile (ARM). Next, the track must be identified as a friend or foe (IFF). A TBM normally has unique characteristics that are relatively easy for the system and operator to handle. TBMs have an arching trajectory, steep dive angle, and high rate of speed. Air defense sensors can normally maintain continuous tracking for the entire sequence, although time is critical depending on the situation. Fixed wing aircraft are more challenging. With a flatter trajectory and lower speed the situation becomes much more ambiguous. The operator, with assistance from the system, must sort through numerous criteria and procedures to classify and correctly identify the track. The lower and slower the track the more challenging the process. Cruise missiles are the most challenging tracks because they fly very low to the ground, sometimes “nap of the earth,” using geographical features as cover. The more terrain features, such as hills and mountains, the more difficult it is for surface radar to detect and maintain track of the target. Cruise missiles are relatively small and therefore have reduced radar cross section (RCS) or visibility to the radar. Earth curvature further limits the range at which a sensor can detect a target thereby reducing reaction time for the operator. Additionally, some cruise missiles have very long range and flight time and can be programmed to fly unpredictable flight paths approaching the target from the side or rear. This is a particular problem for systems whose radar’s are limited in sector and cannot search 360 degrees.

Current Cruise Missile Defense Capability

Current air defense systems in each military service have excellent capabilities however; they are optimized for high-speed aircraft or tactical ballistic missile defense and have limitations against low-altitude threats. They are capable of engaging slower speed, low-altitude targets, but the lower the target the more challenging the engagement. Furthermore, the military services are not fully integrated. The systems are stand-alone and rely on their own organic sensors to feed firing data through local fire control computers to the interceptor such as a gun or missile. While surveillance information is shared to other echelons and services, the exchange of engagement quality data remains significantly limited.

Following is a general description of service anti-missile capabilities. The Army currently employs the Patriot surface to air missile (SAM) system and the Avenger SAM system. The Patriot Capability 3 (PAC-3) is a significant improvement over the system of Desert Storm. In Operation Iraqi Freedom PAC-3 destroyed nine out of nine ballistic missiles launched at coalition forces within its coverage. Patriot is capable of intercepting cruise missiles and has successfully engaged cruise missiles in live fire testing. The Avenger system utilizes the Stinger

missile and has also engaged cruise missiles in a test environment; however, it has very limited range. The Navy employs the Aegis Combat System, the E-2C Hawkeye aircraft, and the Cooperative Engagement Capability. The Aegis Combat System is primarily used to defend the fleet but can provide limited protection to shore based assets. The Hawkeye is an airborne platform capable of detecting cruise missiles at long-range and directing fighters to intercept. The Air Force cruise missile defense system is comprised of fighter assets and the Airborne Warning and Control System (AWACS). The AWACS is capable of providing surveillance of low flying tracks and passing the data to interceptors.

While all three services have the assets to intercept cruise missiles, they share similar challenges: maintaining line of site from the sensor to the target, reflections from ground clutter, and limitations on detecting targets with low radar cross section. Additionally, the lack of an integrated fire control network between the services severely limits capabilities.

The services realize these shortcomings and are working to improve capabilities. Unfortunately, progress is slow. In 1995, the Pentagon identified cruise missiles as an emerging critical threat. In the National Defense Authorization Act of Fiscal Year 1996, the U.S. Congress created the 'Cruise Missile Defense Initiative' charging the Department of Defense (DoD) to develop technologies to defend against advanced cruise missiles. As a result, the Pentagon published the Defense Planning Guidance (DPG) directing the services to be able to defend against difficult to detect cruise missiles no later than 2010. However, three years later, in 1999, the Senate Armed Services Committee found that the various cruise missile defense programs were not integrated into a "coherent architecture and development plan."³² In 2000, the Chief of the U.S. Army Space and Missile Defense Command stated: "the Army does not know what specifications will have to be met to make its air and missile defense systems interoperable with others throughout the military because the requirements for SIAP [Single Integrated Air Picture] have yet to be defined."³³ In 2004, the Congressional Research Service noted: "Although some measure of action toward addressing the CM threat is being taken, the level of urgency remains an issue..."³⁴ The services have limited cruise missile defense capabilities but progress is slow and there remain serious gaps.

