

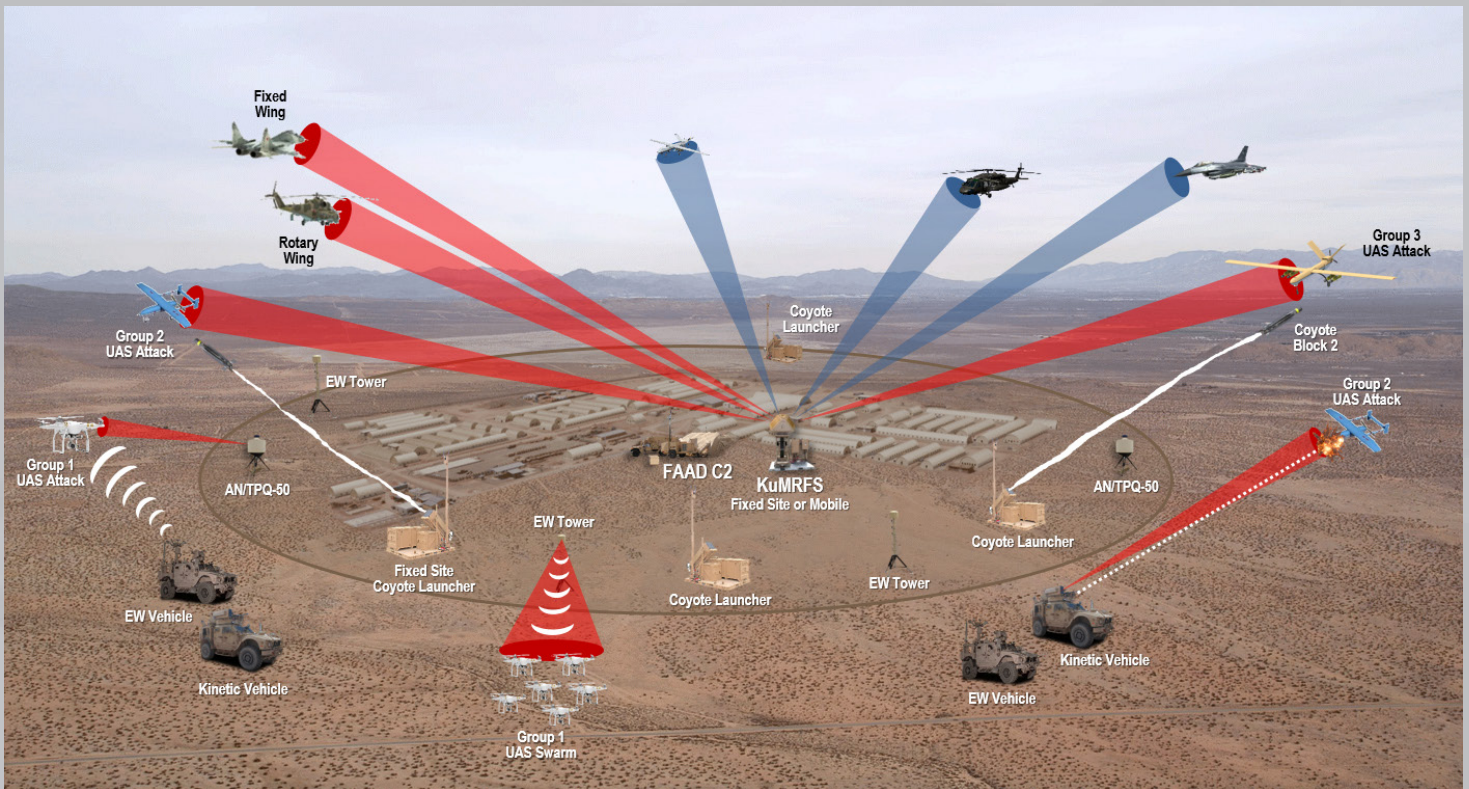
# LIDS

Low, Slow, Small UAS Integrated Defeat System (LIDS)

## Family of Systems



# LIDS OV-1



The Low, Slow, Small UAS Integrated Defeat System (LIDS) Family of Systems uses a range of passive and active sensors to detect, track and identify Groups 1 to 3 UAS and non-hostile aircraft. Using a comprehensive network to communicate, the command and control receives input from the sensors and allows the operator to task appropriate mitigation techniques in accordance with the Rules of Engagement, ranging from Electronic Warfare to full kinetic intercepts.

# Mission Scope & System Capabilities

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The use of Unmanned Aircraft Systems (UAS) in warfare is not new or unique. Even before the rise of American UAS in the 1980s for surveillance, the German V2 rockets had radio frequency guidance to overcome guidance technology limitations.

The miniaturization of control systems and sensors since the early 2000s has brought about the advent of commercially UAS. The desire of operators to have a low training threshold, a robust system capable of sustaining multiple crashes without major damage, and on-board sensors capable of taking professional quality photographs and videos while following a moving object have created a dilemma for military organizations. The same demands consumers have for taking video of themselves on a bike ride are the same technologies that enable a terrorist to follow a supply convoy or a combatant nation-state to call for artillery with precise measurements. A robust network brings all this together in real time, and Artificial Intelligence (AI) enhances capability even further, giving machines basic decision-making ability in real time.

As the military considers countermeasures to fight enemy UAS, it must overcome the robustness and complexity of the commercially available systems. Electronic Warfare (EW) can defeat simple threats or real-time video using large bandwidth and high amplitude signals while posing little risk of collateral damage. Detecting and defeating an AI driven, Radio Frequency (RF) silent system takes active detectors such as radar and the ability to kinetically defeat the threat with options ranging from nets to directed energy weapons and high explosive warheads.

The Low slow small unmanned aircraft system Integrated Defeat System (LIDS) family of systems uses a modular, open architecture to incorporate systems to detect and defeat a broad range of Groups 1 to 3 UAS in different operational environments.

