THE U.S. COUNTER-UNMANNED AERIAL SYSTEMS MARKET REPORT 2024-2029

IDGA
Institute for Defense and Government Advancement

FOREWORD

Recent global conflicts, such as the war in Ukraine, have underscored the widespread use of Unmanned Aerial Systems (UAS) in military scenarios. These systems are not only pivotal in intelligence, surveillance, and reconnaissance (ISR) missions but are also playing direct combat roles. Additionally, UAS are revolutionizing various commercial industries, such as infrastructure, logistics, insurance, media, telecommunications, agriculture, mining, oil and gas, and retail.

This rapid proliferation of UAS has introduced new threats, such as unauthorized surveillance, privacy breaches, airspace obstruction, and the potential use of drones for carrying destructive payloads. These concerns are particularly pronounced in civilian airspace, where incidents involving drones have surged. From 2021 to 2023, the Transportation Security Administration (TSA) reported over 2,000 drone sightings near U.S. airports, including incidents that required pilots to take evasive actions. In the first four months of 2024 alone, the FAA recorded 326 drone-related incidents near airplanes, helicopters, and airports, highlighting the growing security risks.

In response to these challenges, there is an urgent need for effective counter-UAS (C-UAS) technology. Countries are increasingly procuring systems for detection, identification, tracking, alerting, jamming, spoofing, and neutralization of rogue drones. The global market for C-UAS technology is expected to quadruple between 2021 and 2031. Notably, integrated defense networks that combine various detection and mitigation technologies are proving more effective than isolated systems, as evidenced by a U.S. Army assessment.

The following report will analyze the currently evolving C-UAS market, examine current trends, technological advancements, and future efforts to address the growing challenges posed by UAS proliferation.

If you are interested in learning more about the C-UAS market, register for IDGA's C-UAS Summit today. This two-day event, which takes place August 27-28 at the Marriott Crystal Gateway Hotel in Arlington, Virginia, will engage our audience with high level discussions surrounding kinetic and non-kinetic approaches for countering drones, including exploring case studies on specific incidents, insights into the latest innovative CUAS technologies, the impact of shifting legal authorities, and much more.

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OVERALL TRENDS

The 2020 conflict between Armenia and Azerbaijan over the disputed Nagorno-Karabakh region and, more recently, Russia's continued annexation of Ukraine, has established the ubiquity of Unmanned Aerial Systems (UAS) in a conflict scenario. These systems are increasingly being utilized for a wide range of applications, including intelligence, surveillance, and reconnaissance (ISR) missions, as well as direct combat roles. Additionally, UAS are increasingly being used in commercial industries such as infrastructure, logistics, insurance, media and entertainment, telecommunication, agriculture, mining, oil and gas, and retail. In fact, according to a McKinsey study, the number of commercial packages delivered by drones globally increased by over 85% between 2021 and 2023.

Developments such as significant reduction in size, weight, and cost, enhanced battery life, and improved autonomy, are factors driving the use of UAS in military and commercial applications. A recent study conducted by AgileIntel Research estimates the global market for UAVs to increase from US$28 billion in 2023 to almost US$150 billion by 2033, at a compounding annual growth rate (CAGR) of 18.3%. During the same period, the U.S. market for UAVs is estimated to increase from US$7 billion to US$40 billion at a CAGR of 19%. Additionally, according to estimates by the Federal Aviation Administration (FAA), the commercial drone fleet (those operated in connection with business, research, or educational purposes) is expected to grow from around 727,000 at the end of 2022 to 955,000 by 2027. For the same period, the FAA forecasted that the recreational fleet (those operated for personal interest and enjoyment) would also increase from 1.69 million to 1.82 million.

This exponential growth in the use of commercial and military drones has resulted in a number of threats from rogue systems. These include unauthorized surveillance, privacy breaches, airspace obstruction, and UAS operating as carriers for destructive payloads. Global agencies are facing new security challenges in the lower airspace domain, mainly due to the proliferation of commercial systems that are increasingly being used for recreational and professional purposes.

For the U.S. alone, the scale and severity of these drone-related security challenges in the civilian airspace have been well-documented over the last few years. Between 2021 and 2023, the Transportation Security Administration (TSA) reported over 2,000 drone sightings near U.S. airports, with some incidents involving pilots taking evasive action, including four incidents involving commercial aircraft. Moreover, according to the latest data from the Federal Aviation Administration (FAA), in the first four months of 2024 (up to April), there have been as many as 326 incidents involving drones being identified in close proximity to airplanes, helicopters, and airports, thereby posing a serious security hazard.

These trends have necessitated the development of effective counter-drone technology in areas such as detection, identification, location/tracking, alerting, jamming, spoofing, and destruction. Various countries are procuring counter-UAS (C-UAS) systems such as jamming, spoofing, and blinding systems, and laser-based directed energy weapons (DEWs), with the global market expected to quadruple between 2021 and 2031. Interestingly, these procurements are not limited to independent systems working in isolation, but also complementary detection and mitigation technologies woven into an integrated defense network, for better efficacy. In fact, a recent operational assessment conducted by the U.S. Army's Joint Counter-small Unmanned Aircraft Systems Office found a system-of-systems approach to be more effective as compared to deploying isolated systems.

The various C-UAS technologies and systems can be broadly classified into two categories: The various C-UAS technologies and systems can be broadly classified into two categories: kinetic and non-kinetic.

NON-KINETIC CUAS:

- **Detection Systems:** Utilize various sensor technologies such as radar, electro-optical/infrared (EO/IR) cameras, acoustic sensors, and radio frequency (RF) detectors to detect and locate UAS within a given airspace.
- **Identification and Tracking:** Once detected, CUAS systems can employ advanced algorithms and software to identify and track UAS, distinguishing between authorized and unauthorized drones based on characteristics such as flight behavior, size, and communication signals.
- **Electronic Countermeasures (ECM):** ECM techniques disrupt or interfere with UAS control and communication systems, preventing drones from receiving commands from their operators or disrupting GPS signals to induce a loss of navigation.
- **Jamming:** Jamming involves emitting electromagnetic signals to interfere with the radio frequencies used by UAS for communication and navigation, disrupting their control and rendering them ineffective.
- **Spoofing:** Spoofing techniques involve generating false signals to deceive UAS navigation systems, causing drones to deviate from their intended flight path or land safely, thereby neutralizing the threat they pose.
- **Cybersecurity Measures:** CUAS systems may incorporate cybersecurity measures to protect against cyber threats posed by UAS, including unauthorized access to networks, data breaches, and malware attacks targeting critical infrastructure.
- **Acoustic Deterrents:** Emit high-frequency sounds or acoustic signals to deter UAS from entering restricted airspace or sensitive areas, leveraging aversion behaviors in birds and other wildlife to discourage drone intrusion.
- **Directed Energy Weapons (DEW):** While typically considered kinetic, some DEW systems offer non-lethal options such as laser dazzlers or non-destructive beam steering to disable UAS electronics or sensors without causing physical damage.
- **Command and Control (C2) Disruption:** Target the communication links between the UAS and its operator, disrupting the command and control signals and preventing the drone from receiving instructions or transmitting data.
- **Cyber Threat Intelligence:** Utilize advanced analytics and threat intelligence to anticipate and counter cyber threats posed by UAS, including malware, data exfiltration, and network intrusion attempts.