Future Cruise Missile Defense Efforts

The services are making efforts to correct the problem. The key to effective active defense against cruise missiles is to integrate existing systems and leverage the unique capabilities of each into an interagency, joint, networked system of systems. To do this, you must be able to share data from multiple sensors, both ground based and elevated, and

integrate the fire control quality data for the interceptors. Currently, the various cruise missile defense systems are limited to a local command and control system managing information passed between the sensor and interceptor, or radar and missile respectively. For example, the Army Patriot system utilizes a fire control computer managing data from the radar and missile through most of its flight. The goal is for a sensor from one system, such as Navy Aegis, to control an interceptor from another system, such as an Army Patriot missile. This extends coverage, increases range, and gives the commander flexibility in mission planning and execution.

The DoD is addressing this interagency, joint system of systems by developing both a Single Integrated Air Picture (SIAP) and Integrated Fire Control (IFC). SIAP "is the product of fused, near real-time and real-time data from multiple sensors to allow development of common, continuous and unambiguous tracks of all airborne objects in the surveillance area."³⁵ Under the guidance of the Assistant Secretary of the Army for Acquisition, Logistics, and Technology (ASAALT), the Joint SIAP System Engineering Organization (JSSEO) has the lead for developing a SIAP. While fielding of this technology was predicted by September 2005³⁶, a fully integrated air picture among services is still not a reality. The first simulated missile engagement occurred in November 2006, utilizing a product developed by JSSEO called the Integrated Architectural Behavior Model (IABM) on the Aegis weapon system.³⁷

IFC "attempts to decouple service-specific and platform-specific fire control radars from their weapons to create over-the-horizon and joint CMD [cruise missile defense] intercept capabilities."³⁸ Perhaps the most critical capability in cruise missile defense is integrating an aerial sensor with a ground or air launched interceptor. This combination helps to overcome the range and line-of-sight challenges of detecting, tracking and intercepting a low-altitude target like a cruise missile. The Air Force recently upgraded the E-3 AWACS radar with the Radar System Improvement Program (RSIP). RSIP enhances the ability to track low radar cross section targets at greater ranges.³⁹ The Air Force is also developing a program called the Multi-Platform Radar Technology Insertion Program (MP-RTIP). MP-RTIP is a common modular, scalable radar for various airborne platforms to include the Global Hawk UAV and a future platform called the E-10A Multi-sensor Command and Control Aircraft (MC2A) for the wide area surveillance mission.⁴⁰ While performance parameters are classified, the resolution and range are significantly increased allowing enhanced performance against stealthy cruise missiles at hundreds of kilometers.⁴¹ MP-RTIP fielding is scheduled for the Global Hawk UAV in 2009 and the MC2A in 2010.

Despite these developments, maintaining an aerial orbit with fixed wing aircraft is extremely expensive. To help overcome this problem, the Army is leading development of the Joint Land Attack Cruise Missile Defense Elevated Netted Sensor (JLENS). The JLENS is an aerostat with sensor and networking technologies for cruise missile defense. It is tethered to a manned ground station and maintains an average altitude of 15,000 feet. JLENS has the dual mission of providing persistent surveillance for cruise missile defense and a common air picture for DoD. The system is developed in stages called "spiral development."⁴² Unfortunately, IFC is the final spiral and is at least five years away. The JLENS first unit equipped was scheduled for FY2010.⁴³ However, the schedule is slipping with system testing not beginning until 2010 and program completion scheduled for 2012.⁴⁴