# LIDS System Description

## Low, Slow, Small UAS Integrated Defeat System (LIDS)

LIDS capability provides fixed site and mobile counter-unmanned aircraft system capability to detect, track, identify, and defeat Commercial Off-The-Shelf (COTS) Groups 1 to 3 Unmanned Aircraft Systems (UAS). FAAD C2 system provides engagement operations, aircraft avoidance, and fratricide prevention for LIDS kinetic and Mobile LIDS with the Coyote interceptor. FAAD C2 enables Air Defense mission command system integration and Tactical Data Link interoperability with Link-16.



## HIGH POINT

The open architecture of the LIDS system ensures the ability to incorporate new sensor, command and control, and effector technology at a component level versus entire system replacement.

- Government-owned extensible interfaces provide backwards and forwards compatibility for the foreseeable future
- Highly transportable systems designed to use standard assets such as ISO shipping containers and commercial material handling equipment allow for flexible configuration and optimal coverage
- Existing interoperability with other Air Defense systems simplifies integration and contributes to an enhanced Common Operating Picture
- Flexible components give commanders a range of capability to adapt to variable Rules of Engagement

## CAPABILITY DESCRIPTION

- Primary capabilities of the Low, Slow, Small UAS Integrated Defeat System (LIDS) are detection, tracking, identification, and defeat of hostile Unmanned Aircraft Systems (UAS). These effects are accomplished through the integration of systems selected from best of tested technologies available.
- Detection and tracking are achieved through active radar systems that include the AN/TPQ-50 and Ku band Multi-function Radio Frequency Systems (KuMRFS) Multi Mission Radars (MMR). All MMRs support Counter-Rocket, Artillery, Mortar (C-RAM), and Air Surveillance (AS) for C-UAS mission requirements. Multi Mission is achieved through the simultaneous search for artillery ballistic targets and AS for detection of UAS.
- Passive detection relies on the receipt of radio frequencies by a direction finding-sensor and analyzed through the Electronic Warfare (EW) module. All sensors and effectors are correlated with higher echelon through the Forward Area Air Defense Command and Control (FAAD C2) system to provide fratricide avoidance and integrated air picture.
- Identification of hostile UAS is accomplished through visual and electronic means. The Electro-Optical/Infra-Red (EO/IR) camera is used for visual identification confirmation and classification up to 10 kilometers. Radio frequency reception of command or video up/down link signals is compared against known systems for assumed identity and classification by the EW system.
- Defeat of hostile UAS requires a defense in depth strategy employing EW interceptor, and gun technologies. Effective range of the Coyote Block 2+ interceptor is approximately 15 kilometers, followed by the EW system with effects ranging up to 8 kilometers. The XM-914 (30mm chain gun) provides the final protective defense.

## PHYSICAL CHARACTERISTICS

The LIDS family of systems has operated in the CENTCOM area of operations since 2017. The system is ruggedized for harsh environmental conditions with continuous operational requirements. The system and all components use best engineering practices for working in extreme conditions. LIDS has been continuously refined for over five years using comprehensive feedback from test environments and theater operations. As a result, LIDS has had three major increments to capability with many rapid upgrades to ensure operators have the best system possible to fight and win against a complex foe.

## CAPABILITIES

The safety systems in the LIDS have over a decade of operational use. LIDS has ability to deconflict complex airspace, including directing in-flight interceptors away from non-hostile aircraft. The safety pedigree of LIDS tremendously expands the operational area, allowing for operations in active airspace with extremely low risk of collateral damage. Advanced safety algorithms also protect friendly ground forces from fratricide risk, including large ballistic fragments.

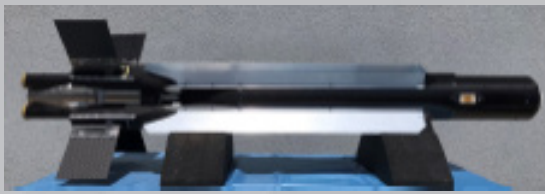
The extensive use of Built In Test (BIT) allows maintenance personnel to rapidly troubleshoot failures and rapidly return the system to full mission capability. The failure analysis feedback system makes continuous upgrades to the system possible, greatly improving AO since initial deployment. The ongoing refinement of the system creates more value by reducing maintenance and support footprint while improving system operational time.

# HIGHLIGHTS



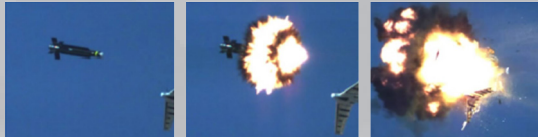
## LIDS (Fixed and Mobile)

- LIDS capability provides fixed-site CUAS capability to detect, track, identify and electronically defeat commercial off-the-shelf (COTS) groups 1 to 3 unmanned aircraft systems (UAS)
- FAAD C2 system provides engagement operations, aircraft avoidance, and fratricide prevention for LIDS kinetic and Mobile LIDS with the Coyote interceptor. FAAD C2 enables Air Defense mission command system integration to Tactical Data Link interoperability with Link-16.



## COYOTE INTERCEPTOR

The Coyote Block 2+ is a low-cost, rail-launched, turbine engine-powered missile for high-speed C-UAS missions. It is a ground-to-air effector proven against small maneuvering UAS threats with rapid time to target. The Coyote Block 2 has been integrated onto a fixed and mobile platform for flexibility of mission employment. It is command-and-control guided to target using from the KuMRFS family of radars until the on-board seeker takes over for terminal engagement. Endgame is completed with fuze and detonation of the low collateral, forward-firing blast fragmentation warhead..



## MOBILE SOLUTIONS

### Electronic Warfare

- Incorporates LIDS base configuration into a mobile platform. Provides C-UAS detect, track, identification, and defeat capabilities (non-kinetic)
- Electronic warfare vehicle incorporates Fixed Site LIDS (slight decrease in effective detection and defeat range)
- Incorporates 50 caliber machine gun for personnel protection Electro-optical/ infrared camera gun system target acquisition range >2 km



### Kinetic

- Provides C-UAS detect, track, identification, and defeat capabilities (kinetic)
- Incorporates Coyote Block 2 interceptor, XM914 30mm chain gun, and M240 anti-personnel weapons
- Electro-optical/ infrared camera gun system target acquisition range >2 km
- KuMRFS Mobile (KuMRFS-M) provides Air Surveillance and Fire Control at the short-halt (not an on-the-move)



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# FAAD C2



Forward Area Air Defense Command and Control (FAAD C2) is a battle-proven, fielded C2 system providing real-time battle management and engagement operations supporting Short Range Air Defense (SHORAD), C-RAM and C-UAS missions.



