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# **U.S. Army Short-Range Air Defense Force Structure and Selected Programs: Background and Issues for Congress**

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## U.S. Army Short-Range Air Defense Force Structure and Selected Programs: Background and Issues for Congress

The U.S. Army defines Short-Range Air Defense (SHORAD) as dedicated air defense artillery (ADA) and non-dedicated air defense capabilities that enable movement and maneuver by destroying, neutralizing or deterring low altitude air threats to defend critical fixed and semi-fixed assets and maneuver forces. SHORAD units were historically embedded in Army divisions, providing them with an organic capability to protect their critical assets against fixed-wing and rotary-wing aircraft. However, in the early 2000s, these ADA units were divested from the Army to meet force demands deemed more critical at that time. Decisionmakers accepted the increased risk that threat aircraft might pose to ground forces and other critical assets because they believed the U.S. Air Force could maintain air superiority. Since 2005 though, there has been a significant increase in air and missile platforms arrayed against U.S. ground forces. The use of unmanned aerial systems (UASs) by both state and non-state actors has increased exponentially, and UASs have been used successfully by both sides in the Russo-Ukrainian conflict. Fixed-wing aircraft, attack helicopters, and cruise missiles also continue to pose a significant threat to U.S. ground forces, as do rockets, artillery, and mortars (RAM).

Recognizing ground force vulnerability to these threats, the Army has embarked on an effort to revitalize and update its SHORAD forces and associated systems. Eventually the Army plans to have 10 Maneuver (M)-SHORAD battalions to defend maneuver units and other critical assets within each of the Army's divisions. The battalions are planned to be created incrementally over time. The Army is also planning to stand up eight Indirect Fire Protection Capability (IFPC) units—five in the Active Component (AC) and three in the Army National Guard (ARNG)—to defend fixed and semi-fixed assets at corps and division-level. In terms of SHORAD systems modernization, the Army is developing a Maneuver SHORAD (M-SHORAD) system based on existing SHORAD capabilities and concurrently developing a directed-energy version (DE) M-SHORAD. The Army is also updating legacy radars and developing new SHORAD radar systems and an Integrated Air and Missile Defense Battle Command System (IBCS) to provide command and control of both SHORAD units and missile defense.

To help protect ground forces from various types of attacks, Congress mandated in the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (P.L. 115-232) and the Department of Defense Appropriations Act for Fiscal Year 2019 (P.L. 115-245) that the Army acquire four Israeli-developed Iron Dome batteries. The Iron Dome system is a dual-mission counter rocket, artillery, and mortar (C-RAM) and a short-range air defense system used to target and destroy missiles with an approximate range of 7–70 km. While the Marines were successful in initial tests integrating Iron Dome with their SHORAD systems, the Army said they have had significant interoperability issues with Iron Dome and expressed doubts that Iron Dome would be an effective system against “higher end” cruise missiles.

Potential issues for Congress include, but are not limited to, the following:

- Should there be a legislative provision on future divestment of SHORAD capability?
- Is the Army's modernization priority for SHORAD appropriate?
- Is the Army allocating sufficient resources to revitalize SHORAD?
- Are planned SHORAD force structure and capabilities adequate to meet predicted future challenges?
- What is the future of Iron Dome and its effectiveness against advanced cruise missiles?
- Is Army SHORAD compatible with Marine Corps SHORAD?

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## Why Is this Issue Important for Congress?

Congress is responsible for funding the Army, establishing rules for its regulation, and conducting oversight of a number of Army functions including manning, equipping, training, and readiness. With the growing state and non-state threats of unmanned aerial systems (UASs), cruise missiles (CM), rockets, artillery, and mortar (RAM), as well as traditional fixed and rotary wing aircraft, congressional oversight of the Army's ability to counter these threats could take on an even more important role. To help protect ground forces from these potential attacks in the near term, Congress has mandated the Army acquire four Israeli-developed Iron Dome batteries in both the John S. McCain National Defense Authorization Act for Fiscal Year 2019 and the Defense Appropriations Act for Fiscal Year 2019 (P.L. 115-232 and P.L. 115-245). There have, however, been Army concerns with Iron Dome, and some in Congress have expressed their dissatisfaction with both the Secretary of Defense and Secretary of the Army on the issue. With the Army's overall modernization plans for the total force and associated plans to rebuild SHORAD force structure, upgrade existing systems, and develop new systems, Congress might have to decide if the Army's SHORAD modernization effort is affordable and if the Army is allocating sufficient resources towards the end goal.

## What Is Short Range Air Defense (SHORAD)?

The Army defines SHORAD as:

Dedicated air defense artillery (ADA) and non-dedicated air defense capabilities that enable movement and maneuver by destroying, neutralizing or deterring low altitude air threats to defend critical fixed and semi-fixed assets and maneuver forces.<sup>1</sup>

As originally envisioned prior to and during the Cold War, low-altitude air threats consisted of enemy ground attack fixed-wing aircraft and attack helicopters. As military technology advanced over time, and as cruise missiles and unmanned aerial systems began to proliferate, these systems were also categorized as low-altitude air threats. While mortars, artillery, and rockets have long been a threat on the battlefield, it is only over the past few decades that military technology has progressed to the point where incoming shells and missiles can be detected, engaged, and destroyed with a relatively high degree of success. As such, mortars, artillery, and rockets are now also included as part of low-altitude air threats and are the responsibility of SHORAD systems and units.

## Recent History and Current State of Army SHORAD

In 2017, the Army summarized the recent history and current state of Army SHORAD:

Short-range air defense artillery units were historically embedded in Army divisions, providing them with an organic capability to protect their critical assets against fixed-wing and rotary-wing aircraft. However, in the early 2000s, these ADA units were divested from the Army to meet force demands deemed more critical at that time. Decision-makers accepted the risk that threat aircraft might have on maneuver forces and other critical assets because we believed the Air Force could maintain air superiority. **Thus, the short-range ADA force post-2005 was reduced to two battalions of active component Avenger and counter-rocket, artillery and mortar batteries and seven National Guard Avenger**

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<sup>1</sup> <https://sill-www.army.mil/fires-bulletin-archive/archives/2017/nov-dec/nov-dec.pdf>, accessed July 17, 2020.

**battalions; none of which are organic divisional elements. Defense against air threats in maneuver forces is currently limited to that provided by organic weapons and maneuver personnel.<sup>2</sup>**

According to the Army, the reduction in active component SHORAD battalions was necessary because “the U.S. Army needed this force structure to grow maneuver brigade combat teams for counter-insurgency operations.”<sup>3</sup>

## Renewed Emphasis on SHORAD

Since 2005, potential threats from air and missile platforms that could threaten U.S. ground forces have significantly increased. The use of unmanned aerial systems (UASs) has increased, and UASs have been used successfully by both sides in the Russo-Ukrainian conflict. Furthermore, fixed-wing aircraft, attack helicopters, and cruise missiles continue to pose a threat to U.S. ground forces. In its 2015 report to the President and Congress, the National Commission on the Future of the Army noted, among things, there were modernization shortfalls in SHORAD.<sup>4</sup>

Of the Army’s 2019 six stated modernization priorities, Air and Missile Defense, of which SHORAD is a subset, ranks fifth.

### Army’s Six Modernization Priorities

1. **Long Range Precision Fires:** long-range artillery/munitions and missiles.
2. **Next Generation of Combat Vehicles:** M-2 Bradley Infantry Fighting Vehicle replacement and associated manned and unmanned ground combat systems.
3. **Future Vertical Lift:** replacements for current Army reconnaissance, utility, and attack helicopters and fixed-wing assets.
4. **Army Network:** command, control, communications, computers and intelligence, surveillance, and reconnaissance (C4ISR) systems.
5. **Air and Missile Defense:** systems to protect Army ground forces against a range of air and missile threats.
6. **Soldier Lethality:** new individual and crew-served weapons, including night vision and other weapon target-acquisition technologies.

