Growing Market Opportunities in Counter Unmanned Systems

2025 REPORT

Harris Williams

ARNOVIA

Acute Drone Threat Driving Investment Opportunities in C-UAS

C-UAS Market Trend	Assessment
The Drone Threat is Increasing	▪ Unmanned aerial system[1] technology has evolved rapidly, creating a new asymmetric threat posed by sophisticated, yet affordable, commercially available drones ▪ Wars in Ukraine and the Middle East and other high-profile incidents executed by state and non-state actors have taken lives and destroyed exponentially more expensive and sophisticated military systems, underscoring the risk posed by low-cost drones ▪ Threat extends beyond the battlefield to critical infrastructure and any location where large crowds congregate
Diverse Threat Demands Layered Defense	▪ The drone threat is dynamic and diverse, requiring multiple methods to detect, track, and potentially defeat enemy UAS ▪ A layered defense strategy adopted by militaries encompasses multiple defeat modalities, including electronic warfare (RF jamming), kinetic defeat (missiles, munitions, nets, etc.), and directed energy (high-power microwaves and high-energy lasers) ▪ Drone threats will continue to adapt, for example, by moving to higher frequencies amid adoption of 5G; solutions must continue to evolve to keep pace with the threat
Military Buyers Leading the Way	▪ Counter-UAS[2] market today is dominated by military end users as current regulatory environment limits the adoption of C-UAS systems by non-government users, particularly in the U.S. ▪ Defense customers are currently prototyping, assessing and rapidly fielding C-UAS solutions in order to address urgent operational needs while continuing to advance R&D into more robust and capable solutions ▪ U.S. DoD[3] investment in C-UAS was $1.2B in FY23; in a full-adoption scenario covering key installations, vehicles, and dismounted units, Arnovia assesses total potential market for Western defense C-UAS[4] is $21B
$35B Potential Market Value	▪ C-UAS market will expand rapidly as regulations ease and more customers can access capabilities to protect their critical assets from hostile drones ▪ Airports and critical infrastructure have already begun adopting C-UAS with myriad feasible use cases ▪ Arnovia estimates total addressable C-UAS market (defense and commercial) in a full-adoption scenario valued at $35B; likely case based on reasonable expectations sees market growing at nearly a 20% CAGR to $5.5B by 2030
Multiple Ways to Invest	▪ Multiple ways for investors to participate in the fragmented C-UAS market; Harris Williams and Arnovia see five key angles

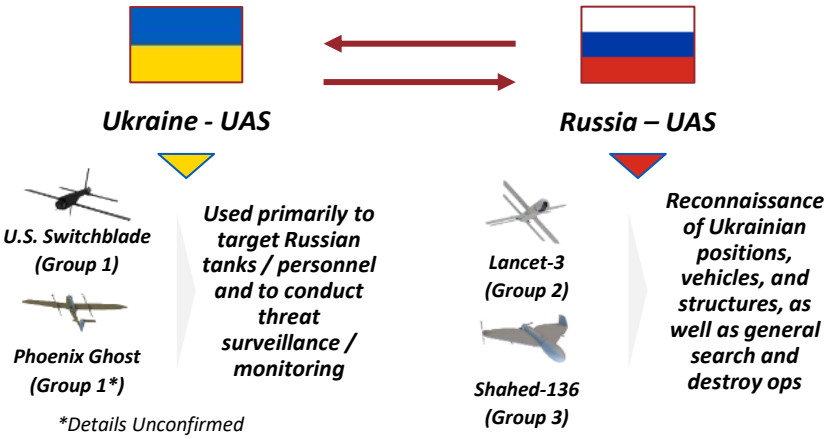
Key Ways to Invest

1. Also known as "UAS" or "drone"
2. C-UAS
3. U.S. Department of Defense
4. U.S., NATO, and close allies

High-Profile Geopolitical Incidents Highlight the Severity of the Unmanned Systems Threat

UAS Warfare in Russia's Invasion of Ukraine

The utilization of Group 1 and 2 UAS for various ISR / attack operations throughout the Russia-Ukraine war has highlighted the enablement of a complex, integrated air attack through the wide proliferation of UAS



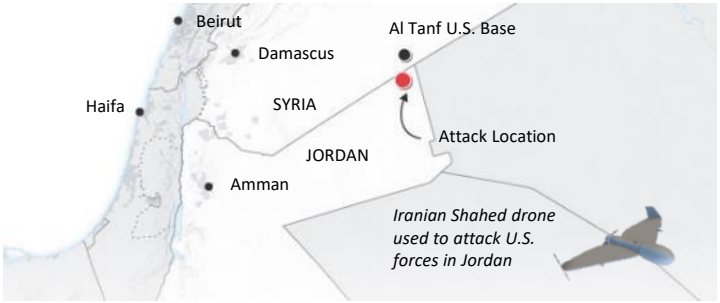
*Details Unconfirmed

The Role of Counter-UAS

While the success of drone attacks has dominated headlines, countermeasures have also made an impact in the war. Russia has gained an edge through effective counter efforts, destroying 24 Ukrainian drones hovering over Moscow territories and intercepting 53 additional Ukrainian drones passing through Russian-controlled areas of Ukraine

