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Raytheon Counter-UAS Capabilities

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Short and Medium Range Ground Based Air Defense, Land and Air Defense Systems

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Introduction: How do we detect and defeat enemy drones?

Discussion Topics

- **The Proliferating UAS Threat**
- **The Counter small UAS (CsUAS) Mission**
- **Raytheon CsUAS**
  - KuMRFS multi-function radar
  - Coyote kinetic and non-kinetic effectors
  - High Energy Laser Weapon System (HELWS)
  - High Power Microwave
  - LIDS CsUAS System of Systems
- **The Path Ahead**

LIDS with Raytheon Coyote and KuRFS Has Completed Over 170 Successful UAS Engage

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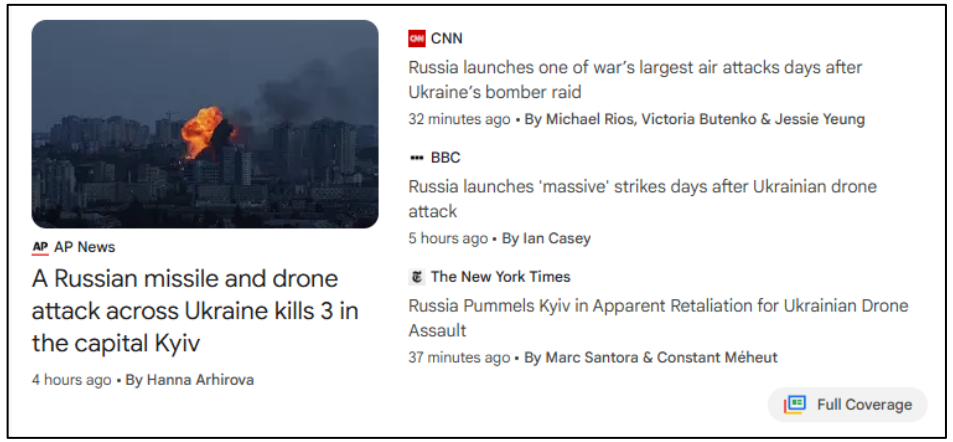
The Proliferating UAS Threat

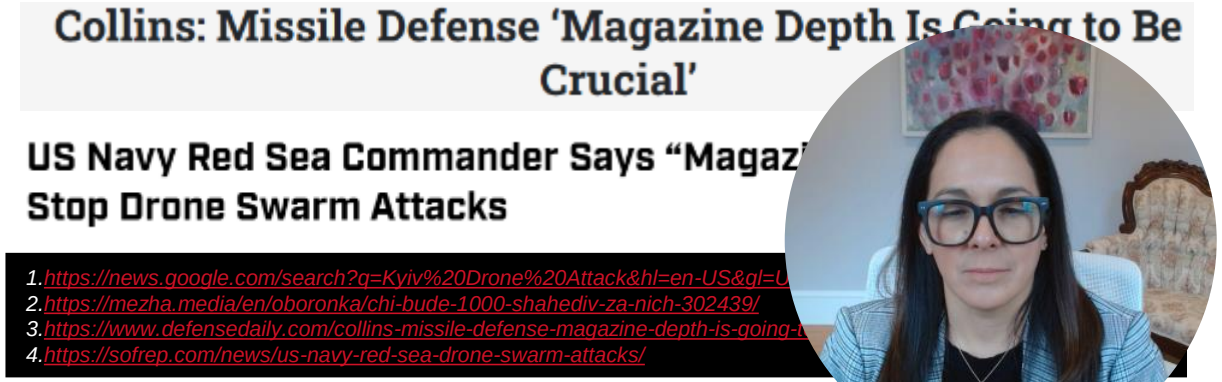
- Attacks and disruptions using unmanned aerial systems (UAS) continue to proliferate across the globe
- Adversaries are rapidly increasing their effectiveness in complex, coordinated attacks using ballistic missiles, cruise missiles and UAS
- Countries are exposed to magazine depth challenges forcing rapidly acquisition of CUAS capabilities to help offset these challenges

