The Combat Training Center as a C-UAS Assessment Environment:

Red Air Capability, MILES Integration Gaps, and the Simulation Fidelity Required to Train the Force for Drone-Saturated Large-Scale Combat Operations

ASSESSMENT SCOPE

This paper assesses the three maneuver combat training centers, NTC Fort Irwin, JRTC Fort Johnson, and JMRC Hohenfels, as C-UAS assessment environments. It examines the current state of Red Air threat replication, the MILES integration gap that prevents real-time force-on-force C-UAS engagement adjudication, OC-T capacity constraints, GPS jamming restrictions, and the Synthetic Training Environment modernization programs that could partially bridge the simulation fidelity gap. It proposes a CTC modernization framework structured around five investment priorities required to make C-UAS a credibly assessed primary training objective at all three centers.

PRIMARY SOURCES

CALL No. 25-1093: C-UAS Training and Implementation at NTC (Sep 2025) | Small Wars Journal: Adapting the CTCs for the Drone Battlefield (Jan 2026) | Army.mil JMRC Drone Validation Course (Jan 2026) | Center for Junior Officers: Defeating the Drone, JMRC Skynet Platoon (Jun 2025) | ADA Bulletin: Organic Red Air / C-sUAS (2024) | Army Times: Combat Training Centers Undergo Generational Makeover (Oct 2023) | Army.mil: Soldiers Test STE (Mar 2024) | Army AL&T Magazine: Reality Check / STE LTS (Jul 2025) | DefenseScoop: Army aims to field RVCT (Jul 2023) | NTC TiC 2.0 Rotation 26-02 (Army Recognition / 1st Cav, Nov 2025) | CRS R48477 DoD C-UAS Background (Mar 2025) | FY2025 NDAA Sections 353, 925, 1073 | AR 350-50 CTC Program | Army CTC Modernization plan TADSS development Group 2-3 UAS (FY2025 FY2028) | BG Chalfont ABCT Transformation (Sep 2025) | Army.mil: Drone Dominance Doctrine Update (Mar 2026)

April 2026 | UNCLASSIFIED

This paper draws exclusively on publicly available and officially released sources. No classified information is referenced.

Executive Summary

The Combat Training Center is the Army's highest-fidelity readiness assessment environment. It is the place where units discover what they cannot do before they arrive in a theater where not being able to do it has irreversible consequences. The institutional premise of the CTC is that training against a thinking OPFOR in conditions approximating actual combat reveals gaps that garrison training cannot. For three decades, that premise has held. For C-UAS, it currently does not.

The Center for Army Lessons Learned analysis of NTC C-UAS training, published September 2025, identifies the core failure with precision: the absence of MILES compatibility with the vast majority of C-UAS weapons and drones prevents a fully immersive training experience. Without MILES integration, Observer Coach Trainers must be physically present at every potential engagement site to conduct white card adjudication. The adjudication process is inherently slow. By the time adjudication is complete, the drone has accomplished its mission and left the area. Because OC-T capacity is limited, many engagements are never reported or properly assessed at all. The result is a training environment in which C-UAS engagements are invisible to the exercise control system, unassessable by available OC-Ts, and therefore not actionable as readiness data.

The CALL finding is not a critique of the CTCs as institutions. NTC, JRTC, and JMRC are investing in UAS and C-UAS threat replication. NTC operates the TSM 800 drone swarm system capable of generating up to 150 simultaneous aircraft. JMRC's Skynet Platoon, a dedicated OPFOR UAS detachment of the 1st Battalion, 4th Infantry Regiment, has become one of the most sophisticated live Red Air threats in any allied training environment, incorporating lessons directly from Ukrainian units training at Hohenfels. The JMRC Drone Validation Course, conducted January 2026, trains OPFOR drone operators in quadcopter, fixed-wing, and FPV systems day and night. These programs are real and represent genuine institutional investment.

The gap is not in the threat replication infrastructure. The gap is in the assessment infrastructure. A unit can be hammered by Skynet's drones throughout a JMRC rotation and leave with a green training readiness status if no adjudication system exists to record those engagements, score the C-UAS response, and feed the data into a post-action review that assigns a quantitative training outcome. Readiness that cannot be measured cannot be assessed. Readiness that cannot be assessed cannot be certified. The C-UAS training gap at the CTCs is not a question of whether units encounter the drone threat. They do. It is a question of whether that encounter has any institutional consequence for unit readiness certification.

