

Package A FEMA C-UAS Grant Submission (Neutral, Multi-Vendor, Deep Technical Narrative)

Project Overview

This project provides a comprehensive, city wide airspace awareness and counter drone capability through an integrated suite of technologies that collectively enhance detection, tracking, identification, and monitoring. The solution emphasizes a multi vendor, performance driven architecture that includes a fusion software platform, high performance radar, Remote ID receivers, and advanced electro-optical and infrared sensors.

Rather than centering the architecture on a single product, the proposed configuration leverages strengths from multiple leading commercial technologies. The software environment provides a vendor neutral integration layer designed to correlate data from radar, Remote ID, RF energy detectors, optical systems, and other municipal sensors. RADAR MANUFACTURER radar contributes high fidelity detection of non cooperative aircraft. RID VENDOR Remote ID devices supply cooperative aircraft identification and attribution. CAMERA EO IR systems provide day and night visual confirmation, payload verification, and continuous tracking capability.

Package A delivers a balanced FEMA aligned sensor mix capable of addressing the complex UAS threats present around critical infrastructure, mass gatherings, airports, border adjacent corridors, dense urban environments, and public safety operations. The total project cost of \$1,857,000 dollars includes software licensing, sensor hardware, installation, integration, training, and multi agency operational onboarding.

Capability Gap and Operational Need

Municipal and regional agencies face an increasing variety of drone related risks that extend beyond recreational operations. FPV style aircraft, modified commercial drones, payload carrying systems, and low altitude autonomous aircraft are routinely observed in many jurisdictions. These craft often operate at high speed, exhibit non standard RF emissions, and possess low radar cross sections, making them difficult to detect without purpose built systems.

Most existing municipal surveillance assets were not designed for UAS detection. Pole cameras, legacy fixed cameras, or isolated RF detectors cannot provide consistent airspace awareness. Remote ID receivers may exist in limited form but rarely provide city scale coverage. Radar deployments, if present, are often single unit installations that lack supporting optical confirmation or multi sensor correlation. These isolated systems

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produce fragmented information that cannot be reliably fused into a coherent operational picture.

The operational gap is most visible around high density venues and critical sites such as stadium districts, transportation hubs, energy infrastructure, downtown corridors, school campuses, and emergency response zones. Agencies require a system capable of detecting both cooperative and non cooperative aircraft, determining flight behavior, confirming payloads, and supporting coordinated response procedures.

The proposed configuration resolves these limitations by combining multi source detection methods, establishing shared situational awareness, and delivering an integrated sensor suite capable of identifying drones that previously operated undetected.

Proposed Solution

Package A consists of a multi layer, multi sensor architecture built around a vendor agnostic fusion environment, RADAR MANUFACTURER radar, RID VENDOR Remote ID devices, and CAMERA EO IR systems. The integration approach ensures no single vendor controls the system design, allowing each sensing modality to contribute unique strengths.

The fusion platform ingests and correlates radar tracks, Remote ID broadcasts, optical detections, RF indications, and other municipal sensor feeds. Radar provides non cooperative detection, Remote ID supports attribution and regulatory compliance, and FLIR systems provide visual confirmation and payload assessment. This layered method aligns with FEMA's detection, tracking, identification, and monitoring (DTIM) scoring requirements.

The system architecture is designed to support multi agency collaboration by enabling police, emergency management, aviation units, fire departments, fusion centers, and state partners to view synchronized airspace activity. Automated alerts notify personnel when unauthorized drones enter restricted areas, display unusual flight behavior, or approach critical sites. All events are archived for reporting and investigative analysis.

This solution delivers a balanced and technologically diverse capability that reflects federal guidance encouraging multi modality detection rather than reliance on any single sensing technology.

Fusion Software Platform Architecture

The software component functions as an integration layer that consolidates all UAS detection inputs into a unified operational picture. The environment accepts radar data, RID signals, EO IR video streams, RF signatures, acoustic detections, and municipal

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camera networks. It operates independently of vendor specific hardware ecosystems, ensuring long term sustainment and avoiding vendor lock.

The software correlates detections from multiple sensors by time, location, behavior pattern, and classification indicators. Radar tracks are compared to RID broadcasts. Optical confirmation is cued to radar or RID derived coordinates. RF indications are associated with corresponding flight paths. These fused results reduce false alarms and generate high confidence tracks.

Role based access control supports multi agency operations. Dispatch centers, police units, tactical teams, aviation bureaus, and emergency managers can access the same synchronized information while maintaining proper data segregation. The platform includes automated alerts, event logs, incident timelines, geospatial tools, and evidence export features. All data is encrypted in transit and at rest, with support for cloud or on premises environments depending on agency requirements.

RADAR MANUFACTURER Radar Technical Description

RADAR MANUFACTURER's RADARradar contributes the primary non cooperative detection capability. The radar uses electronically scanned array (ESA) technology to deliver high resolution detection of small UAS with low radar cross sections. The system is engineered to detect drones flying at low altitude, in clutter rich environments, and at speeds associated with FPV and modified aircraft.