Straight from the News



Rapid Growth in One-Way-Attack (OWA) UAS Strikes

https://img.mezha.media/mezhaprod/system/MediaPhoto/photo/7/c/266243/7c4b1ceaab369dd443a6558cd2740caa1749032849.jpg



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The Need for CsUAS Defense of Maneuver Forces

Lessons and Alliances in Ukraine

June 2025 F/O FPV vs Tank
https://x.com/i/status/1930689828963905693

July 2023 FPV Montage
https://x.com/i/status/1685208474987184128

https://mod.gov.ua/en/news/ukraine-and-nato-join-efforts-to-strengthen-countermeasures-against-fiber-optic-controlled-fpv-drones

US Army Establishes FBLP Initiative

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY FUTURES COMMAND
210 West 7th Street, Austin TX 78701

FCCG 13 January 2025

MEMORANDUM FROM Commander, U.S. Army Futures Command

MEMORANDUM THRU Vice Chief of Staff, U.S. Army

FOR Chief of Staff, U.S. Army

SUBJECT: Formation Based Layered Protection (FBLP) Characteristics of Need

1. **Situation**. To accomplish its mission the Joint force must maintain freedom of maneuver and the ability to extend its operational reach. The expansion and diversification of threats across all the warfighting domains necessitates an integrated and layered multi-dimensional system to protect the force from adversaries developing technologies and tactics at a comparatively faster pace. Adv and information technologies as well as the widespread use of drones unprecedented situation of constant observation and contact in the threat to the force will grow increasingly acute during close comba

2. **Problem**. To deter conflict and protect the force during war, the formation-based approach that creates a converged system of se systems, information, and Soldiers across the domains and forma to squad level. Given their different compositions, divisions invaria protection requirements to operate in and from the land domain, ra on (and under) the ground, in the air, and extending into the sea, cy

Countering the UAS Threat

Higher cost UAS threats:

Can be addressed by traditional Integrated Air Defense Systems (IADS): e.g. NASAMS, PATRIOT

Low cost, swarming threats:

Require innovative, low cost Counter-small-UAS (CsUAS): e.g. LI

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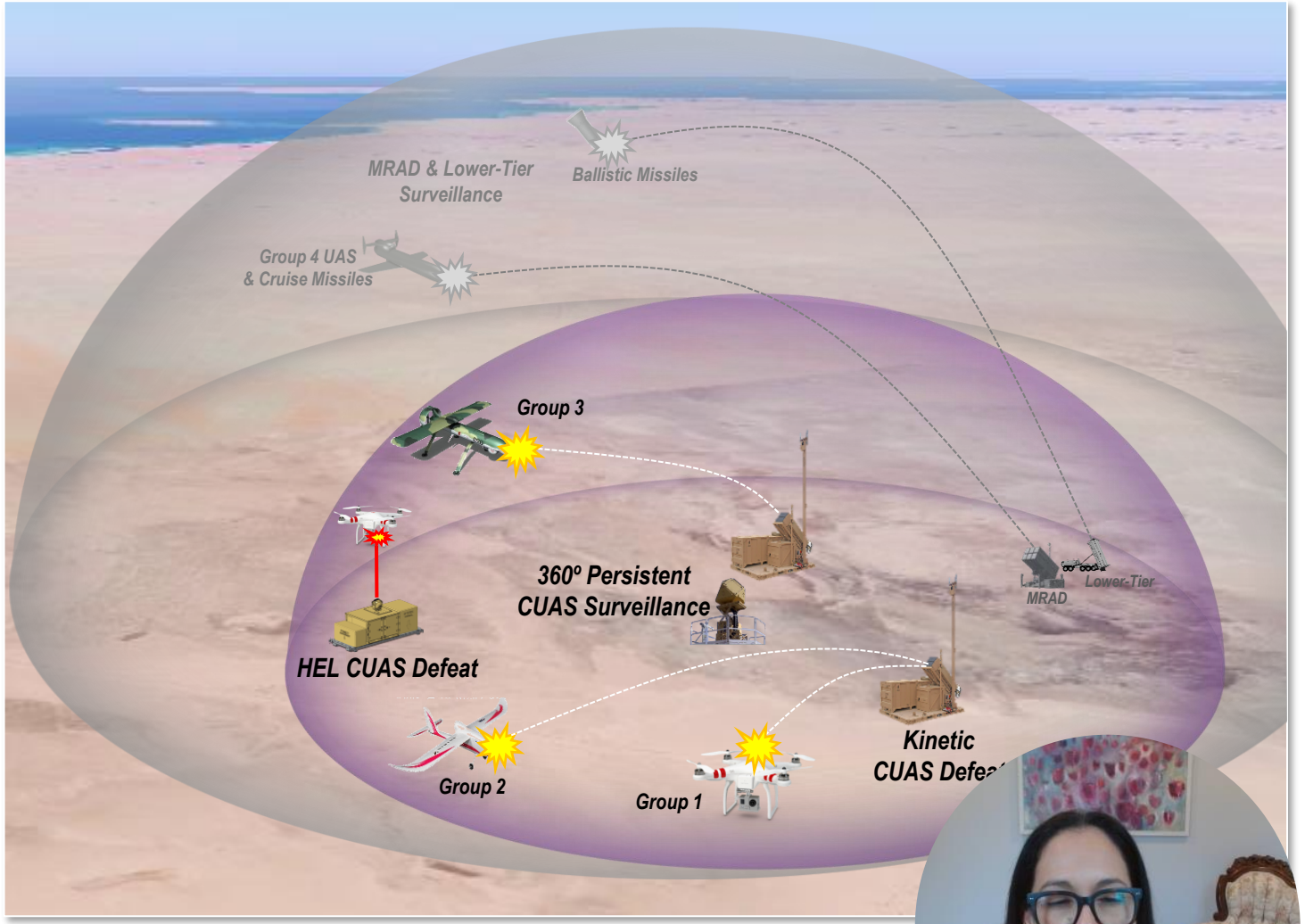
The Counter-small-UAS (CsUAS) Mission

