CONTROL BELOW THE COORDINATING ALTITUDE

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BACKGROUND

The proliferation of unmanned aircraft systems (UAS), both friendly and adversary, in airspace delegated to the land component commander (airspace below the coordinating altitude (CA)) has driven numerous joint UAS integration planning efforts. These efforts have promulgated new airspace terminology that is undefined in joint doctrine. The problematic terminology includes the “air littoral” and “upper tier of the land domain” to erroneously describe saturated airspace contours between ground forces and the CA. Joint force efforts that integrate UAS airspace solutions with undefined terminology are sidestepping current, proven doctrine that 1) maintains the air and land domain are separate with distinct authorities afforded to the component commander and 2) upholds that all airspace is assigned. **This advisory highlights doctrinal architecture that serves as the foundation to build solutions solving the airspace challenges surrounding small UAS, loitering munitions, and fires deconfliction.**

THE AIRMAN’S PERSPECTIVE

The character of war is changing rapidly, but the axioms that animate airpower doctrine endure. Air Force Doctrine Publication (AFDP) 1 states that “**control of the air is a precondition for control of the surface**.” This doctrine remains a proven practice that’s embraced by every service. Without some degree of air superiority, effective land maneuver and joint force integration is not possible. While increased UAS operations challenge effective joint force synchronization, effectively coordinated, deconflicted, and integrated airspace remains a proven practice where the air and land domains converge. Collaborative efforts to defend and control airspace must remain flexible and commensurate with joint mission requirements.

AIRSPACE CONTROL

Both Joint Publication (JP) 3-52, *Joint Airspace Control*, and AFDP 3-52 *Airspace Control,* define airspace control as "the exercise of delegated authority over designated airspace and users through control procedures and coordination measures to maximize operational effectiveness.” **It is described as inherently joint and intrinsically all-domain.** Airspace control involves integration, coordination, prioritization, and deconfliction of mission requirements from all joint force components with the goal of maximizing operational effectiveness and preventing friendly fire incidents.

The **Joint Force Commander (JFC)** is responsible for military-directed airspace control within the joint operations area (JOA) designated by the combatant commander or subordinate unified commander. The JFC designates an **Airspace Control Authority (ACA)**, who holds overall responsibility for airspace control within the designated area. The ACA is tasked with planning, coordinating, and developing airspace control procedures and controlling the airspace through the **Airspace Control System (ACS)**. The ACS is comprised of the organizations, personnel, policies, procedures, and facilities used for command, control, and reporting the use of airspace. The ACA integrates JFC operational and risk requirements with joint force needs, capabilities, and command and

control (C2) structures to enable a coherent, resilient, and interoperable ACS. The ACA's responsibilities are numerous, including developing the Airspace Control Plan (ACP), establishing a responsive ACS, publishing the Airspace Control Order (ACO), and integrating with the host nation's aeronautical information publication (AIP).[1]

Guidance for airspace users is primarily disseminated through the ACP and the daily ACO. The ACP is approved by the JFC and provides specific planning guidance and procedures for the ACS in the JOA. It implements the JFC's operational guidance and can be a separate document or an annex to the operations plan. The ACO implements the ACP and translates general guidance into specific control procedures for defined periods, detailing approved coordination measures (CMs) and establishing airspace for military operations. The ACO is typically published and effective for one 24-hour period, often coinciding with the air tasking order (ATO) day. Airspace control planning begins well before conflict and must be adaptable to various scenarios and requirements. The level of air control achieved directly correlates to the operational risk the JFC must accept.

Airspace is controlled using two primary methods: **positive control** and **procedural control**.

- **Positive control.** JP 3-52 defines positive control as, "A method of airspace control that relies on positive identification, tracking, and communicating with aircraft within an airspace, conducted with electronic means by an airspace control element having the authority and responsibility." This requires continuous monitoring by an airspace control element. Positive control provides the best risk mitigation but requires significant resources. It is normally the goal when electronic means of identification, tracking, and communication are available.