THE THREE-GAP FRAMEWORK

Gap 1: Instrumentation. MILES cannot adjudicate C-UAS engagements. White card adjudication is too slow, too dependent on OC-T presence, and too incomplete to produce reliable readiness assessment data. Without instrumented adjudication, C-UAS is an unassessable training event.

Gap 2: Red Air Capacity and Fidelity. Current Red Air programs at NTC, JRTC, and JMRC range from nascent to developing. The threat density, persistence, and tactical sophistication that rotational units will face in large-scale combat operations exceed what current OPFOR drone inventories and operator proficiency can consistently replicate.

Gap 3: Assessment Standards. No standardized C-UAS training objectives, performance criteria, or OC-T evaluation rubrics exist that apply consistently across all three CTCs. Without common standards, rotation outcomes cannot be compared, consolidated, or used to drive service-wide training improvements.

1. The CTC C-UAS Environment: Current State by Center

1.1 National Training Center (NTC), Fort Irwin, California

The NTC is the Army's primary assessment venue for armored BCTs, Stryker BCTs, and, increasingly, TiC 2.0 formations. The NTC's C-UAS training investment is the most documented of the three centers. CALL No. 25-1093 identifies the specific systems available to rotational units: up to six live DroneBusters and six replica training aids, two VISMOD JLTVs representing the EW and kinetic defeat platforms of an M-LIDS system with no actual detection or defeat capability, and commercial drones including the Parrot Anafi, DJI Phantom 4 Pro V2, DJI Mavic 3, and Parrot Disco for ISR and simulated munitions drop replication. The TSM 800 is the signature Red Air asset, providing military-grade threat simulation with swarm capability up to 150 systems from a single ground control station.

The CALL analysis identifies four specific constraints that limit NTC's C-UAS assessment effectiveness. MILES incompatibility is the foundational constraint, preventing any instrumented recording of C-UAS engagement attempts or outcomes. White card adjudication by OC-Ts is the compensating mechanism, but it requires an OC-T to be physically co-located with every potential engagement site, and the number of OC-Ts available limits coverage to a fraction of the battlespace. GPS jamming restrictions prevent realistic replication of the electronic environment that heavily shapes drone employment and C-UAS response in actual operations, because NTC operations occur in ranges where GPS is actively used by aviation, fire support, and other systems. Finally, the VISMOD M-LIDS, described in the CALL analysis as purely a visual modification offering no actual detection or defeat capability, creates a training environment in which units practice C-UAS planning and positioning around a system that cannot tell them whether their employment scheme is effective.

The 2nd BCT 1st Cavalry Division's TiC 2.0 Rotation 26-02 at NTC in November 2025 represented the most advanced C-UAS integration attempted at any CTC to date. The rotation integrated swarming drones, ruggedized EW kits, and the Mastodon Beast+ system for real-time drone detection, tracking, and disruption. TRADOC is expected to incorporate lessons from this rotation into doctrinal updates and force design evaluations throughout 2026. The rotation is significant precisely because it went beyond the standard NTC C-UAS infrastructure, importing TiC-specific capabilities that the standard NTC equipment set cannot replicate. This establishes a two-tier NTC environment: TiC formations train at a higher C-UAS fidelity than standard rotational units, using equipment that is not available to every brigade that rotates.

1.2 Joint Multinational Readiness Center (JMRC), Hohenfels, Germany

JMRC has the most developed OPFOR drone program of the three centers. The 1st Battalion, 4th Infantry Regiment's Multi-Domain Threat Platoon, callsign Skynet, is a dedicated OPFOR UAS detachment whose members hold years of experience challenging rotational units and whose proficiency has been directly augmented by cooperation with Ukrainian brigades training in Germany. The JMRC Drone Validation Course conducted January 2026 trained OPFOR Soldiers to employ quadcopter, fixed-wing, and FPV systems in day and night conditions, with the explicit goal of replicating the reconnaissance, identification, and targeting capabilities that enemy forces demonstrate on the modern battlefield.

The Skynet team's published TTPs, shared through the Center for Junior Officers in June 2025, document the tactical sophistication the OPFOR brings: ISR drones used to populate battle management systems before strikes, FPV operators targeting unit signatures including thermal and visual, and persistent pressure designed

to force BLUFOR into the concealment and dispersion disciplines that drone-saturated operations demand. SSG Gordon's statement that JMRC is your sparring partner and puts up a threat that is realistic and persistent and constant reflects an institutional commitment to UAS threat replication that is further advanced at JMRC than at any comparable U.S. training venue.