- **Kinetic & High Energy Laser (HEL) Defeat of Group 1-3 UAS**
  - Close-in, low altitude Group1 UAS
  - Long-range higher altitude Group 2-3 UAS
  - Enables conservation of MRAD and Lower-Tier for Cruise Missile and Ballistic Missile Defeat
- **360º Persistent Surveillance**
  - Horizon coverage with low false alarms (must prevent confusion with ground clutter and birds)
  - High update rate to support maneuvering targets (fixed radar faces desired)
- **Scalable Distributed Coverage**
  - Bases, airfields, IAMD systems, urban assets
  - Add/remove and distribute launchers and radar



CUAS Systems Provide Affordable Defeat of Low Cost UAS Threats in a Layered Def
Architecture to Enable MRAD and Lower Tier to Focus on Cruise Missile and Ballistic Miss

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Raytheon CsUAS Capabilities

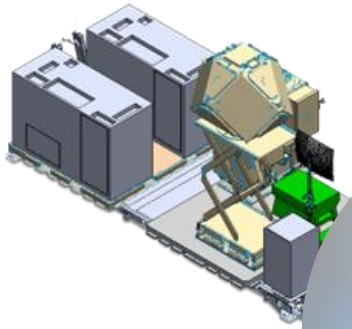
- KuMRFS multi-function radar
- Coyote kinetic and non-kinetic effectors
- High Energy Laser Weapon System (HELWS)
- High Power Microwave
- LIDS CsUAS System of Systems