## NARRATIVE DESCRIPTION

- FAAD C2 software provides critical C2, Situational Awareness (SA), and automated air track information by integrating engagement operations software for multiple systems.
- FAAD C2 supports air defense and C-RAM weapon systems engagements operations by tracking friendly and enemy aircraft, cruise missiles, unmanned aerial systems, mortar and rocket rounds as identified by radar systems, and performing C2 engagement operations for Short Range Air Defense (SHORAD) and

## HIGH POINT

FAAD C2's suite of non-proprietary open interfaces enables quick and easy integration to a proven C2 system, providing a strong foundation for a system-of-systems that is capable of the SHORAD, C-RAM, and C-UAS missions.

FAAD C2 includes powerful data processing models and algorithms to enhance situational awareness, engagement planning and fratricide prevention

- Suite of Non-Proprietary Open Interfaces
- Assisted Battle Management
- Air Track Avoidance / Fratricide Prevention
- Small Footprint - Full functionality on a tablet
- Government has Unlimited Rights







## SYSTEM DESCRIPTION

Due to the nature of adaptive threats, there is no one sensor that can detect all possible targets and no one effector that can defeat all possible threats. FAAD C2's agnostic architecture and ability to quickly integrate with a diverse set of sensors and effectors allows the C2 to adapt in sufficient time to enable the system-of-systems to be relevant in the battlespace. Its primary functions are to correlate data from multiple heterogeneous local and external track sources to generate a real-time situational awareness of the battlespace, enable early warning and provide the decision tools and data to deploy the appropriate effectors to defeat the threat. FAAD C2's Assisted Battle Manager combines the results of battlespace availability, sensor and effector allocation, defensive doctrines, and fratricide prevention into a single coordinated regional engagement plan. This process takes the known, prioritized threat set, considers the areas of impact, calculates sensor and effector resource availability, and creates an efficient engagement plan that assigns and schedules guns, missiles, lasers, and associated sensors and communications systems to defeat hostile aircraft or RAM threats. Sensors supported include radar, electronic warfare (EW), acoustic and electro optical/infrared cameras and both kinetic (missile and guns from .50 cal to 30mm) non-kinetic (Directed Energy and EW) effectors. In addition to the directly controlled sensors and effectors, FAAD C2 shares situational awareness and command data with joint and coalition forces via military standards, the most common being Joint Range Extension Applications Protocol (JREAP) and Automatic Dependent Surveillance-Broadcast (ADS-B). FAAD C2's interfaces are designed to be backward compatible so that future versions of FAAD C2 will maintain compatibility with systems that implemented older versions of the interface.

## PHYSICAL CHARACTERISTICS

FAAD C2 is a software system that is capable of being executed on several different types of computer platforms including: ruggedized or commercial laptops; touch screen tablets; embedded computers; virtualized on servers. FAAD C2 is capable of full functionality on all supported platforms.

## CAPABILITIES

FAAD C2 contains many capabilities enabling it to perform as the command and control for a system-of-systems. Track processing capabilities include: track acquisition; track correlation; track dissemination; track identification; track cueing; saturation alleviation; IFF. Sensor management capabilities include: sensor registration/calculate bias correction; sensor cueing; sensor merging; sensor exclusion zones; false track mitigation; high precision track messages; time synchronization. Assisted Battle Management capabilities include: air track avoidance; fratricide prevention; weapon target pairing; engagement planning; multi-weapon coordination. User interface capabilities include: 3D user interface; touch-screen support; tablet support; multiple viewports. FAAD C2 certifications include: Link 16 certification; safety certifications under MIL-STD882E and AMCOM Reg 385-17; Authority to Operate (ATO) under Risk Management Framework (RMF). FAAD C2 was developed for short range air defense, and this and many other capabilities will ultimately converge into the Integrated Battle Command System (IBCS).

# AN/TPQ-50



The AN/TPQ-50 radar provides the warfighter with a versatile, powerful, all-in-one multi-mission radar for counter-UAS, early warning of incoming rocket, artillery, and mortars, weapon location for indirect fire, counterfire target acquisition (CTA), and short-range air defense missions.



## NARRATIVE DESCRIPTION

- The radar provides continuous 360-degree surveillance and 3-D target location using a non-rotating, electronically steered antenna. The ruggedized radar contains few moving parts, is vehicle mountable and can be configured for fixed site emplacement in hard-to-reach areas where typical radars are impractical.
- The system can simultaneously detect and track multiple incoming weapons from separate points of origin along with air targets (manned aircraft and UAS) within a surveillance area. The radar's outstanding detection capability allows it to track very small targets,

## HIGH POINT

As a multi-mission radar, the AN/TPQ-50 radar can perform the tasks of two or more radars and can be configured to prioritize specific capabilities to fit mission needs.

The radar can detect and track a wide range of traditional and non-traditional aircraft, with an instrumented range of more than 35 kilometers.

- 360-degree coverage with non-rotating, electronically steered antenna; 3-D location
- Performs multiple missions simultaneously
- Transports easily in challenging terrain
- Very low power requirement & air-cooling feature allows for flexible emplacements
- Rooftop, tower, tripod, or vehicle mountable





## SYSTEM DESCRIPTION

The AN/TPQ-50 radar is a lightweight, compact, L-Band, cylindrical, phased-array radar. It detects, tracks, and classifies traditional aircraft (commercial, small/private, military, and rotary wing) and non-traditional aircraft, such as low altitude, slow flying, small RCS targets like ultralights, gliders, and UASs. It coherently processes pulsed-Doppler waveforms, providing automatic target detection, tracking, discrimination, and geolocation.

