UNCLASSIFIED // FOR OFFICIAL USE ONLY (FOUO)

MERIDIAN DEFENSE TECHNOLOGIES, INC.

CAGE Code 3XKT9 | Huntsville, Alabama

TECHNICAL WHITE PAPER

Layered Counter-Unmanned Aircraft System (C-UAS) Architecture for Forward-Deployed Base Defense

Response to Department of Defense Rapid Capabilities Office Request for Information No. RCO-2026-0142

Document No.	MDT-CUAS-WP-2026-014, Rev. B
Classification	UNCLASSIFIED // FOUO
Issue Date	10 July 2026
Prepared By	Systems Engineering Directorate, Meridian Defense Technologies, Inc.
Approved By	J. Alderman, Chief Engineer, C-UAS Programs
Distribution Statement	Statement C: Distribution authorized to U.S. Government agencies and their contractors for administrative and operational use (10 July 2026). Other requests shall be referred to the Program Office identified in Appendix A.

Revision History

Rev	Date	Description	Author
A	2026-05-04	Initial draft for internal technical review.	R. Okafor
A1	2026-06-02	Incorporated systems engineering and cost estimating inputs.	L. Chen
B	2026-07-10	Updated CONOPS diagram, ROM cost table, and risk register for RFI submission.	R. Okafor

Contents

Executive Summary

Meridian Defense Technologies, Inc. (MDT) submits this white paper in response to Rapid Capabilities Office RFI No. RCO-2026-0142, addressing the requirement for a layered, base-defense-capable Counter-Unmanned Aircraft System (C-UAS) architecture against Group 1–3 unmanned aircraft system (UAS) threats at forward-deployed installations.

The proposed architecture integrates existing government furnished sensor assets with a modular, open-architecture Command and Control / Sensor Fusion (C2SF) node and a layered effector suite (radio-frequency defeat, electronic warfare jamming, and kinetic intercept) to close the detect-track-identify-engage-assess kill chain within the RFI-specified 5 km detection range and sub-15-second engagement timeline.

MDT's approach emphasizes a Modular Open Systems Approach (MOSA) to minimize integration risk with existing base-defense infrastructure, including legacy Counter-Rocket, Artillery, Mortar (C-RAM) fire control. The Rough Order of Magnitude (ROM) cost for the 21-month development, integration, and test program is **$9,905K**, structured across eight Work Breakdown Structure (WBS) elements summarized in Section 6.

This white paper presents the operational concept, functional and performance requirements, technical architecture, program schedule, cost basis, and risk posture supporting a Preliminary Design Review (PDR) decision within four months of contract award.

1 Introduction

1.1 Purpose and Scope

This white paper describes MDT's proposed technical approach for a layered C-UAS capability responsive to RCO-2026-0142. It documents the concept of operations, system-level requirements, technical architecture, work breakdown structure, ROM cost estimate, program schedule, and risk assessment necessary to support a government down-select decision. The scope is limited to the base-defense C-UAS mission set and excludes airborne intercept of Group 4/5 systems.

1.2 Background

Forward-deployed installations face an increasing operational threat from low-cost, commercially available Group 1–3 UAS employed for intelligence, surveillance, and reconnaissance (ISR), as well as improvised weaponization. Existing point-defense systems, including legacy C-RAM, were not designed against low radar cross-section, low-altitude UAS tracks and require sensor and effector augmentation to close current capability gaps identified in the FY26 Joint Counter-UAS Capability Gap Assessment.