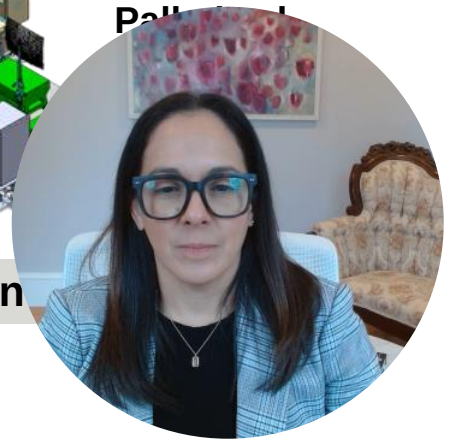
KuMRFS Multi-Function Radar Overview

- **Multi-Mission Radar with C-UAS and C-RAM Missions**
  - >15km Range for Fixed Site and Transportable
  - >7km Range for mobile
- **Ku-Band with High Range Resolution**
  - Accurate Assessment of Multiples and Swarms –
  - Very Low False Alarm Rate (Clear Air Picture)
- **Acquisition, Track, and Fire Control Against Group 1-3 UAS Threats**
  - Proven with Coyote Blk 2 – Including Maneuvering Targets
- **Remote or Locally Operated by C2 Operator**
- **Can be Deployed Stand-Alone or as Part of LIDS / Mobile LIDS**
- **Palletized for Transportability with Generator or Shore Power Options**
- **Effectors supported:**
  - Point and area defense Kinetic: LPWS, 0.50cal gun, 30 mm cannon, Coyote
  - DE weapons: CLaWS, RTX High-Energy Laser, RTX Phaser, EW
  - Mission mode architecture enables rapid integration with new effectors

Fixed Site

Mobile





KuMRFS is Proven for Counter UAS, Counter RAM, Air Surveillance, and Coyote Engagemen

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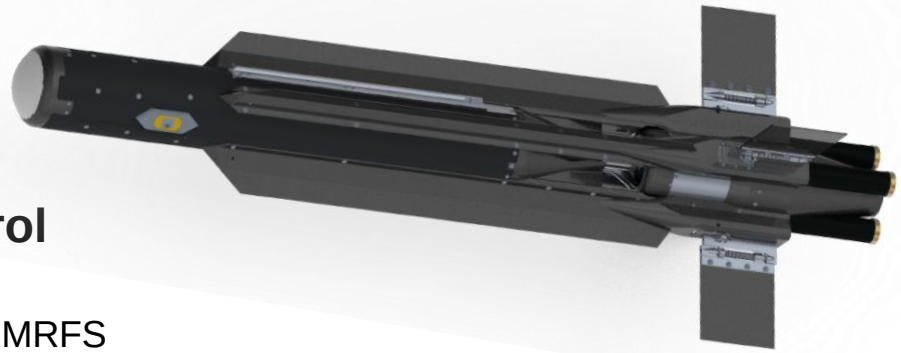
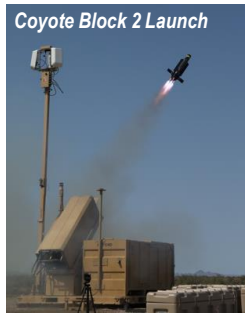
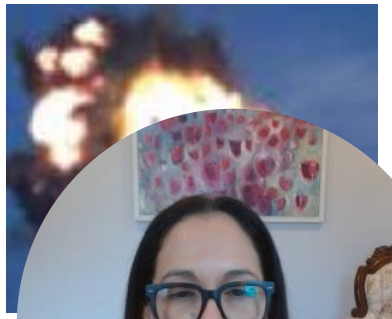
Coyote Kinetic Kill Interceptor

- **Proven Low-cost Intercept for Low Cost UAS Grp1-3 Threats**
  - >10km Range
- **Low Collateral Blast Frag Warhead**
  - Enables Kills at Low Altitude Over Ground
- **RF Seeker for All Weather**
- **Thrust Turbine Engine and Launch Boost Rocket Motor**
  - for Quick Launch and Maximum Range
- **Folding Tail Fins for Maneuver Control**
- **RF Data Link**
  - Radar In Flight Track Updates (IFTUs) from KuMRFS
- **C2 Command Guidance with Automatic Re-Attack**
  - Re-attack Ensures Maximum Single-Shot Pk
- **System Safety Built in with FAAD C2**
  - Includes Air Traffic Avoidance
- **Rapid Reload**



Palletized Launcher





Coyote is Proven in Over 170 Real World Engagements of UAS

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Coyote Block 3 Non-Kinetic (B3NK) Interceptor

SYSTEM DESCRIPTION

The Coyote non-kinetic variant is a ground launched interceptor with an electric motor and non-kinetic payload. It is a ground-to-air interceptor proven against Groups 1-2 UAS threats. It is command and control guided using a high-accuracy fire control radar and a single interceptor is capable of defeating multiple targets during a single engagement.