Iran-Backed Militia Strikes U.S. Forces

Iran-backed forces attacked a U.S. base in northeast Jordan on Jan. 28, 2024, killing three U.S. service members and wounding 40 others



Source: Wall Street Journal

- Attack on Tower 22, a small outpost near Jordan/Syria border, utilized a Shahed Group 3 one-way attack drone – same type of system Iran supplies to Russia
- Strike targeted troop living quarters, striking right as a U.S. drone was returning to base, creating confusion over whether the enemy drone was friend or foe
- Incident signals escalation of hostilities in the region, and highlights need for robust drone defense systems

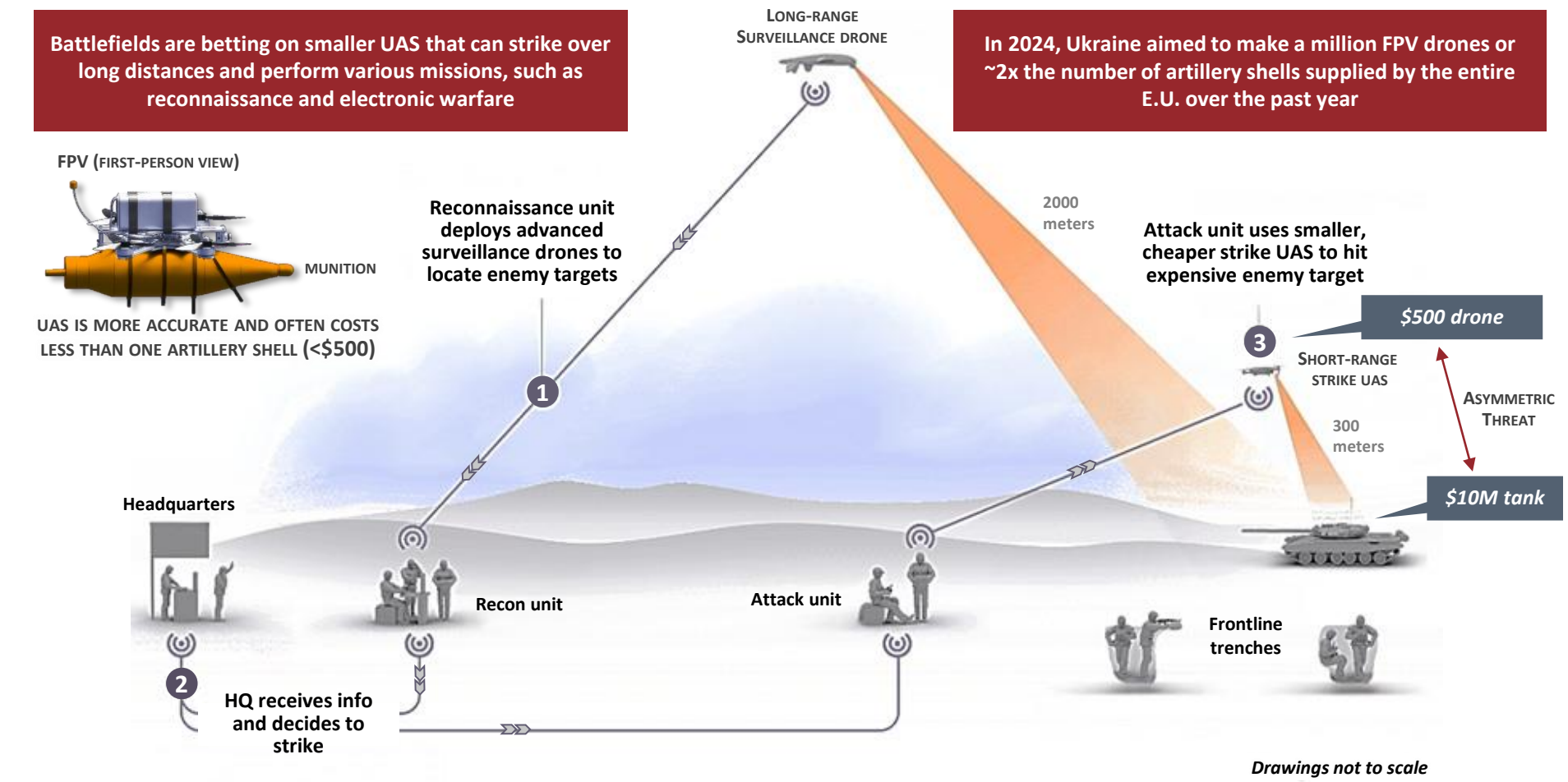
The recent geopolitical environment demonstrates the immediate need for a multi-layered defense system against attacks from modern drones