1.3 Applicable Documents

Document No.	Title	Date
MIL-STD-461G	Control of Electromagnetic Interference Characteristics of Subsystems and Equipment	2015-12-11
MIL-STD-810H	Environmental Engineering Considerations and Laboratory Tests	2019-01-31
DoDI 5000.87	Operation of the Software Acquisition Pathway	2020-10-02
JCIDS Manual	Joint Capabilities Integration and Development System	2021-08-31
FAAD C2 ICD-14	Forward Area Air Defense C2 Interface Control Document	2024-03-15
RCO-2026-0142	Rapid Capabilities Office RFI: Layered Base-Defense C-UAS	2026-04-18

2 Concept of Operations (CONOPS)

2.1 Operational Scenario

A forward operating base (FOB) perimeter is protected by a layered detection ring comprising ground-based radar, electro-optical/infrared (EO/IR) cueing sensors, and passive RF direction-finding (RF-DF) arrays. Upon detection of an inbound Group 1–3 UAS track, sensor data is fused at the C2SF node, correlated against a known-friendly track database, and presented to the engagement authority. Upon authorization, the system cues the appropriate non-kinetic (RF/EW) or kinetic effector based on range, threat classification, and collateral-effect constraints, then performs battle-damage assessment via continued sensor tracking.

2.2 CONOPS Diagram

Figure 1 depicts the notional detect-track-identify-engage-assess kill chain protecting the FOB perimeter.

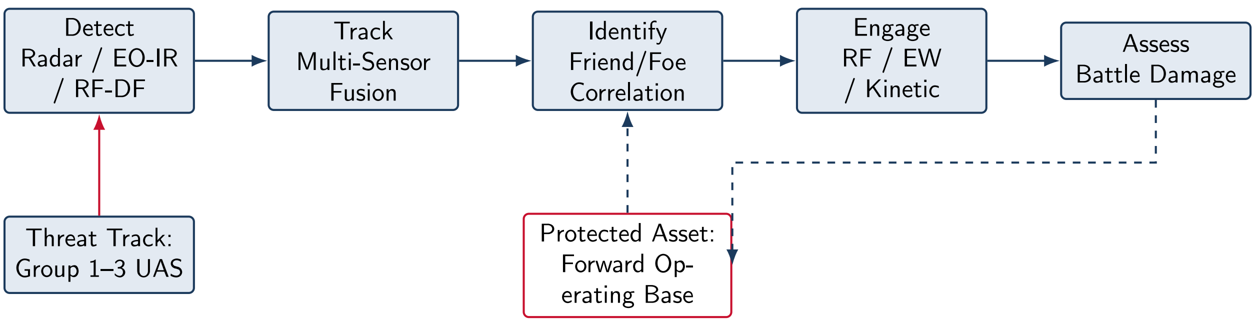

Figure 1: Layered C-UAS engagement kill chain and CONOPS overview.

Engagement authority remains with a human operator at all points in the kill chain; no fully autonomous lethal engagement is proposed under this architecture, consistent with DoD Directive 3000.09.

3 System Requirements

3.1 Functional and Performance Requirements

Table 1 summarizes the top-level functional and performance requirements traced from RCO-2026-0142 Section 4.

ID	Requirement	Priority	Verification
REQ-3.1-001	The system shall detect Group 1–3 UAS targets at a minimum slant range of 5 km under clear-weather daytime conditions.	Threshold	Test
REQ-3.1-002	The system shall classify detected tracks by UAS group within 3 seconds of initial detection.	Threshold	Test
REQ-3.2-001	The system shall achieve a probability of detection (P_d) ≥ 0.90 for Group 2 targets at 3 km.	Threshold	Test
REQ-3.2-002	The system shall achieve a false-alarm rate ≤ 1 per 4 hours of continuous operation.	Threshold	Analysis
REQ-3.3-001	The system shall complete the detect-to-engage sequence within 15 seconds for authorized tracks.	Objective	Test
REQ-3.3-002	The system shall provide non-kinetic (RF/EW) defeat capability as the primary engagement method.	Threshold	Demonstration
REQ-3.4-001	The system shall interface with legacy FAAD C2 via ICD-14 without modification to fielded C-RAM hardware.	Threshold	Inspection
REQ-3.4-002	The system architecture shall conform to a Modular Open Systems Approach (MOSA) to enable third-party sensor integration.	Objective	Analysis
REQ-3.5-001	The system shall sustain continuous operation for 72 hours without scheduled maintenance.	Threshold	Test

Table 1: Top-level functional and performance requirements.