Another future solution to the cruise missile challenge is the Surface Launched Advanced Medium Range Air-to-Air Missile (SLAMRAAM). The SLAMRAAM utilizes the AMRAAM missile, originally designed for air-to-air low altitude intercepts, and employs a look down seeker to overcome difficult topography. SLAMRAAM is mounted on a High Mobility Multi-Wheeled Vehicle (HMMWV) and has an Integrated Fire Control System (IFCS) netted to local radar, JLENS, and the Marine Corps Multi-role Radar System.⁴⁵ The first SLAMRAAM unit will be fielded in FY2010 as part of a composite air defense battalion with a mix of Patriot and SLAMRAAM.⁴⁶

DoD is exploring military use of high altitude airships and aerostats. JLENS is limited in altitude and coverage, when compared to aircraft, and is vulnerable to high winds. High altitude airships (HAA) are a possible long-term solution to this problem. They are unmanned and fly at very high altitudes so they can avoid bad weather and move to change coverage. HAA's can loiter for extended periods, maybe up to a year, providing persistent wide area surveillance. The Missile Defense Agency (MDA) is funding a study using HAA's for possible homeland defense.⁴⁷

Department of Defense Organization for Homeland Cruise Missile Defense

From an organizational perspective, the element within Department of Defense that has the lead for developing joint doctrine and concepts for cruise missile defense is the Joint Staff's Joint Theater Air and Missile Defense Organization (JTAMDO). Established in 1997, JTAMDO is chartered to define joint requirements, joint operational concepts, and command and control relationships for ballistic and cruise missile defense. JTAMDO oversees the development of the Joint Integrated Air and Missile Defense (IAMD) study providing a roadmap for civil-military relationships for homeland cruise missile defense.⁴⁸ United States Northern Command

(USNORTHCOM), established in 2002, has the mission of defense of the homeland. It provides command and control of DoD efforts and coordinates defense support of civil authorities. USNORTHCOM commands the North American Aerospace Defense Command (NORAD), a bi-national command, which provides aerospace warning and control for Canada and the United States.⁴⁹ After the terrorist attacks on 11 September 2001, NORAD's mission was expanded to include all low-altitude threats to America such as cruise missile, civil aircraft and UAV's. The mission was renamed Homeland Air and Cruise Missile Defense of North America (HACMD of NA).⁵⁰ Numerous other DoD organizations have a role in cruise missile defense to include: the services, the Assistant Secretary of Defense for Homeland Defense, Joint Forces Command (JFC), Strategic Command (STRATCOM), Army Space and Missile Defense Command (SMDC), Missile Defense Agency (MDA), Defense Advanced Research Projects Agency (DARPA), Ballistic Missile Defense Organization (BMDO), and the Defense Intelligence Agency (DIA). Organizations outside the DoD include the Federal Administration Agency (FAA), the Central Intelligence Agency (CIA), the Department of Homeland Security, and the Coast Guard.

Defining the roles and responsibilities of each organization involved in cruise missile defense is a daunting task and not in the scope of this paper. However, the challenge of navigating through this joint, interagency bureaucratic maze may be one of the problems. It is difficult to identify exactly who is doing what with cruise missile defense. DoD has worked this issue for over ten years and still does not have a coherent program. SIAP and IFC will not become reality until 2012 at the earliest. In fact, a recent Pentagon assessment finds that capability gaps in cruise missile defense of the homeland may not be solved until 2015. The Air Force is leading a Joint Capabilities Integration and Development System (JCIDS) study to mitigate high-risk joint gaps in the HACMD-NA mission area. JCIDS is the process used by DoD to assess capability gaps in defense, determine requirements, and develop solutions to address the gaps. In September 2005, with the Army as lead, a joint service IAMD Functional Needs Assessment (FNA) identified multiple high priority gaps in cruise missile defense. In May 2006, the Joint Requirements Oversight Council (JROC), a high level oversight council to the JCIDS process chaired by the Vice Chairman of the Joint Chiefs of Staff, directed the Air Force to lead the Functional Solutions Analysis (FSA) for IAMD. Not surprisingly, the capability gaps identified by the FNA include the lack of a SIAP, lack of surveillance coverage, inability to classify and identify a target, and the inability to detect low-speed, low-altitude targets such as a cruise missile.⁵¹ While DoD is taking steps to address cruise missile defense, we have known about these capability gaps long before the current IAMD JCIDS study. It appears that multiple

organizations continue to develop studies that come to similar conclusions and, as a result, we may miss the deadline given by Congress over ten years ago.