Commercial Drones Introduce a New Asymmetric Threat to High-Cost, Advanced Weapons Systems and Critical Infrastructure

Unmanned Front Lines: A Diagram of Scalable, Cost-Effective Drone Technologies in Combat

Battlefields are betting on smaller UAS that can strike over long distances and perform various missions, such as reconnaissance and electronic warfare

In 2024, Ukraine aimed to make a million FPV drones or ~2x the number of artillery shells supplied by the entire E.U. over the past year



Drawings not to scale

Multiple combat use-cases for cheap drones signal investment potential in burgeoning C-UAS technologies

Source: Reuters, The Economist

Pentagon Expands Drone Framework to Address Threats From Small Unmanned Aerial Systems

DoD Unmanned Aerial Systems (UAS) Classification

Increasing Performance, Payload, Vehicle Size

Class	Weight (lbs) Max Gross Takeoff	Operating Altitude (ft)	Speed (knots)	Description	Example	Mitigant
Group 1: Micro/Mini	*0-20 lbs*	*< 1,200 AGL*	*100 kts*	*Low range, low endurance, low payload, cheap, often widely available on commercial market with minimal operating experience needed*	AeroVironment  *RQ-11 Raven*	PAR GOVERNMENT
Group 2: Small Tactical	*21-55*	*< 3500 AGL*	*< 250*	*Larger/more capable than Group 1, but still commercially available; enhanced range, endurance, and payload capabilities*	DJI  *DJI Phantom*	ANDURIL
Group 3: Tactical	*< 1320*	*< 18,000 MSL*	*< 250*	*Vary widely among range/payload/size, generally reserved for military or commercial shipping purposes*	INSITU A Boeing Company  *RQ-21 Blackjack*	SRC ***LIDS***
Group 4: Persistent	*> 1320*	*< 18,000 MSL*	*any*	*Largest aircraft operating at medium to high altitudes, capable of carrying similar logistical burdens to manned aircraft*	NORTHROP GRUMMAN  *MQ-8B Fire Scout*	***C-RAM***
Group 5: Penetrating	*> 1320*	*> 18,000 MSL*	*any*	*Offer greatest range, endurance, and payload capabilities and are the largest aircraft able to operate at the highest altitudes*	GENERAL ATOMICS  *MQ-9 Reaper*	***PATRIOT***

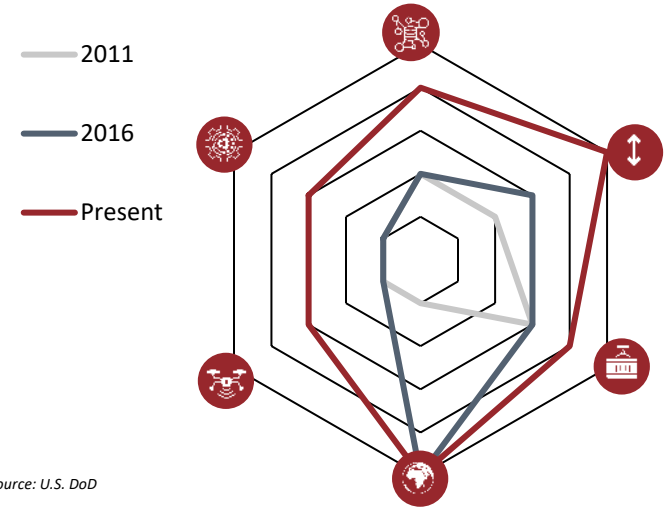
- DoD has established a classification framework for UAS, dividing them into five categories based on factors such as maximum gross takeoff weight, typical operating altitude, and airspeed
  - The smaller Group 1 and 2 systems pose notable vulnerabilities and substantial threats due to their compact size, affordability, widespread availability, and capacity to evade detection
  - Other larger UAS groups are defended with aircraft as well as rocket/missile defense systems, such as Counter-Rocket, Artillery & Mortar (C-RAM) systems and PATRIOT/PAC-3
- C-UAS initiatives are focused on mitigating these vulnerabilities by detecting and defeating Group 1 and 2 UAS

Battlefield requirement for C-UAS targets smaller drone systems within Group 1 and Group 2

AGL: Above Ground Level
MSL: Mean Sea Level

Recent Evolution in Unmanned Aerial Systems Technology

The U.S. DoD is Observing Rapid Advancements in UAS Technology



Source: U.S. DoD

- Over the past several years, commercial drone technologies have become immensely more sophisticated and affordable
- Commoditization of drones has been driven by improved technology (processing power, network connectivity, battery life), while higher volume production has translated to economies of scale and low costs
- Non-state and state actors have recognized the value of these low-cost, expendable systems and have rapidly integrated them into criminal and military operations (e.g., as surveillance drones or as improvised aerial explosives)

