



Statement before the
SENATE ARMED SERVICES SUBCOMMITTEE ON STRATEGIC
FORCES

“THE GOLDEN DOME FOR
AMERICA INITIATIVE”

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Chairman Fischer, Ranking Member King, and distinguished Members of the subcommittee, I appreciate the opportunity to testify before you today on the air and missile defense initiative currently known as Golden Dome for America (GDA). The need to revolutionize our nation's approach to air and missile defense capabilities is both strategically necessary and long overdue.

We find ourselves at a moment of unprecedented global demand for air and missile defenses. One has only to open a newspaper or see online video clips of intercepts for its salience to be clear. Missiles and drones have become weapons of choice. Missile defenses have, in turn, become foundational to deterrence and defense. Both here in the United States and abroad, there has never been more demand for ramping up interceptor production. Long-range strike and missile defenses together top the defense modernization priorities for many allies and partners, such as Japan, Australia, Germany, and Ukraine. Missile defenses have helped keep Ukraine sovereign. Little surprise, then, that the Ukrainians put a Patriot launcher on their currency.

For far too long, U.S. air and missile defense efforts have been characterized by a striking dichotomy. Defenses for the homeland have historically focused on long-range rogue state ballistic threats, while cruise missile defense and other air defense efforts have focused on regional and force protection applications “over there,” to the exclusion of the homeland. Such compartmentalization vainly assumes that battles in one place will only consist of certain parts of the threat spectrum, and battles elsewhere will consist of others. That lingering dichotomy creates a vulnerability that near-peer adversaries now seek to exploit. In a sense, that homeland-regional dichotomy ignores the fact that North America is a region, too.¹ Complex, structured, and numerous air and missile attacks may soon be coming to a theater near you.

I am privileged today to represent the CSIS Missile Defense Project team, which for the last decade has tried to shape the discussion and develop the literature around countering the full spectrum of missile threats, from drones to cruise missiles to hypersonic glide vehicles to orbital bombardment. CSIS does not take policy positions, so the views represented in this testimony are my own and not those of my employer.

My remarks are organized around the principle that the Golden Dome discourse suffers from insufficient attention to three things: communication, imagination, and institutionalization. Following that, I offer a few recommendations for the subcommittee’s consideration for shaping the future of Golden Dome.

I. COMMUNICATION

Golden Dome suffers from a lack of strategic messaging: a clear and simple explanation of what it is, and what we are trying to do here.² The executive order spoke generally of a next generation missile defense shield, of deterring and defending against any foreign aerial attack on the homeland, protecting our secure second-strike capability, and opportunities for greater bilateral and

¹ Tom Karako, Matthew Strohmeyer, Ian Williams, Wes Rumbaugh, and Ken Harmon, “North America Is a Region, Too: An Integrated, Phased, and Affordable Approach to Air and Missile Defense for the Homeland,” Center for Strategic and International Studies, July 14, 2022, <https://www.csis.org/analysis/north-america-region-too>.

² Tom Karako, “Golden Dome: Loosen the gag order, and start talking,” *Breaking Defense*, November 17, 2025, <https://breakingdefense.com/2025/11/golden-dome-loosen-the-gag-order-and-start-talking/>.

multilateral missile defense cooperation.³ Interpretations of what this means have varied widely, contributing to misunderstanding and confusion. The 2023 Strategic Posture Commission likewise remained generic in recommending that “The United States should develop and field homeland IAMD capabilities that can deter and defeat coercive attacks by Russia and China.”⁴ This formulation is fine as far as it goes. It does not go very far.

Given that Golden Dome is a flagship presidential initiative, one underwritten by the reality of today’s strategic environment, the relative lack of communication, explanation, and advocacy by Pentagon leadership is a bit surprising. It was gratifying to see the GDA director publish an opinion editorial this week.⁵ Considerably more engagement is needed. Keep talking.

The result has been a spectacle of Rorschach tests—where ink blots are subjectively interpreted—as commentators project their prior assumptions into fears or fantasies. One sees Golden Dome referenced as an “impenetrable shield” against all forms of missile attack, even though no such language appeared in the executive order or subsequent documents. Inflated public cost estimates for GDA have soared to the trillions, despite budget requests and official GDA life cycle estimates that are a mere fraction of the speculative numbers.

The initiative known as Golden Dome will become real and durable when its logic is understood on a broad, bipartisan, and public basis. Such understanding requires a communication and education campaign with legislative, public, and international components. Without it, Golden Dome could remain a thick binder of good ideas locked in a Pentagon vault, filed alongside other good ideas which never materialized.

Exact numbers of interceptors, notional salvo sizes, defended asset lists, and sensitive operational details should remain closely held. The need for operational security need not get in the way, however, of sharing a few big ideas about what Golden Dome is, why it is necessary to national security, and why it is doable. Silence plays into the hands of those at home and abroad who caricature the effort as foolhardy or reduce it to a meme. It invites Russian, Chinese, and other propaganda to shape the narrative.

With one exception, every air and missile defense system has in the last several years been successfully and operationally employed in real world engagements—and on hundreds of occasions.⁶ Hitting bullets with bullets has become routine. Capabilities developed and fielded over the last four decades have proven their value in spades.

Following the Iranian attack on Al Udeid on June 23, 2025, Chairman of the Joint Chiefs of Staff General Dan Caine publicly praised the exceptional operations of Patriot air defenders.⁷ But there is a much greater story to be told. For years, polite society doubted one could hit a bullet with a bullet and expressed skepticism about real-world operational reliability versus developmental

³ Executive Order 14186, “The Iron Dome for America,” 90 Fed. Reg. 8767 (February 3, 2025), <https://www.federalregister.gov/documents/2025/02/03/2025-02182/the-iron-dome-for-america>.