## PHYSICAL CHARACTERISTICS

- System Weight: < 227 kg / 500 lb.
- System Size: 40 in/102cm diameter by 85 in/216cm high (adjustable)
- Power: 1,800W, 110/240 VAC 50-400 Hz  
Tested against MIL-STD-461E, MIL-STD-464A, MIL-STD-810G
- Shipped Configuration: 6 transport cases. Each transport case weighs between 168 – 175 lbs. One



## CAPABILITIES

The AN/TPQ-50 radar has a detection range of greater than 35 kilometers in air surveillance mode, and greater than 15 kilometers in counterfire mode. The radar scans a full 360 degrees in azimuth and from 0 to 30 degrees in elevation and provides target coordinates in 3-D.

# CUAEWS DF



Counter-Small Unmanned Aircraft Electronic Warfare System (CUAEWS) Direction Finding (DF)

The CUAEWS DF provides advanced electronic warfare engagement techniques designed to detect, track, classify and defeat groups 1, 2 and small group 3 UAS, whether individual targets or swarms.



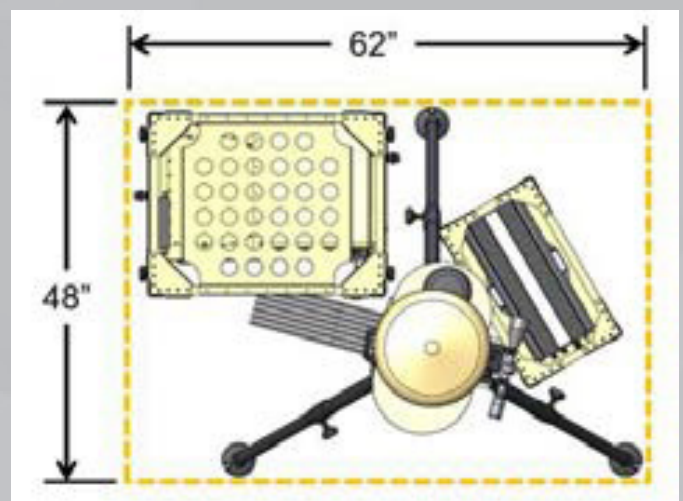
## NARRATIVE DESCRIPTION

There is a drastic difference in cost between employing a UAS platform versus the cost of deterring or defeating these systems with traditional weapons systems. The CUAEWS provides low-cost alternative for engaging UAS, whether individual targets or swarms. It can defeat groups 1, 2 and small group 3 UAS and provides an extra layer of defense for integrated kinetic weapons systems.

## HIGH POINT

The CUAEWS provides frequency surveillance through EW and direction-finding technology that can passively detect, classify, and disrupt communication and control signals of UAS.

- Fixed-site & high-mobility configurations protect a wide variety of forces and missions from peacekeeping to active combat maneuvers
- Electronic negation of UAS platforms and their control links
- Augmented with a multi-band direction finder and a Navigation Warfare (NAVWAR) capability
- Complements kinetic weapon systems for layered



## SYSTEM DESCRIPTION

### FIND

- Passively searches RF environment for signals of interest (SOI)
- If threat signal is recognized, direction finding (DF) sub-system searches for SOI FIX
- DF establishes line of bearing (LOB) to threat (both UAS and operator)
- System classifies SOI using combat ID matrix as SUSPECT, NEUTRAL/UNKNOWN, or FRIEND

### TRACK

- Maintains a positive track of target in RF domain
- Automatically de-clutters EW information before sending to command and control system

### TARGET

- System provides an estimate of potential collateral damage to the electromagnetic spectrum for each defeat technique
- Defeat techniques are automatically prepped and ready to fire

### ENGAGE

- A "man in the loop" activates the defeat technique
- Re-load/re-tasking is near instantaneous and indefinite

### ASSESS

- High-speed look-shoot-look processing allows the system to engage and re-engage targets while also maintaining positive EW track
- System automatically resumes passive RF search upon cease fire

## PHYSICAL CHARACTERISTICS

### SYSTEM WEIGHT

- Tower: 140 lb.
- Power supply: 95 lb.
- EW hardware: 250 lb.
- EW hardware: 29 in x 22 in x 36.5 in

### SYSTEM SIZE

- Complete system fits within a 62 in x 48 in footprint
- Tower: 156.5 in height (adjustable downwards); 38 in diameter (excluding the guying ropes)

### POWER

- 14 in x 22 in x 18.25 in
- 2,200W, 110/240V 50/60 Hz auto switching or 28VDC in high-mobility configurations

### SHIPPED CONFIGURATION

- 6 transport cases. Each transport case weighs between 100lb-170lb.
- Qty 2: (L)62.3" x (W)27.3" x (H)21.6"
- Qty 2: (L)34.4" x (W)27.0" x (H)23.4"
- Qty 2: (L)29.1" x (W)27.0" x (H)21.6"

## CAPABILITIES

- The **Electronic Warfare capability** detects the presence of UAS by observing the UAS communications, guidance, or sensor data links. Using a variety of non-kinetic generic and specialized techniques, the hostile UAS is defeated. Waveforms are tailored for specific UAS signals to improve efficiency and optimize defeat distances. Advanced smart defeat techniques are used to affect only the UAS devices without causing collateral spectral interference to other radio frequency (RF) systems.
- The **NAVWAR capability** provides special purpose electronic attack against a target's Navigation system. This capability is particularly effective for providing low-power, low-collateral damage protection against waypoint-guided threat systems.
- The **Direction Finding capability** focuses on advanced threats that utilize interference resistance technology, such as spread spectrum signals and rapid hop sequences. Direction is determined by capturing high-speed signals common to modern communications links using multiple detectors optimized for creating Lines of Bearing (LoBs) to the target and/or controller/operator. Also provides additional data used to classify targets.

# EO/IR CAMERA



A camera system optimized for counter-UAS missions, providing best-in-class detection, tracking and positive ID of small UAS.