	Improvement Since 2011	
Network Integration	**2x+**	***Real-time data transmission and coordinated operations***
Range	**2.5x+**	***Enhanced antenna design and signal-boosting techniques***
Payload Capacity	**1.5x+**	***Increased ability to carry sensors, cameras, and other cargo***
Proliferation	**5x+**	***Commercially available across the globe***
Survivability	**3x+**	***Increasingly difficult to defeat despite robust countermeasures***
Autonomy & Intelligence	**3x+**	***Able to navigate complex environments without human intervention***

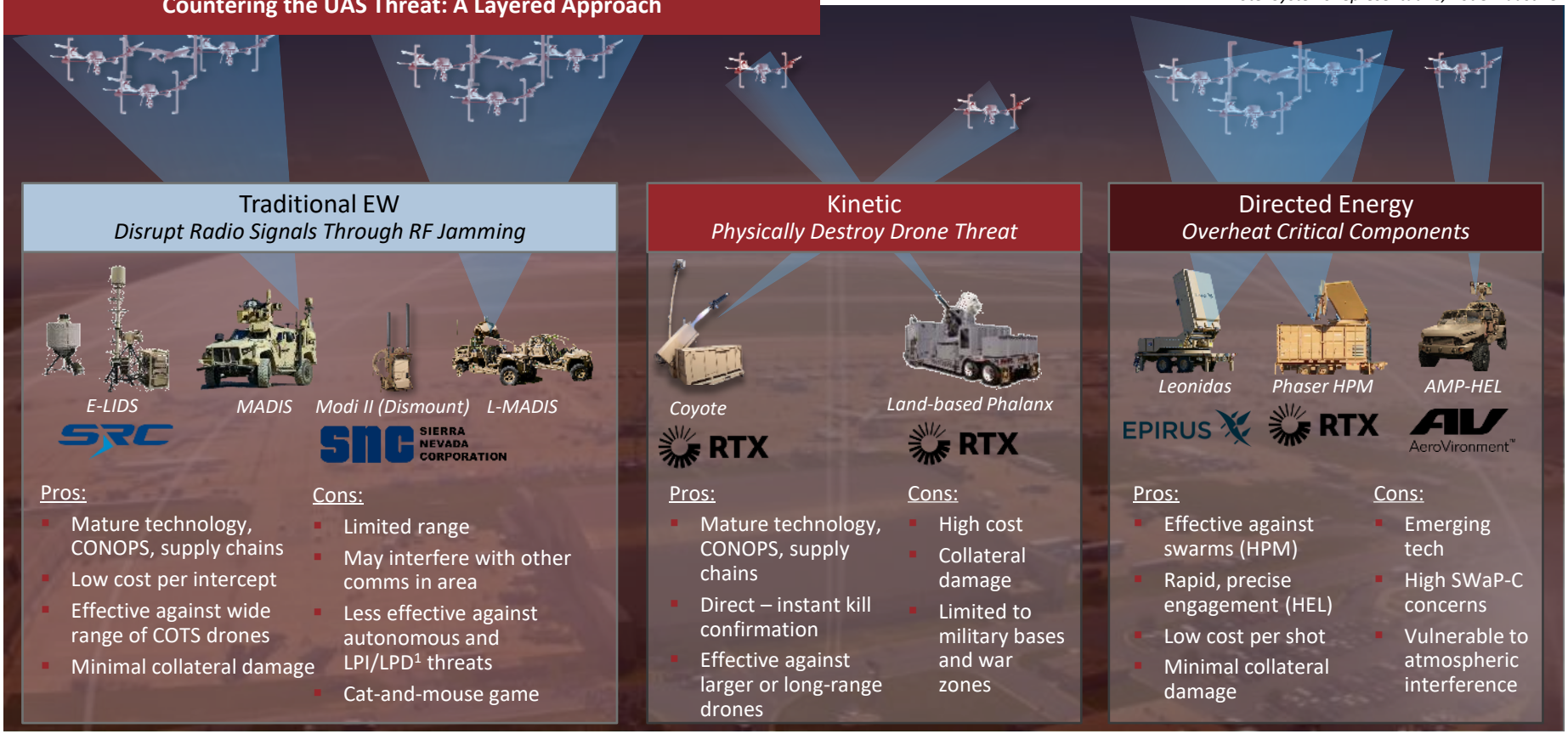
Widespread drone use underpins C-UAS need as low-cost, attritable systems prove their battlefield value

Diverse UAS Threat Demands Layered Defenses

- Emergent threats to military personnel, installations, and critical infrastructure posed by UAS are diverse and rapidly changing
- Layered approach will involve multiple types of solutions: EW/RF jamming, directed energy and kinetic effects
- Continual evolution of solutions required to meet dynamically changing threat (e.g., shift toward higher frequencies/adoption of 5G)