- **Procedural control.** JP 3-52 defines procedural control as, "A method of airspace control which relies on a combination of previously agreed and promulgated orders and procedures." Procedural control is effective for low-density airspace and in areas lacking positive control coverage. Procedural control measures should be simple, accessible, and disseminated through the ACP, ACO, and special instructions (SPINS).

The **CA** and **Coordination Level (CL)** as defined in JP 3-52, are examples of coordination measures used within this framework. A CA is an airspace coordinating measure (ACM) that procedurally separates users and defines the transition between airspace control elements. A CA allows the ACA or an airspace control entity to assign a volume of airspace to another control organization. The CL is another ACM that designates the level below which fixed-wing aircraft normally will not fly. The height of the CL is published in the ACP, which specifies if it is advisory or mandatory. All airspace users should coordinate with appropriate airspace control elements when transitioning through, or firing through, the CA or CL. There is no CA outside of an airspace assigned to an airspace control element.

[1] For additional information on airspace control orders, see JP 3-52, *Joint Airspace Control* and AFDP 3-52, *Airspace Control*.

Integration of various airspace users, including unmanned aircraft, is addressed within current doctrine and Multi-Service Tactics, Techniques, And Procedures (MTTPs). JP 3-52 states that the established principles of airspace control used in manned flight operations normally apply to unmanned aircraft (UA) operations. Motivated by the need for improved coordination and deconfliction, the joint force is working to clarify planned operating altitudes of small UAS and future loitering munitions. In addition, the joint force acknowledges UA present potential hazards due to the difficulty of acquiring and positively identifying UA.

Factors such as small size, low-altitude operations, lack of onboard capabilities to see and avoid other aircraft, or weak electromagnetic emissions, complicate efforts to detect and control UA via positive or procedural means. Therefore, UA operations require special consideration in airspace control and usage, and efforts should be made to integrate UA with manned flight operations.

Specific UA volumes of airspace may need to be included in the ACO, and the ACO/SPINS should provide times of activation. MTTP, *Airspace Control* includes an entire appendix (Appendix A) dedicated to Unmanned Aircraft Operations and provides tactics, techniques, and procedures (TTPs) for integrating unmanned aircraft into joint airspace. It notes that UA operations require airspace control and coordination procedures to safely operate with other airspace users in the unit area of operations (AO). UAS planners and operators must understand their AO and established theater airspace procedures.