JMRC's primary C-UAS assessment constraint is terrain and communications. SSG Gordon identifies RF propagation as the biggest operational challenge for OPFOR drone operators: the Hohenfels terrain creates significant ground station range limitations that reduce the area over which FPV and quadcopter threats can be persistently maintained. This terrain-driven limitation means that JMRC's Red Air coverage is geographically constrained in ways that do not reflect the threat environment in the European or Indo-Pacific operational areas where rotational units will likely deploy. JMRC also shares NTC's MILES incompatibility constraint, meaning that even JMRC's sophisticated Skynet engagements cannot be automatically adjudicated and scored.

1.3 Joint Readiness Training Center (JRTC), Fort Johnson, Louisiana

JRTC is the primary CTC for airborne and light infantry BCTs. The JRTC's Tactical UAS Operations Facility, established at Fort Johnson in 2013, has supported multiple JRTC rotations with 40-50 flight hours per rotation and trained more than 200 National Guard and active component UAS operators. The facility has a documented history of supporting ISR and UAS employment for rotational units, and JRTC's OPFOR structure includes UAS employment as a standard element of the decisive action training environment.

JRTC's C-UAS assessment environment is the least publicly documented of the three centers. JRTC policy documents establish that UAS operations within the training area require compliance with AR 95-1, AR 95-2, and the Blue UAS Cleared List, indicating that commercial drone procurement for OPFOR purposes must navigate the same procurement compliance requirements as operational units. The FPV drone threat that is Skynet's signature capability at JMRC has no publicly documented equivalent JRTC OPFOR program, though JRTC's decisive action training environment includes OPFOR EW and air threat employment. For the light infantry BCTs that constitute JRTC's primary rotational audience, the C-UAS threat environment they will encounter in large-scale combat operations is arguably more severe than for armored formations, because dismounted forces cannot rely on vehicle-mounted C-UAS systems and have fewer organic passive defense options. JRTC's C-UAS Red Air program requires comparable investment to JMRC's Skynet model.

Exhibit 1 | CTC C-UAS Assessment Environment Comparison

Dimension	NTC (Fort Irwin)	JMRC (Hohenfels)	JRTC (Fort Johnson)
Primary Audience	Armored BCT, Stryker BCT, TiC 2.0 ABCTs	Europe-based BCTs, NATO response forces, multinational	Airborne, light infantry BCTs, Special Operations
Red Air Capability	TSM 800 swarm system (up to 150 drones); Parrot Anafi; DJI Mavic 3; Parrot Disco FPV; Grey Eagle OPFOR Group 4-5	Skynet Platoon (1-4 INF): quadcopter, fixed-wing, FPV; day/night; Ukrainian-informed TTPs; Drone Validation Course	Tactical UAS Ops Facility (est. 2013); 40-50 flt hrs/rotation; ISR; less documented FPV/attack replication
MILES C-UAS Integration	None. White card adjudication by OC-T; inherently slow and incomplete	None. Equivalent constraint; engagement outcomes not automatically recorded	None. Same structural gap

Dimension	NTC (Fort Irwin)	JMRC (Hohenfels)	JRTC (Fort Johnson)
VISMOD C-UAS Systems	M-LIDS VISMOD (JLTV) with no detection or defeat capability; 6 live DroneBusters	Not documented at equivalent level	Not documented at equivalent level
OC-T C-UAS Coverage	Limited; cannot cover all potential engagement sites; many engagements not adjudicated	Skynet integration provides direct OPFOR feedback; OC-T C-UAS assessment rubrics not standardized	Not publicly documented
GPS Jamming Restrictions	Restricted; limits EW replication in drone environment	Not publicly detailed; Hohenfels terrain limits RF propagation	Not publicly detailed
Key Capability	TSM 800 swarm fidelity; TiC 2.0 integration (Mastodon Beast+, Falcon UAS, Mastodon EW)	Skynet OPFOR proficiency; Ukrainian TTP integration; persistent realistic pressure	UAS Ops Facility history; light infantry C-UAS context
Primary Gap	MILES incompatibility; VISMOD M-LIDS; OC-T coverage; GPS restrictions; two-tier fidelity (TiC vs. standard)	Terrain-limited RF range; no standardized C-UAS assessment rubric; MILES incompatibility	Least developed Red Air attack program; no documented FPV OPFOR; MILES incompatibility