Countering the UAS Threat: A Layered Approach

Note: Systems representative, not exhaustive



Traditional EW
Disrupt Radio Signals Through RF Jamming

E-LIDS · MADIS · Modi II (Dismount) · L-MADIS

SRC · SNC SIERRA NEVADA CORPORATION

Pros:
- Mature technology, CONOPS, supply chains
- Low cost per intercept
- Effective against wide range of COTS drones
- Minimal collateral damage

Cons:
- Limited range
- May interfere with other comms in area
- Less effective against autonomous and LPI/LPD[1] threats
- Cat-and-mouse game

Kinetic
Physically Destroy Drone Threat

Coyote · Land-based Phalanx

RTX · RTX

Pros:
- Mature technology, CONOPS, supply chains
- Direct – instant kill confirmation
- Effective against larger or long-range drones

Cons:
- High cost
- Collateral damage
- Limited to military bases and war zones

Directed Energy
Overheat Critical Components

Leonidas · Phaser HPM · AMP-HEL

EPIRUS · RTX · AeroVironment

Pros:
- Effective against swarms (HPM)
- Rapid, precise engagement (HEL)
- Low cost per shot
- Minimal collateral damage

Cons:
- Emerging tech
- High SWaP-C concerns
- Vulnerable to atmospheric interference

Defense organizations pursuing multi-pronged, layered approach involving myriad C-UAS solutions

1. Low probability of intercept/low probability of detection

Integrated C-UAS Offers a Multi-Faceted Approach to Defending Against Unauthorized Assets

Multiple Discrete Capabilities Integrated Into A Cohesive System

1 Command & Control

Allow C-UAS operators to use a system that can be layered into a fixed or mobile site defense infrastructure employing systems against a multitude of threats (e.g., ballistic missiles and cruise missiles to rocket, artillery and mortar, small drones)

Software-Enabled Interoperability

Wireless Encrypted Communications *are utilized to safely transmit sensitive data / commands between systems*

C2 Software/Middleware *is used to manage / coordinate air defense operations by integrating data from various sensors*

2 Detect / Identify / Track

C-UAS Kill Chain

Detect → ***Identify*** → ***Assess / Track*** → ***Decide / Defeat***

Advanced Sensors

Radar Systems *detect/track UAVs, used to provide early warning of approaching drones*

EO/IR Cameras *identify drones via optical / infrared software, and provide high-resolution imagery / thermal signatures*

Direction-Finding Systems *provide additional tracking via route-finding tracking capability*

Ku Band RF Systems *utilize complex algorithms to distinguish drone types; occasionally possess jamming capabilities*

PERCEIVED THREAT

Countermeasures deployed (can be kinetic or non-kinetic) to neutralize threat while minimizing risk of collateral damage

Weapons Systems

EW Vehicles *are electronic warfare vehicles that possess sensors and jammers to disable unauthorized drones*

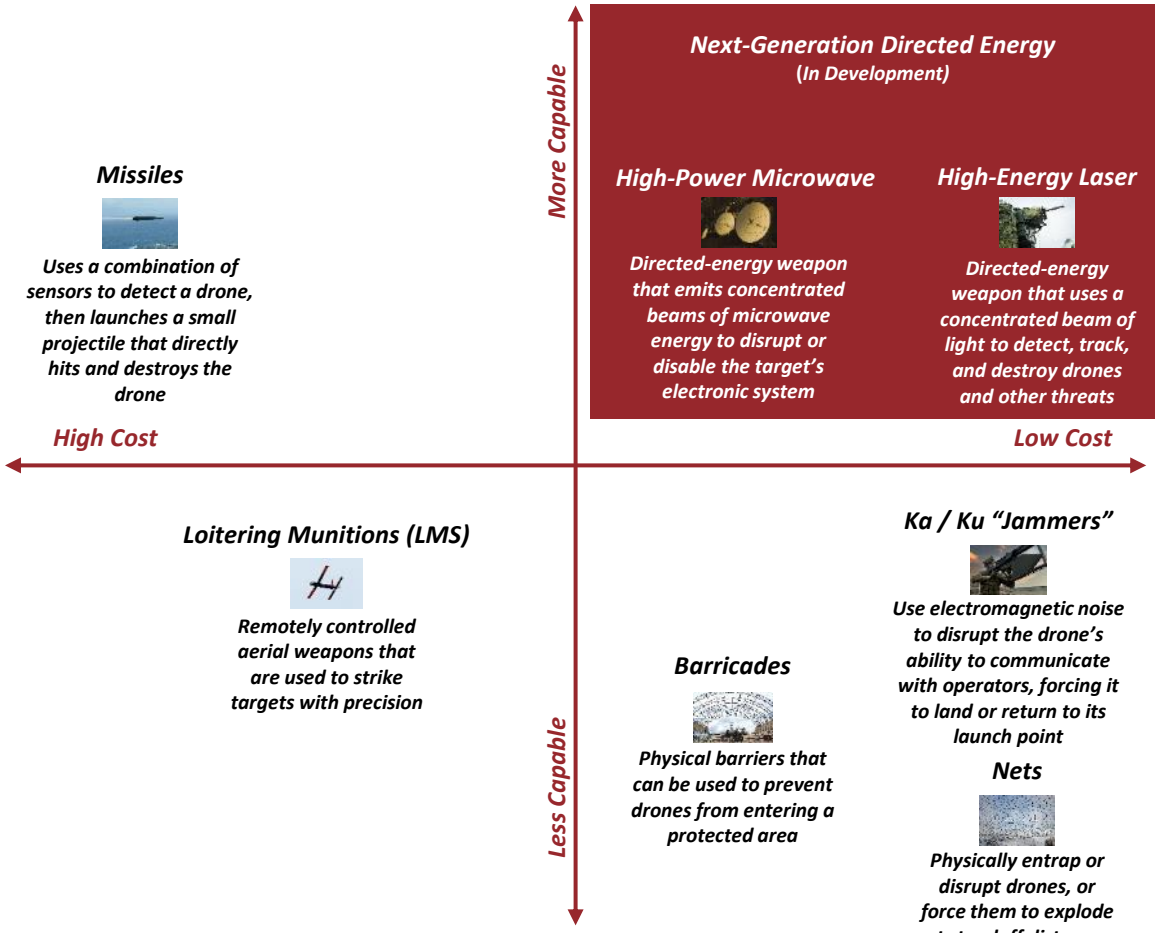
Fixed-Site C-RAM solutions *use projectiles to intercept identified threats*