KINETIC CUAS:

- **Interception:** Intercept UAS threats using manned or unmanned aircraft equipped with net cannons, capture devices, or other means to physically capture or disable the unauthorized drone.
- **Kinetic Projectile Systems:** Deploy firearms, cannons, or other projectile-based weapons to shoot down or disable UAS threats, either by targeting critical components or causing physical damage to the drone.
- **Directed Energy Weapons (DEW):** Utilize high-energy laser beams or microwave pulses to damage or disrupt UAS electronics, sensors, or propulsion systems, rendering the drone inoperable or causing it to malfunction.
- **Explosive Ordinance:** Employ explosives or explosive projectiles to destroy UAS threats, either through direct impact or detonation in close proximity to the target.
- **Collision Avoidance Systems:** Equip aircraft or ground-based platforms with collision avoidance systems designed to physically collide with or disrupt the flight path of UAS threats, causing them to crash or lose control.
- **Electronic Warfare (EW):** Utilize electronic warfare techniques to disrupt or degrade UAS control and communication systems, either through jamming, spoofing, or other means of electronic interference.
- **Maneuvering and Ramming:** Use manned or unmanned vehicles to intercept and physically collide with UAS threats, causing them to crash or become disabled due to impact forces.
- **Dedicated Kinetic Interceptors:** Employ specialized kinetic interceptor systems, such as missile defense systems or anti-drone munitions, to target and destroy UAS threats with precision-guided projectiles or missiles.
- **Ground-based Anti-Aircraft Systems:** Deploy surface-to-air missiles, anti-aircraft guns, or other ground-based weapons systems to engage and neutralize UAS threats flying within range of the defensive systems.
- **Remote Weapon Stations (RWS):** Mount firearms, cannons, or other kinetic weapons on remotely operated platforms or vehicles to engage and disable UAS threats from a distance while minimizing operator exposure.

C-UAS AUTHORITIES

In the U.S., several federal agencies have been granted express statutory authority to conduct drone detection and counter-drone operations. These include the Department of Defense (DOD), the Department of Homeland Security (DHS), the Department of Justice (DOJ), and the Department of Energy (DOE).

While the Federal Aviation Administration (FAA) does not have express statutory authority to conduct drone detection and counter-drone operations, the agency's responsibilities include ensuring the safety and efficiency of the National Airspace System (NAS). Specifically, the FAA is tasked with developing a comprehensive plan to safely integrate UAS into the NAS. This involves establishing the necessary regulations, guidelines, and procedures to enable the seamless and secure operation of drones alongside traditional manned aircraft.

In addition to this integration mandate, the FAA is also charged with coordinating closely with other relevant federal agencies and departments. Since 2016, the FAA's Office of Airports Safety & Standards (AAS) has issued guidance and policy documents outlining the use of UAS detection and mitigation technology specifically at airports. Further, in 2018, legislation was enacted requiring the FAA to develop a plan for the certification, permitting, authorizing, or allowing the deployment of drone detection and mitigation technologies.

FAA MEASURES TO PROTECT U.S. AIRSPACE:

The FAA currently does not support the use of kinetic C-UAS capabilities by any law enforcement entity (state, local, or federal). However, to ensure the security of U.S. air space, the department has undertaken various measures that enable the potential use of kinetic capabilities in certain situations. These include:

NO FLY ZONES – CRITICAL INFRASTRUCTURE:

The FAA Reauthorization Act includes provisions that prohibit the operation of any unmanned aerial systems (UAS) near designated critical infrastructure sites. While the specific classification of critical infrastructure may vary across different states, it encompasses facilities such as:

- Petroleum refineries
- Chemical manufacturing plants
- Pipelines
- Wastewater treatment plants
- Power generating stations
- Electric utilities
- Chemical or rubber manufacturing facilities
- Other similar critical infrastructure assets

NO FLY ZONES – STADIUMS:

The FAA has implemented regulations that prohibit drone operations within a three-mile radius of stadiums during specific timeframes around major events. Specifically, drones are not allowed to fly within this restricted airspace:

- One hour before the scheduled start time of the event
- During the entire duration of the event
- One hour after the scheduled end time of the event

THESE RESTRICTIONS APPLY TO THE FOLLOWING TYPES OF EVENTS:

- Major League Baseball
- National Football League
- NCAA Division One Football
- NASCAR Sprint Cup, Indy Car, and Champ Series races

NO FLY ZONES – AIRPORTS:

The FAA's Special Rule for model aircraft (including hobby drones) imposes several key requirements on drone operators:

- **Notification Requirement:** UAV operators must notify the airport and air traffic control tower if they plan to fly their aircraft within a 5-mile radius of an airport.
- **Restrictions Near Aircraft and Emergencies:** UAVs are prohibited from flying near other aircraft. In addition, the UAVs are also not allowed to interfere with or fly near any emergency response efforts.

The FAA, through a newly formed Office of Integration and Engagement (AIE) is working towards integrating entrants and technologies into the national airspace system (NAS). Specifically, the key focus areas of the AIE include:

- **Preliminary Reviews and Framing:** The AIE will conduct thorough preliminary reviews to identify and frame the potential benefits and challenges related to the integration of UAS and other new technologies into the NAS.
- **Safety Case Development:** In coordination with the relevant organizations, the AIE will support the development of comprehensive safety cases for UAS and other innovative technologies. This will ensure that their integration into the airspace can be approved and implemented safely.
- **Policy and Regulatory Support:** The AIE will provide crucial support in the development and implementation of new rules, legislation, and other policies necessary to enable the safe integration of UAS, Advanced Air Mobility, and other innovative concepts into the National Airspace System.

C-UAS AUTHORITIES

U.S. DOD

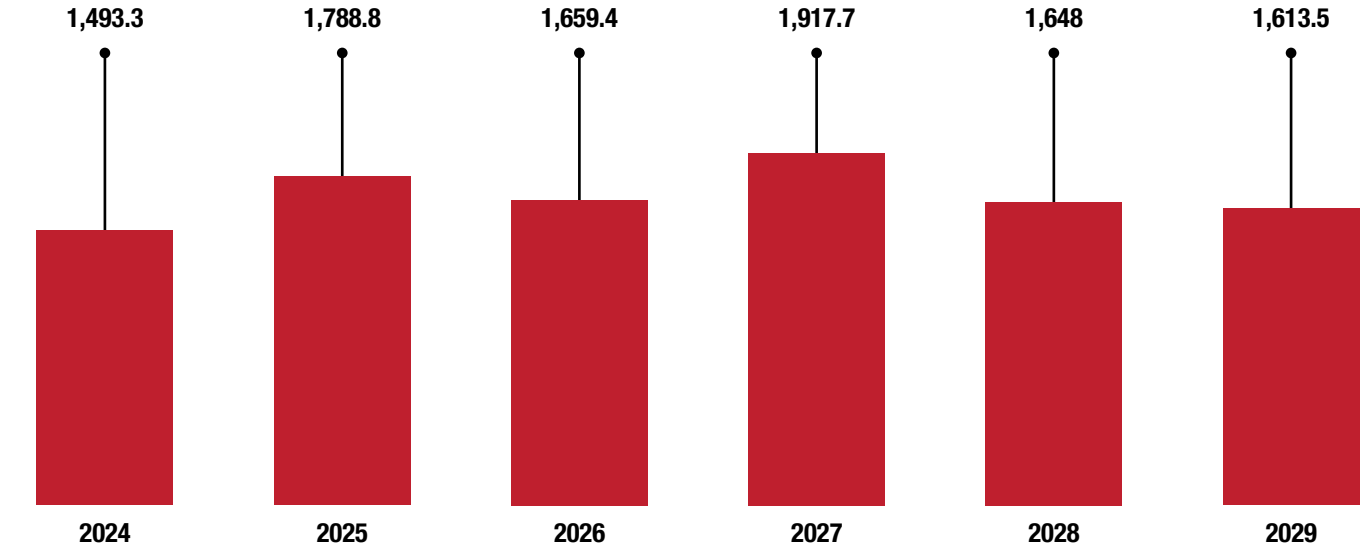
The U.S. DoD's C-UAS market is estimated to cumulatively value US$10.1 billion during the forecast period 2024-2029. The key programs include the procurement of 1,867 counter small unmanned aerial systems (C-SUAS) for US$2.8 billion, an unspecified number of Interim Maneuver Short-Range Air Defense (IM-SHORAD) C-UAS systems for US$1.2 billion, development of directed energy systems for the Army under MSHORAD Inc 2 for US$1.1 billion, counter drone systems for the U.S. States Special Operations Command (SOCOM)-for US$967.6 million, and proprietary novel C-UAS technologies for the U.S. Air Force for US$900 million.