⁴ Congressional Commission on the Strategic Posture of the United States, *America’s Strategic Posture: The Final Report of the Congressional Commission on the Strategic Posture of the United States* (Washington, DC: Institute for Defense Analyses, October 2023), <https://pcis.spa.com/assets/pdf/Strategic-Posture-Commission-Report.pdf>.

⁵ Mike A. Guetlein, “Why America needs Golden Dome for protection,” *Washington Post*, September 24, 2026.

⁶ From the close-in weapon System (CIWS) to SM-3, the one air and missile defense system that has not, thankfully, yet been operationally employed is the Ground-based Midcourse Defense (GMD) designed to intercept ICBMs.

⁷ U.S. Department of War, “Hegseth, Caine Hold Press Briefing,” June 26, 2025, <https://www.war.gov/Multimedia/video/968149/>.

testing. Now the Pentagon, the several military service departments, US Central Command, and the Missile Defense Agency have an opportunity to describe how missile defenses have been doing in practice. For all the attention to the damage Shaheds have inflicted upon U.S. bases in the Middle East, public affairs officers have missed the opportunity to describe the many Shaheds engaged by Coyote/M-LIDS and other C-UAS interceptors.

The uncommunicated operational and technical successes of air and missile defenders and their systems impair broader understanding. The eye-watering capability of sensors and interceptors built by the American industrial base deserves acknowledgement. The enterprise's broader global reach through C2BMC and the broader Missile Defense System (MDS) merit it too.

Lest this be mistaken for an excess of enthusiasm, one must emphasize that the quest for an impenetrable shield to defend everything is a fool's errand. As a 2022 CSIS study concluded, "The beginning of wisdom for homeland cruise missile defense is to recognize the necessity of preferential defense. Perfect or geographically comprehensive defense is impossible."⁸

It would be wrong to lampoon the Golden Dome initiative as an effort aimed at achieving such an impenetrable shield. With apologies to Ronald Reagan, missile defenses are not going to make nuclear weapons impotent and obsolete, at least not anytime soon. The realization of meaningful homeland air and missile defense is possible and necessary, but it will not be easy.

An Initiative, not a System

As the title of this hearing reflects, Golden Dome is not a weapon system. It is rather an initiative that comprises a tremendous integration challenge and experiments in defense acquisition reform. As General Michael Guetlein has said, "Golden Dome isn't a technology problem. It is an organizational behavior and social engineering challenge."⁹

The executive order for GDA emphasized attention to the full spectrum of threats: not just ICBMs and hypersonic glide vehicles, but also cruise missiles and advanced aerial threats like Group 3 drones. A significant amount of capability already exists that may be stitched together to counter these threats.

GDA's first epoch tailored to 2028 is understandably and necessarily focused on producing, fielding, and integrating capabilities that have already been developed. That near-term operational ambition comes at the expense of developmental modesty—and that is just fine. Next generation capability is certainly needed, but decades of development must be leveraged to deliver capability now, in this decisive decade.

Strategic Instability

One of the more frequent issues that has belabored the GDA discussion is whether it will "disrupt strategic stability." The insinuation, informed by phantasms and intellectual baggage from the Cold War, is that too much defense capability will be delivered, and that from behind that

⁸ Tom Karako, Matthew Strohmeyer, Ian Williams, Wes Rumbaugh, and Ken Harmon, "North America Is a Region, Too: An Integrated, Phased, and Affordable Approach to Air and Missile Defense for the Homeland," Center for Strategic and International Studies, July 14, 2022, 21, <https://www.csis.org/analysis/north-america-region-too>.

⁹ Tom Karako, "Golden Dome: Loosen the gag order, and start talking," *Breaking Defense*, November 17, 2025, <https://breakingdefense.com/2025/11/golden-dome-loosen-the-gag-order-and-start-talking/>.

impenetrable shield the United States could attack and disarm other nuclear-armed nations. The prospect of that could be destabilizing by encouraging an adversary to strike first in a crisis.

Such insinuations have too much faith in missile defenses, too little respect for the gravity of the threat, and insufficient attention to the specter and the problem of non-nuclear strategic attack. The 1980s called, and they want their intellectual baggage back.

There is another sense in which this intellectual baggage is especially unhelpful, in that it supposes that the status quo is one of strategic stability, and that to preserve it we must simply do nothing. The specter of non-nuclear strategic attack—perhaps a mix of missile, drone, and cyber attacks—could have significant strategic effects without any radiation being released. Stipulating and internalizing this prospect forces one to redefine “strategic stability” more broadly than the legacy Cold War concept of “a big nuclear attack on the homeland.”

The development of these threats presents the troubling conclusion that we may not currently be in a situation of strategic stability. The current degree of vulnerability to non-nuclear strategic attack is likewise destabilizing, in the sense that weakness is provocative. Tempting an adversary to attempt a disarming (non-nuclear) first strike is a form of crisis instability.