CAPABILITIES

- Demonstrated capability to track, engage, and intercept Groups 1-2 Unmanned Air craft Systems
- Cruising speed: > 50m/s
- Engagement Range: < 10km
- Re-attack capability for maximum Probability of Kill (Pk)
- On-board system safety logic

FEATURES

- Fully integrates into Fixed Site-Low, Slow, Small UAS Integrated Defeat System (FS-LIDS) and is launched from the common palletized 4-pack Fixed Site Coyote Launcher System
- Rocket assisted launch with sabot
- Net recovery system which allows the interceptor to be recovered, refurbished and re-flown for multiple flights

Coyote B3NK enables multiple kills per launch, and multiple launches per effector

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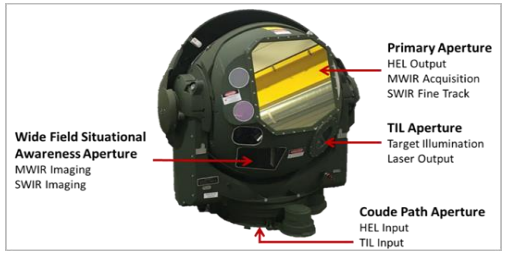
High Energy Laser Weapon System (HELWS)



- **Sensor & Effector** - Optical Track, ID & BDA (i.e. MTS)
- **Precise "hard kills"** – Laser is silent, invisible
- **Platform Flexibility** - Low-SWaP, Modular Architecture
- **Deep, rechargeable magazine**
- **Single user interface** – easy to operate
- **Proven in the field** – 500 drones, 40,000 hours

Counter-sUAS

- Class 1-2 Drones
- Small targets i.e. FAC/FIAC & UXO

15kW

Short Range Air Defense

- Class 1-3 Drones

HELWS can be operated stand-alone or interoperable with LIDS

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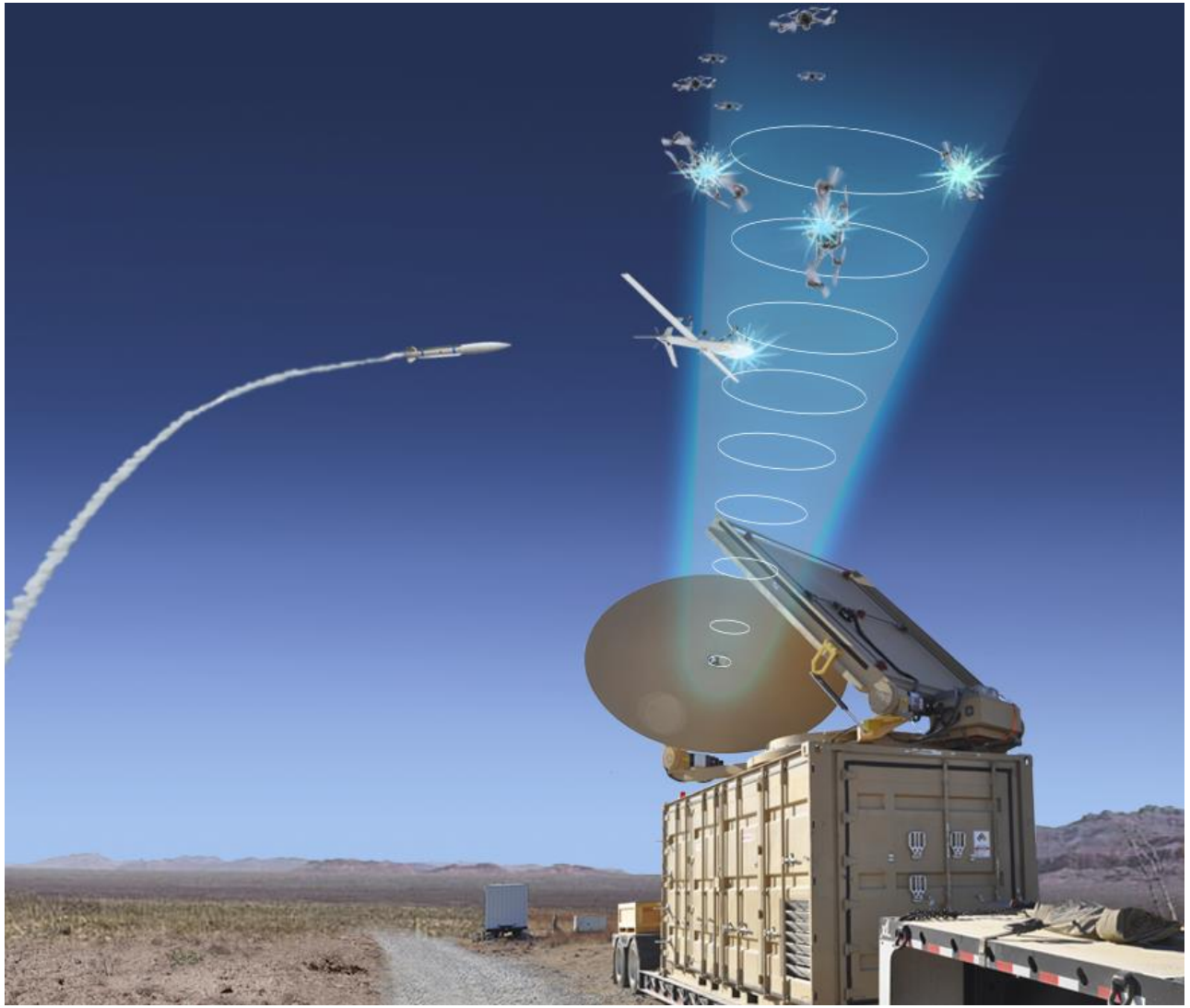
High Power Microwave (HPM)