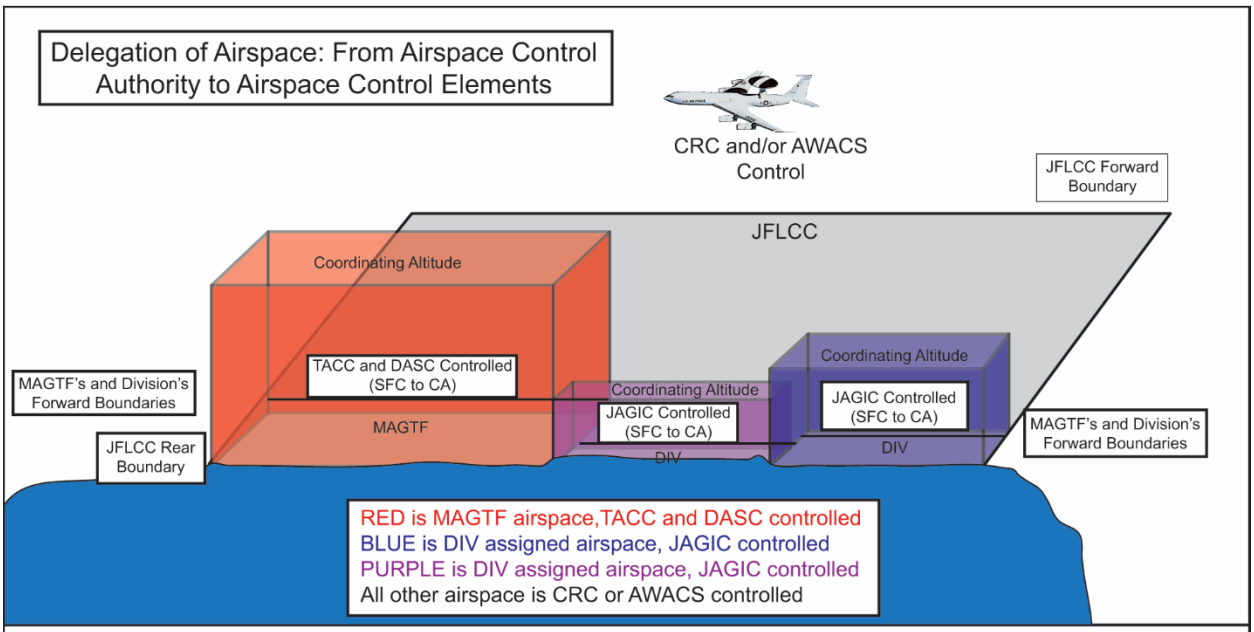
Furthermore, JP 3-30, *Joint Air Operations*, states: “Typically, it is not necessary to include smaller UA on the ATO unless their planned operating altitudes could cause a conflict with other airborne operations. Depending on their operating altitude, larger UA should be included in the ACO, ATO, and SPINS. The ACA may establish specific flight routes, altitudes, and coordination measures to deconflict UAS operations. These should be published in the ACO.” JP 3-30 also discusses the requirement for the ACA to affect procedures for loitering munitions operating both inside and outside delegated airspace. In addition, efforts across the joint community are on-going to define smaller UAs by weight and operating altitude and outline airspace control considerations for new classes of loitering munitions.

The **Theater Air-Ground System (TAGS)** combines each joint component’s ACS into a joint framework that supports the JFC. It is comprised of the Air Force theater air control system (TACS), Army air-ground system (AAGS), Navy tactical air control system (NTACS), Marine air command and control system (MACCS), and special operations air-ground system. Elements like the Control and Reporting Center (CRC) provide positive and procedural control, while the USAF Air Support Operations Center (ASOC) and United States Marine Corps (USMC) Direct Air Support Center (DASC) provide procedural control. Neither the CRC, ASOC, nor DASC provides air traffic control (ATC) services. These elements operate as part of the decentralized execution of airspace control under the ACA's authority.

CONTROL OF AIRSPACE BELOW THE COORDINATING ALTITUDE:

The ACA may delegate authority for airspace control to subordinate airspace control elements for specific volumes of airspace, tailored to their capability to control. This often means that below the CA, control responsibility transitions to different entities depending on the operational area and the component responsible for ground or maritime operations in that area.

The graphic below is taken directly from MTTP, *Airspace Control* and depicts **Designated Airspace Control Authorities**. Conceptually, it shows how responsibility can be delegated, provided the airspace control elements have the capability to control all airspace users, including nonmilitary users, within their assigned volume of airspace. It portrays the **ACA** at the top level, delegating authority for an **Airspace Control Subarea/Sector (ACSS)** to a subordinate airspace control element. An ACSS is airspace of defined dimensions established for an airspace control element and allows the ACA to assign a volume of airspace to that element. ACSS boundaries normally coincide with air and missile defense unit boundaries. References



Legend:
AWACS—Airborne Warning and Control System
CA—coordinating altitude
CRC—control and reporting center
DASC—direct air support center
DIV—division
JAGIC—joint air-ground integration center
JFLCC—joint force land component commander
MAGTF—Marine air-ground task force (USMC)
SFC—surface
TACC—tactical air command center

Addressing airspace control below the CA:

