Cover Photo: Lisa Simunaci / Missile Defense Agency

Protecting the Homeland: The Iron Dome for America

BY Ioannis Nikas and Grayson Phillips

On January 27, 2025, President Trump signed an executive order (EO) entitled "The Iron Dome for America." Citing the potentially "catastrophic threat" from across the missile spectrum, its stated purpose is to "provide for the common defense of [American] citizens and the Nation." In an evolving and diverse threat environment, this order calls for a modernized missile defense infrastructure tailored to present-day and near-future challenges. Achieving the policy goals outlined in the EO will require significant innovation and investment, and issues of feasibility, cost, and implications for strategic stability will again be debated.

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Q1: What is The Iron Dome for America?

A1: The Iron Dome for America calls for the development and deployment of "a next-generation missile defense shield" to protect the United States. It directs the Secretary of Defense to submit a reference architecture for new missile defense capabilities to the President within 60 days. The name "Iron Dome" is an allusion to the Israeli missile defense system that has successfully intercepted thousands of rockets, short-range missiles, and drones since 2011, protecting Israeli cities and critical infrastructure. That moniker does not indicate that the systems involved will be a literal parallel; it is likely meant instead to evoke a similar idea of missile defenses that protect the American people and U.S. homeland from attack. While the architectural plans are still being formulated, the capabilities are envisioned to defend the United States against a variety of advanced threats, including ballistic, hypersonic, and cruise missiles, as well as other advanced aerial systems.

There are three components of any missile defense system: sensors to detect and track missile threats, interceptors to destroy them, and command and control mechanisms to link each component. Besides building on current capabilities, new ones may be developed, including space-based interceptors designed to destroy missiles in their boost-phase of flight. The executive order indicates that the purpose of such a shield will be to both protect American lives and increase the survivability of the U.S. nuclear arsenal.

Upon submission of the missile shield architecture to the President, the EO also directs the Secretary of Defense to identify ways that the United States can collaborate with its allies and partners to develop new and improve theater missile defenses for forward-deployed U.S. and allied troops and accelerate the provision of U.S. missile defense capabilities to allies and partners.

Q2: What gaps does the Executive Order address and why is it timely now?

A2: The Ground-based Midcourse Defense (GMD) system is the principal capability fielded to protect the U.S. homeland from a small number of long-range ballistic missiles. The United States also deploys Aegis, Terminal High Altitude Area Defense (THAAD), and Patriot systems to protect forward-deployed troops and allies from short and intermediate-range ballistic missiles. These American defense systems across the globe have proven to be highly effective in recent years. THAAD has helped protect Israel from incoming missiles launched from Yemen, while the Navy's Aegis system has intercepted numerous Iranian missiles launched at Israel and at vessels in the Red Sea. In Ukraine, Patriots have proven to be vital in the fight against Russia, even intercepting the Kinzhal maneuvering air-launched ballistic missile.

Ground-based Interceptor launch / Lisa Simunaci, Missile Defense Agency

With potential adversaries continuing to develop their capabilities, however, these legacy capabilities remain insufficient. According to the 2024 Annual Threat Assessment of the U.S. Intelligence Community, both Russia and China are actively developing "a range of weapons capabilities, including nontraditional weapons intended to defeat or evade U.S. missile defenses." Per the same assessment, both North Korea and Iran are continuing to expand their long-range missile arsenals in both capacity and capability.

In his 2002 statement on the U.S. withdrawal from the Anti-Ballistic Missile Treaty, then-President George W. Bush characterized the threats facing the homeland to largely be longer-range ballistic missiles wielded by rogue states, and established policy that U.S. homeland defense infrastructure be oriented towards such a threat. GMD is designed with this threat in mind, aiming

to defend the United States from rogue state intercontinental ballistic missile attacks. Today's homeland missile defense has gaps that could be exploited by newer missile and aerial systems or stressed by lower launch trajectories and non-ballistic profiles, especially from major powers like Russia and China. With low-flying cruise missiles, maneuverable hypersonic missiles, and unmanned aerial systems (UAS) all presenting themselves as concerning capabilities in the arsenals of adversaries, the U.S. missile shield would be insufficient against a concerted attack on the homeland.

Other key features of the EO include its attention to missile defeat, "left-of-launch," and boost-phase defense, which would allow for tracking and eliminating missile threats earlier than presently possible. Boost-phase capabilities remain a critical gap in the existing layered missile defense infrastructure, despite longstanding interest. The EO makes it clear that mitigating missile threats as early in their trajectory as possible will be a priority in the administration's plan.

Q3: How would the Iron Dome for America work?