3 Defeat (Kinetic / Non-Kinetic)

Integrated systems enabled via C2 to provide the best line of defense against unauthorized drones

Evaluation of Existing C-UAS "Defeat" Modalities

Current Solutions Vary Widely on Measures of Cost and Effectiveness



- Available U.S. and allied solutions are likely to struggle to contain the modern UAS threat, particularly when they are fielded in large numbers, known as swarms
- Ka / Ku jammers are readily available and often effective in defeating less sophisticated drones, but they are inadequate against autonomous or semi-autonomous UAS platforms
- Missiles and LMS have had success, but they are typically too expensive to deploy as a permanent solution and/or can be defeated through electronic warfare (jamming, spoofing, etc.)
- High-power microwave (HPM) and high-energy laser (HEL) systems offer potential – if successful, these systems will be able to destroy targets at a safe distance for a fraction of the cost of a typical missile or loitering munition
  - Early generations of the programs, however, have encountered technical issues, particularly with power and heat

Next-generation directed-energy solutions bring clear advantages, despite certain technical challenges

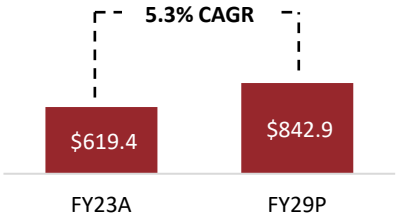
Robust and Growing U.S. Funding Across C-UAS "Defeat" Modalities

Research conducted by Arnovia

Traditional EW

RF Jamming

DoD EW C-UAS Budget ($M)



- Mature technology, CONOPS, established supply chains
- Best suited for commercial applications, limits collateral damage
- Low cost per intercept
- Autonomous or LPI/LPD comm systems present challenges

Example Solution

Silent Archer

SRC

Directed Energy Weapons

High-Power Microwave

- Emerging technology with immature supply chain
- Anti-swarm capability
- Low cost per shot, but power-intensive
- Susceptible to atmospheric conditions, causing increased diffusion
- Limited range resulting from signal propagation, antenna gain, and transmit power

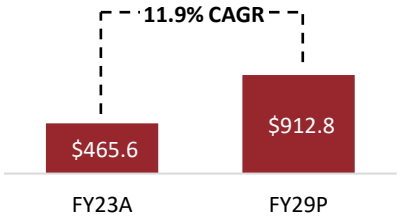
Example Solution

Leonidas

EPIRUS

High-Energy Laser

DoD Directed Energy C-UAS Budget ($M)



- Emerging technology with immature supply chain
- Rapid, precise engagement
- Low cost per shot, but power-intensive
- Susceptible to atmospheric conditions, causing increased diffraction
- Limited to line-of-sight targets

Example Solution

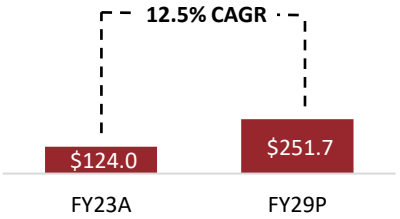
AMP-HEL

AV AeroVironment™

Munitions

Kinetic

DoD Kinetic C-UAS Budget ($M)



