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**OPERATING UNCREWED AIRCRAFT
SYSTEMS (UAS) BEYOND VISUAL
LACUNAE OF STATUTES – IDENTIFYING A
LEGAL FRAMEWORK IN SUPPORT OF
UAS TRAFFIC MANAGEMENT (UTM)**

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ABSTRACT

As commercial and recreational use of uncrewed aircraft systems (UAS) continues to expand, inter-agency efforts between the National Aeronautics and Space Administration (NASA) and the Federal Aviation Administration (FAA) are developing the technical and organizational architecture for their UAS Traffic Management (UTM) initiative. Eventually, the UTM ecosystem will provide for the safe and seamless integration of large-scale UAS operations into the National Airspace System (NAS). Certain milestones within UTM development have included the formation of the UTM Research Transition Team (RTT), UTM Pilot Program (UPP), and UAS Low Altitude Authorization and Notification Capability (LAANC). This article seeks to identify the statutory and regulatory support necessary to fully implement UTM concepts. Starting with an analysis of current applications under 49 U.S.C. § 44802 (Integration of Civil Unmanned Aircraft Systems into National Airspace System) and 14 C.F.R. Parts 107 (Small Unmanned Aircraft Systems); 135 (Air Carrier and Operator Certification); and 91 (General Operating and Flight Rules) to govern UTM principles, the article will then examine recent legislation under the FAA Reauthorization Act of 2018.

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I. INTRODUCTION

In 2012, Congress mandated that the Federal Aviation Administration (FAA) must develop rules to integrate uncrewed aircraft systems (UAS) into the National Airspace System (NAS) by September 2015.¹ The use of UAS for commercial applications has expanded into multiple operational facets, including inspections, surveying, and delivery.² As such, the FAA and the National Aeronautics and Space Administration (NASA) are jointly creating the means to establish a UAS Traffic Management (UTM) system to fully integrate increasing UAS traffic into the NAS. In doing so, the agencies are forging public and private stakeholder partnerships while utilizing current technologies to create this new ecosystem. As stated by the Next Generation Air Transportation System (NextGen) of the FAA, these efforts will ensure that the “safety, security, efficiency, and equity of the NAS are maintained to the highest standards.”³

Despite the promising benefits of allowing commercial operators to fly drones beyond visual line of sight (BVLOS) at low altitudes within the NAS (below 400 feet above ground level), two unique challenges exist in regards to UTM.⁴ First, the uncrewed nature of UAS does not provide for the same level of situational awareness as compared to having a human onboard the aircraft to see and avoid collisions with obstacles or other aircraft.⁵ This collision avoidance concern also extends to the abilities to maneuver the aircraft in a manner to avoid an accident because the human

¹ DAVID HEFFERNAN & BRENT CONNOR, AVIATION REGULATION IN THE UNITED STATES 518 (2014). *See* FAA Modernization and Reform Act of 2012, Pub. L. No. 112-95, 126 Stat. 11 (2014). *See also* FED. AVIATION ADMIN., INTEGRATION OF CIVIL UNMANNED AIRCRAFT SYSTEMS (UAS) IN THE NATIONAL AIRSPACE SYSTEM (NAS) ROADMAP (3rd ed. 2020), https://www.faa.gov/sites/faa.gov/files/uas/resources/policy_library/2019_UAS_Civil_Integration_Roadmap_third_edition.pdf.

² FED. AVIATION ADMIN., UNMANNED AIRCRAFT SYSTEMS (UAS) TRAFFIC MANAGEMENT (UTM) CONCEPT OF OPERATIONS v2.0 1 (2020), https://www.faa.gov/uas/research_development/traffic_management/media/UTM_ConOps_v2.pdf [hereinafter FAA, UTM CONCEPT OF OPERATIONS].

³ *Id.*

⁴ Alex Zektser & Dean Griffith, *The Regulator’s Perspective: Integrating UAS into the National Airspace System*, 28 Air & Space L. 3, 3 (2015).