A3: The proposed next-generation missile shield will likely expand on current missile defense capabilities. The 44 Ground Based Interceptor currently available as part of the GMD system will likely be supplemented with the Next Generation Interceptor currently in development to enhance defense of the homeland from ballistic missiles. The EO directs the deployment of a "custody layer of the Proliferated Warfighter Space Architecture" (PWSA) and for the "acceleration of the deployment of the Hypersonic and Ballistic Tracking Space Sensor (HBTSS) layer." These programs are also currently in development, with the Space Development Agency (SDA) leading PWSA and the Missile Defense Agency having led HBTSS. The PWSA will comprise seven layers, ranging from tracking to battle management, as part of a "single, coherent proliferated space architecture." The PWSA custody layer will employ multiple satellite constellations to track time-sensitive targets, and HBTSS or similar capabilities will provide detailed tracking of hypersonic threats. Future sensors will track reentry vehicles, as well. These and other sensors will augment current missile warning satellites such as the Space Based Infrared System.

Missile Defense Agency and Space Development Agency launch 6 satellites to low earth orbit / Missile Defense Agency

The next-generation missile shield also calls for the development of novel capabilities, including proliferated space-based interceptors to target missiles in boost-phase. Concepts for space-based interceptors have been around for decades, such as Project Defender in the 1950s. These early research efforts eventually led to the launch of the Strategic Defense Initiative in 1983 under the Reagan administration, but the technology maturity and relative cost of the concept at the time were obstacles to achieving operational capability. Since then, the cost to launch satellites to orbit has drastically decreased. Other new technologies may also contribute to making such an architecture more feasible. While the interceptors are likely to employ a kinetic kill mechanism, the EO also directs the development of non-kinetic kill mechanisms, which could include cyber or directed energy weapons. Defending against attacks by unmanned systems will also be critical to homeland defense, and efforts to respond to this threat include the release of the 2024 Department of Defense strategy to counter UAS systems and investments in counter-UAS systems. To kick off the development of the Iron Dome for America, the Missile Defense Agency hosted an industry day on February 18, 2025, and contract opportunities to contribute to the missile shield have been submitted.

Q4: What challenges will developing The Iron Dome for America present?

A4: Successfully implementing a next-generation missile shield will require clearing several technical and financial hurdles.

Deploying hypersonic weapon defenses for the homeland is crucial to accomplishing a dependable missile shield. The United States currently has a maritime hypersonic defense capability, the Aegis Sea-Based Terminal weapons system, and progress in broader hypersonic missile defense is still limited. The Glide Phase Interceptor, designed to engage hypersonic missiles, is currently slated to deploy around 2035, but could well be accelerated under this new EO. In a similar way, the EO could potentially direct a move into production for HBTSS, of which two prototype satellites were launched last year.

Developing a boost-phase space-based interceptor architecture might be technologically feasible today. Nevertheless, if such an architecture is expected to defend reliably against large missile salvos, thousands of satellites will likely be needed, requiring significant financial investment. Creating a supply-chain envisioned in the EO to support the components for space-based interceptors and allocating personnel to operate these systems would also require resource allocation. While some argue that using these interceptors would produce significant space debris, others argue that neutralizing a missile in its boost-phase would not lead to long-lasting debris creation. Notably, the 1967 Outer Space Treaty, to which the United States is a signatory, does not limit the deployment of space-based interceptors, as such weapons are not weapons of mass destruction. There remains the challenge of strategic stability, which some argue is further eroded with the deployment of more robust missile defense systems. They further reason that destabilization could be compounded with a space arms race incentivizing adversaries to develop countermeasures or new missile capabilities. These could take the form of anti-satellite weapons, such as the nuclear anti-satellite weapon currently under development by Russia, or novel technologies against which that the U.S. is not prepared to defend. The test of a nuclear-capable hypersonic missile by China in August 2021 that caught U.S. intelligence by surprise is an example of the latter. Yet as the space domain becomes increasingly important for warfighting and adversaries continue to hold America's homeland at risk both kinetically and in the cyber domain, others see efforts to deploy space-based interceptors simply as America catching up to its adversaries and denying them the opportunity to exploit American vulnerabilities.

Working to provide allies with missile defense capabilities may be one of the most achievable near-term goals set by the EO. The United States has sold Patriot, Aegis, and THAAD systems to multiple foreign partners and has shown a willingness to deploy such systems to allies under pressing security conditions, such as the deployment of an American THAAD missile battery to Israel in October 2024.

Implementing The Iron Dome for America will be a challenge, but both the threat and the technological means to accomplish it are greater than ever before.

The Glide Phase Interceptor / Northrop Grumman

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