- **Deep & continuous magazine**
  - Affordable
  - Reverses adversaries' cost advantage
- **Speed of light effect**
  - Instantaneous target interaction
  - Can engage threat multiple times
  - Prevents defensive maneuvers
- **Simultaneous target engagement**
  - Multiple defeats possible
- **Integrates with existing kinetic weapons and fire control**
  - Collaborative
  - Complementary
- **Low collateral damage**
  - No human effects
  - Minimal debris
- **Non-attributable effect**
  - Clandestine operations

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LIDS Counter sUAS System of Systems

Scalable LIDS Counter sUAS System

Sensor – RF KuMRFS — Raytheon An RTX Business

Effector – Coyote Kinetic and Non-Kinetic — Raytheon An RTX Business

Launcher – Coyote FSP — Raytheon An RTX Business

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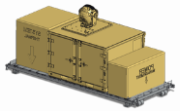
Non-Kinetic – EW Suite — SRC

Senor – EO / IR — SRC

C2 – FAAD C2 — Northrop Grumman

High Energy Laser Weapon System (HELWS)

Sensor – KuMRFS — Raytheon An RTX Business



Non-Kinetic Kill – HEL — Raytheon An RTX Business
15kW or 30-50kW Products

C2 — Raytheon An RTX Business

LIDS Has Passed Milestone C as a US Program of Record, is Currently Deployed, and is Being Delivered a

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LIDS Configurations

- **Fixed Site LIDS**
  - Scalable deployments of KuMRFS radars, Coyote Blk 2 launchers, EO/IR sensors, and non-kinetic EW suite
  - Coyote launchers hold 4 rounds
- **Relocatable LIDS**
  - Fixed Site LIDS capabilities are emplaced on movable pallets
- **Mobile LIDS**
  - Currently deployed in the US on M-ATV, but new vehicle will be Stryker
  - KuMRFS-M (M for Mobile) is scaled down version of the fixed site / transportable radar

LIDS Capabilities have Been Scaled, Deployed and Proven for a Variety Operational Needs

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The CsUAS Path Forward

- Collaboration with Army experimentation initiatives
  - Formation Based Layered Defense (FBLP), Transformation in Contact
- Compete and win PEO M&S programs of record
- Transition LIDS for international partners
- Invest & partner for low-cost, high-capacity sensor technology
- Invest & partner for low-cost, deep-magazine effector technology

Raytheon Remains well Positioned to Dominate the CsUAS Market in the Coming Deca

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Thank You!