In summary, there is clear evidence that Islamic terrorists want to destroy the United States using weapons of mass destruction. The cruise missile is a very attractive means of delivery for WMD because it is readily available, inexpensive, highly accurate, can be launched outside our territorial waters, and is difficult to defend against using conventional air defense systems. Currently, we can defend the homeland against a cruise missile attack but there are significant capability gaps. While there are several efforts to develop a fully integrated cruise missile defense capability, bureaucratic lethargy and service parochialism have caused significant delays. Meanwhile, the threat has evolved from a hypothetical scenario to a very dangerous and potentially catastrophic reality. We must act now to close the gap.

Recommendations

The June 2005 Strategy for Homeland Defense and Civil Support states that “the Department of Defense will devote significant attention to defending US territory against cruise missile attacks.”⁵² We certainly are devoting significant attention to the problem. In fact, we have been working on it for over a decade and still don’t have a coherent strategy. The key to cruise missile defense is a holistic, net-centric, system of systems utilizing the various capabilities within each service and agency. Following are three recommendations that provide both an immediate and long-term solution. First, we must get control of the various, seemingly redundant actions within the bureaucracy and coordinate the effort. Second, using existing capabilities, create an organizational package ready to deploy on order to defend critical homeland assets. Finally, streamline and accelerate the process of research, development, and acquisition of future capabilities such as SIAP, IFC, and sensor/shooter systems.

Coordinated Effort

The solution to the first recommendation, coordinating the effort, may be in the works already. Amid growing concern about the possibility of a cruise missile attack on the United States, Congress has, yet again, directed DoD to focus on cruise missile defense with the National Defense Authorization Act for FY 2006. The act mandates that the DoD appoint an executive agent to coordinate the effort to include funding, requirements and needed solutions for integrated cruise missile defense. The Secretary of Defense is to develop a comprehensive plan for defending the homeland against cruise missile attack. The move comes amid growing realization in Congress that DoD lacks a specific mandate or central coordinating authority to develop such capabilities for homeland defense.⁵³

Creating a comprehensive plan should be relatively easy to accomplish given all the efforts to date. For example, as early as 1996, DoD tasked JTAMDO and BMDO to coordinate all theater air and missile defense activities including cruise missile defense. They developed a three-tiered integrated product team (IPT) consisting of members from air and missile defense requirements, acquisitions and operations. The end product is a Theater Air and Missile Defense Master Plan, intended to be the overall coordination mechanism for joint missile defense to be published annually. The Government Accounting Office reported to Congress that while there is progress, there remain significant challenges. The biggest challenge is cutting across the bureaucracy, i.e. services and programs, and reestablishing priorities and funding. Unlike ballistic missile defense programs, most cruise missile defense programs reside within the services' budgets.⁵⁴

While the Theater Air and Missile Defense Plan focuses on a theater solution, similar systems and architecture are used in homeland defense. An organization that is implementing a homeland air defense mission is the Joint Air Defense Operations Center (JADOC) in Washington D.C. In response to the terrorist attacks on 11 September 2001, the JADOC was established to coordinate air defense of the capitol region. The JADOC is integrating joint and interagency assets utilizing air defense command and control tools developed by DoD organizations such as SMDC.⁵⁵

There are many examples from which the newly appointed executive agent can draw to quickly develop a comprehensive plan for homeland cruise missile defense. The key to success is having the power to reach into service budgets and adjust priorities. As in most joint endeavors, politics and service parochialism are the barriers to change, especially when it comes to money and jobs. Congress must adjust priorities and give the executive agent the authority and resources to focus the effort and develop an effective homeland cruise missile defense program.