## NARRATIVE DESCRIPTION

SRC integrated camera systems are specifically designed to meet the needs of the C-UAS mission. The systems are comprised of high-definition electro-optic (EO) and infrared (IR) cameras, providing plug-and-play functionality as an integrated sensor in LIDS solution. The system provides superior small UAS detection, identification and tracking capabilities and include all components required to operate either interdependently or as part of a C-UAS system of systems.



## HIGH POINT

SRC's camera technology reduces the time to decision by getting actionable information in front of the user as quickly as possible.

Best-in-class motion control and optical tracking.

- Quick & accurate focus shortens the time needed for target identification
- Automated target tracking minimizes the operational burden or personnel
- Ease of use reduces training needs



## SYSTEM DESCRIPTION

### AUTOMATED TARGET TRACKING

- Performs target tracking automatically with technology specially optimized for low-contrast targets in high clutter environments, like small UAS flying against clouds and mountains.

### PRECISE CAMERA CONTROL

- Careful design of the positioner motion response gives the operator precise control to manually track slow-and fast-moving targets at all ranges.

### FULL LIFE CYCLE SUPPORT

- Built-in-test capabilities to detect and isolate failures at the line replaceable unit level, as well as predictive schedules for preventative maintenance.

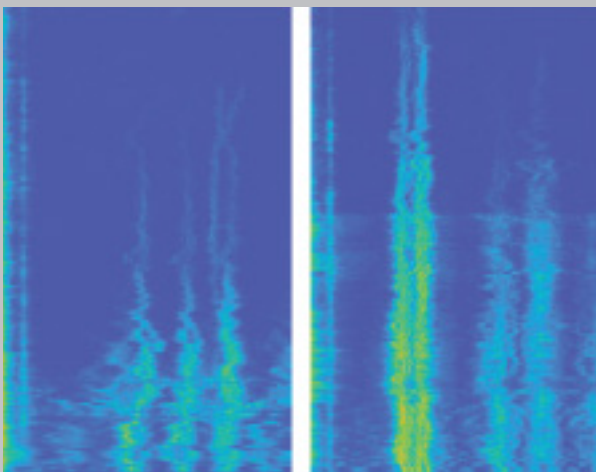
## PHYSICAL CHARACTERISTICS

### SYSTEM WEIGHT

- Daylight camera (high definition): Narrow FOV: 0.2o x 0.1o, Wide FOV: 22.5o x 13.1o
- Thermal Camera (high definition): Narrow FOV: 0.9o x 0.7o, Wide FOV: 5.5o x 4.4o
- Positioner: Azimuth: 360 degrees | Azimuth Velocity: 0.05 degrees/sec to 100 degrees/sec | Elevation: -90 degrees to +90 degrees | Elevation Velocity: 0.05 degrees/sec to 60 degrees/sec
- System Weight: 331 lbs. (including cables)
- System Size: Camera Assembly: 44 in x 30 in x 22 in | Electronics Assembly: 27 in x 24 in x 9 in
- Power: <1440W
- Designed to MIL-STD-810G qualifications
- Shipped configuration: 5 shipping cases that pack onto 1 pallet

## CAPABILITIES

- Best-in-class motion control & optical tracking
  - Automated tracking of targets
  - Fault detection & isolation
  - Zoom-coupled focus provides an easy lens calibration process for instant focusing
  - Error correction techniques ensure high-level accuracy to support fire control & targeting applications
- Camera server software allows for setup & control of the camera system. Integrates with pre-existing command & control hardware.

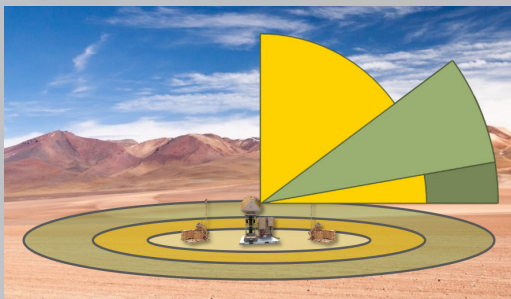


# KuMRFS



Ku-band Multi-Mission RF System, or KuMRFS, is a battle-proven true multi-mission radar, capable of providing simultaneous Counter-Unmanned Aircraft System (C-UAS), Counter-Rocket, Artillery and Mortar (C-RAM), air surveillance and effector support missions. With over 1.5 million hours of deployed operations through 2020, KuMRFS has proven its ability to adapt to the evolving SHORAD threat environment and is the backbone sensing capability for base defense and critical site protection.

## NARRATIVE DESCRIPTION



- KuMRFS radars are an enabling sensor in the Fixed Site LIDS and Mobile C-UAS layered defense solution for the US Government's C-UAS, providing a cost-effective "one multi-mission radar" capability.
- With full upper hemisphere surveillance and track, and low false alarm rates, KuMRFS provides a clear air picture to the warfighter for rapid reaction and confident decision making.
- The precision of KuMRFS tracking enables a broad array of C-UAS layered defense effectors. The KuMRFS radar family consists of two options:
  - KuMRFS-T is a palletized radar intended for fixed sites and can be packaged on an MTV class vehicle for transportable capability to remote and temporary locations. KuMRFS-T enables SHORAD/C-UAS protection of high-value assets and military facilities.
  - KuMRFS-M is a mobile configuration of the KuMRFS-T, which fits within the size, weight and power limits of an M-ATV, JLTV or other light tactical vehicle. KuMRFS-M provides the range capability to support light expeditionary and small mobile unit operations.

## HIGH POINT

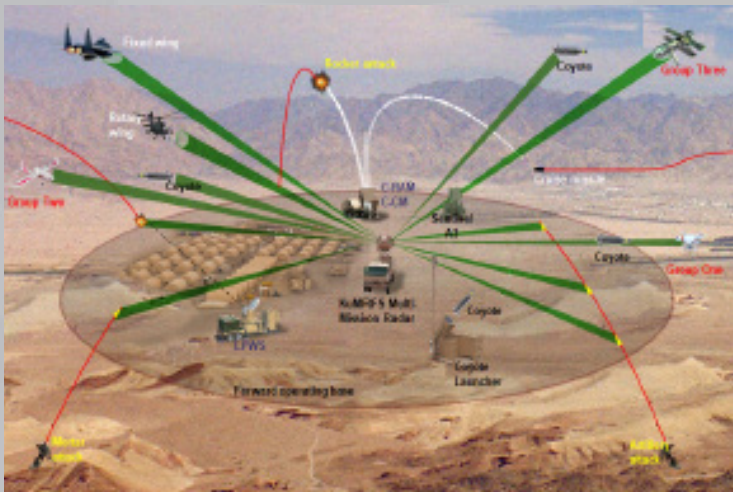
KuMRFS provides sensing and fire control capability, delivering a clear air picture and improved probability of kill across an array of effectors, including High Energy Lasers and EW effects as well as kinetic- defeat missiles and guns for C-UAS and C-RAM.