The pinched Cold War application of strategic stability to only big nuclear attack on the homeland must be expanded to incorporate other threats. This sort of coercive attack, beneath the perceived threshold of nuclear response by the United States, that makes something like the Golden Dome initiative so urgent. The current threat environment is in that sense unstable. Active defenses in support of deterrence by denial help provide or restore stability by raising the threshold for attack. General Guetlein made this connection explicit last week: “The strongest shield is one our adversaries never choose to test because they know they cannot achieve their objectives. That is the purpose of Golden Dome for America. Golden Dome is meant to deny aggressors any expectation that their missiles can be used reliably for coercive purposes. It will therefore strengthen deterrence-by-denial.”¹⁰

This was the logic for the Biden administration’s commencement of the Defense of Guam effort, and those roles were articulated in the 2022 Missile Defense Review.¹¹ It was a sound logic. Golden Dome is a continuation and extension of that logic, not a departure. It will also be limited, just as every weapon system ever devised and fielded is limited.

Past theoretical predictions about the potential for missile defense to contribute to deescalation and damage limitation have now become real world case studies. In 2024, the combined missile defense of Israel—aided extensively by U.S. Army THAAD air defenders—gave the Israeli government the opportunity, as encouraged by President Biden, to “take the win” rather than massively retaliate.¹² Defenses in Ukraine and more recently across the Middle East have provided still more case studies of how missile defense contributes to stability and escalation control even within conflicts.

¹⁰ Mike A. Guetlein, “Why America needs Golden Dome for protection,” *Washington Post*, September 24, 2026.

¹¹ U.S. Department of Defense, *2022 National Defense Strategy of the United States of America*, (Washington, DC: Department of Defense, October 27, 2022), <https://media.defense.gov/2022/Oct/27/2003103845/-1/-1/1/2022-NATIONAL-DEFENSE-STRATEGY-NPR-MDR.pdf>.

¹² Eugene Daniels, Ryan Lizza, and Rachael Bade, “Playbook: Will Israel heed Biden and ‘take the win’?,” *Politico*, April 14, 2024, <https://www.politico.com/newsletters/playbook/2024/04/14/will-israel-heed-biden-and-take-the-win-00152137>.

It is especially peculiar that Russia and China have characterized the Golden Dome effort as provocative and destabilizing. Both nations field sophisticated air and missile defenses for their own homelands. Americans sometimes take for granted that our adversaries would field anti-access/area denial (A2/AD) bubbles for themselves even while doubting the prospect of fielding some for ourselves. In the words of my former boss (and former Deputy Secretary of Defense) Dr. Kath Hicks, from 2016, “Russia has built a thicket of overlapping and redundant A2/AD systems... stretching from the Kola Peninsula in the Russian Arctic to Latakia, Syria, in the eastern Mediterranean.”¹³ Recent military parades and other reporting suggest that more is likely to come on this front. One would therefore not be surprised by the emergence of a “Red Dome” of sorts over China.¹⁴

Instead of being the putative cause for Chinese and Russian buildups, Golden Dome is not dissimilar from what they have already been doing. It is a form of playing catch-up, to develop some limited A2/AD thickets for ourselves, to support deterrence by denial.

How the United States government reacts to various other forms of non-nuclear attacks on the homeland has purchase here. Failing to call out, attribute, and punish, say, cyber attacks by foreign actors on utilities infrastructure—non-kinetic attacks with real world kinetic effects—could encourage further bad behavior, and convince adversaries that the United States is likely to accept non-nuclear attacks without significant reprisal. Again, weakness is provocative. A sustained pattern of (even being perceived to be) taking it on the chin could encourage adversaries to wrongly suppose that they would get away with other non-nuclear strategic attack on the homeland.

Allied and Theater Considerations

Another aspect of communication concerns allies and partners. The January 2025 executive order directed an Allied and Theater Missile Defense Review (ATMDR) “to identify opportunities for greater bilateral and multilateral missile defense cooperation.” Secretary Hegseth reportedly ordered its completion by May 15, 2025.¹⁵ Sixteen months later, many key allies and partners have apparently not yet been consulted, and the document has not been finalized and released.

It would be beneficial to reach out to some of our closest allies whose defense industrial bases can be leveraged. Even without knowing many details, a number of these nations have expressed interest in helping.

This lack of communication with allies seemingly undermines implementation of the White House’s February 6, 2026 executive order for establishing an America First arms transfer strategy for getting allies to buy U.S.-made military equipment.¹⁶ Germany is moving towards domestic

¹³ Kathleen H. Hicks, Heather A. Conley, John O’Grady, Jeffrey Rathke, and Olga Oliker, “Evaluating Future U.S. Army Force Posture in Europe: Phase I Report,” Center for Strategic and International Studies, February 4, 2016, https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/160629_Evaluating_Future_US_Army_Posture_Europe_Phase_II_Report.pdf.

¹⁴ Kari A. Bingen, Tom Karako, and Heather Williams, “China’s Military on Parade,” transcript, Center for Strategic and International Studies, September 4, 2025, <https://www.csis.org/analysis/chinas-military-parade>.

¹⁵ Theresa Hitchens, “Exclusive: Here’s who Hegseth may task to put together Trump’s Iron Dome plan,” *Breaking Defense*, February 6, 2025, <https://breakingdefense.com/2025/02/exclusive-heres-who-hegseth-is-tasking-to-put-together-trumps-iron-dome-plan/>.