U.S. DOD: COUNTER-UAS MARKET, 2024-2029, US$ MILLIONS

TABLE 1: U.S. DOD: COUNTER UAS MARKET, 2024-2029, US$ MILLIONS

Types	2024	2025	2026	2027	2028	2029	Total
Kinetic	719.6	884.6	853.8	1,093.6	789.8	700.4	**5,041.8**
Non-Kinetic	308.1	387.1	371.4	366.6	387.0	435.2	**2,255.4**
Mixed Systems	465.6	517.1	434.2	457.4	471.2	477.9	**2,823.5**
Total	**1,493.3**	**1,788.8**	**1,659.4**	**1,917.7**	**1,648.0**	**1,613.5**	**10,120.7**

FIGURE 1: U.S. DOD: COUNTER UAS MARKET, 2024-2029, US$ MILLIONS



KINETIC AND NON-KINETIC - COUNTER SMALL UNMANNED AERIAL SYSTEM (C-SUAS) PROCUREMENT:

Under the ongoing Counter Small Unmanned Aerial System (C-SUAS) program, the U.S. Army is procuring fixed, semi-fixed, mounted, dismounted, and handheld counter-UAS, not only for conflict scenarios, but to also protect strategically important DoD facilities worldwide. These systems have various capabilities including electronic warfare (EW), command and control (C2), and kinetic and non-kinetic weapons.

In the early part of 2022, the Army launched five programs outlined in the C-SUAS Capability Development Document (CDD) Increment 1. They include:

- Fixed Site-Low, Slow, Small Unmanned Aircraft System (UAS) Integrated Defeat System (FS-LIDS)
- Mobile-low, Slow, Small UAS Integrated Defeat System (M-LIDS)
- Ku-band Radio Frequency System (KuRFS) Family of Radars
- Coyote Block 2+ Interceptors
- Handheld/Dismounted Systems

In October 2022, the first of the contracts for the above-mentioned programs was awarded to RTX (formerly Raytheon) for US$207 million by the U.S. Army. This entailed the procurement of Ku-band Radio Frequency Sensors, or KuRFS, and Coyote effectors to detect and neutralize unmanned aircraft. The company received follow-up contracts worth US$237 million and US$75 million in April 2023 and January 2024, respectively. These involved the procurement of additional KuRFS and Coyote effectors and 600 Coyote 2C drone interceptors.

Additionally, as per the acquisition plan outlined in the budget document, RTX is expected to receive another contract in April 2025 for the procurement and integration of KuRFS and XBAEU radar systems. Deliveries of the radars are slated to begin in March 2027.

Notably, the Army's 2025 budget request includes US$13.5 million for hand-held anti-drone devices, and US$54.2 million for backpack-size jammers. Moreover, by 2029, the Army is projected to acquire approximately 7,000 Coyote interceptors, 250 fixed-site launcher systems, 25 mobile launcher systems, and 150 KuRFS. The Army has allocated a total of US$2.8 billion for the acquisition of these platforms until 2029, with approximately US$1.8 billion allocated for the period 2024 to 2029.

The Army is also actively engaged in the development of other novel solutions to counter the increasing threat posed by UAVs and has allocated approximately US$717.7 million for associated Research, Development, Test, and Evaluation (RDT&E) efforts between 2024 and 2029.

KINETIC AND NON-KINETIC - COUNTER SMALL UNMANNED AERIAL SYSTEM (C-SUAS) INTERCEPTORS (PLANNED):

For fiscal year 2025, the U.S. Army has outlined its plans to implement a new program aimed at countering small unmanned aerial systems (C-SUAS). The objective of this program is to detect, track, classify, evaluate, and neutralize threats posed by Groups 1 and 2 unmanned aerial systems. Under this new initiative, the Army plans to acquire Coyote kinetic and non-kinetic interceptors developed by RTX.

Coyote is a ground-launched, radar-guided system available in both kinetic and non-kinetic variants, designed to counter Groups 1-3 UAS threats. The kinetic variant is equipped with a turbine engine, a forward-firing warhead, and an onboard radio frequency seeker, enabling it to achieve high speed and maneuverability. The non-kinetic variant is specifically designed to defeat multiple Groups 1 and 2 UAS threats in a single engagement, and includes both the interceptor and launcher, which can be configured for fixed or mobile platforms.

According to the acquisition plan outlined in the budget document, a contract to procure kinetic and non-kinetic Coyote interceptors is scheduled to be awarded to RTX in June 2025, with deliveries commencing in December 2026. A budget of US$351.1 million has been allocated for this procurement between 2025 and 2029, with the possibility of additional spending beyond this timeframe.

KINETIC - COUNTER SMALL UNMANNED AIRCRAFT SYSTEM (C-SUAS) TECHNOLOGY (RDT&E):

The U.S. Army's fiscal year 2025 budget prioritizes the development of Counter-small Unmanned Aircraft System (C-SUAS) capabilities. This includes research and design activities for innovative kinetic missile interceptors specifically tailored for countering small unmanned aircraft systems (SUAS). The goal is to improve the range, reaction time, lethality, reliability, and reload time for both fixed-site and mobile C-SUAS configurations. The resultant rapid-response, high-speed, long-range kinetic interceptors are expected to enable maneuver forces to effectively engage Group 3 sUAS, which operate at higher altitudes and have extended standoff ranges.

Additionally, the program aims to develop small, lightweight, and cost-effective missile interceptor technologies to neutralize multiple short-range SUAS threats. The U.S. Army has allocated approximately US$56.7 million for research and development (R&D) efforts between 2025 and 2029 to support this endeavor.

Kinetic - M-SHORAD

(Maneuver - Short Range Air Defense) **– Inc. 2**

As part of M-SHORAD Increment 2 (Inc 2) program, the U.S. Army is acquiring advanced laser capabilities which will be integrated in its Stryker Combat Vehicle (SCV) and Infantry Squad Vehicle (ISV). The SCV will be equipped with a 50-kilowatt (kW)-class laser capability, enabling it to effectively engage and defeat rotary wing aircraft, unmanned aerial systems (UAS), rockets, artillery, and mortar (RAM), as well as conduct Intelligence, Surveillance, and Reconnaissance (ISR) operations. Additionally, the Army will procure a 20-kilowatt (kW)-class laser capability for integration onto the ISV, specifically designed to counter Group 1 and 2 UAS threats. The U.S. Army has budgeted around US$1.16 billion by 2029, out of which around US$887.9 million is expected to be spent during the forecast period 2024 and 2029.

KINETIC - INTERIM MANEUVER SHORT-RANGE AIR DEFENSE (IM-SHORAD) C-UAS SYSTEMS:

In October 2020, General Dynamics Land Systems (GDLS) secured a contract worth US$1.219 billion from the U.S. Army for the production, testing, and delivery of Interim Maneuver Short-Range Air Defense (IM-SHORAD) systems. The initial order under the contract entails the manufacture of 28 Stryker IM-SHORAD vehicles, valued at US$230 million.