Cruise Missile Defense Rapid Deployment Force

The second recommendation is to utilize existing capabilities and organizations to create a joint rapid deployment force (RDF) with an on-order mission to quickly deploy to priority assets. As described above, we currently have an anti-cruise missile capability within the services. In fact, for the past ten years numerous successful tests and exercises have demonstrated a joint capability, albeit limited. For example, in 1996, a joint cruise missile defense Advanced Concept Technology Demonstration (ACTD) called MountainTop, successfully demonstrated the air-directed surface-to-air missile (ADSAM) concept. The goal

was to detect, track, and engage cruise missile targets beyond-radar-horizon. An experimental Navy radar located on top of a mountain was networked to surface launched air defense systems including an Aegis Cruiser and an Army Patriot battery.⁵⁶ This early example demonstrates that the ability to link joint air defense systems together has existed for some time even though we remain limited by a lack of true SIAP and IFC.

To further illustrate the point with a current, real-world example, a top Israeli air defense officer recently briefed that Israel successfully intercepted UAV's launched at their country from Lebanon by Hezbollah. The UAV's were packed with explosives and intended to hit targets in Israel but were intercepted by Israeli aircraft. Of particular interest is that a Patriot air defense system detected the target and passed the information to aircraft for intercept. This case demonstrates that the enemy has figured out how to convert airframes into cruise missiles. Fortunately, it also demonstrates that the capability currently exists to intercept the threat.⁵⁷

This paper does not attempt to reach below the strategic level but a clear and simple chain of command is imperative along with designating specific units that plan and rehearse the mission on a regular basis. Given the nature of the threat and the potential catastrophic impact to our nation, a cruise missile defense RDF is the best, near-term solution.

Long-term Recommendations

The final recommendation is to prioritize and accelerate research, development and acquisition of future joint capabilities such as airborne sensors, SIAP, and IFC. This serves the dual purpose of homeland defense and protecting deployed forces from cruise missile attack. These capabilities also enhance net-centric warfare for the entire force. JLENS may not be fielded until 2015, missing the original congressional deadline by five years. Fielding of JLENS is high priority because it provides the critical capabilities of elevated, persistent surveillance, net-centric communications and contributes to a SIAP. SLAMRAAM gives significant interceptor and IFC capability but isn't scheduled for fielding until 2010 if things stay on track. This program should be monitored closely and not allowed to slip further. Other joint technologies such as the High Altitude Airship and the Air Force E10A Multi-sensor Command and Control Aircraft provide long term solutions that further expand cruise missile defense capabilities and net-centric warfare. The bottom line is that the research, development and acquisition of these critical capabilities should be accelerated or at least not allowed to slip any further so we can truly achieve a SIAP and IFC.

In addition to material solutions, the executive agent needs to monitor the simultaneous develop of cruise missile defense doctrine, organization, training, logistics, personnel, and

facilities. The IPT process used by JTAMDO and BMDO has made significant progress in this area in addition to efforts by the services. As new capabilities are developed, close coordination and management is required to ensure fielding of total systems to place in the hands of the war fighters. In short, we must meet the FY96 Defense Planning Guidance goal of 2010 with a fully integrated air picture and fire control. The threat is real and the consequences of failure are too great. The solutions are there; we simply need to prioritize and execute.

Conclusion

The world changed on September 11, 2001. We learned that a threat that gathers on the other side of the earth can strike our own cities and kill our own citizens. It's an important lesson; one we can never forget. Oceans no longer protect America from the dangers of this world.⁵⁸

The merging of radicalism and technology makes this the most dangerous time in our history. Our enemies seek to destroy us using weapons of mass destruction to achieve their ends. A cruise missile attack on the homeland is a scenario we must be ready to defend against. We must act quickly to develop our limited cruise missile defense into a networked, system of systems capable of providing wide area defense of low-level threats.