**Source:** Statement by the Honorable Mark T. Esper Secretary of the Army and General Mark A. Milley Chief of Staff United States Army before the Senate Armed Services Committee First Session, 116<sup>th</sup> Congress on the Posture of the United States Army, March 26, 2019, p. 6.

Given the possibility of defense budget cuts in the aftermath of the Coronavirus Disease 2019 (COVID-19) pandemic,<sup>5</sup> it remains to be seen from a budgetary perspective if the Army’s second-to-last modernization priority will receive the necessary budget authority to fully modernize the SHORAD force as currently planned.

## Army Categories of UAS

The Army has five categories of UAS that guide the development of SHORAD systems. These five categories are described in **Table 1**.

<sup>2</sup> Brig. Gen. Randall McIntire, “The Return of Army Short-Range Air Defense in a Changing Environment,” Army Fires Bulletin, November-December 2017.

<sup>3</sup> Gary Sheftick, “Army Rebuilding Short-Range Air Defense,” Army News Service, July 3, 2019.

<sup>4</sup> Report to the President and the Congress of the United States, National Commission on the Future of the Army, January 28, 2016, p. 112.

<sup>5</sup> Sydney J. Freedberg Jr., “Army Braces for Post-COVID Cuts: Gen. Murray,” *BreakingDefense.com*, May 20, 2020, and Sydney J. Freedberg Jr., “Army Ponders what to Cut if Budget Drops,” *BreakingDefense.com*, June 10, 2020.

**Table I. Army Categories of Unmanned Aerial Systems (UAS)**

UAS Category	Max Gross Take Off Weight	Normal Operating Altitude (feet)	Airspeed (knots)
Group 1 UAS	< 20 pounds	< 1200 feet above ground level (AGL)	< 100 knots
Group 2 UAS	21 – 55 pounds	< 3500 AGL	< 250 knots
Group 3 UAS	< 1320 pounds	< 18000 feet mean sea level (MSL)	< 250 knots
Group 4 UAS	> 1320 pounds	< 18000 MSL	Any airspeed
Group 5 UAS	> 1320 pounds	> 18000 MSL	Any airspeed

**Source:** U.S. Army Road Map for UAS 2010-2035, p. 12.

## Growing the SHORAD Force<sup>6</sup>

According to the Army, its current plan is eventually to have 10 SHORAD battalions to defend maneuver units and other critical assets within each of the Army’s divisions. They are to be stood up incrementally over time. The Army is also planning to stand up Indirect Fire Protection Capability (IFPC) units, in both the Active Component (AC) and the Army National Guard (ARNG) to defend fixed and semi-fixed assets at corps and division level. Battalions currently fielded with the Land-Based Phalanx Weapons System (LPWS) used to counter rockets, artillery and mortars—and therefore also known as the C-RAM system—are planned to eventually transition to a new IFPC system.

## Current Army SHORAD Modernization Plans<sup>7</sup>

Army leadership has approved the addition of four new Maneuver Short Range Air Defense (M-SHORAD) Battalions in the Regular Army (RA). These battalions are intended to support Armored and Mechanized and Stryker-equipped divisions as divisional Air Defense battalions. The Army’s plans for these battalions are as follows:

- The first battalion 5-4 ADA was activated in Germany in 2018 as an Avenger battalion and will transition to the M-SHORAD, Increment 1 vehicle with a projected fielding in FY2021.
- The second M-SHORAD battalion will activate at Joint Base Lewis-McChord, WA, in FY2021 to support the first full Multi-Domain Task Force (MDTF)<sup>8</sup> in the Army. The intent is to provide an interim SHORAD capability to the MDTF, which will transition to IFPC in the future once a decision is made on what system will satisfy the Army’s IFPC requirements.

<sup>6</sup> Information in this section is taken from Gary Sheftick, “Army Rebuilding Short-Range Air Defense,” *Army News Service*, July 3, 2019.

<sup>7</sup> Information in this section is taken from Army’s Air and Missile Defense (AMD) Modernization Plan, provided to CRS by the Fires Capabilities Development and Integration Directorate (F-CDID) Fort Sill, OK, June 3, 2020.

<sup>8</sup> For additional information on Multi-Domain Task Forces, see CRS In Focus IF11542, *The Army’s AimPoint Force Structure Initiative*, by Andrew Feickert.



- A recommendation by Army Staff is that the third and fourth M-SHORAD battalions be assigned to Army Forces Command (FORSCOM)<sup>9</sup> headquartered at Ft. Bragg, NC, to support Armored and Mechanized divisions.
- When M-SHORAD High Energy Laser (HEL) systems are available in FY2025, they will replace one platoon of M-SHORAD in each battery. Eventually, the ARNG is planned to have four M-SHORAD battalions, achieved by converting four existing Avenger battalions.

The Army's intentions in terms of IFPC are as follows:

- The Army will create a total of five Indirect Fire Protection Capability (IFPC) Battalions in the RA. Once the Army decides on a system for IFPC, these units will operate as separate battalions assigned to Corps (I, III, V, 18<sup>th</sup> Airborne) and 8<sup>th</sup> Army. To create the five IFPC battalions, the Army plans to convert the 2-44, 5-5, and 4-60 ADA battalions to IFPC. The RC will convert three existing Avenger Battalions to IFPC, pending materiel availability, with the intent to align one to support 3d Army. No decisions have been made on the status of E/6-52 and E/3-4, but one will likely be required soon given the end of life of the Stinger/Avenger system within the next decade.
- Land-based Phalanx Weapon System (LPWS) will remain in the Army inventory until the fielding of RA IFPC battalions is complete.
- Disposition of the Iron Dome system and/or the extent to which its components will be incorporated into the enduring IFPC materiel solution have not yet been determined.

The Army's intentions in terms of dedicated SHORAD radars are as follows:

- As part of the modernization effort for SHORAD radars, the Army plans to procure the Sentinel A4 radar starting FY2023. This will serve as the sensor for new IFPC battalions and will replace the Sentinel A3 in all formations.

## Selected Legacy and Developmental SHORAD Systems

### Selected Legacy Systems

#### Stinger<sup>10</sup>

The FIM-92 Stinger is an advanced, fire-and-forget, short-range, man-portable, air defense missile that provides maneuver forces and point defense assets with low-altitude air defense against fixed and rotary wing aircraft, UAS, and cruise missiles (CM) (see **Figure 1**). It is deployable from a variety of platforms, including vehicles, helicopters, and UASs. The Stinger is

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<sup>9</sup> FORSCOM trains, mobilizes, deploys, sustains, transforms, and reconstitutes assigned conventional forces, providing relevant and ready land power to combatant commanders, <https://www.army.mil/organization/>, accessed June 4, 2020.

<sup>10</sup> Information in this section is taken from an Army SHORAD Capability briefing provided to CRS dated June 5, 2020, and David Overson, "Army Intensifying Stinger Air Missile Training as Part of New Strategic Initiatives," *Army.mil*, January 12, 2018.



delivered as a round of ammunition and requires no field testing or maintenance. The Stinger had an original shelf-life of 10 years, which has been extended by service life extension programs (SLEPs).<sup>11</sup> Plans call for the Stinger to remain in service until FY2030-FY2031. The Stinger has a range in excess of four kilometers and uses passive infra-red/ultra violet (IR/UV) homing and high-explosive warhead with a proximity fuse.

The Army noted that it had “drifted away from the FIM-92 Stinger,” which has been in service since the late 1970s, as it focused on counterinsurgency tactics. As an interim solution to the identified lack of SHORAD, the Army developed a pilot course in late 2017 focused on creating two-man Stinger teams for units rotating into Germany or Korea. Since 2017, a number of brigades have sent soldiers through the pilot course and an enhanced five-week course.

**Figure 1. FIM-92 Stinger Man-Portable, Air Defense Missile System**



**Source:** [https://www.army.mil/article/198986/army\\_intensifying\\_stinger\\_air\\_missile\\_training\\_as\\_part\\_of\\_new\\_strategic\\_initiatives](https://www.army.mil/article/198986/army_intensifying_stinger_air_missile_training_as_part_of_new_strategic_initiatives), accessed June 2, 2020.