The IM-SHORAD system is specifically designed to counter threats posed by unmanned aerial systems (UAS), as well as a wide range of rotary and fixed-wing aircraft. It offers the Army a cost-effective, mobile, survivable, sustainable, and transportable platform that can address these threats effectively.

The specific locations for work and funding allocation will be determined for each order placed, and the estimated completion date for the overall contract is September 30, 2025. The Army is estimated to spend around US$450 million on this program during the forecast period 2024-2029.

KINETIC - EAGLS C-UAS:

In April 2024, the U.S. Navy awarded a US$24 million contract to MSI Defense Solutions, to procure the Electrically Aided Gunnery Laser System (EAGLS) Counter-Unmanned Aerial Systems (C-UAS) system. This advanced system integrates a remotely operated weapon station, a sensor turret equipped with electro-optical and infrared capabilities, and a compact AESA radar provided by Leonardo DRS. The AESA radar has a range of up to 10 kilometers, significantly enhancing situational awareness and enabling the early detection of potential threats. Notably, the EAGLS system utilizes laser-guided 70mm rockets to effectively safeguard ground forces from the threat of suicide drones.

KINETIC - SHIP-BASED GUN MOUNT C-UAS:

The U.S. Navy is currently in the process of equipping its surface vessels, such as Aircraft Carriers (CVN), Destroyer Designated Guided ships (DDG), Littoral Combat Ships (LCS), Patrol Crafts Coastal (PC), MK VI Patrol Boats, and land-based training/test units, with minor, medium, and major caliber gun mounts. These gun mounts provide the outfitted ships with capabilities for anti-surface warfare and anti-air warfare operations.

In terms of countering Unmanned Aerial Systems (UAS), the DDG 51 Flight IIA and Flight III class destroyers are set to receive the state-of-the-art 30mm MK38 MOD 4 Gun Weapon System (GWS). This advanced system, integrated with the AEGIS combat system, significantly enhances the ships' effectiveness and precision in executing Counter-Unmanned Aerial Systems (C-UAS) operations.

The 2025 defense budget has allocated around US$1.5 billion for the implementation of these gun mount systems. Notably, an estimated US$102.2 million will be specifically dedicated to the development and deployment of gun mounts designed for C-UAS operations between 2024 and 2029.

Kinetic - U.S. Army Rapid Capabilities and Critical Technologies Office (RCCTO) - Army Multi-Purpose High Energy Laser (AMP-HEL) system

The U.S. Army Rapid Capabilities and Critical Technologies Office (RCCTO) has awarded BlueHalo a US$45.7 million contract, with an additional US$30.2 million in options, for the development of the Army Multi-Purpose High Energy Laser (AMP-HEL) system. Under this contract, BlueHalo will provide an Infantry Squad Vehicle (ISV) mounted 20-kilowatt class laser weapon system, called LOCUST, to defend against the growing Unmanned Aircraft System (UAS) threats on the battlefield.

The LOCUST laser system combines precision optical and laser hardware with advanced software, Artificial Intelligence/Machine Learning (AI/ML) algorithms, and processing to enable and enhance the directed energy kill chain. This includes the ability to track, identify, and engage a wide variety of targets using its hard-kill high-energy laser (HEL) capabilities.

In April 2024, the RCCTO exercised an option to award a four-year logistics support contract to BlueHalo. This contract will provide preventative and corrective maintenance, as well as operator and maintenance team training for the HEL system.

Overall, the total contract value, including the initial development and the subsequent logistics support, is expected to amount to US$60 million during the forecast period between 2024 and 2029.

KINETIC - DIRECTED ENERGY - INDIRECT FIRE PROTECTION CAPABILITY (DE-IFPC) INTERCEPT CAPABILITY:

The U.S. Army is actively involved in various R&D initiatives to develop the Directed Energy - Indirect Fire Protection Capability (DE-IFPC), mainly to counter airborne threats. DE-IFPC comprises three components: the Indirect Fire Protection Capability - High Energy Laser (IFPC-HEL), the Indirect Fire Protection Capability - High Power Microwave (IFPC-HPM), and the Multi-Domain Artillery Cannon System (MDACS).

IFPC-HEL:

- The IFPC-HEL is a ground-based weapon system specifically developed to detect, track, engage, and neutralize various threats, including Unmanned Aircraft Systems (UAS), Cruise Missiles (CM), Rocket, Artillery, and Mortar (RAM) threats, Fixed Wing (FW), and Rotary Wing (RW) threats. This system includes a vehicle, high energy laser subsystem, power and thermal subsystem, and a beam control subsystem. These components are integrated with battle management command, control, and communication software.
- In July and November 2023, Lockheed Martin received two contracts worth US$157.6 million and US$77.3 million, to develop related systems for the IFPC-HEL.
- The U.S. Army has budgeted around US$326.4 million by 2029, out of which around US$117.5 million is expected to be spent during the forecast period 2024 and 2029.

IFPC-HPM:

- The IFPC-HPM is a ground-based weapon system developed to effectively detect, track, engage, and neutralize UAS swarms. It comprises an HPM source, a power and thermal subsystem, and an antenna subsystem. These components are designed to seamlessly integrate with battle management command, control, and communication software, ensuring interoperability and efficient operation.
- Defense contractor Epirus received two contracts worth US$33.6 million and US$9.4 million in February 2023 for the development of IFPC-HPM systems. Subsequently, in December 2023, they were awarded an additional contract worth US$9.4 million.
- The U.S. Army has budgeted to spend around US$56.6 million by 2029, out of which around US$15.2 million is expected to be spent during the forecast period 2024 and 2029.

MDACS:

- Under this program, the U.S. Army aims to develop an adaptable and efficient system that encompasses multiple components, including the Multi-Domain Artillery Cannon (MDAC), Multi-Function Precision Radar (MFPR), Multi-Domain Battle Manager (MDBM), Hypervelocity Projectiles (HVP), and an Ammo Handler Vehicle.
- The primary objective of MDACS is to enhance the defense capabilities of the Joint Force by providing effective protection for fixed and semi-fixed sites against UAS and cruise missiles.
- A contract is expected to be awarded for the development of the MDACS by October 2024.
- The U.S. Army has budgeted to spend around US$646.3 million between 2025 and 2029.

KINETIC - GROUND BASED AIR DEFENSE (GBAD):

The U.S. Marine Corps (USMC) is currently acquiring various defense systems as part of the Ground Based Air Defense (GBAD) project. These systems include the Marine Air Defense Integrated System (MADIS) Family of Systems, Installations-Counter Small Unmanned Air Systems (I-CsUAS), and Medium Range Intercept Capability (MRIC). Their purpose is to effectively counter airborne threats from unmanned aerial systems (UAS) as well as fixed-wing and rotary-wing (FW/RW) aircraft.

MADIS

- The MADIS program aims to enhance the existing GBAD system by equipping the Joint Light Tactical Vehicles (JLTV) with a combination of both legacy and newly developed weapons capabilities. This upgrade serves to reduce the vulnerability to attacks from UAS and FW/RW aircraft. MADIS is specifically designed as an air defense capability for the Littoral Anti-Air Battalion (LAAB) within each marine littoral regiment.
- The initial phase of MADIS involved the procurement and integration of counter-unmanned aerial systems (C-UAS) and air defense equipment onto two JLTVs in 2020. Future upgrades of MADIS will focus on incremental and block enhancements, with a particular emphasis on both kinetic and non-kinetic capabilities to enhance overall lethality.