¹⁶ Executive Order 14383, “Establishing an America First Arms Transfer Strategy,” 91 Fed. Reg. 6497 (February 11, 2026), <https://www.federalregister.gov/documents/2026/02/11/2026-02814/establishing-an-america-first-arms-transfer-strategy>.

production of PAC-2 interceptors; other countries are exploring the prospect for similar efforts. Allies and partners need to understand, however, what the United States would like them to do, and what they should be able to expect from the United States. They would understandably wonder how they will be able to buy more missiles or interceptors after the recent expenditures in Operation Epic Fury. News reports suggest that the United States is exercising its sovereign authority to cut in line and redirect previously agreed foreign military sales to the U.S. military, including PAC-2 and PAC-3 interceptors already paid for by allies.¹⁷

Far more is at stake than foreign military sales. Japan's recent release of draft FY2027 budget documents indicate that their government could drop its planned acquisition of a next generation radar for their Patriot force. Such a change would be a potential setback for US-Japan interoperability and capability in that critical region.¹⁸ Communication is a two-way endeavor; it is important to not merely speak to our allies, but also to understand their needs and constraints. In Europe, numerous nations are desirous of procuring and co-producing more missile defense capabilities, both interceptors and continent-wide sensor nets.¹⁹ The administration has properly asked our allies to do more. Pursuant to the President's executive order, the United States should look to make it easier for them to do more in "cooperation" with us.

There are significant opportunities here to lead and shape this effort that will enhance defense industrial bases at home and abroad.

America's neighbors to the north are also important. President Trump noted the importance of Canadian participation in an Oval Office announcement last May.²⁰ The contours of that cooperation could include sensor modernization efforts, such as modernization of the North Warning System (NWS), new over the horizon radars (OTHRs), and Aegis-equipped frigates. The F-35 sensor suite will also be important for the NORAD air defense mission.²¹

As noted in a recent agreement pursuant to the 1951 treaty with Denmark, Greenland may also play a role here. Besides the Cold War-era ballistic missile early warning radar at Pituffik Space Force Base, many sensors and effectors could be usefully fielded there.²²

¹⁷ Jen Judson and Sebastian Sprenger, "Switzerland becomes newest customer of most advanced Patriot missile," *Defense News*, November 1, 2023, <https://www.defensenews.com/land/2023/11/01/switzerland-becomes-newest-customer-of-most-advanced-patriot-missile/>; Demetri Sevastopulo, "US warns Japan of severe delays in Tomahawk deliveries due to Iran war," *Financial Times*, May 23, 2026, <https://www.ft.com/content/406bc3bb-068b-4f4c-b064-23082e8a9f70?syn-25a6b1a6=1>; Joseph Trevithick, "U.S. Army Is Buying Older PAC-2 Patriot Missiles for the First Time in Decades," *TWZ*, July 23, 2026, <https://www.twz.com/land/u-s-army-is-buying-older-pac-2-patriot-missiles-for-the-first-time-in-decades>.

¹⁸ Tom Karako, "Time to decide: A critical moment in Japan-US missile defense cooperation," *Breaking Defense*, July 28, 2026, <https://breakingdefense.com/2026/07/time-to-decide-a-critical-moment-in-japan-us-missile-defense-cooperation/>.

¹⁹ Joseph Serowik, *Listening to the Sky: Acoustic Drone Detection in Ukraine*, No. 26-1115 (Fort Leavenworth, KS: Center for Army Lessons Learned, March 2026), <https://api.army.mil/e2/c/downloads/2026/04/30/af450e75/no-26-1115-listening-to-the-sky-acoustic-drone-detection-in-ukraine-mar-26.pdf>.

²⁰ Alexander Panetta, "Canada wants to join Golden Dome missile-defence program, Trump says," *CBC News*, May 20, 2025, <https://www.cbc.ca/news/world/golden-dome-trump-us-missile-defence-canada-1.7539390>.

²¹ Giovanni de Briganti, "How Canada Plans to Integrate F-35 Fighters Into NORAD and Arctic Air Defense Operations," *DEFENSE-AEROSPACE*, December 18, 2025, <https://www.defense-aerospace.com/how-canada-plans-to-integrate-f-35-fighters-into-norad-and-arctic-air-defense-operations/>.

²² White House, AGREEMENT BETWEEN THE GOVERNMENT OF THE UNITED STATES OF AMERICA AND THE GOVERNMENT OF THE KINGDOM OF DENMARK TOGETHER WITH THE GOVERNMENT OF GREENLAND, September 22, 2026, <https://www.whitehouse.gov/briefings-statements/2026/09/agreement-between->

Another relevant consideration for ATMDR is the defense of the territory of Guam, part of the U.S. homeland in the Pacific theater. That which cannot be moved or hidden may need to be defended. Given the outsized importance of Guam for operational plans in the Pacific, it is necessary to enhance its defenses.

II. IMAGINATION

A second major shortcoming of the current discussion is a lack of imagination—about the purposes of Golden Dome, the means to realize them, and the extraordinary complexity of the emergent air and missile threat spectrum.

First, Pay Attention

Insufficient attention to both the reported contours of the program and an understanding of the art of the possible has contributed to unimaginative, cookie cutter approaches to public analysis and cost estimating with little relation to what Golden Dome is actually building.

Curiously, there has been insufficient recognition of the possibilities for getting after this initiative, and the means to do so—even in the face of public revelations showing what those means might be. While unlikely to be dispositive of the architecture, an industry day held in August 2025, and other public statements have described several types of various elements and approaches that were not being considered in any of the higher end estimates (which have been in the trillions).²³

Reflection upon these elements can inform more imaginative ways and means to field a meaningful defense. Paying attention to what has already been revealed conveys that this is a tractable problem, that it is technically feasible, and that it could be addressed at an order of magnitude less than some of the public cost estimates—in fact, more in line with General Guetlein’s public estimate of \$185 billion over ten years.²⁴

It seems reasonable to surmise that the architecture will be more modest, more connected to current capabilities, and altogether more achievable than some commentators suggest. Hints for this are found in past industry day slides and a handful of Pentagon requests for information (RFIs). Industry day slides have referenced “Limited Area Defense” for a select number of areas, as well as “Wide Area Surveillance.” Both are terms of art within NORAD and USNORTHCOM for their longtime pursuit of continental air defense. An approach to “limited area defense” is quite different from trying to defend every blade of grass. The word “limited” is literally there, in the name.