UNCLASSIFIED // FOR OFFICIAL USE ONLY (FOUO)

4 Technical Approach

4.1 System Architecture

The proposed architecture (Figure 2) consists of three layers: a Sensor Layer providing multi-modal detection and tracking, a Command and Control / Sensor Fusion (C2SF) Layer performing track correlation and engagement management, and an Effector Layer providing tiered non-kinetic and kinetic defeat options. The C2SF node interfaces upward to the base Common Operating Picture (COP) and to higher-echelon air defense C2 via the existing FAAD C2 interface.

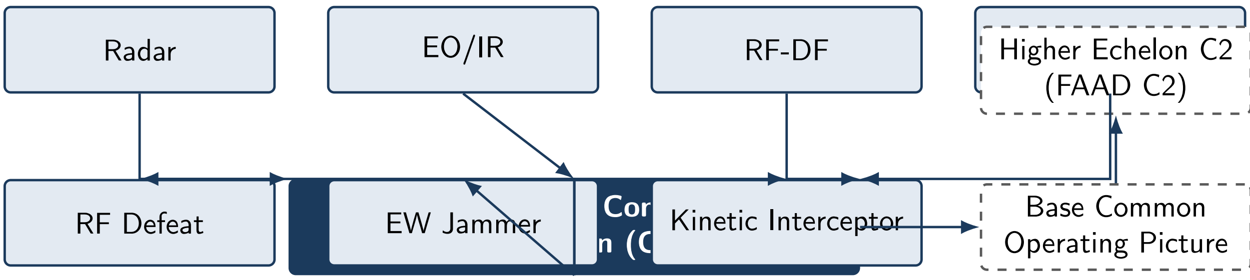

Figure 2: Three-layer C-UAS system architecture with external interfaces.

4.2 Key Subsystems

- **Sensor Layer:** Government furnished 3D air-surveillance radar augmented by MDT-integrated EO/IR cueing cameras and a passive RF-DF array for early warning against RF-controlled UAS.
- **C2SF Node:** MOSA-compliant fusion engine performing track correlation, IFF cross-check, and operator decision support via a common tactical display.
- **Effector Suite:** Tiered response comprising an RF defeat system (link/GPS disruption), a directional EW jammer, and a kinetic interceptor for high-confidence, high-priority tracks.

5 Work Breakdown Structure (WBS)

Table 2 presents the program WBS to the second level, aligned to the ROM cost estimate in Section 6.

WBS ID	Element
1.0	**Program Management**
1.1	Integrated Master Schedule & Reporting
1.2	Risk Management
2.0	**Systems Engineering**
2.1	Requirements Management & Traceability
2.2	System Architecture & Interface Control
3.0	**Sensor Subsystem**
3.1	Radar Integration
3.2	EO/IR and RF-DF Integration
4.0	**Command & Control Subsystem**
4.1	C2SF Software Development
4.2	Operator HMI Development
5.0	**Effector Subsystem**
5.1	RF Defeat & EW Jammer Integration
5.2	Kinetic Interceptor Integration
6.0	**Integration, Test & Evaluation**
6.1	Developmental Test
6.2	Operational Assessment
7.0	**Training & Logistics**
8.0	**Program Documentation & Data**

Table 2: Work breakdown structure to WBS level 2.

6 Rough Order of Magnitude (ROM) Cost Estimate

6.1 Cost Summary

Table 3 presents the ROM cost estimate by Contract Line Item Number (CLIN), mapped to the WBS elements of Section 5. Estimates are expressed in FY26 constant-year dollars ($K) and are based on a parametric/analogy estimate using MDT's C-RAM integration cost history, adjusted for the sensor and effector scope defined in Section 4.