## **Avenger<sup>12</sup>**

First fielded in 1989, the Avenger provides a short-range capability against UAS and fixed and rotary wing threats (see **Figure 2**). It is described as “a rear-area air defense system, not designed to support a maneuvering force, and it would not survive nor be effective in defending a heavy

<sup>11</sup> According to the Defense Acquisition University, a Service Life Extension Program (SLEP) are modification(s) to fielded systems undertaken to extend the life of the system beyond what was previously planned.

<sup>12</sup> Information in this section is taken from an Army SHORAD Capability briefing provided to CRS dated June 5, 2020, and Gary Sheftick, “Army Rebuilding Short-Range Air Defense,” Army News Service, July 3, 2019.

force on the move.”<sup>13</sup> Avenger employs eight Stinger missiles to counter aerial threats and a M3P gun for close-in ground and air threats. An Identification Friend or Foe (IFF) system assists in the identification of friendly aircraft in order to minimize the potential for fratricide. It also provides day/night adverse weather operations, shoot-on-the-move capability, rapid target engagement, and remote firing capability.

In 2018, the Army reestablished an active SHORAD battalion in Germany with Avengers—modified Humvees (HMMWVs) with a turret on top and two pods of Stinger missiles. The Avengers had been reassigned to the ARNG or stored in depots. An Avenger SLEP that started in the third Quarter of FY2019 included installation of a Mode 5 IFF, a new fire-control computer, and converting analog Avenger communications equipment to digital communications. The Avenger SLEP also included a new air-conditioning and heating unit and a new .50-caliber machine gun.

In addition to the battalion in Germany, the active Army also has four separate Avenger batteries: one in South Korea; one at Fort Sill, OK; one at Fort Campbell, KY; and one with the Global Response Force at Fort Bragg, NC.

**Figure 2. Avenger SHORAD System**



**Source:** [https://www.army.mil/article/213675/avenger\\_and\\_sentinel\\_advanced\\_gunnery\\_validates\\_shorad\\_capabilities\\_on\\_the\\_korean\\_peninsula](https://www.army.mil/article/213675/avenger_and_sentinel_advanced_gunnery_validates_shorad_capabilities_on_the_korean_peninsula), accessed June 2, 2020.

<sup>13</sup> David L. Mann, Roger F. Matthews, and Francis G. Mahon, “None of this is Going to Matter if You’re Dead: Modernizing Integrated Air and Missile Defense Must Remain Army’s Top Priority,” *Real Clear Defense*, June 16, 2020.



## Land-Based Phalanx Weapons System (LPWS)

According to the Army:

LPWS was originally developed and deployed to Forward Operating Bases (FOB) in Iraq in support of Operation Iraqi Freedom (OIF) with some systems also deployed to Afghanistan in support of Operation Freedom's Sentinel (OFS). In 2013, the Army authorized the fielding of existing C-RAM intercept assets and support equipment to ADA battalions. The primary component for the C-RAM Intercept program was the Land-based Phalanx Weapon System (LPWS), a modified U.S. Navy Phalanx Close-In Weapon System (CIWS) mounted on a commercial semitrailer for land-based operations. The 20mm Gatling gun is capable of on-board target acquisition and fire control. LPWS barrels are optimized for use with self-destruct ammunition to minimize collateral damage. Integrated search and track radars detect and engage a wide range of indirect fire threats.<sup>14</sup>

According to the Army, the LPWS is combat proven and has achieved more than 450 successful intercepts of a rocket or mortar round fired at high-value assets.<sup>15</sup> LPWS 20mm Gatling guns have a 2 kilometer range, and the system has built-in engagement features designed to avoid fratricide (see **Figure 3**). It also has integrated search and track radars and employs a Forward Looking Infrared Radar (FLIR) for target classification. The LPWS can be linked to the Sentinel radar to detect incoming threats.

**Figure 3. Land-Based Phalanx Weapons System (LPWS)**



**Source:** <https://www.rgb.com/news/rgb-spectrum-image-processing-technology-deployed-raytheon-phalanx-weapons-defense-system>, accessed June 9, 2020.

<sup>14</sup> <https://www.msl.army.mil/Pages/C-RAM/Ipws.html>, accessed June 9, 2019.

<sup>15</sup> Information in this section is from an Army SHORAD Capability briefing provided to CRS dated June 5, 2020.

## **AN/MPQ-64 Sentinel A3 Radar<sup>16</sup>**

The Sentinel A3 Radar is the Army's primary sensor for tactical formations and supports air space management at division and Brigade Combat Team (BCT) level, as well as at Maneuver SHORAD battalion levels (see **Figure 4**). The Sentinel A3's characteristics are

- a three-dimensional X-band Phased Array Radar;
- all-weather; day/night; 360° coverage;
- integration into Integrated Air Missile Defense common architecture; systems supporting the National Capitol Region air defense; and Counter Rocket Artillery and Mortars (C-RAM) warning systems;
- ability to alert/cue friendly forces of enemy air attack;
- automatic detection/ability to track cruise missiles, UAVs, and rotary wing/fixed wing (RW/FW) aircraft: and
- mobility.

**Figure 4. AN/MPQ-64 Sentinel A3 Radar**



**Source:** <https://www.militaryaerospace.com/unmanned/article/16722055/thalesraytheon-to-build-50-anmpq64-enhanced-sentinel-a3-radar-systems-in-519-million-deal>, accessed June 15, 2020.

<sup>16</sup> Ibid.

## Selected Developmental Systems

### Maneuver Short Range Air Defense (M-SHORAD)

The Maneuver, Short-Range Air Defense (M-SHORAD) system is primarily intended to defend maneuver forces against air threats (see **Figure 5**). It also has the capability to engage a range of ground targets. The Army reportedly plans to procure 144 M-SHORAD Systems, with the objective of equipping the first and second battalions with 36 systems apiece by FY2021 and a third and fourth battalion with 36 systems each by FY2022. The Army reportedly categorizes M-SHORAD as a rapid acquisition system, and it is not scheduled to go through a standard defense acquisition development cycle; rather, it is to be developed under the Other Transaction Authority (OTA) contracting process.<sup>17</sup> M-SHORAD uses the M-1126 Stryker combat vehicle as its chassis. The weapons and radar packages are to be put together by Leonardo DRS and then installed on the Stryker by General Dynamics Land Systems (GDLS)—the vehicle’s original manufacturer.<sup>18</sup> According to Leonardo DRS, M-SHORAD are to have the capabilities to

- move and maneuver with BCTs with the necessary mobility, survivability, and lethality to fight at the tactical level;
- detect, identify, and track air threats with on-board sensors providing 360 degree aerial surveillance;
- destroy or defeat ground and air threats using multiple kinetic effectors (direct fire and missiles—Long Bow Hellfire and Stinger missiles);
- provide protection for the vehicle and crew with the XM914 (30mm) and M240 (7.62mm);
- integrate with existing Army networks and interoperable with Sentinel radar;
- defeat smaller air threats (Group 1 and 2 unmanned aerial systems [UAS]) at closer ranges with direct fire (as required); and
- support growth to directed energy when available.<sup>19</sup>

Currently, the Army plans to complete M-SHORAD developmental testing and proceed to operational testing in the autumn of 2020 ahead of fielding in FY2021.<sup>20</sup>

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<sup>17</sup> Jason Sherman, “Lawmakers Back Army’s IM-SHORAD Rapid Acquisition to Counter Low-Flying Russian Threats,” *InsideDefense.com*, June 15, 2018.

<sup>18</sup> <https://www.leonardodrs.com/news/in-the-news/leonardo-drs-readying-for-next-phases-of-two-army-maneuver-air-defense-programs/>, accessed June 1, 2020.

<sup>19</sup> Leonardo DRS Fact Sheet, <https://www.leonardodrs.com/media/11191/im-shorad-info-sheet-oct-ausa.pdf>, accessed June 1, 2020.