[the-government-of-the-united-states-of-america-and-the-government-of-the-kingdom-of-denmark-together-with-the-government-of-greenland-to-amend-and-supplement-the-agreement-of-27-apri/](#).

²³ Todd Harrison, “Build Your Own Golden Dome: A Framework for Understanding Costs, Choices, and Tradeoffs,” American Enterprise Institute, September 12, 2025, <https://www.aei.org/wp-content/uploads/2025/09/WP-Estimating-the-Cost-of-Golden-Dome.pdf?x16878>; Congressional Budget Office, *Potential Costs of a National Missile Defense System*, (Washington, DC: Congressional Budget Office, May 2026), <https://www.cbo.gov/publication/62379>

²⁴ Ashleigh Fields, “Golden Dome cost estimate grows to \$185B,” *The Hill*, March 18, 2026, <https://thehill.com/policy/defense/5789969-golden-dome-missile-defense-cost/>.

Preferential Defense

One set of assumptions that has skewed public discourse is about the scope of the defended asset list. There is not, in fact, any reference in the January 2025 executive order to an impenetrable shield. Assumptions about this alone can drive very different conclusions.

By way of comparison, a 2022 CSIS analysis of homeland air and cruise missile defense was dramatically different than the architecture costed by the CBO, largely because of assumptions about the defense design and the defended area. The CBO's cost estimates for a comprehensive cruise missile defense architecture went as high as \$466 billion. Focused on preferential defense of fewer areas, the CSIS architecture had a life cycle price tag of \$32.7 billion over 20 years.²⁵

Public statements and details suggest that Golden Dome will not try to field a comprehensive or impenetrable defense, but rather a limited but meaningful measure of protection of a finite number of sites. Such a capability might be understood as an effort to counter a fait accompli, cheap shots, or decapitation attacks designed to degrade military means or political will.²⁶ These more limited goals are dramatically more feasible than an impenetrable shield to defend everything against everything, including large-scale nuclear attack.

Home Field Advantage

Once one accepts the necessity of preferential defense, a second critical feature is that this is a home game rather than an away game. Unlike the contested environment overseas, operating at home can contribute to eased manning, ruggedization, and power requirements. While the homeland environment would still be a contested environment, home field advantage also permits different approaches to launcher concepts, sensing architecture, and the employment of enabling capabilities.

Alternative Defense Designs

One aspect of playing the home game is the potential for a disaggregated, network centric approach with distributed elements. A Patriot launcher operating at a military base and integrated into a nationwide network of sensors and effectors would have a lighter logistical footprint than one alone in the middle of a desert. At any given time, local base power could be used, rather than diesel generators. Another positive feature of home field advantage is the potential for robust and resilient terrestrial-based communications infrastructure.

GDA officials have explicitly noted the differences and benefits of the home game, but they have not informed most public cost estimates. This could be enabled by modular and relocatable launchers, with a minimized facility footprint reducing reliance on prepared sites.²⁷ Of course, not all threats need to be engaged by missile interceptors. Various non-kinetic effectors and low-cost gun-based solutions could play important roles for air defense.

²⁵ David Arthur and Michael Bennett, *National Cruise Missile Defense: Issues and Alternatives* (Washington, DC: Congressional Budget Office, 2021), 4, <https://www.cbo.gov/system/files/2021-02/56950-CMD.pdf>; Tom Karako, Matthew Strohmeier, Ian Williams, Wes Rumbaugh, and Ken Harmon, "North America Is a Region, Too: An Integrated, Phased, and Affordable Approach to Air and Missile Defense for the Homeland," Center for Strategic and International Studies, July 14, 2022, <https://www.csis.org/analysis/north-america-region-too>.

²⁶ Steve Trimble, "Key Focus for First Golden Dome Rollout: Protect Leadership," Aviation Week, September 18, 2026, <https://aviationweek.com/defense/missile-defense-weapons/key-focus-first-golden-dome-rollout-protect-leadership>.

²⁷ Mr. Stan Stafira, "Architecture," from Golden Dome for America Industry Summit, August 7, 2025.

Instead of each firing unit having its own complete kill chain, there could be remote operations which “Significantly reduc[e] human-in-the-loop interactions across sensor and effector platforms into a common point of operation and engagement.”²⁸ Instead of simply multiplying a lot of ruggedized and mobile Patriot and THAAD batteries, a next generation system might employ containerized launchers integrated with numerous radars and sensors and the nationwide air and missile defense battle management. Remote operations and their attendant characteristics translate into a different structure to cost, one that would “Enhance AI-driven remote operation by developing durable, ID-specific components with predictable maintenance and minimal soldier touchpoints, supported by reliable, sustainable, and practical long-distance communication systems.”²⁹

The concept of disaggregated firing units with containerized launchers and its potential for defense concepts of operation was outlined at length in the 2018 CSIS report, *Distributed Defense*.³⁰

Alternative Sensor Architectures

The home game also permits alternative approaches to sensing. As described in several CSIS reports, this sensor architecture could include a mesh of various active and passive sensors, to include over the horizon radars (OTHRs), and surface-, building-, or tower-based radars.³¹ Ukraine’s passive acoustic sensor network is an example of such mesh sensing, but numerous other possibilities exist by operating in the ambient noise of electromagnetic spectrum, such as passive television or cellular signals.³² Far more than with expeditionary deployments where air defense batteries must operate alone and unafraid, there exist considerable opportunities for widespread passive and active sensing across and around the North American continent.