Sources: CALL No. 25-1093 (NTC); Army.mil / JMRC Drone Validation Course Jan 2026; Center for Junior Officers Skynet (Jun 2025); Army Times CTC Makeover (Oct 2023)

2. The Four Structural Gaps: Why Current Infrastructure Cannot Assess C-UAS Readiness

2.1 Gap 1: MILES Cannot Adjudicate What Drones and C-UAS Weapons Actually Do

The Multiple Integrated Laser Engagement System is the backbone of the Army's force-on-force training adjudication. MILES encodes weapons effects as laser emissions detected by body-worn harnesses, vehicle-mounted detectors, and instrumented systems across the training area. A tank round fired in the MILES environment produces an instrumented kill effect recorded in the training area network, scoreable by the exercise control system and reviewable in post-action review. C-UAS weapons do not function within the MILES framework. A DroneBuster's RF jamming effect has no MILES equivalent. A Coyote interceptor's kinetic defeat of an FPV drone produces no MILES-recorded kill effect. A Smart Shooter's optical sighting solution for a drone target generates no MILES engagement data. The drone itself carries no MILES harness and therefore cannot register as a killed threat when an engagement is successful or as a successful attack when it reaches its target.

The operational consequences of this adjudication void are documented in CALL No. 25-1093. Some Soldiers fail to notice drones at all. Others see them but hesitate, uncertain of the appropriate response. Some observe with curiosity or indifference. Others engage but their engagement is never recorded. None of these behavioral data points are visible to the exercise control system. The OC-T who must physically travel to the

engagement site, observe the Soldier's response, and manually transmit the adjudication data to EXCON provides a slow, geographically constrained substitute for instrumented assessment, but by the time the adjudication is complete, the drone has accomplished its mission and departed. The ADA Bulletin's Organic Red Air analysis from 2024 makes the comparison precisely: treating C-UAS as untestable at the CTC is analogous to soldiers training with laser rifles at the range and skipping NTC altogether.

Resolving the MILES gap does not require rebuilding MILES from the ground up. It requires developing instrumentation solutions specifically for the drone and C-UAS engagement. Candidate approaches include RF detection markers that sense and record DroneBuster and jammer activations, video-based adjudication systems that use AI to identify drone targets and evaluate intercept geometry, and MILES-compatible emitters for training drones that register defeat when they receive a qualifying RF or laser signal from a C-UAS weapon. The Army's CTC modernization plan, documented in Army Times October 2023 reporting, identifies development of tactical drone groups 2 and 3 TADSS with fielding beginning in FY2028 as a scheduled program action. That timeline is four years from the gap being documented by CALL. The operational cost of four years without instrumented C-UAS adjudication at the Army's premier readiness assessment centers is unquantifiable but operationally significant.

2.2 Gap 2: Red Air Density, Persistence, and Tactical Sophistication

Ukraine's experience establishes the threat baseline against which CTC Red Air programs must be measured. By 2025, Ukrainian and Russian forces were employing tens of thousands of drones monthly along hundreds of miles of front. Individual units operated in an environment of persistent ISR coverage where movement, communication signatures, and thermal emissions attracted drone attention continuously, not episodically. The Small Wars Journal January 2026 analysis documents what this means for CTC threat replication: CTCs must move from episodic drone encounters to persistent drone saturation, because large-scale combat operations will not offer rotational breaks from drone threat environments.

NTC's TSM 800 is capable of generating up to 150 drones from a single ground control station, which represents a significant capability for simultaneous threat density. The operational question is how that system is actually employed during rotations. Generating 150 drones simultaneously is a capability; employing them persistently across a full brigade training area for the duration of a 14-day rotation requires operator manning, system maintenance, spare parts, and a rotation employment plan that treats Red Air as a continuous environmental feature rather than a scripted scenario event.

JMRC's Skynet Platoon represents the most operationally mature Red Air program in the U.S. Army's CTC enterprise. The direct incorporation of Ukrainian TTP, described by SSG Gordon and CPT Cox as cooperation with Ukrainian brigades that bring frontline lessons, gives Skynet a tactical sophistication that no domestically developed OPFOR program can replicate without combat experience as the knowledge base. The Skynet model should be the standard for all three CTCs, not a JMRC-specific capability. NTC and JRTC require equivalent dedicated OPFOR UAS units with comparable training standards, TTP development programs, and operational integration with ground OPFOR maneuver elements.