<sup>20</sup> Jen Judson, “US Army to Soon Wrap up Early Testing of Short-Range Air Defense System,” *DefenseNews.com*, March 24, 2020.



**Figure 5.M SHORAD**



**Source:** <https://www.leonardodrs.com/products-and-services/im-shorad/>, accessed May 28, 2020.

## **Indirect Fire Protection Capability (IFPC) Increment 2 (Inc 2)**

The evolution of IFPC (see **Figure 6**) is described in the following passage:

The advent of the C-RAM mission led to the development of the Indirect Fire Protection Capability program (IFPC). Unfortunately, the threat is dynamic, and the counter-unmanned aerial systems and cruise missile capability gap took precedence, morphing IFPC into IFPC Increment-2 to close those critical gaps. IFPC Increment-2 was envisioned to be a non-developmental item, leveraging a multi-missile launcher - developed by Army laboratories and produced in Army depots - which employed existing interceptors and missiles to defeat cruise missiles and UASs. The Sentinel radar is IFPC's primary sensor, and the Army's Integrated Air and Missile Defense Battle Command System (IBCS) would serve as its command and control center and gateway into the integrated architecture. IFPC is envisioned to replace Avenger as the rear-area air defense system capable of dealing with

the cruise missile and UAS threat, and eventually, the rockets, artillery, and mortar threats.<sup>21</sup>

The Army envisions to IFPC Increment 2 to be

[a] kinetic interceptor-based solution operating as a platoon of no more than four launchers using IBCS and Sentinel A3/A4 to defend critical military and geopolitical fixed assets; semi-fixed assets; and maneuver forces against surveillance and attack by Cruise Missiles (CM); Unmanned Aerial Systems (UAS); Rockets, Artillery, and Mortars (RAM); Fixed-Wing (FW) aircraft, and Rotary-Wing (RW) aircraft.

IFPC Inc. 2 defends units at Corps level and compliments Maneuver Short Range Air Defense (M-SHORAD) units at the Division level and Patriot units above Corps level to provide flexible employment options that enable layered and tiered air defense for commanders during all periods of Multi-Domain Operations.<sup>22</sup>

IFPC Inc. 2's desired capabilities are to include the following:

- Platoon Coverage: 360° coverage of a defended asset with an area of  $\geq 16\text{km}^2$  to  $\geq 32\text{km}^2$  against simultaneous threats.
- Transportability: C-5/C-17 roll on/roll off capability.
- Engagement Capacity:  $\geq 20$  engagements without reload.
- Target Service Rate: 9 Targets  $\leq 15$  seconds (minimum).
- Upgradeability: future upgrades enable mixed interceptor magazines.<sup>23</sup>

The Army is also pursuing high-energy laser and high-power microwave capabilities for IFPC in addition to kinetic interceptor capabilities.<sup>24</sup>

Currently, the Army has reportedly gone back to industry for a solution and is proposing a “shoot-off” demonstration planned for April 2021 to June 2021 at which interested companies can present their proposed path to integration with the Army’s Integrated Air and Missile Defense Battle Command Systems (IBCS) and Sentinel A3 Radar.<sup>25</sup> Plans then call for the Army to use the shoot-off results along with digital simulation data to select a vendor to deliver 16 IFPC prototypes in FY2023 followed by full-rate production in FY2024.<sup>26</sup>

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<sup>21</sup> Taken directly from David L. Mann, Roger F. Matthews, and Francis G. Mahon, “None of this is Going to Matter if You’re Dead: Modernizing Integrated Air and Missile Defense Must Remain Army’s Top Priority,” Real Clear Defense, June 16, 2020.

<sup>22</sup> Information in this section is taken from an Army SHORAD Capability briefing provided to CRS dated June 5, 2020.

<sup>23</sup> Ibid.

<sup>24</sup> Army email to CRS, July 15, 2020.

<sup>25</sup> Ibid.

<sup>26</sup> Jason Sherman, “Iron Dome Shortcomings Prompt Army to Overhaul IFPC 2 Inc. 2 with New ‘Shoot Off’ Competition,” InsideDefense.com, March 5, 2020.



**Figure 6. Prototype IFPC Inc 2 Launcher**



**Source:** <https://www.defensenews.com/digital-show-dailies/ausa/2018/10/10/army-nearing-strategy-on-way-ahead-for-indirect-fire-protection-capability/>, accessed June 19, 2020.

## Iron Dome

### Background

According to the RAND Corporation:

In the 2000s, and early 2010s Israel was threatened by a growing missile threat from Hezbollah and Hamas. Both groups amassed inventories of thousands of missiles, including systems that could penetrate deep into Israel. In the 2006 Lebanon war, these missiles were a major source of Israeli civilian casualties. Israeli planners worried that without a way of blunting these threats, future conflicts would impose even greater costs, both psychological and physical, on the Israeli citizenry, as well as damage bases and assembly areas, thus limiting Israel's ability to project force.<sup>27</sup>

Consequently, Israel began to develop systems to address this growing threat.

### Characteristics

The RAND analysis continues:

The Iron Dome system [see **Figure 7**] is a dual-mission counter rocket, artillery, and mortar (C-RAM) and very short range air defense (V-SHORAD) system used to target and destroy

<sup>27</sup> Elizabeth M. Bartels, "Is Iron Dome a Poisoned Chalice? Strategic Risks from Tactical Success," *The Rand Blog*, November 29, 2017.

missiles with a range of about 7–70 km. The system is designed to protect high-value infrastructure by targeting only those missiles aimed at the specific areas with interceptor warheads which explode within a meter of the threat to destroy incoming missiles. Two elements of Iron Dome gave it an advantage over traditional approaches to missile defense. First, the new system allowed very precise tracking of incoming rockets. As a result, defenders could pick and choose which rockets to fire at, saving rounds and minimizing collateral damage. Second, the interceptors were relatively cheap, encouraging users to experiment in peacetime to fine-tune the system. While there has been substantial debate over both claims, it was striking that among the Israeli experts, even the most critical thought Iron Dome performed better, for less money, than competitor systems.<sup>28</sup>

### **Claims of Iron Dome Performance in Combat**

Placed in service by the Israeli Air Force in 2011, Israeli firm Rafael Ltd.—Iron Dome’s developer—claims over 2,000 rockets have been intercepted successfully, constituting a rate over 90%.<sup>29</sup> While acknowledging Iron Dome has been an effective system, some U.S. officials reportedly have expressed doubts that Iron Dome is effective against the full range of cruise missiles that U.S. forces might have to face in an operational setting.<sup>30</sup>

### **Administration and Congressional Interest in Iron Dome**

The Administration and Congress have had a long standing interest in Iron Dome and, at times, Congress has been less than satisfied with the Army’s approach toward the system. On March 5, 2012, the Obama Administration stated:

The President secured an additional \$205 million in FY 2011 to help produce an Israeli-developed short-range rocket defense system called Iron Dome, which has helped defend Israeli communities against rocket attacks by successfully striking rockets as they are fired at Israeli civilians.

In July 2012, President Obama provided an additional \$70 million to Israel to ensure that Israel could maximize its production of the Iron Dome system for 2012. Over the next three years, the Administration intends to request additional funding for Iron Dome, based on an annual assessment of Israeli security requirements against an evolving threat.<sup>31</sup>

On March 6, 2012:

The US House of Representatives passed the Fiscal Year 2013 National Defense Authorization Act, including \$680 million for “procurement of additional batteries and interceptors, and for operations and sustainment expenses,” from fiscal year 2012 through 2015. This brought U.S. investment in Iron Dome to more than \$900 million since 2011. Significantly, the House act explicitly calls for Israel to share Iron Dome technology with the United States and to explore coproduction of the system before the money is disbursed.<sup>32</sup>

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<sup>28</sup> Ibid.

<sup>29</sup> <https://www.rafael.co.il/wp-content/uploads/2019/06/Multi-Mission-IRON-DOME-Brochure.pdf>, accessed June 15, 2020.