The Federal Aviation Administration’s ARSR-4 air traffic control (ATC) radar replacement program presents one opportunity for stitching together existing assets, both military and non-military. Should higher bandwidth radars be procured, they could contribute to not just the ATC function but also better detection and threat classification of non-cooperative aerial threats. At minimum, priority should be given to providing GDA whatever data feeds are useful, including from non-military and commercial sources.

Given the importance of extending the horizon, aerostats, high altitude balloons (HABs), and other high-altitude platforms may provide improved sensing capability and communication

²⁸ Guy Yelverton, “Program Executive Office Missiles and Space,” from Golden Dome for America Industry Summit, August 7, 2025.

²⁹ Douglas Williams, “Demonstrating Capabilities at Pace,” from Golden Dome for America Industry Summit, August 7, 2025

³⁰ Tom Karako and Wes Rumbaugh, “Distributed Defense,” Center for Strategic and International Studies, January 25, 2018, <https://www.csis.org/analysis/distributed-defense>.

³¹ Masao Dahlgren, Patrycja Bazylczyk, and Tom Karako, “Mesh Sensing for Air and Missile Defense,” Center for Strategic and International Studies, July 21, 2025, <https://www.csis.org/analysis/mesh-sensing-air-and-missile-defense>; Tom Karako, “Beyond the Radar Archipelago: A New Roadmap for Missile Defense Sensors,” *War on the Rocks*, November 28, 2018, <https://warontherocks.com/beyond-the-radar-archipelago-a-new-roadmap-for-missile-defense-sensors/>.

³² Tom Karako and Masao Dahlgren, “Complex Air Defense: Countering the Hypersonic Missile Threat,” Center for Strategic and International Studies, February 7, 2022, <https://www.csis.org/analysis/complex-air-defense-countering-hypersonic-missile-threat>.

resilience.³³ Autonomous maritime platforms off the coasts could contribute further by expanding battlespace and warning time.

All such homeland-centric efforts would be additive to current global efforts already underway, such as space-based airborne moving target indicators (AMTI), the Hypersonic and Ballistic Tracking Space Sensor (HBTSS), Proliferated Warfighter Space Architecture (PWSA), the Space Data Network (SDN), and next generation overhead persistent infrared (OPIR).

Battle Management

The principal acquisition managed by the GDA office is to procure a battle management capability for maintaining a common operating picture and simultaneously fighting multiple fire control systems. Addressing the challenge of fire direction and fire control is necessary so that multiple defense systems do not inadvertently try to engage the same threat. Solving this will require innovation by a consortium of new and disruptive companies. It will also require the technical and operational experience of legacy systems and companies that have developed and operated fire control functions for decades. Expectation control will be important, inasmuch as the new integrated battle management layer (I-BML) will not likely replace tactical fire control of the weapon systems. The effort builds upon and will in turn advance recent efforts for the air and missile defense of Guam.

Spectrum

Last year, a topic of particular interest to this subcommittee was that of electromagnetic spectrum—a vital, scarce, and invisible natural resource for national security, air and missile defense, and Golden Dome. It is the medium for many detection, tracking, and communication functions often represented in slide decks as lightning bolts. Of special importance are the S- and X-bands, so that terrestrial radars may accurately detect, track, and classify noncooperative aerial objects.³⁴ While the spectrum auction authorized last year by Congress thankfully avoided some of the more dangerous potential pitfalls, it will remain important for Congress to continue to police the issue and educate stakeholders.

Given the increased importance of bandwidth for national security, it is worth monitoring whether sufficient spectrum remains for military requirements. There is the need for balance between ensuring growth in spectrum as a commodity and prioritizing spectrum access for national security interests in the air and space domains.³⁵ If bandwidth compression and spectrum sharing becomes possible, and as national security needs become greater, some of the auctioned commercial spectrum bands might need to be recovered for national security purposes, whether by legislation or eminent domain.

³³ Wes Rumbaugh and Tom Karako, “Extending the Horizon: Elevated Sensors for Targeting and Missile Defense,” Center for Strategic and International Studies, September 27, 2021, https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/210927_Rumbaugh_Extending_Horizon.pdf?VersionId=4A_Sv5v1HuR5cghHC1proU6iJ1m2gJx1.

³⁴ Tom Karako, “Why Auctioning Military S-Band Spectrum Is a Bad Idea,” Center for Strategic and International Studies, June 9, 2025, <https://www.csis.org/analysis/why-auctioning-military-s-band-spectrum-bad-idea>.

³⁵ Jean-Francois Morizur, “Mobile networks want to use the satellite airwaves we need to track climate change,” *Space News*, December 5, 2025, <https://spacenews.com/mobile-networks-want-to-use-the-satellite-airwaves-we-need-to-track-climate-change/>.