The barbarians defeated Rome in part because the Roman government was mired in bureaucracy and unable to quickly respond to the threat. We cannot allow America to fall prey to another terrorist attack because of our inability to act. As President Bush stated, "History will judge harshly those who saw this coming danger but failed to act."⁵⁹ We see the coming danger and must act now to protect the homeland.

Endnotes

¹ George W. Bush, *National Strategy to Combat Weapons of Mass Destruction* (Washington, D.C.: The Pentagon, December 2002), 1.

² Mohamed ElBaradei, "Addressing Verification Challenges," Statements of the Director General (Vienna, Austria: International Atomic Energy Agency, 16 October 2006). Available from <http://www.iaea.org/NewsCenter/Statements/2006/ebsp2006n018.html>; Internet; accessed 12 December 2006.

³ Ikrama Sabri, quoted in Federal Bureau of Investigation Congressional Testimony, available from www.fbi.gov/congress/congress02/bowman073102.htm; Internet; accessed 12 December 2006.

⁴ Mullah Omar, quoted in Federal Bureau of Investigation Congressional Testimony, available from www.fbi.gov/congress/congress02/bowman073102.htm; Internet; accessed 12 December 2006.

⁵ Jerold M. Post, ed., *Military Studies in the Jihad Against the Tyrants: The Al Qaeda Training Manual* (USAF Counterproliferation Center, Maxwell Air Force Base, Alabama, August 2004), 6.

⁶ Christopher M. Blanchard, "Al Qaeda: Statements and Evolving Ideology." Congress Research Service, (Washington D.C.: Library of Congress, 2006), 14.

⁷ Blanchard, 10.

⁸ Federal Bureau of Investigation Congressional Testimony, 5.

⁹ Robert G. Joseph, "The Global Initiative to Combat Nuclear Terrorism: A Comprehensive Approach to Today's Most Serious National Security Threat," (Washington, D.C. U.S. Department of State, 18 July 2006). Available from <http://www.state.gov/t/us/rm/69124.htm>; Internet; accessed 12 December 2006.

¹⁰ Ibid.

¹¹ Ibid.

¹² Office of the Democratic Whip, *Ensuring America's Strength and Security: A Democratic National Security Strategy for the 21st Century*, (Washington D.C.: U.S. House of Representatives, September 2005), 4. Available from www.house.gov/tauscher/national_security_plan.htm; Internet; accessed 12 December 2006.

¹³ Ibid., 3.

¹⁴ Gene Aloise, *Combating Nuclear Smuggling: Efforts to Deploy Radiation Detection Equipment in the United States and in Other Countries*, (Washington D.C.: U.S. Government Accountability Office, 21 June 2005), 1. Available from <http://www.gao.gov/cgi-bin/getrpt?GAO-05-840T>; Internet; accessed 6 December 2006.

¹⁵ Joseph, 1.

¹⁶ Jack Boureston and Charles Mahaffey, "Al Qaeda and Mass Casualty Terrorism: Assessing the Threat," *Strategic Insights*, Volume II (October 2003), 3. Available at <http://www.ccc.nps.navy.mil/si/oct03/terrorism.asp>; Internet; accessed 12 December 2006.

¹⁷ Jack Boureston, "Assessing Al Qaeda's WMD Capabilities," *Strategic Insights*, Volume I (September 2002), 1. Available at <http://www.ccc.nps.navy.mil/si/sept02/wmd.asp>; Internet; accessed 12 December 2006.

¹⁸ Boureston and Mahaffey, 3.

¹⁹ Joseph, 2.

²⁰ *The National Security Strategy of the United States of America*, (Washington, D.C.: The White House, March 2006), 1.

²¹ *The National Defense Strategy of The United States of America*, (Washington, D.C.: The Pentagon, March 2005), 9.

²² *Strategy for Homeland Defense and Civil Support*, (Washington, D.C.: The Pentagon, June 2005), 10, 11.

²³ *Ibid.*, 24.