<sup>30</sup> Sydney J. Freedberg Jr., “Army Doubts Iron Dome Can Kill Cruise Missiles,” *BreakingDefense.com*, March 4, 2020.

<sup>31</sup> White House, President Obama: Advancing Israel’s Security and Supporting Peace, March 5, 2012, <https://obamawhitehouse.archives.gov/advancing-israels-security>.

<sup>32</sup> Lazar Berman, “Israel’s Iron Dome: Why America Is Investing Hundreds of Millions of Dollars,” American Enterprise Institute for Public Policy Research, September 2012, and House Armed Services Committee, National Defense Authorization Act for Fiscal Year 2013, H.Rept. 112-479.

The Army's initial decision to pursue Iron Dome was part of the Army's Indirect Fires Protection Capability Increment 2 (IFPC Inc. 2) program, with the goal of developing or buying a static system capable of protecting ground troops from cruise missiles, artillery, and air threats. Reportedly, Congress viewed Iron Dome as an interim system until the Army could develop SHORAD systems to protect ground forces from the aforementioned threats.<sup>33</sup>

On September 14, 2016, the United States and Israel agreed to procure components for the Iron Dome through coproduction in the United States by U.S. companies. As a result, the U.S. firm Raytheon partnered with Rafael Ltd. to develop the U.S. version of Iron Dome.

In both the FY2019 National Defense Authorization Act (NDAA) (P.L. 115-232) and the FY2019 Department of Defense Appropriations Act (P.L. 115-245), Congress directed the Army to deploy four batteries—two in 2020 and two in 2023—of a medium-range air defense system to counter cruise missiles and other threats. In response to this mandate, the Army issued a report selecting Iron Dome because it provided “the best value to the Army based on its schedule, cost per kill, magazine depth, and capability against specified threats.”<sup>34</sup> Reportedly, in August 2019, the United States and Israel began finalizing contract terms for the Army to purchase two Iron Dome batteries from state-owned Israeli defense contractors so the Army could meet the congressionally mandated 2020 deployment.<sup>35</sup> Each battery was to consist of six launchers, one radar, one battle management center, an initial load of 120 Tamir Interceptor missiles, and an additional reload of 120 missiles.<sup>36</sup>

## **U.S. Army Reverses Its Iron Dome Procurement Decision**

On March 5, 2020, during a House hearing of the Subcommittee on Tactical Air and Land Forces on FY2021 Army and Marine Corps Ground Modernization Programs, General Murray, Commander of Army Futures Command, testified regarding Iron Dome:

In the 2019 NDAA there was a report submitted that we would purchase two batteries of Iron Dome with the intent of integrating them into our integrated air defense system. We do air defense in layers, and so the connections between high-altitude, mid-altitude, and low altitude systems is very important to us.

It took us longer to acquire those two batteries than we would have liked for a lot of different reasons and we are in the process right now, we believe we cannot integrate them into our air defense system based on some interoperability challenges, some cyber challenges, and some other challenges. So what we ended up having really is two standalone batteries that will be very capable, but they cannot be integrated into our air defense system. And so we are working a path right now, the report came in last Friday on our way forward. We anticipate a shoot off open to U.S. industry, foreign industry to go after whatever is the best solution to provide that capability.<sup>37</sup>

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<sup>33</sup> Charlie Gao, “The U.S. Army Just Dumped Israel's Iron Dome Rocket Defense System,” *The National Interest*, March 21, 2020.

<sup>34</sup> Congressional Letter to Secretary of Defense Mark Esper, dated April 17, 2020, <https://joewilson.house.gov/sites/joewilson.house.gov/files/MENG%20WILSON%20Iron%20Dome%20Letter.pdf>.

<sup>35</sup> Jason Sherman, “U.S., Israel Readying Contract for Iron Dome Purchase,” *InsideDefense.com*, August 6, 2019.

<sup>36</sup> *Ibid.* Information on missile reload provided to CRS by the Army, July 15, 2020.

<sup>37</sup> Congressional Quarterly (CQ) Transcripts: House Subcommittee on Tactical Air and Land Forces Hearing: “The Fiscal Year 2021 Army and Marine Corps Ground Modernization Programs,” March 5, 2020 - March 6, 2020.

While some characterized this as the “cancellation” of Iron Dome,<sup>38</sup> the Army is reportedly receptive to having components of Iron Dome as part of the Army’s final IFPC solution, based on the outcome of the IFPC “shoot off.”<sup>39</sup>

### **Marine Corps Success with Iron Dome Integration<sup>40</sup>**

While the Army has been unable to integrate Iron Dome with its air defense system, the Marine Corps reportedly successfully integrated elements of the Iron Dome system with its existing radar and command and control system during a live-fire event in August 2019. According to a Marine official at the time, “The Marine Corps proved during a live-fire demonstration last month that it could integrate Marine Corps systems with other components to successfully counter emerging threats.”<sup>41</sup> This test was reportedly “part of an effort to identify a solution to respond to an urgent need from deployed Marines for a medium-range intercept capability deployed as part of an organic, ground-based air defense.”<sup>42</sup>

### **Congressional Reaction**

Some in Congress were opposed to the Army’s decision regarding Iron Dome. In an April 17, 2020, letter, 23 Representatives wrote Defense Secretary Mark Esper expressing their concerns and requesting

- a deployment plan for the first two batteries of Iron Dome, including whether the Army can accelerate its fielding;
- an update on any work done since October 2018 to ensure the integration of the Iron Dome system into other Army systems; and
- ideas for how this integration can more rapidly meet current threats and/or provide additional interim capability.<sup>43</sup>

On May 14, 2020, Senator John Boozman, wrote Secretary Esper urging the deployment of one Iron Dome battery to the U.S. Central Command (USCENTCOM) region to protect against missile, rocket, artillery, and mortar threats.<sup>44</sup>

### **FY2021 National Defense Authorization Act (NDAA)**

S. 4049, the National Defense Authorization Act for Fiscal Year 2021, provisions also address Iron Dome concerns:

**SEC. 113. MODIFICATIONS TO REQUIREMENT FOR AN INTERIM CRUISE MISSILE DEFENSE CAPABILITY.**

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<sup>38</sup> Jason Sherman, “US Army Scraps \$1b. Iron Dome Project, after Israel Refuses to Provide Key Codes,” *The Times of Israel*, March 7, 2020.

<sup>39</sup> Sydney J. Freedberg, Jr., “Iron Dome Does Not Work for the Army: Gen. Murray,” *BreakingDefense.com*, March 5, 2020.

<sup>40</sup> Information from this section is taken from Jason Sherman, “Marine Corps ‘Successfully’ Demos Iron Dome Integration with G/ATOR, CAC2S,” *InsideDefense.com*, September 16, 2019.

<sup>41</sup> Ibid.

<sup>42</sup> Ibid.

<sup>43</sup> Letter to Dr. Mark Esper, Secretary of Defense, April 17, 2020.

<sup>44</sup> Letter to Dr. Mark Esper, Secretary of Defense from Senator John Boozman, May 14, 2020.

The committee recommends a provision that would require the Secretary of Army to submit to the congressional defense committees the plan to operationally deploy or forward station in an operational theater or theaters the two batteries of interim cruise missile defense capability required by section 112(b)(1)(A) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Public Law 115–232). The provision would also modify the terms of the waiver for the requirement for two additional batteries by September 30, 2023.

The committee notes that the Secretary of the Army has exercised the waiver for the first two batteries since the Army will not meet the deployment deadline of September 30, 2020. While the committee understands the requirements for testing and training prior to deployment, the committee still expects the Secretary to meet the original intent of section 112—forward stationing an interim cruise missile defense capability to protect fixed sites from cruise missile threats with prioritization to locations in Europe and Asia.<sup>45</sup>

**SEC. 1661. IRON DOME SHORT-RANGE ROCKET DEFENSE SYSTEM AND ISRAELI COOPERATIVE MISSILE DEFENSE PROGRAM CO-DEVELOPMENT AND 10 CO-PRODUCTION.**

The committee recommends a provision that would authorize not more than \$73.0 million for the Missile Defense Agency (MDA) to provide to the Government of Israel to procure components for the Iron Dome short-range rocket defense system through co-production of such components in the United States. The provision would also authorize \$50.0 million for the MDA to provide to the Government of Israel for the procurement of the David’s Sling Weapon System and \$77.0 million for the Arrow 3 Upper Tier Interceptor Program, including for co-production of parts and components in the United States by U.S. industry. The provision would also provide a series of certification requirements relating to implementation of the below relevant bilateral agreements before disbursement of these funds. These funds are a subset of the \$500.0 million total authorized to be appropriated for cooperative missile defense programs with Israel within this Act.