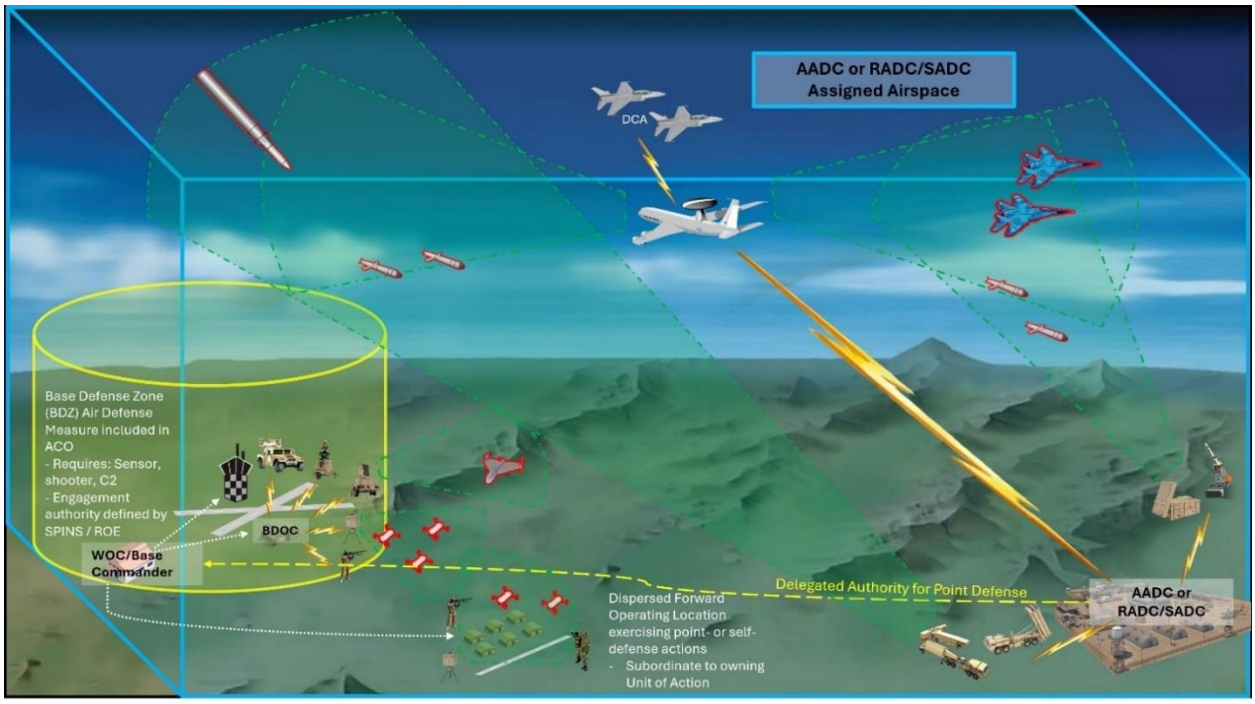
- Ground forces (e.g., the Army, utilizing the Joint Air-Ground Integration Center [JAGIC]) TTP have their own airspace control procedures within their AOs, documented in their operation orders (OPORDs). For example, the Army OPORD Annex C Appendix 10 provides guidance on how to integrate airspace users in accordance with the commander's intent and risk guidance within their AO.
- Ground forces (e.g., Marine air-ground task force [MAGTF]) operating in amphibious objective areas (AOAs), may request to control the airspace over their AO, with boundaries potentially corresponding to terrain features like a shoreline. Within this delegated airspace, the MAGTF commander is responsible for controlling and integrating all airspace users. This authority is delegated to the aviation combat element commander who uses the MACCS.
- UA and loitering munitions in a unit's AO require coordination procedures to safely deconflict with other airspace users. Examples of these procedures may include, but are not limited to, minimum risk routes (MRR), restricted operations zones (ROZ), transit routes, and air corridors.

Therefore, while the ACA retains overall responsibility, specific control and deconfliction below the CA is often delegated to component-level airspace control elements (ASOCs, CRCs, or MACCS elements) operating within designated volumes like ACSSs, AOAs, High Density Airspace Control Zones (HIDACZ), or unit AOs, coordinated through documents like the ACP, ACO, and component OPORDs.