⁵ *Id.*

element has been considered to be at the heart of maintaining proper flight intervals within the NAS.⁶

The second challenge includes the potential for UAS operators to lose control of the aircraft due to a lost link between the ground control station and the drone itself.⁷ The same situation may arise from a system failure onboard the aircraft, or if the aircraft is flown beyond the signal range of the communication link.⁸

In order to identify the statutory and regulatory framework that can mitigate these challenges and support a safe and seamless integration of UAS flights BVLOS into the NAS, this article will address the issue through three primary areas as they pertain to the FAA: the aircraft, the operators, and the airspace. For the aircraft, current laws regarding the required attributes of drones will be explored, to include Remote ID and other registration concerns. Then, the training and certifications for operators will be analyzed. Lastly, the nature of safely delineating the airspace for both crewed and uncrewed flights through regulatory support—along with the necessary technologies that must be available—will be discussed.

II. THE AIRCRAFT

The first consideration for UTM is the aircraft itself. To properly integrate UAS into the national airspace, the physical components that will be traversing through the air must be regulated for safe operations. In doing so, the law must be clear as to the definitions of an aircraft relative to UAS. Then, a systematic method to register and identify drones is necessary to record the ever-increasing number of aircraft, as well as to ensure they are properly equipped with components for collision avoidance. These attributes become even more pressing as the FAA expands drone operations to allow for less restrictive flights over people. Through the same rule, the agency has also granted more opportunities to conduct UAS flights at night.

As I.H.Ph. Diederiks-Verschoor stated, “UAS operations must be as safe as manned aircraft insofar as they must not present or

⁶ *Id.*

⁷ Zektser & Griffith, *supra* note 4, at 3.

⁸ *Id.*

create a greater hazard to persons, property, vehicles, or vessels whilst in the air or on the ground than that attributable to the operations of manned aircraft of equivalent class or category.”⁹

A. Defining an Aircraft

i. The Federal Aviation Act of 1958 and *Huerta v. Pirker*

The Federal Aviation Act of 1958 defines the term “aircraft” as “any contrivance invented, used, or designed to navigate, or fly in, the air.”¹⁰ Timothy Ravich, an associate professor of legal studies at the University of Central Florida, noted that the legal definition for different types of conveyances is important, especially given that the relatively new generation of aircraft (drones) may not always be clearly categorized within the current lexicon of aircraft types.¹¹

Issues surrounding how an aircraft may be defined were apparent in *Huerta v. Pirker*. In this case, the Administrator of the FAA ordered the respondent to pay a civil penalty in the amount of \$10,000 based on the agency’s findings.¹² The FAA alleged that the respondent violated 14 C.F.R. § 91.13(a) due to his careless or reckless operation of an uncrewed aircraft, “so as to endanger the life or property of another.”¹³ However, the court terminated the enforcement proceeding against the respondent, finding that the regulation did not apply because the respondent’s device (a remotely-piloted Ritewing Zephyr) did not meet the definition of an aircraft under § 91.13(a).¹⁴

Therefore, although the legislature has provided a statutory definition for aircraft, this case demonstrates the need to clearly categorize and identify types of aircraft, particularly with drones. As the usage of UAS inevitably increases, additional manufactur-

⁹ I.H.PH. DIEDERIKS-VERSCHOOR, AN INTRODUCTION TO AIR LAW 261 (9th ed. 2012).

¹⁰ TIMOTHY M. RAVICH, INTRODUCTION TO AVIATION LAW 106 (2020). See 49 U.S.C. § 40102(a)(6).

¹¹ *Id.* at 107.

¹² *Id.* at 121. See *Huerta v. Pirker*, NTSB No. EA-5730 (Nat’l Transp. Safety Bd. Nov. 17, 2014).

¹³ Ravich, *supra* note 10, at 121.