Space-based Intercept and Space Fires

A final topic meriting greater imagination is space-based interceptors. Critics are not wrong to point to the problem of the absentee ratio and the challenge of deorbiting rapidly from hundreds of kilometers. As noted by the program office, “Advances in technology, manufacturing, and cost curves since the Brilliant Pebbles program make space-based interceptors feasible—but not simple.”³⁶ GDA officials have noted that scalability and affordability are the criteria for whether an SBI constellation will be fielded, and of what type.³⁷

To assess prospects for scalability and affordability, there is merit to continuing the experiment and technological demonstration, not just to conduct a boost phase intercept but to explore new concepts of operation. Cheerleaders should abandon their obliviousness to physics and the absentee ratio; these are real problems. Critics should likewise reevaluate intellectual baggage from the Cold War and improved technological feasibility.

The missile threat spectrum of today is not that of 1983, 1991, or 2004. Compared to the mere challenge of SS-18s and SS-19s, the challenge is far more diverse, numerous, and complex. Nor are the space capabilities of the United States, Russia, or China comparable to that in decades past. The presence of weapons in space, while not exactly news, is now openly acknowledged by military officials.³⁸

The implications of space as a warfighting domain are still beginning to sink in. As they do, our evaluation of military capability in space will continue to mature. In turn, the relative significance of space-based missile defenses will likewise evolve.

The advent of space fires is upon us, both kinetic and non-kinetic. They will include space-to-space, space-to-ground and, yes, space-to-flying missile. Once exotic delivery concepts like space-to-ground orbital delivery, space planes, and fractional and multiple orbital bombardment (FOBs and MOBs) are already becoming a reality and will increase in prominence for both offensive and defensive purposes. Radiation and other forms of hardening for satellites will also rise in importance. From this ferment, space-based interceptors will likely emerge as a subset of a range of space fires.

The supply and demand for space fires is not an American idiosyncrasy. Russia and China have long been reportedly pursuing significant counterspace and space fires capability to deny, threaten, and deter U.S. freedom of action. They are not waiting for American permission to do so. Whatever inhibitions one may have today about space-based interceptors, one has to wonder how that will change if it turned out that Russia or China was pursuing similar SBI capability to hold at risk U.S. ICBMs or other long-range strike.

Given the dramatic changes to space as a warfighting domain, it will not suffice to merely rinse and repeat with a GPALS architecture of old. Doing the same thing over and over and expecting a different result is never a good idea. The real promise is that new things can be done,

³⁶ Golden Dome for America Industry Day" briefing slides, Missile Defense Agency, August 7, 2025.

³⁷ Theresa Hitchens, “CBO’s \$1.2 trillion Golden Dome estimate based on bad data: Guetlein,” *Breaking Defense*, May 14, 2026, <https://breakingdefense.com/2026/05/cbos-1-2-trillion-golden-dome-estimate-based-on-bad-data-guetlein/>.

³⁸ Steven Beynon, “Air Force secretary acknowledges the US has weapons in space,” *ABC News*, September 15, 2026, <https://abcnews.com/Politics/air-force-secretary-acknowledges-us-weapons-space/story?id=136437923>; Clayton Swope, Kari A. Bingen, Makena Young, and Kendra LaFave, “Space Threat Assessment 2025,” Center for Strategic and International Studies, April 25, 2025, https://csis-website-prod.s3.amazonaws.com/s3fs-public/2025-04/250425_Swope_Space_Threat.pdf?VersionId=orhySgjISemJLjhdQKKes2OVb35jwkU5.

new capabilities are available, and new and innovative concepts can be devised. The dramatic reduction in space launch costs is significant, but is only one relevant factor. Component miniaturization, size weight and power advances, and other means to conduct orbital maneuver could enhance operational options. The prospect of operating and sustaining satellites in very low earth orbit (VLEO), considerably closer to rising threats, is more viable today than in decades past. The coming diversity of space fires and the prospect of true maneuver warfare in space will come to make GPALS-like architectures look like child's play.

For both missile defense and other purposes, these current experiments deserve a chance to go forward. I would urge bipartisan patience to let these experiments advance, and render judgment not now, and certainly not on the basis of outdated assumptions and intellectual baggage, but rather in a few years after we have seen what the new American space industry is capable of doing.

III. INSTITUTIONALIZATION

A third topic deserving further attention is how to best institutionalize the efforts now being handled by the Golden Dome office. GDA is led by a Direct Reporting Portfolio Manager (DRPM) whose authority is a function of delegation by the Secretary and Deputy Secretary.

By all accounts, the DRPM construct is intended as a temporary solution. Over the last four decades, national missile defense modernization has been embodied in an office, then in an organization, and then in an agency—the Strategic Defense Initiative Office (SDIO), the Ballistic Missile Defense Organization (BMDO), and the Missile Defense Agency (MDA).

It is not too soon to contemplate what should happen next, and to ask how the broader missile defense enterprise should best be organized to be fit for purpose.³⁹ Some kind of new institutional arrangements and organizational structure will almost certainly be needed to tackle the massive organizational, cultural, and social engineering challenges of the undertaking.

Over the past year, the GDA office has not tried to replicate the functions that already exist elsewhere. With the exception of the battle management effort, the vast majority of interceptor, launcher, and radar procurement; systems integration and testing; and construction efforts, for instance, are being handled by others, such as the Missile Defense Agency and the military services. The authorities of the GDA DRPM have enabled both unity of purpose and more rapid movement than typical Pentagon processes.

Supposing that an initial GDA capability is fielded by 2028, what then? From whence will the continued direction and organization be sustained? What organization or arrangement will continue to advance and sustain the effort?

The United States probably does not need more than one joint, national, missile defense acquisition-centric organization.