I-CsUAS

- The I-CsUAS system is designed to safeguard vital assets of the USMC on both permanent and temporary installations. Its main purpose is to counter threats posed by small unmanned aerial systems (sUAS), particularly those falling within Group 1 through 3 classifications. Presently, I-CsUAS is deployed as a service at six Urgent Statement of Need (USON) locations throughout the U.S.
- However, the 2025 defense budget has allocated funds for the USMC to procure the I-CsUAS systems outright instead of continuing to lease them. This decision reflects a long-term investment in acquiring and maintaining these systems to ensure the ongoing protection of critical assets.

MRIC

- The MRIC system offers a defensive capability to protect forward deployed forces primarily from cruise missile threats. It also serves as a secondary defense against unmanned aerial systems (UAS) and other airborne threats that enter the Weapons Engagement Zone (WEZ) of the MRIC.
- In July 2023, RTX got the first contract to deliver four MRIC launchers for the program.

The USMC has allocated a total of US$3.6 billion on this project till 2029 for the procurement of the above-mentioned systems, out of which around US$2.5 billion will be spent during the forecast period 2024-2029.

KINETIC-HIGH-POWER MICROWAVE (HPM) C-UAS PROTOTYPE:

In March 2022, the U.S. Air Force (USAF) awarded Leidos Inc. a US$26.9 million cost-plus-fixed-fee contract for the development of a high-power microwave (HPM) based counter unmanned aerial system (C-UAS). Under this contract, Leidos will build the Mjölnir counter-drone system based on its Tactical High-Power Operational Responder (THOR) technology.

The Mjölnir system is an HPM based counter-drone solution that aims to provide the USAF with an effective capability to detect, track, and neutralize a wide range of unmanned aerial threats. By building on the foundational THOR technology, Leidos will further refine and strengthen the Mjölnir system to meet the evolving requirements of the Air Force's counter-UAS operations.

The work on this contract will be performed in Albuquerque, New Mexico, and is expected to be completed by 2024.

KINETIC - U.S. ARMY AVIATION AND MISSILE COMMAND– TURRET BASED C-UAS CAPABILITIES:

The U.S. Army is currently identifying mobile weapons platforms capable of shooting down unmanned aerial systems (UAS). In March 2024, the U.S. Army Aviation and Missile Command issued a Request for Information (RFI) to seek a Counter Unmanned Aircraft Systems (C-UAS) turreted gun-based capability.

The RFI aims to gather knowledge about the interests, capabilities, and qualifications of businesses that could compete and perform a hybrid-type contract with both fixed-price and cost-reimbursable requirements. The contractor must be capable of designing, documenting, manufacturing, and integrating a C-UAS gun-based solution. The Army is particularly interested in mobile platforms, such as vehicle-mounted weapon systems, which can defeat drones using a rapid-fire cannon with automatic aiming capabilities. Additional anticipated requirements include:

- A command-and-control solution that can display air tracks and pass them to the gun system.
- Active radar, electro-optical, and infrared sensors.
- The ability to raise the sensor and communication suite above a 10-meter tree line.

The contract is expected to be awarded in the second quarter of 2024, following the completion of the market research and evaluation process.

KINETIC - SHIPBOARD C-UAS CAPABILITIES:

In January 2024, the U.S. Navy's Naval Sea Systems Command (NAVSEA), on behalf of the Program Executive Office Integrated Warfare Systems 11.0 (PEO IWS 11.0), issued a request for information (RFI) seeking innovative, mature solutions for shipboard use to counter unmanned aerial systems (UAS).

The RFI specifically asked respondents to provide information on their available systems' performance against Group 3-5 UAS, including metrics such as probability of kill. Respondents were also asked to share key system performance parameters like range, engagement timelines, capacity, as well as details on size, weight, power, and cooling (SWaPC) requirements, operator and training needs, integration concepts and requirements for surface ships, current production rates, adaptability to evolving UAS threats, and unit cost projections.

PEO IWS 11.0 is looking for respondents to submit feasibility and capability information on innovative, mature solutions capable of countering Group 3-5 UAS from surface ships. The key system requirements outlined in the RFI include:

- Mature systems that are already in production and can be deployed within 1-6 months (preferred) or 6-12 months at the latest.
- Demonstrated performance against Groups 3 to 5 UAS, with the ability to engage other UAS classes being of interest as well.
- Minimal integration requirements with Naval combat systems, with independent, self-contained capabilities being highly desirable.

As of May 2024, there have been no public reports on any contract awards resulting from this specific RFI process.

NON-KINETIC - AUTOMATED C-UAS CAPABILITIES:

In July 2021, Anduril, a technology startup, was awarded a US$99 million contract by the U.S. Defense Innovation Unit (DIU) to provide a new automated counter-unmanned aerial system (C-UAS) capability. The contract allows the Department of Defense (DoD) to purchase Anduril's technology and services for detecting and deterring enemy drones using artificial intelligence. The agreement spans five years and offers Anduril the flexibility to update its services as threats evolve. The system utilizes AI-enabled technology that leverages data from various sensors to detect incoming drones, thereby addressing the challenges posed by small and agile unmanned aerial systems. Around US$40 million is estimated to be spent on this program during the forecast period 2024 and 2029.

NON-KINETIC - COUNTER UNMANNED AERIAL SYSTEMS (C-UAS) (RDT&E):

The U.S. Army is undertaking several R&D initiatives to develop capabilities around four major C-UAS areas: Fixed/Mobile System Development, Technology Refresh for Army Joint Urgent Operational Need/Joint Emergent Operational Need (JUON/JEON) Efforts, Family of Counter UAS Systems (FoCUS) and Next Generation Product Development.

- Fixed/Mobile System Development: involves the development of hardware and software for a small, flat-panel fire control radar, to provide Fixed Site LIDS (FS-LIDS) and mounted systems with enhanced air surveillance capability against fixed-wing aircraft, rotorcraft, and UAVs.
- Technology Refresh for Army JUON/JEON Efforts: includes technological development of C-UAS systems in terms of electronic warfare effectiveness against current and future threats.
- Family of Counter UAS Systems (FoCUS): integrate artificial intelligence (AI) and machine learning (ML) to enhance UAS sensor search, target interrogation, and verification capabilities.
- Next Generation Product Development: focuses on the development of new systems through the integration of emerging technologies, for deployment in 2035.

A total of US$299.2 million is expected to be spent on this procurement over the period 2024-2029.

NON-KINETIC - U.S. SOCOM - COUNTER DRONE SYSTEMS INTEGRATION:

In April 2022, the U.S. Special Operations Command (SOCOM) selected California based Anduril Industries, for the integration of counter-drone systems. This selection was made through an Indefinite Delivery Indefinite Quantity (IDIQ) contract worth US$967.6 million. Anduril will serve as a Systems Integration Partner (SIP) and provide support to SOCOM's efforts in countering unmanned systems, leveraging its transformative technology to address the ever-evolving threats posed by drones.