- Mature technology, CONOPS, established supply chains
- Limited to military installations and conflict zones
- High cost per intercept at range (Missiles & UAS)
- Limited range and accuracy (guns & entanglements)

Example Solution

Coyote

RTX

The U.S. is exploring mix of traditional kinetic and non-kinetic C-UAS solutions alongside directed energy

Total Potential Market for Western C-UAS Surpasses $35B

Research conducted by Arnovia

O&G Infrastructure

Prisons

Other Public Airports

Critical Infrastructure

Capacity 10-50MW

Data Centers

Power Plants

Large: >500MW capacity; $1.0M per

Medium: 50-500MW capacity; $0.5M per

Hub Airports

Large: >= 20M pax/year; $5.5M per

Medium: ~4-20M pax/year; $3M per

Small: ~1-4M pax/year; $2M per

Sports Arenas

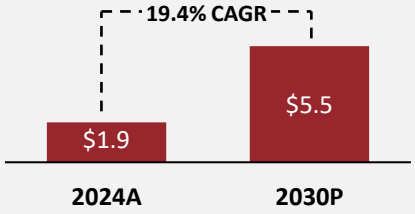
Capacity >= 30,000

Defense Market: ~$21B Total Value

Secondary Markets: $5.5B Total Value

Tertiary Markets: $8.9B Total Value

Near-Term C-UAS Annual Market Value ($B)



Multiple use cases identified for C-UAS solutions protecting national security and high-value assets

Non-Defense markets assume a regulatory environment amenable to deployment of counter-drone technologies by non-federal entities
Assumed cost for large hub airports based on London Gatwick Airport reference case; other costs adjusted based on complexity and criticality
Analysis includes North America and Europe for secondary and tertiary markets

C-UAS Competitive Landscape – Select Solutions

	Company	Example Solution	Type (Primary)	Function	Methods	Recent Wins
Integrated Solutions	ANDURIL	C-UAS Family of Systems	Fixed, Mobile	Detect & Defeat (Kinetic & Non)	Radar, IR, RF, EW, Interceptor UAS	▪ SOCOM: $1B contract for family of systems run by Anduril Lattice AI solution
	BAE SYSTEMS	AMPV C-UAS (Prototype)	Mobile	Detect & Kinetic Defeat	Radar, 30mm Cannon, M-SHORAD	▪ Integrating Moog turret, Leonardo radar and C2, and Northrop XM914 onto AMPV
	CACI	X-MADIS, Corian, SkyTracker	Fixed, Mobile	Detect & Non-Kinetic Defeat	Radar, RF, EO/IR, EW Jammer	▪ Acquired Ascent Vision Technologies in 2020 to expand integrated C-UAS solution
	SAIC	C-sUAS Multi-Domain SoS	Fixed	Detect & Defeat (Kinetic & Non)	Radar, RF, EW, Ammo, HEL/HPM	▪ Gaining traction in Directed Energy solutions (Army High-Energy Laser OTA)
	SRC	LIDS Family of Systems	Fixed, Mobile	Detect & Defeat (Kinetic & Non)	Radar, EO/IR, RF/GPS, Coyote	▪ Providing Army up to 100 E-LIDS for Joint Urgent Operational Need; $425M contract
C-UAS Subsystem / Component Suppliers	EPIRUS	Leonidas Family of Systems	Fixed, Mobile	Detect & Non-Kinetic Defeat	Gallium Nitride (GaN) Semiconductors	▪ Selected for the U.S. Army's Indirect Fire Protection Capability–High-Power Microwave (IFPC-HPM) initiative
	BLUEHALO	Titan C-UAS	Fixed, Mobile	Detect & Non-Kinetic Defeat	RF, Radar, Optical Systems	▪ Awarded a $4M order for an elite unit within the U.S. Army
	ECHODYNE	EchoGuard and EchoShield	Fixed, Mobile	Detect & Track	ESA Radar	▪ Partnership with PAR Government to provide small-form-factor solid-state ESA radar for AFRL IDIQ
	KONGSBERG	Cortex Typhon	Mobile	Detect & Kinetic Defeat	Thermal Imaging, 50-Cal. Machine Gun	▪ Partnered with Teledyne FLIR (imaging) to provide vehicle-mounted C-UAS to Ukraine
	LOCKHEED MARTIN	AN/TPQ-53 Radar, MORFIUS	Mobile	Detect & Non-Kinetic Defeat	ESA Radar, MORFIUS Loitering Munition	▪ Q-53 radar integrates with Northrop FAAD C2 as primary fire control for RTX Coyote
	MZA	HELWS Beam Control System	Mobile	Non-Kinetic Defeat	High-Energy Laser	▪ Navy contract to develop High-Energy Laser Weapon System beam director/controller
	Raytheon	KuRFS Radar, Coyote Effector	Fixed, Mobile	Detect & Defeat (Kinetic & Non)	Radar, Coyote Loitering Munition	▪ Aligned to SRC LIDS FoS providing radar and Coyote for kinetic/non-kinetic effects