- Designed to support growth and adaptation to the evolving threat environment
- Simultaneous, multi-mission capability providing low-cost SHORAD solutions
- Searches the entire upper hemisphere
- Provides clear, actionable air picture, filtering biological tracks, small arms fire and ground movers; Proven 'best in class' for false alarm performance
- Remote operated, by the C2 operator
- Precision fire control capability extends weapon system and effector capabilities
- Precision real time track adaptation for low cost kinetic defeat effectors, like Coyote
- Enables defense against multi-axis, multi-threat attacks

### KuMRFS-M







#### COUNTER UAS MISSION

- Clear Air Picture
- Best in class low false alarms

#### AIR SURVEILLANCE

- Fixed Wing, Rotary Wing, UAS Group 3+, Cruise Missiles
- Excellent integrated air picture metrics
- Cued-track acquisition from longer range radars

#### C-RAM MISSION

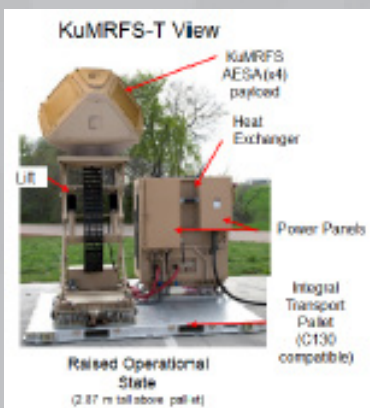
- Rockets, Artillery and Mortars Warn & Intercept
- Autonomous search / self-confirming enabling low C2 operator manning footprint

#### FIRE CONTROL SUPPORT

- Fire control accuracy enabling all effectors (gun, EW, DE and area defense effectors like Coyote)
- Enables low cost effectors and higher Pk
- Complement to longer range search radars

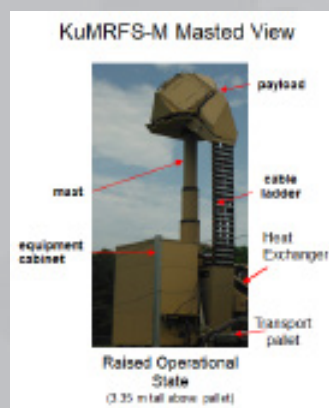
## SYSTEM DESCRIPTION

- KuMRFS delivers proven, industry- leading defense against an array of UAS threats. KuMRFS addresses the toughest of threats, including multiples of low, slow and small Group 1-3 UASs, while maintaining persistent air surveillance. KuMRFS provides precision tracking and weapons fire control, supporting a broad set of layered defense SHORAD effectors.
- KuMRFS –T and –M radars each feature four (4) independent AESA quadrant radars which operate together to provide 360-degree radar coverage of the full upper hemisphere. KuMRFS-M quadrant arrays are ¼ the size of the KuMRFS-T quadrant arrays, providing a scaled radar package for highly mobile or expeditionary needs. KuMRFS is optimized to handle the stressing multiples UAS threat environment. The result is a robust, reliable and effective capability for Counter-UAS and C-RAM missions.
- KuMRFS uses a common software product family approach. The software architecture enables efficient capability additions using a common interface standard and modular design approach. The result is a robust software baseline that ensures commonality while enabling rapid and unique capability additions.



### KuMRFS-T CAPABILITIES

- Provides threat multiples capability
- Built on an Intex 461L compatible pallet (2.18m x 2.69m) for fixed site and transportable install configurations
- 30kW generator or shore power
- 2295Kg weight
- Equipped with GPS/INS
- 55C plus solar load hot environment
- Mil-STD 810 Transport Environment (Composite Tactical Vehicles, C130, Helicopter Sling-Lift)
- UAS Group 1 - 3 capability beyond 15 Km



### KuMRFS-M CAPABILITIES

- Provides threat multiples capability
- Masted radar for expeditionary vehicle platforms
- 15kW vehicle, generator or shore power
- 889Kg weight
- Equipped with GPS/INS
- 55C plus solar load hot environment
- Mil-STD 810 Transport Environment (Composite Tactical Vehicles, C130)
- UAS Group 1-3 capability beyond 7 Km

# COYOTE

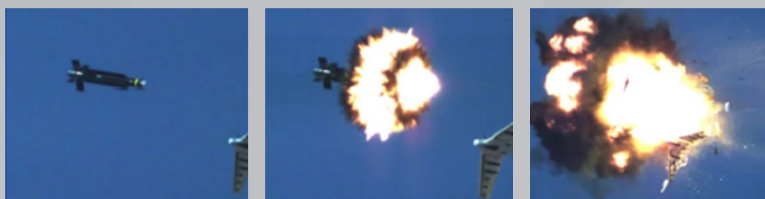


The Coyote C-UAS kinetic defeat effector is a key capability for addressing Group 1-3 UAS threats. The Coyote Block 2+ completed flight test qualification in December 2019 enabling US Government deployments in 2020. Affordable kinetic defeat of the asymmetric UAS threat and the ability to address that approaching threat at tactical ranges is a key component ensuring base and critical site protection.



## NARRATIVE DESCRIPTION

The Coyote Block 2+ is a low-cost, rail-launched, turbine engine-powered missile for high-speed C-UAS missions. It is a ground-to-air effector proven against small maneuvering UAS threats with rapid time to target. The Coyote Block 2+ has been integrated onto a fixed and mobile platform for flexibility of mission employment. It is command and control guided using a high-accuracy fire control radar until the on-board seeker takes over for terminal engagement. Endgame is completed with fuze and detonation of the forward-firing, low collateral blast fragmentation warhead.