2.3 Gap 3: OC-T Capacity and Expertise

The OC-T corps is the human assessment infrastructure of the CTC. OC-Ts observe unit performance, deliver assessments during training, and provide post-action review feedback that is the primary mechanism by which rotational units receive high-quality training feedback. For C-UAS, OC-Ts face a dual capacity problem: they are not numerous enough to cover all potential drone engagement sites across a brigade training area, and their C-UAS expertise base is not yet standardized across the CTC enterprise.

The CALL analysis identifies the OC-T coverage constraint explicitly: the number of OC-Ts is limited, meaning that many engagements are not reported or properly assessed at all. This constraint is not solvable simply by increasing OC-T numbers, because the drone engagement occurs on a timescale that makes physical presence at the engagement site before and during the event unreliable. An ISR drone conducting a call-for-fire mission moves through a unit's area in seconds. An OC-T notified of potential drone activity cannot reliably be on-site for a pre-event observation position unless the OPFOR UAS employment is predictable, which defeats the purpose of threat replication.

The structural solution is not more OC-Ts; it is instrumented assessment that reduces OC-T dependence for engagement recording. OC-Ts can then focus their capacity on the qualitative assessment dimensions that instruments cannot capture: whether the unit's C-UAS planning was incorporated into the operational order, whether the air guard function was assigned and executed, whether the TACSOP for drone response was practiced before the rotation, and whether the unit's C-UAS training objective was met in terms of reduced mission impact from drone attacks compared to previous rotations. These qualitative assessments require human judgment. Engagement recording does not.

2.4 Gap 4: GPS Jamming and the Electronic Environment

GPS-dependent drone navigation is not the operational baseline for current adversary drone employment. Ukrainian and Russian forces have developed and deployed fiber-optic FPV drones specifically because GPS jamming is effective against GPS-dependent systems. The threat environment that rotational units will face in large-scale combat operations includes dense EW activity that degrades GPS-dependent C-UAS sensors, drone navigation systems that resist RF-based defeat methods, and passive RF detection as a primary drone detection modality precisely because active radar emissions attract counter-battery fire.

NTC's GPS jamming restrictions, necessary to protect aviation, fire support, and other systems that depend on GPS for safe operation across the training area, create a training environment in which the electronic dimension of C-UAS operations cannot be fully replicated. The CALL analysis notes that many enemy drones rely on GPS for flight and that restrictions on GPS jamming constrain the training fidelity of EW-based C-UAS defeat. Resolving this constraint requires either designated GPS-denied training zones within the CTC training areas where jamming is permitted and GPS-dependent systems are prohibited, or the development of C-UAS training scenarios that operate within the GPS-available environment but include constructive simulation of GPS-denied effects through the STE or an equivalent system.

3. The Synthetic Training Environment: Partial Bridge, Not Complete Solution

3.1 What STE Offers for C-UAS Training

The Army's Synthetic Training Environment is the service's top training modernization initiative, designed to converge live, virtual, and constructive training environments into a single interoperable system using one software, one terrain, and one training tool across multiple interfaces. The STE's Reconfigurable Virtual Collective Trainer, first fielded in FY2024 at Fort Cavazos, Fort Novosel, and Fort Moore, enables combined air-

ground training in a virtual environment that connects aviation platforms, ground vehicles, and dismounted infantry into a single operational picture. The Army has already tested UAS operator training on the RVCT, described in DefenseScoop 2023 reporting as a significant time- and cost-saving capability.

For C-UAS specifically, the STE offers two capabilities that the live training environment cannot currently provide. First, constructive simulation of dense drone environments at scale, potentially generating hundreds of simultaneous drone threats across a brigade frontage in a virtual environment, without the physical drone inventory, operator manning, and airspace deconfliction requirements that live Red Air programs demand. A unit that rehearses C-UAS integration in STE before arriving at NTC for the live assessment portion of a rotation could arrive with the foundational C-UAS collective task practice that CALL No. 25-1093 identifies as currently absent. Second, the STE's ability to inject synthetic threats into live training environments through Synthetic Inject to Live technology could enable a live rotation to include constructive drone swarms that are visible on unit battle management systems and require C-UAS responses without requiring physical drones in every sector.