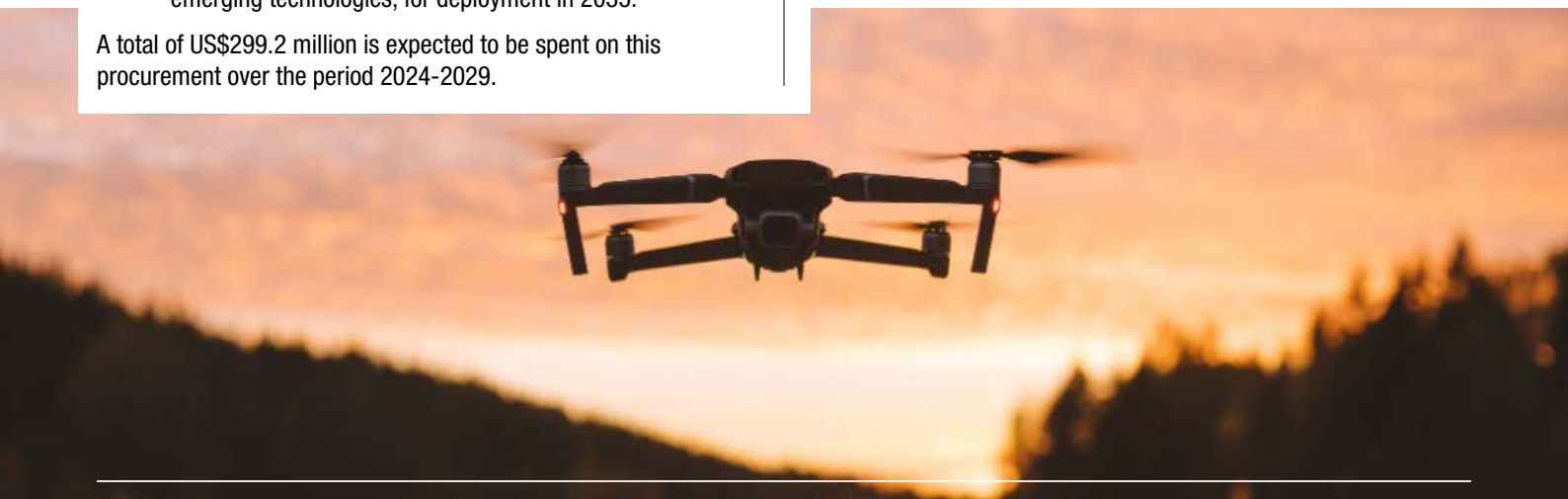
Under the terms of the contract, Anduril will be responsible for delivering, enhancing, and sustaining C-UAS capabilities for special operations forces in diverse operational settings. Anduril's C-UAS systems are powered by the Lattice operating system and consist of various components, including the Sentry tower and the small unmanned aerial system named Anvil. Anduril will conduct its operations within and outside the continental U.S. as part of the SOCOM contract. The program is expected to be completed by January 2032.

NON-KINETIC – U.S. AIR FORCE - C-UAS TECHNOLOGY DEVELOPMENT:

In January 2023, the U.S. Air Force (USAF) awarded an indefinite-delivery/indefinite-quantity (IDIQ) contract to Black Sage towards the development of innovative approaches for counter unmanned aircraft system (C-UAS) solutions. The contract was valued at up to US$900 million over a five-year period, with options to extend it up to ten years.

The key aspects of this IDIQ contract include:

- Multi-Domain System Capabilities: the contract covers the development of innovative approaches that bring multi-domain systems capabilities to C-UAS solutions.
- Technology Characterization: it includes the characterization of new technologies and systems through studies, recurrent demonstrations, and rapid development.
- Rapid Prototyping and Testing: it enables rapid prototyping, testing, and capability transition of the developed C-UAS solutions.



NON-KINETIC - DRAKE C-UAS:

The U.S. Navy is acquiring the Drone Restricted Access Using Known Electromagnetic Warfare (DRAKE) Counter-Unmanned Aircraft System (C-UAS) to disrupt enemy small Unmanned Aircraft Systems (sUAS) by interfering with their command and control radio frequency (RF) communications. Developed by Northrop Grumman, DRAKE is an Electronic Warfare (EW) force protection system specifically designed to detect, identify, track, and neutralize small UAS for naval forces operating at sea. Unlike conventional anti-drone systems that rely on projectile attacks, the DRAKE system operates by severing the signal connection between the drone and its operator, creating a shield-like field around its perimeter. The 2025 defense budget has earmarked approximately US$42.3 million for the procurement of these C-UAS systems between 2024 and 2029.

The DRAKE system has a history of deployment in the military, with previous use in field missions conducted by HUMVEES in Iraq and Afghanistan since 2016. However, in order to meet the non-kinetic requirements outlined in the Office of the Chief of Naval Operations (OPNAV) Top Level Requirement (TLR) for Afloat CUAS, the DRAKE system will undergo upgrades. These upgrades will involve improvements to radios, processors, and display units. Consequently, the U.S. Navy's 2025 defense budget has earmarked US$63 million between 2024 and 2029, to upgrade the existing DRAKE systems and make them compatible with the TLR.

NON-KINETIC - SHIP MISSILE SUPPORT EQUIPMENT-I-STALKER:

The U.S. Navy is procuring the Stalker Long Range Electro-Optic Sensor System (SLREOSS), now referred to as the Improved Stalker (I-Stalker), in response to a 2016 United States Fleet Forces Command (USFFC) Operational Needs Statement (ONS).

The I-Stalker system is currently fielded on aircraft carriers (CVN) and amphibious assault ships (LHA/LHD) and is planned for installation on the first 10 Constellation-class guided-missile frigates (FFG). It provides 360-degree situational awareness and enhances the ability of these ships to passively detect, classify, identify, and determine the intent of current and emerging surface and air threats.

The I-Stalker system, when combined with the Navy's own Situational Awareness System (SAwS), delivers an integrated radar and Electro-Optic/Infrared (EO/IR) control and display suite. This integrated solution enables enhanced threat detection, tracking, and decision-making capabilities for naval forces.

In July 2023, Ball Aerospace was awarded a US$2.4 million contract to supply four I-Stalker Independent Mounts, with the first delivery expected in January 2025. Over the forecast period between 2024 and 2029, a total of US$110.3 million is expected to be spent on this program.

NON-KINETIC - COUNTER SMALL UAS TECHNOLOGY:

In September 2021, PAR Government Systems was awarded a contract worth US$490 million to provide counter-small unmanned aerial system (C-SUAS) technology to the U.S. Air Force (USAF). The contract, issued by the Air Force Research Laboratory (AFRL), includes the delivery of software, hardware, and technical documentation related to the C-SUAS capabilities. It is structured as an indefinite-delivery, indefinite-quantity (IDIQ) contract, which allows the USAF to issue task orders for the required systems and services over the contract's duration. The contract period is scheduled to run through August 31, 2029. A total of US$350 million is estimated to be spent during the forecast period 2024 and 2029.

NON-KINETIC - COUNTER SMALL UAS SUPPORT:

In August 2020, SRC Inc. was awarded a US$90 million indefinite delivery, indefinite quantity (IDIQ) contract to support the U.S. Air Force's counter-small unmanned aerial system (C-SUAS) efforts. Under this sole-source acquisition, SRC will also provide upgrades, sustainment, installation support, and design and analysis support. Additionally, SRC will provide sustainment for its products within the Multi-Environmental Domain Unmanned Systems Application (MEDUSA) system. MEDUSA is a command-and-control platform that integrates multiple C-SUAS and related components to detect and mitigate small drone threats across various operational environments.

The work on this contract is expected to be completed by August 2028. During the forecast period between 2024 and 2029, it is estimated that US$60 million will be spent under this contract.

NON-KINETIC - COUNTER UAS AND AIR DEFENSE SYSTEMS:

In January 2024, the U.S. Air Force awarded a contract to U.S. based Kratos Defense & Security Solutions, to procure hardware, including support for Counter Unmanned Aerial System (CUAS), air defense, and radar systems. The contract, valued at US$50 million, encompasses work that was awarded to Kratos on a single-award or sole-source basis. Under this contract, the work will be performed at Kratos' secure manufacturing facilities as well as at customer locations.