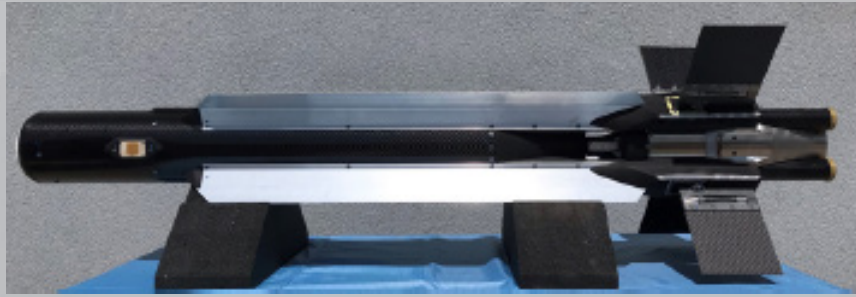


## HIGH POINT

Coyote Block 2+ is a game changing capability leveraging innovative solutions to affordably counter the small and low cost UAS threat set.

- Proven C-UAS Group 1-3 effector
- Low risk, affordable integration on wide variety of mobile and fixed site/portable platforms
- Innovative solutions optimizing effector capability and increased Pk (Probability of Kill) while ensuring low cost
- User friendly setup requiring limited training and minimal maintenance support
- Fixed site launcher system integrated on a transportation pallet for flexibility across fixed site and portable configurations
- Launcher system designed for distributed launcher system setup, ensuring maximum base and critical site protection





## SYSTEM DESCRIPTION

- The Coyote Block 2+ uses a combination of Commercial Off The Shelf (COTS) and designed components that make up the effector and launcher system. The Coyote Block 2+ includes a data link, a Raytheon Missiles & Defense common MP-7U guidance electronic unit, a launch rocket motor and a thrust jet engine which propels the Block 2 for rapid intercepts at distances of more than 10 kilometers. The Block 2 is controlled through the Coyote launcher data link by the FAAD Command and Control system which supplies in-flight target updates through the flight profile. In the terminal guidance stage, the on-board seeker and proximity fuze take over for end-game targeting refinement and warhead detonation. The Block 2+ carries a tungsten fragmentation warhead developed and optimized for the C-UAS mission.
- The Block 2+ Electronic Safe and Arming Device (ESAD) fuze provides extensive environmental safety and reliability features, including pitot static airspeed, terminal arming, and return to ready capability to accommodate the Block 2's ability to re-attack the target multiple times to increase probability of kill (Pk). While guided with in-flight guidance updates from FAAD C2, the Block 2+ interceptor contains on board "Adaptive Autopilot" technology ensuring missile performance in unknown or difficult flight envelopes. The Coyote system has Air Traffic avoidance capability, guiding around friendly aircraft while maintaining track on the original hostile target. Additional features include auto air termination and "loitering with re-engagement" capability handling instances where there is a drop in ground-based communication or guidance data.
- The Coyote effector is launched from palletized fixed site Coyote launchers and from mobile Coyote launcher systems. The launch systems are fully integrated with the Fixed Site LIDS and mobile systems and can be integrated with other targeting or control systems and platforms. The Coyote system provides engagement of multiple hostile target scenarios ensuring protection against threat raids.

### FIXED SITE



### CAPABILITIES

- Enables defense against multi-axis, multi-threat attacks
- Group 1-3 target sets
- Re-attack capability for maximum Pk
- System safety logic (ATA, aero-terminate)
- 6+ Gs maneuverability
- Speeds > 555 kph
- 4-minute flight time
- Low cost kinetic defeat capability against low cost Groups 1-3 threat
- 4-pack fixed site palletized launcher enabling scaled magazine depth per site

### MOBILE



### FEATURES

- Forward firing, low collateral blast frag warhead lethal against Group 1-3 threats
- 145 cm length, 22kg AUR weight
- Low cost RF Seeker
- Launch assist boost rocket motor and turbine engine propulsion
- Deploying fins for control authority
- C-Band datalink
- Rail launched, low cost launcher system
- COTS components for low cost design
- Rapid reload capability
- Minimal personnel required for operations
- Small, lightweight footprint
- JP10 fuel based

# TURRETED SYSTEMS



Leonardo DRS serves as the lead systems integrator for the two-vehicle M-LIDS capability. Working with the government and industry partners highlighted in this brochure, DRS delivers fully integrated mobile C-UAS capabilities to detect, identify, track and defeat small UAS. As the systems integrator, DRS also provides technical manuals, engineering testing, training, and field service support.

## NARRATIVE DESCRIPTION

The M-LIDS capability provides soldiers both kinetic and non-kinetic defeat capabilities. The two vehicles are designed to operate as a Section with an elevated radar to provide targeting information to both vehicles through the FAAD-C2 network.

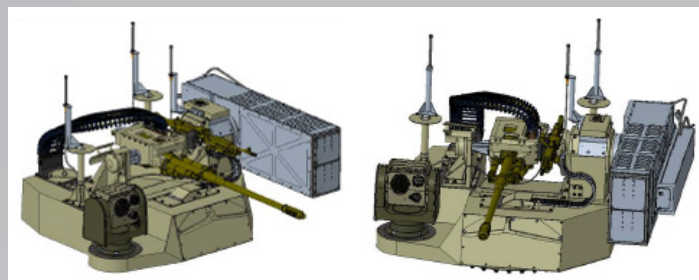
When employed together, the elevated radar detects and tracks multiple threats simultaneously. The kinetic and non-kinetic defeat capabilities provide a layered defense that minimizes collateral damage. With a slew-to-cue function, a Gunner quickly locates, identifies, and defeats small UAS with 30mm direct fire for close-in threats or the Coyote for longer range threats. The Northrop Grumman XM914E1 (30mm) cannon with proximity fuzed ammunition is



## HIGH POINT

### Moog's RlWP Turret

The M-LIDS Remote Integrated weapons Platform (RlWP) turret includes the Leonardo DRS Stabilized Sight Sensor (S3) EO/IR which provides the required D/R/I and built-in auto-tracker necessary to locate, identify, and track threats through kinetic engagements for both ground and air threats. The turret hosts the XM914E1 (30mm) cannon and the M240 (7.62mm) coaxial machine gun for vehicle and crew protection. Both direct fire weapons can be reloaded while under full armor protection. The turret also includes the Raytheon Coyote Block 2 launcher with two missiles which are easily reloaded from outside the vehicle. With an integrated, independently stabilized sight and included weather sensor and other technologies, the RlWP provides precision long-range lethality.