The STE Live Training System, demonstrated at JRTC in January 2024, validated synthetic Claymore, mortar, grenade, and Stinger weapons systems in an operational environment. The Army AL&T July 2025 reporting on STE LTS identifies the direct fire system with haptic and AI-enabled assessment as scheduled for production in FY2027 and fielding in FY2028-2029. The Stinger Training System, providing simulation for the Stinger missile in C-UAS engagement scenarios, has first increment production planned beginning FY2025 with fielding in FY2027. These timelines place STE C-UAS training aids in the force at approximately the same time as the TADSS Group 2-3 drone development is scheduled to field in FY2028.

3.2 What STE Cannot Replace

The STE's contribution to C-UAS training fidelity is significant but cannot substitute for live Red Air in the CTC assessment environment. The qualitative difference between a unit that knows it is training in a virtual environment and a unit that hears a real FPV drone approaching and must execute a battle drill in the noise, confusion, and decision pressure of a live encounter is the difference the CTC is designed to create. The STE can build collective task proficiency and allow battle drill rehearsal before the live rotation. It cannot replicate the physiological and psychological stress response that the CTC live environment generates.

The AUSA analysis of STE notes that researchers at West Point's Modern War Institute found that when presented with VR goggles and preloaded imagery, many tech-savvy cadets were too cognitively overloaded to effectively use the simulations, suggesting that the gap between virtual proficiency and live performance is real and non-trivial. For C-UAS, this gap matters particularly because the response to a drone threat involves sensory cues, acoustic identification, visual tracking, and immediate action drills that unfold in the first seconds of detection, before a trained response can interrupt an untrained instinct. STE can condition the trained response. Live Red Air tests whether the conditioning holds under realistic conditions.

The recommended model is therefore a two-stage preparation architecture: STE-enabled collective task training at home station, building from individual drill to platoon and company collective task proficiency before departure for the CTC, followed by live Red Air assessment at the CTC that tests whether home-station preparation translated to live performance. The CTC then provides the assessment data that informs the next home-station training cycle. This model is how gunnery proficiency builds: table qualification at home station, followed by CTC live assessment. C-UAS readiness should follow the same architecture.

4. The Required Framework: Five Investment Priorities for CTC C-UAS Modernization

Priority 1: Develop and Field C-UAS-Specific Instrumentation for Force-on-Force Adjudication

TRADOC, working through Program Executive Office Simulation, Training and Instrumentation and the STE Cross-Functional Team, should direct immediate development of C-UAS instrumentation solutions that enable automated engagement recording without dependence on physical OC-T presence at each engagement site. The minimum viable instrumentation set includes RF activation detection systems that record DroneBuster and jammer employment events and their coverage areas, video-based AI adjudication systems mounted on OPFOR drones that record intercept geometry and assess whether an engagement attempt would have been successful based on weapon parameters and drone position, and MILES-compatible emitters for training drones that can receive and register defeat signals from qualifying C-UAS weapons.

Interim instrumentation solutions should be fielded within 12 months using available commercial technology. The Army Times CTC modernization reporting identifies Group 2-3 TADSS development with FY2028 fielding as the programmatic solution. A four-year gap between documented need and fielded instrumentation is not operationally acceptable given the current threat environment. Interim solutions using commercial AI video adjudication and RF sensing technology can be fielded at lower cost and higher speed than a TADSS development program, and the lessons from interim solutions should inform TADSS requirements.

Priority 2: Establish Dedicated OPFOR UAS Units at NTC and JRTC Modeled on JMRC's Skynet Platoon

JMRC's Skynet Platoon is the most operationally effective Red Air program in the Army's CTC enterprise. Its effectiveness derives from dedicated manning, persistent focus on UAS threat replication as a primary mission, and direct incorporation of frontline lessons from Ukrainian units training at Hohenfels. NTC and JRTC require equivalent formations. NTC should establish a permanent OPFOR UAS company within the 11th Armored Cavalry Regiment, the NTC's dedicated OPFOR force, staffed with personnel who hold UAS Master Trainer qualifications and who receive annual refresher training on current threat TTPs derived from JIATF 401 threat assessments and operational lessons from CENTCOM and EUCOM. JRTC should establish an equivalent formation within its OPFOR structure.