One possibility is for the DRPMs to simply go away and have things return to business as usual. This path could jeopardize both the unity of purpose and the continued evolution of the architecture to future epochs. Progress beyond 2028 capability would be doubtful.

³⁹ Tom Karako and Wes Rumbaugh, "Reorganizing the missile defense enterprise," *Defense News*, August 6, 2018, <https://www.defensenews.com/smr/space-missile-defense/2018/07/27/reorganizing-the-missile-defense-enterprise/>.

Another approach might be to endow the GDA authorities onto a new entity altogether, perhaps an agency outside the Pentagon building. Such an entity might be led by a four star, and report to the Deputy Secretary rather than an Under Secretary, and have authorities similar to that of the GDA DRPM. The prospect of a new entity would of course require both time to establish and risks the prospect of duplicating functions.

A third path would be to combine the GDA office with the Missile Defense Agency, but in so doing effectively transform the latter. Such a merger could keep the MDA name or perhaps give it a new one. In doing so, it could effectively transform the MDA and perhaps be the vehicle for birthing the GDA-informed vision for the Missile Defense System-Next (MDS-Next). This path would also benefit from a four star rank, direct reporting to the Deputy Secretary, and retention of similar acquisition authorities. Today, MDA reports to the Under Secretary for Research and Engineering, with dotted lines as GDA deputy director, and further dotted lines to Acquisition and Sustainment.

Of course, any of these arrangements would need to determine how or if an institutionalized GDA retains the ability to direct or coordinate acquisition by the services. Irrespective of this future organization structure, it is clear that FY 2027 will witness some significant changes to how the missile defense enterprise will develop and procure capabilities. The most notable is the multiyear acceleration of THAAD, PAC-3 MSE, SM-3, and SM-6. Further efforts are likely to include G/ATOR, SPY-6, TPY-6, LTAMDS, and other radars.⁴⁰ Other movements within the enterprise are also coming. Procurement of the THAAD system, for instance, will this week formally transfer from MDA to the U.S. Army.

Whatever the scope of mission for the future air and missile defense of the homeland, its realization and governance will benefit from unity of effort with clear authority, high level access, control of resources, and appropriate acquisition authorities.

Finally, it is no secret that the “Golden Dome” moniker has contributed to political polarization around the effort. Several options exist to depolarize and depoliticize the effort. It belongs to Congress to name or rename executive departments—witness the pending proposal to rename the Department of Defense as the Department of War. Congress likewise has legislative power to rename the Golden Dome initiative in a future national defense authorization act.

The threat gets a vote, and it has voted to make missiles weapons of choice. Inbound missile threats will not care about our feelings. Nor will they care about the foibles of American domestic politics. One of the principal challenges for both Congress and the executive branch will be to extricate politics and find a bipartisan solution to field meaningful air and missile defense capability for the American homeland.

⁴⁰ Natalie Oliverio, “Pentagon gives industry 21 days to submit plans for ‘significantly faster’ weapons production,” *Defense News*, August 11, 2026, <https://www.defensenews.com/news/pentagon-congress/2026/08/11/pentagon-gives-industry-21-days-to-submit-plans-for-significantly-faster-weapons-production/>.

IV. RECOMMENDATIONS

In closing, allow me to suggest a few ways in which this subcommittee and Congress more broadly might constructively guide, assist, and improve the Pentagon's efforts related to homeland air and missile defense, through both legislative and oversight functions.

- The most urgent congressional action is to appropriate funds, this calendar year, for the missile acceleration ramp and homeland missile defense efforts. Whether it comes in the form of reconciliation, war supplemental, or base budget, both Golden Dome and munitions ramp efforts will stand or fall on FY2027 funding.
- To shore up sustainment and improve oversight, Congress might consider requiring the Golden Dome efforts to be built into base budget planning and budget requests for future fiscal years, along with projections of future year defense program (FYDP).
- Whether by fencing money or some other legislative mechanism, Congress could coerce the finalization and release of:
 - The Allied and Theater Missile Defense Review (ATMDR), which will be important to inform and implement further missile defense cooperation with allies and partners; and
 - A public report or fact sheets communicating the strategic logic behind Golden Dome and the broad concepts being pursued to achieve those strategic goals. These could be issued by, for instance, the Under Secretary for Policy or the GDA DRPM.
- Congressional defense committees might consider coordination with other committees of jurisdiction to ensure whole-of-government attention to air and missile defense needs of the homeland, including the Federal Aviation Agency and Federal Communications Commission, for selection criteria for air traffic control radars and spectrum availability.
- In exercising both oversight and legislative functions, Congress could encourage new and innovative approaches and technology development for SBI capability development, with particular attention to how the capability could be scaled affordably and incorporate the warfighting functions of maneuver and massed fires.
- Begin consideration of the future institutionalization in some entity with the necessary authorities, high level access, and resources—and the appropriate organization of the broad missile defense enterprise, to implement and over time sustain the broad sweep of the initiative now underway. As part of the reorganization and reform of the enterprise, it may make sense to in some way merge GDA with MDA, and rename the Golden Dome initiative.

By whatever name, initiatives to create and sustain homeland air and missile defense are necessary and long overdue. The relevant technologies and capabilities exist. This initiative is required to bring them together and operationalize them.

This is a tractable problem. With improved communication, imagination, and attention to its institutionalization, these initiatives can buttress today's degraded strategic stability and contribute to homeland defense, which has long been, on a bipartisan basis, our nation's top defense priority.

Thank you for the opportunity to be here today. I look forward to your questions.