The committee acknowledges that the September 14, 2016, Memorandum of Understanding (MOU) between the United States and Israel commits \$500.0 million in U.S. funding for cooperative missile defense programs annually, beginning in fiscal year 2019 and ending in fiscal year 2028. According to the MOU, the United States and Israel jointly understand that any U.S. funds provided for such programs should be made available according to separate bilateral agreements for the Iron Dome, David’s Sling, and Arrow 3 Upper Tier Interceptor Program and should maximize co-production of parts and components in the United States at a level equal to or greater than 50 percent of U.S.-appropriated funds for production. Additionally, Israel commits not to seek additional missile defense funding from the United States for the duration of the MOU, except in exceptional circumstances as may be jointly agreed by the United States and Israel. The committee expects to continue to receive annual updates on all cooperative defense programs, as delineated in the MOU, to include progress reports and spending plans as well as the top-line figures of the Israel Missile Defense Organization budget for these programs.<sup>46</sup>

**Army’s Current Position on Iron Dome<sup>47</sup>**

Reportedly on May 27, 2020, the Commander of Army Futures Command (AFC) stated the Army would “work this fall and spring and try [to] integrate Iron Dome as it exists“ into the Integrated

<sup>45</sup> S.Rept. 116-236, National Defense Authorization Act for Fiscal Year 2021, p. 8.

<sup>46</sup> *Ibid.*, p. 352.

<sup>47</sup> Information in this section is taken from Ashley Tressel, “Murray: Army will Try ‘Best we Can’ to Integrate Iron



Air and Missile Defense Battle Command System.”<sup>48</sup> The AFC Commander also noted that as it stands as of May 27, 2020, the Army did not have a deployed Iron Dome battery, with the delivery of the first Iron Dome battery expected in December 2020 and the second battery in February 2021.<sup>49</sup> He observed further that “it will take some time to train soldiers on a system they have never operated before and we've committed to Congress that we will expedite that as much as we possibly can.”

**Figure 7. Israel’s Iron Dome System**



**Source:** <https://www.cnn.com/2014/07/09/world/meast/israel-palestinians-iron-dome/index.html>, accessed June 23, 2020.

## Integrated Air and Missile Defense Battle Command Systems (IBCS)

IBCS (see **Figure 8**) is summarized in one article in the following passage:

The final element in the Army's air and missile defense reformation is its Integrated Air and Missile Defense Battle Command System (IBCS). Command and control systems are referred to as “the glue that binds a family of systems - the element that melds capabilities to create synergies and greater capabilities which could not be realized if capabilities operated in isolation.” IBCS is that command and control system, which has demonstrated the ability to:

- 1). Accept data from a joint family of sensors (including the F-35) to generate a single integrated air picture, which provides enhanced situational awareness and enhanced protection for friendly aircraft;

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Dome into Air Defense Architecture,” *InsideDefense.com*, May 27, 2020.

<sup>48</sup> Ibid.

<sup>49</sup> Ibid.

- 2). Provide an integrated fire control network which optimizes the single air picture, thereby allowing the optimal weapon to engage a threat and enable earlier engagements, potentially multiple engagements (if necessary), and defend in depth;
- 3). Perform integrated defense planning, to minimize gaps in cover; and
- 4). Provide automated battle management aids to operations.

IBCS got off to a rocky start, but it has made tremendous progress and now exemplifies the Army's 2019 Modernization Strategy's language, "[we] may not succeed on the first demonstration and experimentation ... but we will learn and rapidly adjust." IBCS has had five successful flight tests, and its development has been informed by Soldier Check-Out Events, which put soldiers on the system much sooner than traditional acquisition programs.<sup>50</sup>

According to the Army:

IBCS integrates current and future Air and Missile Defense (AMD) sensors and weapons into a common integrated fire control capability with a distributed "plug-and-fight" network architecture. IBCS is the fire control and operational-center capability that provides greater defense effectiveness than the current single sensor fire unit systems.<sup>51</sup>

Reportedly, in June, the Army noted that the IBCS was "getting very close" to a limited user test of Northrop Grumman's Integrated Air and Missile Defense Battle Command System at White Sands Missile Range, NM.<sup>52</sup> If testing goes well, the Army expects IBCS will achieve an initial operational capability (IOC) in 2022.<sup>53</sup>

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<sup>50</sup> Taken directly from David L. Mann, Roger F. Matthews, and Francis G. Mahon, "None of this is Going to Matter if You're Dead: Modernizing Integrated Air and Missile Defense Must Remain Army's Top Priority," *Real Clear Defense*, June 16, 2020.

<sup>51</sup> Army News Service, "Army Integrated Air and Missile Defense System Successfully Intercepts Test Targets," December 12, 2019.

<sup>52</sup> Ashley Tressel, "Murray: IBCS Nearing Limited User Test," *InsideDefense.com*, June 10, 2020.

<sup>53</sup> *Ibid.*



**Figure 8. Integrated Air and Missile Defense Battle Command Systems (IBCS)**



**Source:** [https://www.army.mil/article/230907/army\\_integrated\\_air\\_and\\_missile\\_defense\\_system\\_successfully\\_intercepts\\_test\\_targets](https://www.army.mil/article/230907/army_integrated_air_and_missile_defense_system_successfully_intercepts_test_targets), accessed June 24, 2020.

## AN/MPQ-64 Sentinel A4 Radar

According to the Army, the Sentinel A4 Radar (see **Figure 9**) is to be a modification of the A3 Radar with the following characteristics:

- performance specifications to derived from approved IFPC and Sentinel A3 requirements;
- an increase in range performance of more than twice the current capability;
- significant electronic attack protection;
- ability to provide data on where a projectile was fired from and where it will likely impact; and
- provision for future growth as the threat evolves via software without major hardware redesign.<sup>54</sup>

In September 2019, the Army reportedly awarded Lockheed Martin a contract to develop the A4 Radar.<sup>55</sup> Plans call for the Army to procure eight low-rate initial production (LRIP) Sentinel A4s in FY2024 as part of a plan to upgrade 199 Sentinel A3 radars to the A4 variant over the next decade.

<sup>54</sup> Information in this section is taken from an Army SHORAD Capability briefing provided to CRS dated June 5, 2020.

<sup>55</sup> Jason Sherman, "Lockheed Wins Sentinel A4 Competition, Ousting Raytheon for \$3B Project," *InsideDefense.com*, September 25, 2019.

**Figure 9. AN/MPQ-64 Sentinel A4 Radar**



**Source:** <https://armyupdate.com/index.php/2019/09/26/lockheed-martin-awarded-281m-to-acquire-sentinel-a4-radar-systems/>, accessed June 25, 2020.

## Directed Energy (DE) M-SHORAD

According to the Army, DE M-SHORAD (see **Figure 10**) is to consist of

[a] 50 kW Laser Weapon System integrated onto a Stryker with onboard 360 degree radar and a secondary Independent Target Acquisition and Tracking System. With a crew of three, DE M-SHORAD's primary target sets include Group 1-3 UAS [see **Table 1**], rotary wing aircraft, and limited rocket artillery and mortars (RAM). The system is designed to maneuver with Brigade Combat Teams (BCTs) and to be operational while on the move, stopping only briefly to fire if necessary.<sup>56</sup>

The Army's central idea is that DE M-SHORAD will give existing M-SHORAD formations the additional ability to counter RAM and UAS Groups 1 and 2 (see **Table 1**). Directed Energy is intended to provide

- the ability to conduct both lethal and nonlethal missions;
- the ability to conduct precision engagements and select aimpoints;
- minimization of collateral damage;
- a means of attacking targets that is difficult to outmaneuver;
- the ability to rapidly retarget;
- the ability to control (scale) target effects (i.e., disable vs. destroy);

<sup>56</sup> Information in this section is taken from an Army SHORAD Capability briefing provided to CRS dated June 5, 2020.