The radar produces precise range, azimuth, elevation, and track information that enables continuous monitoring of suspicious aircraft. Its advanced micro Doppler and signature discrimination capabilities reduce false alarms and support classification of drone versus bird targets. When integrated into the fusion platform, radar tracks are correlated with RID broadcasts, EO IR cues, and RF detections to provide complete multi source validation.

This radar type is particularly important for FEMA DTIM programs because it addresses the detection of drones that do not broadcast Remote ID and do not emit predictable RF signals. Radar enables early warning, identification of emerging threats, and monitoring of aircraft operating beyond visual line of sight.

RID VENDOR Remote ID System Description

Remote ID receivers supply cooperative identification for FAA compliant drones. The RID VENDOR system captures aircraft identifiers, horizontal and vertical position, operator location when available, heading, velocity, and broadcast signal integrity. These detections form the identification layer of the DTIM framework.

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A distributed network of twelve Remote ID devices provides broad area coverage across dense urban terrain. The receivers detect aircraft in areas where radar line of sight may be obstructed. RID data also enables attribution during investigations and provides context for distinguishing compliant from non compliant aircraft during events.

Remote ID signals become more valuable when correlated with radar or EO IR detections. For example, multiple RID receivers can compensate for signal obstruction caused by buildings. When fused with radar, RID distinguishes friendly or authorized operations from unknown activity requiring escalation.

CAMERA EO/IR Technical Description

CAMERA EO IR systems provide visual confirmation under both daytime and nighttime conditions. These sensors operate across electro optical and infrared spectrums, enabling identification of drones flying in low light, behind obscurants, or at extended ranges. The Ranger series is designed for long duration surveillance, high zoom capability, and rapid slew response.

When integrated with radar or RID derived coordinates, the EO IR system slews to points of interest for visual confirmation. This feature allows operators to verify payloads, characterize aircraft type, observe flight intent, and document evidence. Infrared imaging supports nighttime detection and monitoring where optical systems alone are insufficient.

EO IR confirmation is a critical component of FEMA's identification and monitoring requirements. It provides the final layer of verification necessary to distinguish between legitimate operations and malicious or suspicious activity, enabling appropriate response actions.

Alignment with FEMA Detection, Tracking, Identification, and Monitoring Requirements

The combined strengths of the fusion platform, RADAR MANUFACTURER radar, RID VENDOR RID, and CAMERA EO IR directly address FEMA's four DTIM categories.

Detection: Radar and RID together detect cooperative and non cooperative drones. Radar identifies fast, low altitude aircraft. RID detects compliant drones broadcasting FAA required information.

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Tracking: The fusion software correlates radar tracks, RID broadcasts, and EO IR cues to maintain continuous tracking. Tracks persist across sensor boundaries and are reinforced through multi source validation.

Identification: RID provides positive aircraft identification. EO IR enables payload verification, aircraft type classification, and intent assessment.

Monitoring: The system supports real time monitoring, automated alerts, geofenced warning zones, event logging, and multi agency access. All detections and operator actions are preserved for after action review and FEMA reporting.

This multi vendor, multi sensor approach aligns with FEMA's guidance encouraging use of multiple detection modalities rather than a single technology type.

Project Activities and Budget Narrative

Project activities include planning, surveying, system engineering, network modeling, installation, integration, testing, training, operational exercises, and policy development. Radar emplacement requires terrain analysis, line of sight modeling, and power and backhaul planning. Remote ID device placement relies on urban topology and expected event locations. EO IR systems require mounting, power, weather shrouding, and network connectivity.

Equipment costs include radar, Remote ID receivers, EO IR systems, software licensing, network radios, mounts, poles, cabling, installation labor, and integration services. Training covers operator certification, sensor interpretation, system administration, and scenario based exercises. Exercises include multi agency drills, red team injects, and validation events.

Total project cost: 1857000 dollars.

Implementation Timeline

Phase 1 Month 1: Engineering surveys, site validation, and network planning.

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Phase 2 Months 2 to 4: Installation of radar, RID receivers, EO IR systems, and software deployment.

Phase 3 Months 4 to 6: Training, coordinated exercises, validation testing, and policy implementation.

Phase 4 Months 6 to 12: Continuous monitoring, interagency refinement, and performance reporting.

Outcomes and Performance Measures

Expected outcomes include increased detection coverage, earlier warning times, enhanced situational awareness, improved classification accuracy, reduced false alarms, faster response coordination, and more complete investigative records.

Performance metrics include detection workload, track continuity, classification confidence, identification accuracy, response time, system availability, geofence alert statistics, and interagency utilization data.

Sustainment Plan

Sustainment activities include annual licensing, hardware servicing, sensor calibration, operator retraining, network upkeep, and periodic system expansion. The multi vendor architecture supports incremental upgrades without full system replacement, ensuring long term cost efficiency and scalability.

Agencies can incorporate sustainment into annual budgets or leverage future FEMA funding rounds to expand radar coverage, add additional Remote ID receivers, deploy more EO IR units, or introduce RF detection sensors to further enhance airspace awareness.