Primes are investing alongside governments to develop C-UAS solutions; Anduril is seeking to disrupt traditional procurement with its commercially developed alternative, the Lattice-powered family of systems

Potential C-UAS M&A Opportunities

To view full M&A pipeline, please contact:
ADGInsights@harriswilliams.com

Company	Headquarters	Ownership	Revenue ($M)	Description
[redacted]				

The number of attractive M&A opportunities within C-UAS is expected to increase meaningfully over the next several years

Potential C-UAS M&A Opportunities (Cont.)

To view full M&A pipeline, please contact:
ADGInsights@harriswilliams.com

Company	Headquarters	Ownership	Revenue ($M)	Description
[redacted]				
[redacted]				
[redacted]				
[redacted]				
[redacted]				

The number of attractive M&A opportunities within C-UAS is expected to increase meaningfully over the next several years

Other Attractive Ways to Invest in the Growing C-UAS Market

- The cutting-edge specifications, high electronic content, and sourcing restrictions of C-UAS systems create attractive new business opportunities for trusted suppliers in the high reliability electronics supply chain within the U.S. and allied countries
- In this area, investors value the level of product / process IP, lower cost relative to system value, specified-in nature of product positions, reoccurring demand from tech upgrades and replacement, and program diversity

Board-Level Components | ***Power Amplifiers***
Software-Defined Radios | ***Antenna Systems***

- The proliferation of C-UAS will require a high volume of sensors enabled by command-and-control software to generate unified situational awareness and data for operators; the marketplace is still aligning around the most effective model for enabling this important function
- Early investors in emerging C-UAS players see massive future potential by delivering a recurring software-as-a-service (coupled with light hardware integration) in a fast-growing total addressable market

EO / IR Systems | ***Video Processing***
Acoustic Sensors | ***Identification & Security Software***

- C-UAS solutions require a robust infrastructure of testing and instrumentation services for the R&D and operational maintenance of these critical systems
- Large support and sustainment contracts are allocated for U.S. military-funded research centers, and investors are eager to find platforms that are positioned to win these contracts given their strong alignment to well-funded budgetary priorities
- There are also opportunities to support recurring demand in the aftermarket by testing and calibrating the instrumentation of C-UAS systems (once fielded)

Modeling & Simulation | ***RTD&E Services[1]***
Systems Engineering | ***Data Processing***

- In addition to military applications, C-UAS technologies are becoming increasingly important to civilian environments, particularly in Europe
- The FAA has restricted civilian use of C-UAS technologies in the U.S., but legislation is being introduced to extend these authorities which would create a new market for civilian-operated C-UAS solutions
- With FAA restrictions lifted, civilian C-UAS services at critical infrastructure and live events could become an attractive area of investment in the U.S.

Three-Dimensional Monitoring | ***Integration***
Mitigation | ***Data Collection***

1. RTD&E Services refers to the ongoing processes of investigating, designing, testing, and improving new methods and systems to detect, track, and neutralize unmanned aerial vehicles

Arnovia Overview

Arnovia is the leading advisory firm supporting investors and companies within the Aerospace, Defense, Energy, and Government Services (ADEG) markets

Transaction Advisory Services

Buy-Side Diligence

- Arnovia provides transparent and unbiased analysis of markets, programs, and forecasts to support internal investment committee decisions, valuation, and financing

Sell-Side Diligence

- Provides an overview of a company's business, markets, and competitors, including a forecast risk and opportunity assessment that gives potential buyers an informed understanding of the company's outlook

Strategic Advisory Services

Growth Strategy

- With close collaboration from company leadership, Arnovia deploys its team of domain experts for a deep-dive review of the company's markets and products

M&A Strategy

- Focused and actionable acquisition strategies yielding clear recommendations used with the company's board of directors or private equity sponsors to evaluate inorganic growth opportunities

ARNOVIA

Provides transaction and strategic growth advisory services to leading private equity and corporate clients

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Recent transactions in the Defense sector:

Raptor Scientific — a portfolio company of L2 Capital Partners — has been acquired by TransDigm Group Inc.

Select Aerospace and Defense Electronics Businesses of Excelitas Technologies — a portfolio company of AEA — have been acquired by Teledyne Technologies (Everywhereyoulook)

ATG Aronix Technologies Group — a portfolio company of ShoreView — has received a strategic investment from TINICUM

CPI Communications & Power Industries — Electron Device Business — a portfolio company of TJC — has been acquired by TransDigm Group Inc.

Learn more about our experience in the UAS and C-UAS space:

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