# MOOG

## SYSTEM DESCRIPTION

The two-vehicle M-LIDS capability includes the following technologies:



### KINETIC DEFEAT VEHICLE

- C2 Network:
  - FAAD C2
  - Mission Data Recorder
  - Secure Comms
- Wired/Wireless Network
- Masted Radar
  - KuMRFS-M
- RlwP Kinetic Defeat:
  - S3 Sight
  - XM914E1 (30mm)
  - M240 (7.62mm)
  - Coyote Block 2+



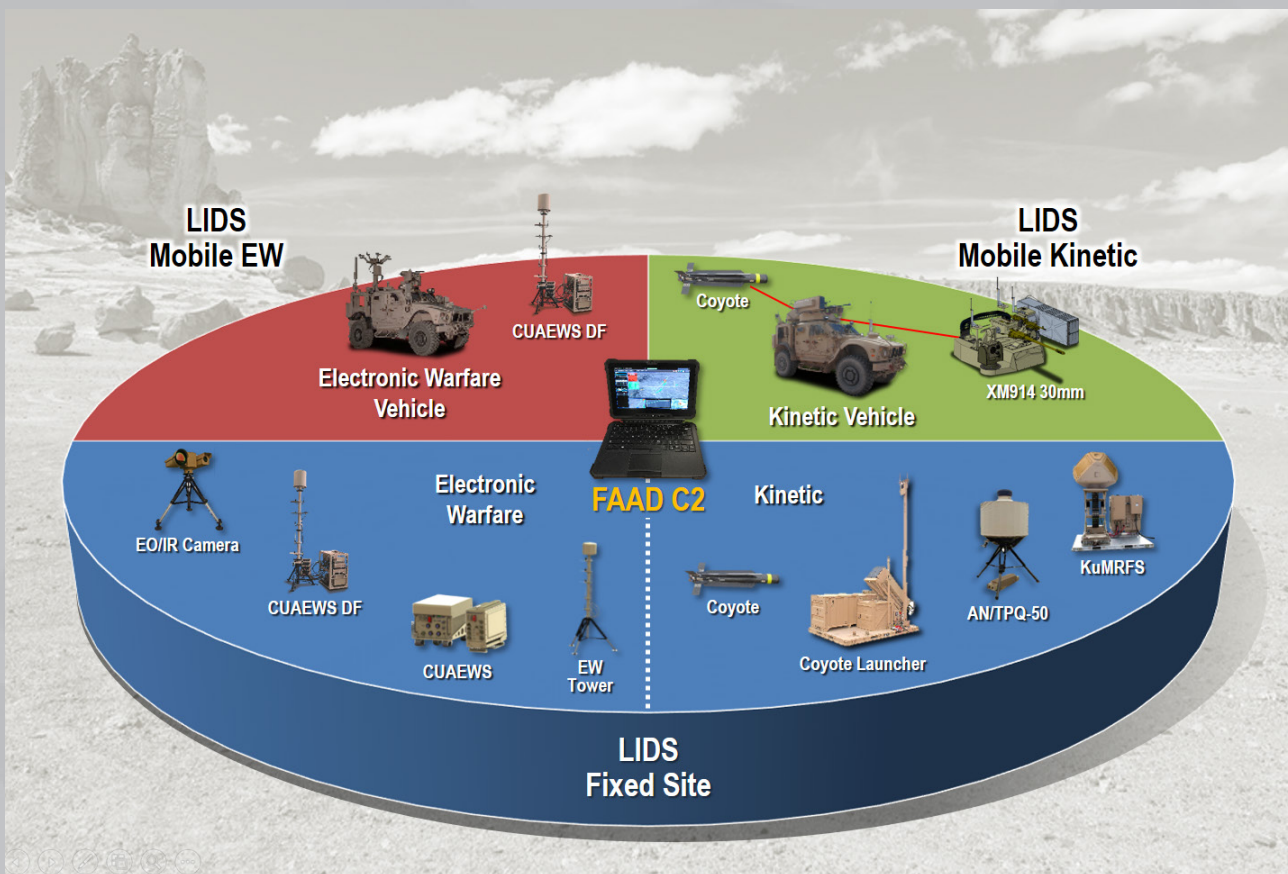
### ELECTRONIC WARFARE VEHICLE

- C2 Network:
  - FAAD C2
  - Mission Data Recorder
  - Secure Comms
    - Wired/Wireless Network
- EW Defeat:
  - Weapon Finding CUAEWS
- Blade Kinetic Defeat:
  - M2 .50 cal

### Mobile C-UAS

The M-LIDS capability provides soldiers the mobility, firepower and protection required to detect, identify, track and defeat ground and air threats. With fully integrated and mature technologies, the two-vehicle solution provides commanders options to employ near fixed sites or protect unit formations from current and emerging UAS threats. The modular nature of the system allows users to improve the capability as future technologies are developed. Using the integrated network, threat information is passed quickly across all employed systems, providing leaders defense-in-depth. The current M-LIDS capability also allows the system to be easily improved as technologies are developed in the future. Through numerous, rigorous US Army testing, M-LIDS is a low-risk mobile C-UAS capability available today.

# CONNECTIVITY & INTEROPERABILITY



Highly tailorable architectures enable out-of-the-box operation in a standard configuration to custom defense designs for complex RF environments and unique protection requirements.



# POINTS OF CONTACT

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