²⁴ National Nuclear Security Administration, *NNSA's Second Line of Defense Program*, December 2006. Available from <http://www.nnsa.doe.gov/docs/factsheets/2006/NA-06-FS01.pdf>; Internet; accessed 17 December 2006.

²⁵ Aloise, 1.

²⁶ Robert Gates, *NIE 95-19: Independent Panel Review of "Emerging Missile Threats to North America During the Next 15 Years,"* Testimony before Select Committee on Intelligence, U.S. Senate (Washington D.C.: The Central Intelligence Agency, 23 December 1996). Available from <http://www.fas.org/irp/threat/missile/oca961908.htm>; Internet; accessed 20 December 2006.

²⁷ Dennis M. Gormley, Testimony before the Subcommittee on National Security, Emerging Threats, and International Affairs, U.S. House of Representatives Committee on Government Reform, (Monterey, CA: Monterey Institute of International Studies, 9 March 2004). Available from <http://cns.miis.edu/research/congress/testim/testgorm.htm>; Internet; accessed 2 January 2007.

²⁸ *Ibid.*, 3.

²⁹ Federation of American Scientists, "Special Weapons Primer, Cruise Missiles," 2005, 4, 5. Available from <http://www.fas.org/nuke/intro/cm>; Internet; accessed 5 December 2006.

³⁰ *Ibid.*, 6.

³¹ Association of the United States Army, *The Cruise Missile Threat: Prospects for Homeland Defense*, (Institute of Land Warfare, Association of the United States Army, June 2006), 2. Available at <http://www.ausa.org/pdfdocs/NSW06-3.pdf>; Internet; accessed 17 December 2006.

³² Ravi R. Hichkad and Christopher Bolkcom, *Cruise Missile Defense*, (Washington D.C.: Congressional Research Service, 27 August 2004), CRS-1.

³³ Dennis M. Gormley, *Dealing with the Threat of Cruise Missiles*, (New York: International Institute for Strategic Studies, Oxford University Press Inc., June 2001), 69.

³⁴ Hichkad and Bolkcom, CRS-6.

³⁵ "Exhibit R-2, Research Development Test and Evaluation Navy, Budget Item Justification," February 2002, 1. Available from <http://www.dtic.mil/descriptivesum/Y2003/NAVY/0603879N.pdf>; Internet; accessed 6 January 2007.

³⁶ Hichkad and Bolkcom, CRS-3.

³⁷ *Aegis Demonstrates Open Architecture Capabilities in Simulation Using Joint Single Integrated Air Picture Product*, (Global Security.Org, 7 November 2006). Available from <http://www.globalsecurity.org/military/library/news/2006/11/mil-061107-lockheed-martin01.htm>; Internet; accessed 6 January 2007.

³⁸ Hichkad and Bolkcom, CRS-4.

³⁹ *E-3 Sentry AWACS Radar System Improvement Program*, (Global Security.Org, 16 April 2006). Available from <http://www.globalsecurity.org/military/systems/aircraft/e-3-rsip.htm> ; Internet; accessed 12 January 2007.

⁴⁰ *Multi Platform Radar Insertion Program*, (Global Security.Org, 26 April 2005). Available from <http://www.globalsecurity.org/intell/systems/mp-rtip.htm> ; Internet; accessed 12 January 2007.

⁴¹ Gormley, *Dealing with the Threat of Cruise Missiles*, 71.

⁴² Christopher Bolkcom, *Potential Military Use of Airships and Aerostats*, CRS Report for Congress RS21886, (Washington D.C.: Congressional Research Service, 9 May 2005), CRS-2. Available from <http://www.fas.org/sgp/crs/weapons/rs21886.pdf> ; Internet; accessed 6 January 2007.

⁴³ U.S. House Armed Services Committee, Number 109-24, *Hearings on National Defense Authorization Act 2006*, 15 March 2005, 23. Available from http://commdocs.house.gov/committees/security/has074290.000/has074290_0.HTM; Internet; accessed 9 January 2007.