- provision of a logistics advantage, particularly in terms of missile/ammunition resupply;
- increased magazine depth (i.e., number of shots limited by onboard DE power generation capacity); and
- increased affordability (i.e., reduced cost per kill (laser vs. munition))<sup>57</sup>

In terms of capabilities, plans call for a 50 kilowatt weapon with an onboard sensor with the objective to

- detect rotary wing (RW), UAS, fixed wing (FW), and RAM from 20km to 30km;
- track multiple RW, UAS, FW, and RAM 80% of the time;
- identify aerial object as friend, foe, or neutral > 95% of the time; and
- destroy RW, Group 2 & 3 UAS (see **Table 1**), FW, and RAM at standoff ranges 20km to 25km, Group 1 UAS 5km to 10km > 80% of the time.<sup>58</sup>

In August 2019, Northrop Grumman and Raytheon were reportedly awarded contracts to build a 50-kilowatt-class laser weapon for Stryker combat vehicles as part of the Army's DE M-SHORAD effort.<sup>59</sup> The Army reportedly hopes to field the DE M-SHORAD beginning in 2022.<sup>60</sup>

**Figure 10. Artist's Conception: Directed Energy (DE) M-SHORAD**



**Source:** Illustration taken from an Army SHORAD Capability briefing provided to CRS dated June 5, 2020.

<sup>57</sup> Ibid.

<sup>58</sup> Ibid.

<sup>59</sup> Jen Judson, "Northrop and Raytheon to Compete to Build Laser Weapon for Short-Range Air Defense," *DefenseNews.com*, August 1, 2019.

<sup>60</sup> Sydney J. Freedberg Jr., "Army Ramps Up Funding for Laser Shield, Hypersonics Sword," *BreakingDefense.com*, February 28, 2020.

## Potential Issues for Congress

The Army’s plan to increase SHORAD force structure, develop new systems, and update legacy systems raises potential issues for congressional oversight, including but not limited to the following:

### Should There Be a Legislative Provision on Future Divestment of SHORAD Capability?

As previously noted, in the early 2000s, the Army divested almost its entire Active Component SHORAD force structure to meet force structure demands elsewhere in the Army—largely predicated on the belief that U.S. Air Force platforms could protect Army ground forces from air attack. However, as a result of global events over the past two decades, the Army found itself at high risk from aerial attack, as well as increasingly vulnerable to rocket, artillery, and mortar fire.

Today, because of the decision to divest SHORAD capability, some commentators argue that not only are ground forces highly vulnerable to both state and non-state actors air threats, but the Army is also in the seemingly difficult and costly position of having to rapidly rebuild and man entire SHORAD units, which arguably should not have been eliminated in the first place. In addition, associated SHORAD research and development and modernization were significantly curtailed during this period, resulting in the Army now doing “catch up” and fielding SHORAD systems on what some argue is an extremely aggressive timeline.

Army leadership appears to want to avoid divesting significant levels of capabilities in the future. Yet, there is no guarantee that this might not happen again. However, given the Army’s costly future modernization plans,<sup>61</sup> it is possible that Air and Missile Defense (and by default SHORAD)—the Army’s fifth out of six modernization priorities—might again be divested to pay for other Army programs or initiatives.

Given this possibility, Congress might decide to examine if a legislative provision establishing a basic required level of SHORAD protection for Army forces could avoid these kinds of problems in the future. A similar provision could also be used for other capabilities, like cannon artillery, which also experienced significant divestment in the 2000s to pay for unrelated force structure and programs and is now in the process of being rebuilt as well.

### Is the Army’s Modernization Priority for SHORAD Appropriate?

While Army leaders have noted the continual evolution of threat air systems that could potentially increase the threat that ground forces already face, air and missile defense continues to be the Army’s fifth of six modernization priorities. Some analysts, however, suggest that current Army modernization priorities are inappropriate and are not based on the current state of the Army’s capabilities. For example, the Heritage Foundation’s August 2019 report *Rebuilding America’s Military Project: The United States Army*, suggests different modernization priorities:

Given the dependence of Multi Domain Operations (MDO)<sup>62</sup> on fires and the poor state of Army fire systems, the inclusion and first placement of long-range precision fires is logical. Based on the importance of the network to MDO and the current state of Army tactical

<sup>61</sup> For additional information on Army Modernization, see CRS Report R46216, *The Army’s Modernization Strategy: Congressional Oversight Considerations*, by Andrew Feickert and Brendan W. McGarry.

<sup>62</sup> For additional information on Multi Domain Operations, see CRS In Focus IF11409, *Defense Primer: Army Multi-Domain Operations (MDO)*, by Andrew Feickert.



networks, logically the network should come next in priority. **Third, based on the severely limited current capabilities, should come air and missile defense** [emphasis added], followed by soldier lethality in fourth. Next-generation combat vehicles are fifth; nothing has come forward to suggest that there is a technological advancement that will make a next-generation of combat vehicles significantly better. Finally, the last priority should be future vertical lift, although a persuasive argument could be made to include sustainment capabilities instead. Nowhere in the MDO concept is a compelling case made for the use of Army aviation, combined with the relative youth of Army aviation fleets.<sup>63</sup>

Critics suggest the Army should prioritize its modernization in areas that were divested and, as a result, lack the force structure, systems, and capability required to address current and future threats. Such a reordering of modernization priorities might result in more emphasis and possibly resources allocated in functional areas where the Army is at risk. In this regard, Congress might decide to revisit the Army's modernization priorities with Army leadership, as well as Department of Defense leadership to ensure the Army's modernization strategy prioritizes at-risk functional areas and capabilities.

## Is the Army Allocating Sufficient Resources to Revitalize SHORAD?

According to the Army's FY2021 Budget Overview,<sup>64</sup> as depicted in **Figure 11**, in FY2021, the Army plans to devote about 9% of its Research, Development, Test and Evaluation (RDT&E) budget to overall Air and Missile Defense<sup>65</sup> and 10 % to Procurement of Air and Missile Defense systems.<sup>66</sup> According to Army officials, both RDT&E and Procurement figures for total Air and Missile Defense budget allocation is closer to 8.6% as opposed to 9% or 10%.<sup>67</sup> According to the Army, the actual budget allocation in FY2021 for SHORAD modernization (which includes M-SHORAD, IFPC, Sentinel and Stinger) is approximately 2.6%.<sup>68</sup>

The FY2021 allocations depicted in **Figure 11** are a function of the Army's modernization priorities and represent how the Army plans to spend FY2021 funds appropriated by Congress. At 2.6%, some might question why the Army is devoting a relatively limited amount of funding to rebuilding its SHORAD capability, particularly when Army officials reportedly have warned how at-risk and vulnerable ground forces are from air threats and rocket, artillery, and mortar attacks.<sup>69</sup>

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<sup>63</sup> Thomas Spoehr, *Rebuilding America's Military Project: The United States Army*, The Heritage Foundation, Washington DC, August 22, 2019, p. 53.

<sup>64</sup> MG Paul A. Chamberlain, Director, Army Budget, Army Fiscal Year 2021 Budget Overview, February 10, 2020, pp. 13-14.

<sup>65</sup> *Ibid.*, p. 13.