These formations should be authorized to operate FPV, quadcopter, and fixed-wing systems across the full training area with a tempo requirement specified in the CTC rotation employment plan: persistent ISR coverage of at least one brigade element for the full duration of each operational phase, and simulated munitions employment against at least one high-value target per operational cycle. The employment plan should be reviewed and updated with each rotation based on OPFOR lessons and BLUFOR C-UAS response patterns, creating the adaptive OPFOR dynamic that is the CTC's fundamental advantage over scripted garrison training.

Priority 3: Establish Standardized C-UAS Training Objectives and OC-T Assessment Rubrics Across All Three Centers

The absence of standardized C-UAS training objectives and OC-T evaluation rubrics means that a unit that performs well on C-UAS at NTC has no common benchmark against which to compare its performance to a unit that rotated through JRTC. TRADOC should direct development of a common C-UAS Mission-Essential Task assessment framework applicable at all three maneuver CTCs, specifying: the specific C-UAS METs

assessed at each echelon from platoon to brigade, the performance indicators for each MET, the OC-T observation and assessment methodology for each indicator, and the scoring rubric that connects assessment to readiness determination. This framework should be aligned with the ATP 3-01.81 planning and integration guidance and with the combined arms C-UAS standards being developed under BG Chalfont's ABCT transformation program.

The FY2025 NDAA Section 925 requirement for the Secretary of Defense to submit a report summarizing C-UAS training curricula provided to installation commanders and deployed forces provides the Congressional mandate for this standardization. The FY2025 NDAA Section 1073 requirement for a large-scale exercise in special use DoD airspace to test C-UAS response capability provides the assessment vehicle. Both requirements imply common standards; neither can be meaningfully executed without them.

Priority 4: Establish GPS-Denied Training Zones and EW Integration Protocol at Each CTC

The GPS jamming restriction that limits C-UAS EW training fidelity at NTC reflects a legitimate safety requirement. The solution is not to eliminate that restriction but to create designated GPS-denied training zones within each CTC's training area where EW employment including GPS jamming and RF jamming is permitted within defined airspace and geographic boundaries, and where GPS-dependent systems are identified, deconflicted, and either excluded or equipped with GPS-alternative navigation before entry into the zone.

This approach is modeled on the range safety design that permits live-fire artillery and direct fire weapons in designated areas while protecting non-participating personnel and assets. A GPS-denied training zone requires coordination with the FAA regarding restricted airspace, agreement between the CTC and supported aviation units on exclusion procedures, and acquisition of GPS-alternative navigation aids for systems that must operate within the zone. This is a planning and coordination challenge, not a technical impossibility. The Small Wars Journal CTC analysis explicitly notes that no valid safety or doctrinal barrier prevents full-fidelity drone and C-UAS integration at the CTCs; it just takes planning and leadership.

Priority 5: Integrate STE Pre-Rotation C-UAS Preparation Into the CTC Rotation Standard

The CTC rotation preparation program, governed by AR 350-50, specifies the training prerequisites and preparation events that units complete before arriving at the CTC. TRADOC should revise the CTC rotation preparation standard to include mandatory STE-enabled C-UAS collective task training at a specified echelon and proficiency level as a prerequisite for CTC rotation. This integration creates the two-stage preparation architecture described in Section 3.2: units rehearse C-UAS collective tasks in the STE home-station environment before the CTC rotation, then demonstrate live-environment performance during the rotation itself.

The STE RVCT's connectivity capability, enabling units to join from different installations into a shared training environment, means that this pre-rotation preparation does not require all elements of the rotating BCT to co-locate before departure. Battalion and company commanders can rehearse C-UAS integration across the brigade virtually before the first vehicle loads onto a truck for the move to the CTC. This is the home-station training enabler that the CTC cannot provide but that the STE can, and it directly addresses the CALL finding that units arrive at NTC without foundational C-UAS knowledge.