AIR DEFENSE

The conflict in Ukraine illustrates significant challenges caused by the proliferation of drone technologies across the battlespace. Defending against these types of adversarial threats is a critical air defense component of force protection. Force protection doctrine includes defending against air threats, and active measures for Counter-small UAS (C-sUAS) require detailed coordination with the airspace control authority and area air defense commander (AADC). Air base commanders, for instance, may conduct point defense of their installations using organic capabilities, within their base defense zone (BDZ). Point defense of air bases is integrated into the broader Integrated Air and Missile Defense (IAMD) system under the JFC and AADC when in operational theaters. The AADC is responsible for planning and executing integrated air defense operations and should also be prepared to prevent the engagement of friendly UAS and loitering munitions.

In the notional integrated IAMD example depicted in the figure below, the United States Air Force (USAF) base commander has been delegated authority, via the ACO, to employ organic point defense capabilities inside a BDZ. In this example, the base commander plans, directs, integrates, coordinates, and controls point defense activities through the base defense operations center (BDOC) as the focal point for base defense and security.[2]



Air base point defense within a notional IAMD construct

Joint doctrine advises commanders and planners to arrange adequate protection and defensive measures; coordinate and deconflict operational procedures; and establish sufficient roles, responsibilities, and authorities for defense against low-altitude air threats. For example, MTTP, *Air and Missile Defense*, lays out many doctrinal approaches for both passive and active C-sUAS planning considerations and control measures. Future commanders **should not assume that joint capabilities will be available or sufficient** and may need to plan to leverage organic capabilities for the point defense of widely dispersed operating locations under an Agile Combat Employment (ACE) scheme of maneuver.

Additionally, the USAF conducts counterair operations, both offensive counterair (OCA) and defensive counterair (DCA) as part of IAMD to accomplish the joint function of protection. OCA operations seek to dominate enemy airspace and prevent the launch of threats, resulting in greater freedom from attack and increased freedom of action. DCA operations defend friendly lines of communication, deny the enemy the freedom to carry out offensive attacks from the air, and provide a secure area from which all elements of the joint force can operate. DCA is classified into two categories: active and passive air

[2] For additional information on base defense operations centers, see JP 3-10, *Joint Security Operations in Theater.*

and missile defense (AMD). AMD—both **active** and **passive**—is direct defensive action taken to destroy, nullify, or reduce the effectiveness of hostile air and ballistic missile threats against friendly forces and assets. It includes actions to counter enemy manned aircraft, UA, aerodynamic missiles (cruise, air-to-surface, and air-to-air), and ballistic missiles.

HOMELAND DEFENSE

Homeland defensive operations require a fundamentally different approach than overseas operations. According to JP 3-27 *Joint Homeland Defense*, the Department of Defense (DoD), operating through North American Aerospace Defense Command (NORAD), maintains sole responsibility for defending against air threats in U.S. airspace and approaches. However, DoD relies on critical support from the Federal Aviation Administration (FAA) and Department of Homeland Security assets for early detection and identification of anomalous air activity that could threaten the United States.

AFDP 3-27 *Homeland Operations,* reinforces this collaborative framework, noting that while DoD leads threat response, the FAA typically retains its role as the Airspace Control Authority for air traffic coordination and deconfliction. UA threats add significant complexity to this operational environment, demanding unambiguous command structures and coordinated response frameworks.

Unleashing U.S. Military Drone Dominance

- "First, we will bolster the nascent U.S. drone manufacturing base by approving hundreds of American products for purchase by our military. Leveraging private capital flows that support this industry, our overt preference is to Buy American."
- "Second, we will power a technological leapfrog, arming our combat units with a variety of low-cost drones made by America's world-leading engineers and AI experts. Drone dominance is a process race as much as a technological race. Modern battlefield innovation demands a new procurement strategy that fuses manufacturers with our frontline troops."
- "Finally, we'll train as we expect to fight. To simulate the modern battlefield, senior officers must overcome the bureaucracy's instinctive risk-aversion on everything from budgeting to weaponizing and training. Next year I expect to see this capability integrated into all relevant training, including force-on-force drone wars."