CLIN	Description	Basis of Estimate	ROM ($K)
0001	Program Management (WBS 1.0)	Analogy	420
0002	Systems Engineering (WBS 2.0)	Analogy	610
0003	Sensor Subsystem Integration (WBS 3.0)	Parametric	2,150
0004	C2 Subsystem Development (WBS 4.0)	Parametric	1,840
0005	Effector Subsystem Integration (WBS 5.0)	Vendor Quote	2,975
0006	Integration, Test & Evaluation (WBS 6.0)	Analogy	1,320
0007	Training & Logistics (WBS 7.0)	Engineering Estimate	380
0008	Program Documentation & Data (WBS 8.0)	Engineering Estimate	210
	Total ROM Cost		**9,905**

Table 3: ROM cost estimate by CLIN, FY26 constant-year $K.

6.2 Cost Assumptions

- Estimate assumes Government Furnished Equipment (GFE) radar and FAAD C2 test-bed access provided at contract start.
- Excludes production-representative unit costs beyond the single integration/test article assumed for CDR.
- Excludes escalation beyond FY26; estimate to be refined at PDR with a Class III estimate.

7 Program Schedule

Table 4 summarizes the notional 21-month schedule from Authority to Proceed (ATP) to Operational Assessment complete.

Phase	Milestone	Duration	Target
1	Concept Refinement & Requirements Baseline	3 months	ATP + 3 mo
2	Preliminary Design Review (PDR)	4 months	ATP + 7 mo
3	Critical Design Review (CDR)	5 months	ATP + 12 mo
4	Integration & Developmental Test	6 months	ATP + 18 mo
5	Operational Assessment	3 months	ATP + 21 mo

Table 4: Notional program schedule by phase.

8 Risk Assessment

Table 5 identifies the top program risks and associated mitigation strategies, assessed per MDT's standard 5x5 likelihood/impact risk matrix (L/M/H scale shown).

ID	Risk Description	Like.	Impact	Mitigation
R-01	Supply-chain delay for qualified RF front-end components.	Medium	High	Dual-source qualified vendors; initiate long-lead procurement at ATP.
R-02	Integration complexity with legacy C-RAM fire-control interfaces.	Medium	Medium	Early ICD development with government stakeholders; access to FAAD C2 test bed.
R-03	EMI/EMC interference between co-located RF effectors and host base sensors.	Medium	High	EMI/EMC characterization at CDR; frequency deconfliction plan per MIL-STD-461G.
R-04	Late delivery of Government Furnished radar sensor data.	Low	Medium	Negotiated GFE delivery schedule with buffer; contingency simulated data sources.

Table 5: Top program risks and mitigation strategies.

9 Glossary of Symbols and Abbreviations

Abbreviation	Definition
ATP	Authority to Proceed
C2	Command and Control
C2SF	Command and Control / Sensor Fusion
C-RAM	Counter-Rocket, Artillery, Mortar
CDR	Critical Design Review
CLIN	Contract Line Item Number
CONOPS	Concept of Operations
COP	Common Operating Picture
C-UAS	Counter-Unmanned Aircraft System
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EO/IR	Electro-Optical / Infrared
EW	Electronic Warfare
FOB	Forward Operating Base
GFE	Government Furnished Equipment
ICD	Interface Control Document
MOSA	Modular Open Systems Approach
P_d	Probability of Detection
PDR	Preliminary Design Review
RF-DF	Radio Frequency Direction Finding
ROM	Rough Order of Magnitude
UAS	Unmanned Aircraft System
WBS	Work Breakdown Structure

Appendix A: Point of Contact

Program Manager	J. Alderman, Chief Engineer, C-UAS Programs
Email	j.alderman@meridiandefense.example
Phone	(256) 555-0142
Mailing Address	Meridian Defense Technologies, Inc., 4100 Explorer Way, Huntsville, AL 35806
CAGE Code	3XKT9

All technical data contained herein is notional and provided for template demonstration purposes only. No actual proprietary, export-controlled, or classified information is included in this document.