Exhibit 2 | CTC C-UAS Modernization Priority Roadmap

Priority	Timeline	Lead	Resource / Authority
Develop and field interim C-UAS instrumentation: RF activation sensors, AI video adjudication, MILES-compatible drone emitters; inform TADSS Group 2-3 requirements	0 to 12 months (interim); FY2028 (TADSS program)	PEO STRI / STE CFT / TRADOC / CTC commanders	STE CFT rapid development authority; OTA vehicle for interim commercial solutions; FY2028 TADSS program funding
Establish permanent OPFOR UAS units at NTC (11th ACR) and JRTC modeled on JMRC Skynet Platoon; resource with UAS Master Trainer-qualified personnel; connect to JIATF 401 threat assessment cycle	0 to 18 months	TRADOC / NTC / JRTC commanders / JIATF 401	TRADOC FORCE DESIGN; OPFOR unit activation authority; JIATF 401 threat information sharing; UAS Master Trainer qualification pipeline
Develop common C-UAS MET assessment framework and OC-T evaluation rubrics for all three maneuver CTCs; align with ATP 3-01.81 and FY2025 NDAA Section 925 reporting requirement	0 to 12 months	TRADOC CAC / CTC commanders / JCU / MCoE	TRADOC doctrine authority; FY2025 NDAA Section 925 mandate; ATP 3-01.81 proponent (Fires CoE)
Establish GPS-denied training zones at NTC, JRTC, and JMRC; develop EW integration protocol for zone operations; coordinate with FAA and aviation safety authorities	12 to 24 months	CTC commanders / TRADOC / FAA coordination / ASA(ALT)	CTC installation authority; FAA coordination process; aviation deconfliction protocol; range safety design review
Revise AR 350-50 CTC rotation preparation standard to require STE-enabled C-UAS collective task training as a prerequisite for CTC rotation; specify echelon, tasks, and proficiency standards	6 to 18 months	TRADOC CAC / STE CFT / PEO STRI	AR 350-50 revision authority; STE RVCT deployment plan; battalion and brigade-level STE training design
Establish JMRC-NTC-JRTC monthly C-UAS OPFOR lesson-sharing mechanism; incorporate JIATF 401 threat assessments and operational lesson reports from CENTCOM/EUCOM into OPFOR employment plans each rotation	0 to 6 months	CTC commanders / JIATF 401 / TRADOC	JIATF 401 information sharing authority; TRADOC CTC coordination directive; no additional resource required
Congress direct multi-year CTC C-UAS modernization authorization; specify TADSS Group 2-3 drone development schedule and	Next NDAA cycle (FY2027)	Congressional defense committees / TRADOC	FY2027 NDAA legislative vehicle; TRADOC budget submission; JIATF 401 congressional reporting

Priority	Timeline	Lead	Resource / Authority
interim instrumentation funding; require TRADOC annual report on C-UAS assessment fidelity at each CTC			

5. Conclusion: The Readiness Cost of an Unassessable Training Objective

The Army has invested in C-UAS hardware, doctrine, and training infrastructure. Soldiers do encounter drone threats at the CTCs. The problem is not exposure. The problem is that exposure without instrumented assessment produces no measurable readiness outcome. A unit that encounters drones, attempts C-UAS responses, and leaves the CTC rotation with a green status has not demonstrated C-UAS readiness. It has demonstrated that no instrumented system recorded its C-UAS failures, and no OC-T was present to adjudicate them.

The ADA Bulletin's comparison is exact: treating C-UAS as unassessable at the CTC is analogous to soldiers training with laser rifles and skipping NTC. The CTC's value is precisely the assessment function it provides. When the assessment system cannot record engagement outcomes, cannot score unit responses, cannot generate readiness data for the post-action review, and cannot produce a training objective determination that follows the unit into its next training cycle, the CTC rotation is an incomplete readiness event for C-UAS. The unit experiences the threat. It does not learn its performance against the threat. It does not carry a measured gap into the next training cycle. And when it deploys, it encounters the real drone, which does not require adjudication to register its effect.

Army Chief of Staff General Randy George has stated that every Soldier on tomorrow's battlefield will have access to a drone, just as every Soldier today carries a radio. The institutional structure that prepares Soldiers to use that radio begins with individual training, progresses through collective task proficiency, and culminates in the CTC rotation that assesses whether the unit can execute radio-enabled mission command under the stress of a thinking OPFOR. C-UAS requires the same institutional progression. The individual training pipeline is developing through the JCU. The collective task doctrine is developing through ATP 3-01.81 and TiC 2.0. The CTC assessment environment, which is where that progression culminates and where readiness is certified, is the piece that has not kept pace. The investments required to close the CTC C-UAS assessment gap are identified, bounded, and achievable within existing programmatic authorities. What they require is the institutional prioritization to execute them.

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