- Secretary of Defense memorandum dated July 10, 2025

THE WAY FORWARD

As the joint force considers this multi-faceted airspace, the rapid expansion of UAS technology across the services will undoubtedly impact Air Force and joint airspace control doctrine. The innovation of UAS tactics and technology has not created new *airspace* but it has created airspace challenges at home and abroad. Senior military leaders highlight the urgent need to strengthen defensive capabilities in initiatives such as Golden Dome. While Golden Dome primarily focuses on countering advanced long-range missiles, it must seamlessly integrate with existing efforts to fortify defenses against UA threats. This imperative is reinforced by the November 19, 2024, Air Force Requirements Oversight Council memorandum, wherein Headquarters Air Force emphasized the critical importance of establishing definitions and terminology for small and tactical UA in addition to loitering munitions. Building upon our doctrine, future solutions must address key questions regarding UAS airspace control challenges:

- How should the CL be defined to accommodate UA and LM?
- Are LM fires or UA?
- What are the systems and procedures required to deconflict, coordinate, control, and defend within the airspace?
- What are the appropriate definitions/characterizations of the varied UA sizes?
- Who has airspace control authority to prevent fratricide when a conflict arises between manned aircraft, UA, LM, and legacy fires solutions?
- What are the airspace control system technologies required to control, coordinate, and deconflict manned aircraft, UA, LM, and fires?

CONCLUSION

The comprehensive operational procedures in AFDP 3-52 *Airspace Control*, AFDP 3-01 C*ounterair Operations*, and AFDP 3-27 *Homeland Operations* supported by joint force publications (JP 3-01, JP 3-10, JP 3-27, JP 3-30, JP 3-52) and multiple MTTPs provide the foundation for future airspace control and defense solutions. This doctrinal framework includes procedures for integrating friendly UAS and defending against air threats—it is the foundation for solving adversary UAS challenges in contested environments. The difficulty lies not in the absence of doctrine for this airspace volume, but in the ability to effectively manage, deconflict, and counter potentially overwhelming numbers of adversary UA operating in the congested altitude environment below the CA. Addressing this concern with new technology requires an understanding of current airspace practices. This Air Force Doctrine Advisory affirms that current joint and service operational doctrine provides enduring architecture to address the emergent challenges posed by UAS. Further, it demands continued focus on developing the necessary technologies and refining the tactics, techniques, and procedures to operate effectively within this increasingly contested and saturated airspace.

REFERENCES

All websites accessed 21 August 2025

Doctrine can be accessed through links provided at: https://www.doctrine.af.mil/

US AIR FORCE DOCTRINE: https://www.doctrine.af.mil/

- AFDP 1, *The Air Force*
- AFDP 3-01, *Counterair Operations*
- AFDP 3-27, *Homeland Operations*
- AFDP 3-52, *Airspace Control*

JOINT DOCTRINE

Joint Electronic Library (JEL): https://www.jcs.mil/Doctrine/

JEL+ (CAC Required): https://jdeis.js.mil/jdeis/index.jsp?pindex=2

- JP 3-01, *Countering Air and Missile Threats*
- JP 3-10, *Joint Security Operations in Theater*
- JP 3-27, *Joint Homeland Defense*
- JP 3-30, *Joint Air Operations*
- JP 3-52, *Joint Air Space Control*

TACTICAL DOCTRINE

Multi-Service Tactics, Techniques, and Procedures (MTTPs):

https://www.alssa.mil/

- AFTTP 3-2.31, *Multi-Service Tactics, Techniques, and Procedures for Air and Missile Defense*
- AFTTP 3-2.78, *Multi-Service Tactics, Techniques, and Procedures for Airspace Control*