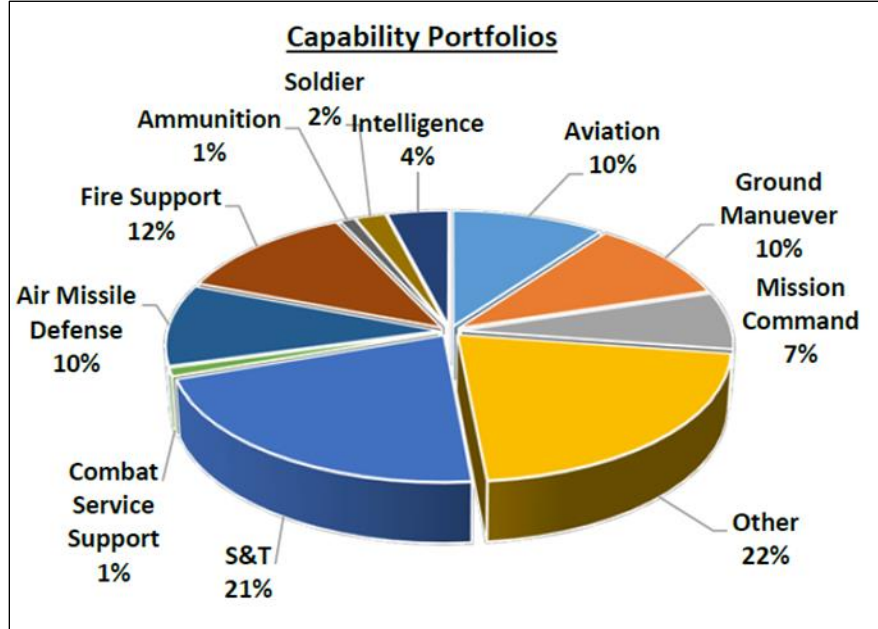
<sup>66</sup> *Ibid.*, p. 14. Actual figures were rounded up for briefing purposes.

<sup>67</sup> Response from an inquiry to the Army by the author, received on June 25, 2020.

<sup>68</sup> *Ibid.*

<sup>69</sup> David L. Mann, Roger F. Matthews, and Francis G. Mahon.

**Figure 11. FY2021 Army Budget Allocation, by Capability Portfolio**



**Source:** MG Paul A. Chamberlain, Director, Army Budget, Army Fiscal Year 2021 Budget Overview, February 10, 2020, p. 14.

**Notes:** This figure depicts procurement only. As previously noted, RDT&E for FY2021 is 9%. This graph is intended to show comparisons between capability portfolios.

## Are Planned SHORAD Force Structure and Capabilities Adequate to Meet Predicted Future Challenges?

The 2018 National Security Strategy notes:

The central challenge to U.S. prosperity and security is the reemergence of long-term, strategic competition by what the National Security Strategy classifies as revisionist powers. It is increasingly clear that China and Russia want to shape a world consistent with their authoritarian model.<sup>70</sup>

In addition to these two central threats, the 2018 National Security Strategy classifies Iran and North Korea as “rouge threats.”<sup>71</sup> The Army, in order to meet the mandate set out in the 2018 National Security Strategy, as well as other derivative strategic documents, could be required to develop SHORAD capabilities and force structure to compete with these threats on a daily basis around the world or—worse case—to engage in combat with one or more of these potential adversaries. Aside from the Army’s current posture in South Korea, its presence in the Middle East, and possible contingency operations, two “initiatives” could essentially form the basis for future Army SHORAD requirements: the European Deterrence Initiative (EDI) and the recently introduced Pacific Deterrence Initiative (PDI). The EDI, first established in 2014 as the European Reassurance Initiative (ERI), “enables the United States to enhance the U.S. deterrence posture, increase the readiness and responsiveness of U.S. forces in Europe, support the collective defense

<sup>70</sup> Summary of the 2018 National Security Strategy, p. 2., <https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf>.

<sup>71</sup> Ibid.

and security of NATO allies, and bolster the security and capacity of U.S. allies and partners.”<sup>72</sup> The PDI is not DOD policy but was introduced by Congress as part of the FY2021 National Defense Authorization Act to, among other things, “help deter Chinese aggression by strengthening the credibility of American deterrence.”<sup>73</sup> If passed into law, it could support current planned efforts to station Army forces forward in the region.

As discussed above, current Army modernization plans call for 10 M-SHORAD Battalions and eight IFPC Battalions to be split between the Active and Reserve components to protect to maneuver forces (M-SHORAD) and to defend fixed and semi-fixed assets at corps and division level (IFPC). Some Members might question if this is sufficient, given the security challenges and force posture requirements the Army faces. While some of these SHORAD assets would likely be “fenced” to support contingency operations, the balance might be forward-deployed on a permanent or rotational basis. In the case of rotational SHORAD forces, there would likely need to be an undedicated pool of similar units to replace the rotational unit once it returns to its home station. The Army’s eventual deployment and rotational plans for SHORAD units is not known. Yet there appears to be a significant demand for these forces, compounded by the fact SHORAD units in the Reserve Components have legal restrictions on both the duration and types of deployments they can participate in.<sup>74</sup> Congress might decide to examine the Army’s plans for allocating both Active and Reserve SHORAD forces to support requirements in the Middle East, Europe, the Pacific, South Korea, and for contingency operations.

## **What Is the Future of Iron Dome and Its Effectiveness Against Cruise Missiles?**

As previously noted, some in Congress have supported the Army’s acquisition of Israel’s Iron Dome system, viewing it as a combat-proven alternative to potentially more expensive alternatives under development. Also as discussed, the Army, while recognizing Iron Dome’s capabilities, has been more reluctant to embrace it. Complicating the interoperability issue are statements by the Marine Corps that it was successful in integrating Iron Dome into its SHORAD architecture during preliminary testing. Nevertheless, despite differing opinions and experiences, it appears the Army will take possession of two Iron Dome batteries in the next few months.

Given the complexity of the issues involved, Congress might consider having a third impartial party examine the full range issues related to Iron Dome—including concerns about its effectiveness against more advanced cruise missiles—and taking into consideration the Marines’ experience in preliminary Iron Dome tests. Such an analysis might help to further refine both the Army’s and Congress’s thinking and expectations of Iron Dome.

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<sup>72</sup> FY2020 European Deterrence Initiative (EDI) Fact Sheet, <https://www.eucom.mil/document/39921/fy-2020-european-deterrence-initiative-fact-s>, accessed July 1, 2020.

<sup>73</sup> Senate Armed Services Committee Press Release, “Inhofe and Reed in War on the Rocks: The Pacific Deterrence Initiative - Peace Through Strength in the Indo-Pacific,” May 28, 2020, [https://www.armed-services.senate.gov/press-releases/inhofe-and-reed-in-war-on-the-rocks-the-pacific-deterrence-initiative\\_-peace-through-strength-in-the-indo-pacific](https://www.armed-services.senate.gov/press-releases/inhofe-and-reed-in-war-on-the-rocks-the-pacific-deterrence-initiative_-peace-through-strength-in-the-indo-pacific), accessed July 1, 2020.

<sup>74</sup> For additional information on Reserve Components, see CRS In Focus IF10540, *Defense Primer: Reserve Forces*, by Lawrence Kapp.



## **Is Army SHORAD Compatible with Marine Corps SHORAD?**

DOD’s Joint Publication 3-31 “Joint Land Operations” defines Joint Land Forces as “the Army, Marine Corps, or special operations.”<sup>75</sup> As borne out through history, the Army and Marines have often fought side by side or as an integrated task-organized force. In all regards, for this relationship to work, the Services are required to be compatible across platforms, command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR), as well as doctrinally. This compatibility may be considered particularly important in terms of SHORAD. While this report does not specifically address Marine Corp’s SHORAD capabilities, force structure, or systems, the Marines have their own organic SHORAD to protect Marine forces ashore. In order to better understand Joint SHORAD from an Army and Marine perspective, as well as to identify any compatibility issues or differences in test results (e.g., Marine’s Iron Dome testing), Congress might decide to examine Joint SHORAD in greater detail with the Army, Marines, and the Joint Staff.

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<sup>75</sup> Department of Defense Joint Publication 3-31 “Joint Land Operations,” October 3, 2019, p. I-3.