⁴⁴ "Raytheon, US Army Agree on US\$1.4 Billion JLENS Development Program," *Defense Update*, (3 January 2007). Available from http://www.defense-update.com/newscast/0107/news/030107_jlens.htm; Internet; accessed 12 January 2007.

⁴⁵ "Surface Launched (SL) AMRAAM Complimentary Low Altitude Weapon System (CLAWS)," *Defense Update*, (18 October 2006). Available from <http://www.defense-update.com/products/s/slamraam.htm> ; Internet; accessed 12 January 2007.

⁴⁶ Robert P. Lennox, "Troop Talk," *The Monitor*, (Fort Bliss, Texas, 22 June 2006). Available from <http://www.avenpublishing.com/monitor/2006/06%20June/062206%20/PDF/02.pdf> ; Internet; accessed 12 January 2007.

⁴⁷ Hichkad and Bolkcom, CRS-3.

⁴⁸ "Exhibit R-2, Research Development Test and Evaluation, Budget Item Justification, Joint Theater Air and Missile Defense Organization (JTAMDO)," February 2004, 1. Available from <http://www.dtic.mil/descriptivesum/Y2005/JCS/0605126J.pdf> ; Internet; accessed 12 January 2007.

⁴⁹ United States Northern Command (USNORTHCOM), "About Us." Available from http://www.northcom.mil/about_us.htm ; Internet; accessed 12 January 2007.

⁵⁰ "The Cruise Missile Threat: Prospects for Homeland Defense," 2.

⁵¹ The Air Force published a request for information (RFI) to industry to solicit materiel and non-material solutions to the identified gaps. Material solutions include weapons, communications systems, and other hardware and software. Non-material solutions include changes to doctrine, organization, training, leadership, personnel and facilities (DOTLPF). See John Liang, "DoD finds Cruise Missile Defense 'Gaps'," *Military.com*. (17 August 2006). Available from <http://www.military.com/features/0,15240,110199,00.html>; Internet; accessed 13 January 2007.

⁵² *Strategy for Homeland and Civil Support*, 25.

⁵³ Ilan Berman, ed. "A Congressional Push for Cruise Missile Defense," *Missile Defense Briefing Report*, no. 178 (Washington D.C.: American Foreign Policy Council, 28 May 2005). Available from <http://www.afpc.org/mdbr/mdbr178.shtml>; Internet; accessed 14 January 2007.

⁵⁴ Government Accountability Office, *Cruise Missile Defense, Progress Made but Significant Challenges Remain*, NSIAD-99-68, (Washington D.C.: United States General Accounting Office, March 1999). Available from <http://www.gao.gov/archive/1999/ns99068.pdf>; Internet; accessed 14 January 2007.

⁵⁵ U.S. Army Space and Missile Defense Command, *Advanced Warfare Environment*, (Huntsville AL: U.S. Army Space and Missile Defense Command, Public Affairs Office) 2. Available from <http://www.smdc.army.mil/FactSheets/AWARE.pdf>; Internet; accessed 15 January 2007.

⁵⁶ Federation of American Scientists, "Advanced Concept Technology Demonstration (ACTD) Master Plan, Cruise Missile Defense Phase I." Available from http://www.fas.org/spp/military/docops/defense/actd_mp/CMD.htm#progdesc; Internet; accessed 15 January 2007.

⁵⁷ The Chief of Israeli Air Defense briefed the leadership of U.S. Army Air Defense at Fort Bliss, Texas on the successful intercept of UAV's using the Patriot surface to air missile system and fighter aircraft. This happened during the recent conflict between Israel and Lebanon in 2006.

⁵⁸ George W. Bush, *Strategy for Homeland Defense and Civil Support*, (Washington, D.C.: The Pentagon, June 2005), 1.

⁵⁹ George W. Bush, *National Strategy to Combat Weapons of Mass Destruction*, (Washington, D.C.: The Pentagon, December 2002), 1.