NON-KINETIC - C-UAS WITH SATELLITE NAVIGATION ATTACK CAPABILITIES:

In September 2023, the U.S. Air Force (USAF) issued an RFI for the procurement of counter-UAS systems with satellite navigation attack capabilities. Under this program, the 55th Security Forces Squadron (SFS) at Offutt Air Force Base, Nebraska is looking to acquire four such C-UAS systems, to improve its surveillance and base security requirements, as well as its ability to defeat air threats.

The C-UAS with satellite navigation attack capabilities are vital for the USAF's force protection, intelligence, surveillance, reconnaissance (ISR), anti-terrorism, and installation defense needs. These systems will complement the Negation of Improvised Non-State Joint Aerial (NINJA) system, which is already in use for C-UAS missions.

As of May 2024, there has been no update on the contract award for this program.

NON-KINETIC - CUAS SENSOR AND NON-KINETIC DEFEAT TECHNOLOGIES:

On February 2, 2024, the U.S. Army C5ISR (Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance and Reconnaissance) Center Research and Technology Integration Directorate issued a request for information (RFI) seeking novel sensor and non-kinetic defeat technologies to counter unmanned aerial systems (UAS). According to the RFI, the Army is interested in technologies that are between Technology Readiness Levels (TRLs) 3 and 7. They should also possess the ability to reduce the size, weight, power requirements, or cost of existing Army C-UAS systems, or improve their overall performance.

The responses to this RFI were submitted towards the end of February 2024, and the selection process is scheduled to be completed by the end of May 2024.

U.S. CIVILIAN AUTHORITIES

The market for C-UAS platforms for use by the U.S. Civilian Authorities such as the Department of Homeland Security (DHS), the Department of Energy (DoE), and the Department of Justice (DoJ) is expected to value US$490.3 million during the forecast period 2024-2029. The largest programs include the Counter-UAS Technical Service Support program run by the Science & Technology Directorate (S&T), that operates under the ambit of the DHS.

Currently, the DHS has four divisions that are authorized by the Secretary of DHS to field capabilities that operationally mitigate the threat of nefarious sUAS. Those divisions include the Customs and Border Security, the Secret Service, the Management Directorate, and the Transport Security and Administrations (TSA).

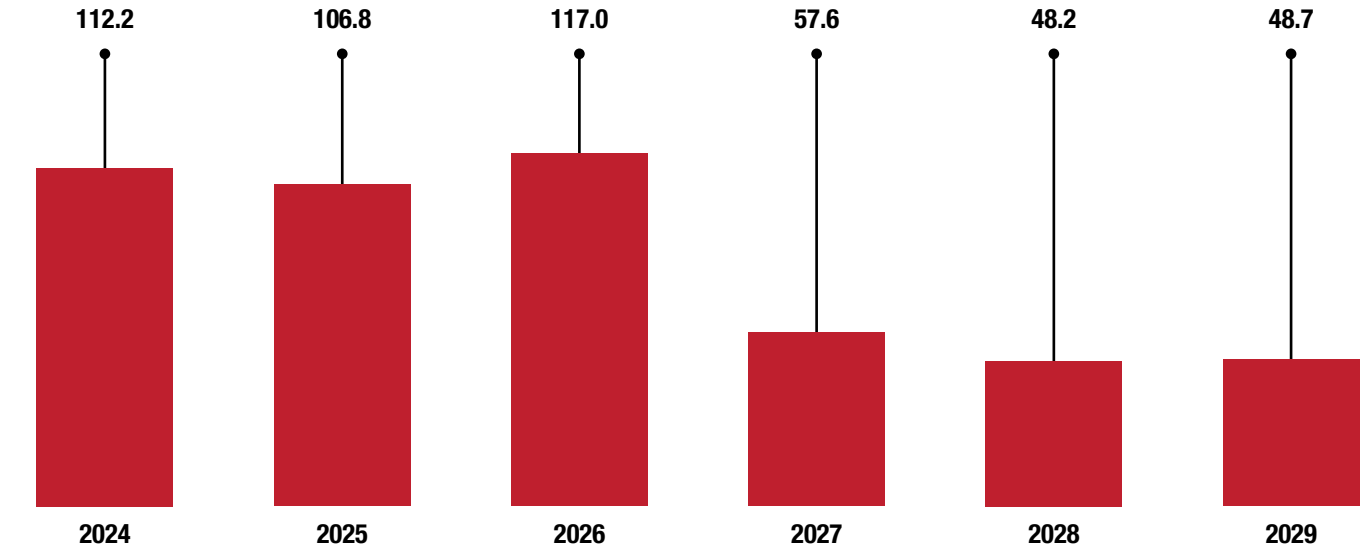
Given the rapid proliferation of sUAS in the marketplace and their ever-increasing capabilities, the S&T directorate is also working with industry, government, and international partners to develop and test new and innovative C-UAS capabilities that detect, track, identify and mitigate these advanced threats. S&T is also responsible for ensuring the C-UAS equipment can be used safely and securely by performing specialized testing and analysis and then coordinating that data with interagency partners such as the Department of Transportation (DOT), FAA, and others.

U.S. CIVILIAN AUTHORITIES: COUNTER-UAS MARKET, 2024-2029, US$ MILLIONS

TABLE 2: U.S. CIVILIAN AUTHORITIES: COUNTER UAS MARKET, 2024-2029, US$ MILLIONS

Types	2024	2025	2026	2027	2028	2029	Total
Non-Kinetic	77.4	71.6	81.8	22.0	12.2	12.5	**277.5**
Mixed Systems	34.8	35.1	35.2	35.6	36.0	36.2	**212.8**
Total	**112.2**	**106.8**	**117.0**	**57.6**	**48.2**	**48.7**	**490.3**

FIGURE 2: U.S. CIVILIAN AUTHORITIES: COUNTER UAS MARKET, 2024-2029, US$ MILLIONS



DHS - SCIENCE & TECHNOLOGY DIRECTORATE (S&T) - COUNTER-UAS TECHNICAL SERVICE SUPPORT:

In April 2022, Amentum, a U.S. based defense contractor was awarded a potential five-year contract worth US$260 million by the Department of Homeland Security (DHS) Science and Technology Directorate (S&T) to support counter-drone development efforts. The contract aims to address the growing challenges posed by unmanned aircraft systems (UAS) and enhance the protection of critical infrastructure and the American public at large.

Amentum will collaborate with the S&T to demonstrate and evaluate counter-UAS technologies and systems. The company's R&D activities will encompass various areas, including cybersecurity, radio frequency spectrum measurements, and integration of new and emerging UAS technologies across different environments. The contract will also involve the deployment of prototype systems and obtaining operational feedback.

Additionally, in May 2023, S&T awarded a US$48 million contract to Amentum to develop and deploy advanced technology solutions and prototypes. The focus of this contract is to counter emerging multi-domain threats, including the growing challenge posed by unmanned aerial systems (UAS).

A total of US$200 million is expected to be spent on these programs during the forecast period 2024 and 2029.

DHS - CUSTOMS AND BORDER SECURITY - COUNTER-UAS SYSTEMS:

For the year 2024, the DHS has designated a sum of US$6.1 million specifically for counter-Unmanned Aircraft Systems (CUAS) initiatives within the Customs and Border Security department. These funds will be utilized for various purposes including the upgrade of mobile systems with Radar/RF insertion Package (two MSC-lite Upgrades), the acquisition of Long Range RF Detect and Jamming Systems (three systems), the procurement of a Transportable and Relocatable Radar/RF Detection/Video system (one system), hardware upgrades for mitigation systems, early operational assessments, travel expenses related to tech demos, demonstrations, and conferences, as well as program deployment support. However, it is worth noting that the latest budget does not allocate any additional funding for this particular investment.

DHS - SCIENCE & TECHNOLOGY DIRECTORATE (S&T) - COUNTER-UAS SYSTEMS:

The DHS's Science & Technology directorate (S&T) is collaborating with industry, government, and international partners to develop and test innovative C-UAS capabilities. This involves detecting, tracking, identifying, and mitigating advanced threats. The S&T is also responsible for conducting specialized testing and analysis to ensure the safe and secure use of C-UAS equipment.

In the latest FY 2025 budget, the fundings for these initiatives stands at US$26.2 million, consistent with previous funding levels. These funds will be utilized for several purposes, including supporting a C-UAS test event for the 2026 World Cup and conducting operational tests of an airborne drone detection technology that is currently being developed. The allocated funding will be dedicated to four key research and development (R&D) areas: Defense Chain Effectiveness, Interoperability and Operational Coordination, Deployment and Interagency Coordination, and New and Emerging CUAS Technologies and Systems Engineering.

DHS – TRANSPORTATION SECURITY ADMINISTRATION (TSA) - COUNTER-UAS SYSTEMS:

The Transportation Security Administration (TSA) has been proactively testing counter-unmanned aircraft system (C-UAS) technology at several major U.S. airports since August 2022. The airports selected for these tests, including Los Angeles International Airport (LAX) and Miami International Airport, were chosen due to the high frequency of unmanned aerial vehicle (UAV) activity observed in their airspaces.

The TSA's Requirements and Capabilities Analysis (RCA) Office has established these test beds to evaluate the effectiveness of C-UAS technology in operational airport environments. Specifically, the agency is testing state-of-the-art systems that can detect, track, and identify (DTI) drones that enter the restricted airspace surrounding LAX. The key objectives of these testing efforts are:

- Determine the Effectiveness and Suitability of C-UAS Technology: The TSA aims to validate and verify the performance of C-UAS technologies in different airport environments, comparing their capabilities against vendor claims.
- Identify Crucial Operational Factors: The testing will help identify the most critical operational factors in determining the effectiveness of C-UAS technologies. This information will inform the further development of requirements and communication of enhancements to vendors.
- Develop a C-UAS Security Technology Catalog: The TSA plans to create an annual catalog that summarizes the current commercial marketplace options for C-UAS technologies, operational testing data, and emerging market trends.

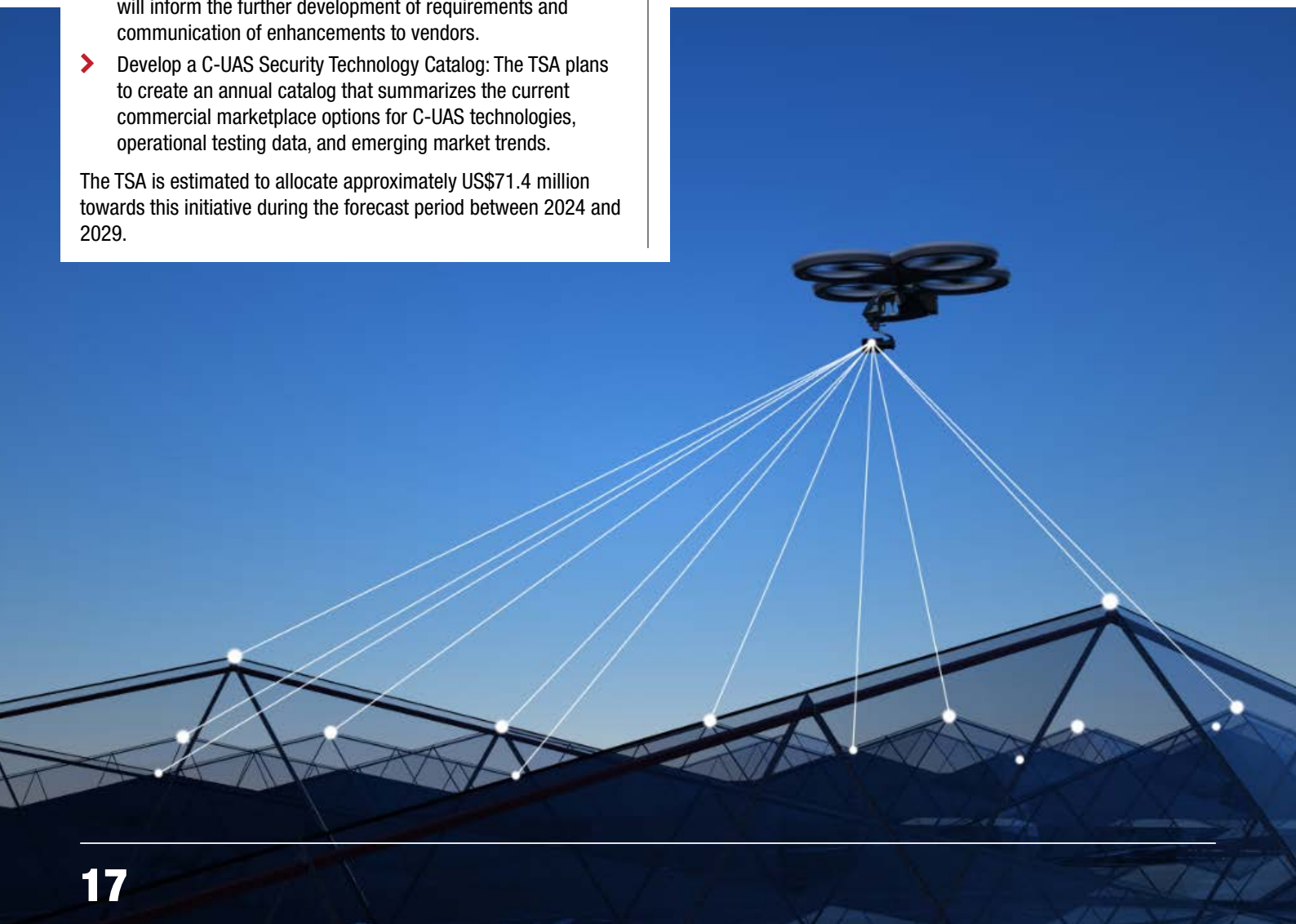
The TSA is estimated to allocate approximately US$71.4 million towards this initiative during the forecast period between 2024 and 2029.

DEPARTMENT OF ENERGY - COUNTER-UAS SYSTEMS:

In January 2024, the U.S. Department of Energy (DoE), on behalf of the Defense Nuclear Security Office (NA-70), issued a Request for Information (RFI) that seeks to gather information on the current capabilities, technologies, approaches, and business models for Counter Unmanned Aircraft Systems (CUAS).

The NA-70 office, which is responsible for the physical security of several high-security Continental United States (CONUS) sites, is particularly interested in exploring Command and Control (C2) systems that are highly agile and adaptable to evolving drone-related threats. Specifically, NA-70 is seeking information on CUAS architectures and C2 capabilities that enable seamless integration of sensors, effectors, and C2 algorithms from multiple suppliers. This approach would allow for the rapid upgrading of systems with the latest CUAS technologies without lengthy and costly development cycles. By ensuring the flexibility and modularity of the CUAS solution, NA-70 aims to stay ahead of the evolving threats posed by unmanned aerial systems.

This RFI represents the first step in an anticipated large-scale, multi-stage acquisition process that will establish the next-generation, long-term CUAS enterprise at the multiple high-security sites operated by NA-70. The contract for this CUAS solution is expected to be awarded in the third quarter of 2024.



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