¹⁴ *Id.*

ers and models within this line further necessitate the need for a regulatory system to define uncrewed aircraft categories.

ii. 14 C.F.R. Part 107 (Small Unmanned Aircraft Systems)

14 C.F.R. Part 107 provides a foundational basis for defining drones by identifying five important components of drone operations: control station, small unmanned aircraft, small unmanned aircraft system, unmanned aircraft, and visual observer:

- *Control station* means an interface used by the remote pilot to control the flight path of the small unmanned aircraft.
- *Small unmanned aircraft* means an unmanned aircraft weighing less than 55 pounds on takeoff, including everything that is on board or otherwise attached to the aircraft.
- *Small unmanned aircraft system (small UAS)* means a small unmanned aircraft and its associated elements (including communication links and the components that control the small unmanned aircraft) that are required for the safe and efficient operation of the small unmanned aircraft in the national airspace system.
- *Unmanned aircraft* means an aircraft operated without the possibility of direct human intervention from within or on the aircraft.
- *Visual observer* means a person who is designated by the remote pilot in command to assist the remote pilot in command and the person manipulating the flight controls of the small UAS to see and avoid other air traffic or objects aloft or on the ground.¹⁵

In addition to the delineation between UAS and small UAS (sUAS), these terms also clarify the construct of the entire uncrewed aircraft system, which includes the ground control stations. As UAS operations are given clearance to fly BVLOS under UTM objectives, the parallel increase in the number of ground control stations presents the need to accurately define this component as well.

¹⁵ 14 C.F.R. § 107.3.

B. Registration and Remote ID

i. Registering UAS under 14 C.F.R. Part 107 (Small Unmanned Aircraft Systems)

Here, the regulation states that, “A person operating a civil small unmanned aircraft system for purposes of flight must comply with the provisions of § 91.203(a)(2) of this chapter.”¹⁶ In regard to the certifications required under § 91.203, an effective U.S. registration certificate issued to its owner for operations within the country must be available.¹⁷

In the past, the FAA faced criticism from Congress regarding its mandate to the agency to fully integrate UAS into the NAS by the September 2015 deadline.¹⁸ The requirements and procedures involving the registration of UAS were part of the issue. In its proposed rule, published in early 2015, the FAA received over 4,000 comments filed by a litany of stakeholders, including manufacturers, airline pilots, privacy advocacy groups, retailers, railroad representatives, real estate agents, utility companies, and even movie and television producers.¹⁹ Initially, the proposed framework from this rule would have permitted sUAS commercial operations to commence without requiring airworthiness certifications or a certificate of authorization.²⁰ Although sUAS would be exempt from these certifications for nonrecreational flights, the rule would nevertheless mandate operators to maintain the aircraft in a condition deemed safe for flight and to conduct preflight inspections.²¹ Despite these reprieves in terms of certifications, sUAS must comply with the same aircraft registration requirements applicable to all other aircraft.²²

Given the relatively nascent use of commercial sUAS in a BVLOS capacity, the current registration requirements are adequate to safeguard the public with regards to screening the aircraft before flights over the populace. However, as UTM becomes

¹⁶ 14 C.F.R. § 107.13.

¹⁷ 14 C.F.R. § 91.203.

¹⁸ Brent Connor, *Perspectives on FAA’s Proposed Rule on Operating Small Unmanned Aircraft Systems*, 28 Air & Space L. 1, 1 (2015).

¹⁹ *Id.*

²⁰ *Id.* at 20.

²¹ Connor, *supra* note 18, at 20.

²² *Id.*

more prevalent, these regulations should include standardized requirements for maintenance and preflight checks. Aircraft accidents due to poor maintenance are wholly preventable, notwithstanding any product liability concerns. Such accidents are even more preventable when considering the importance of vigilant preflight inspections. The challenge comes with proper oversight and accountability for these inspections. Since it will likely not be feasible to employ an FAA program solely dedicated to the inspection of sUAS, the accountability aspect of drone accidents can be better enforced through the Remote ID program.

ii. Remote ID Under the Remote Identification of Unmanned Aircraft Systems Final Rule (14 C.F.R. Part 89)

The FAA's Office of NextGen has stated that Remote ID capabilities contribute towards public safety and security by allowing federal agencies, law enforcement, and members of the public to remotely identify UAS operating within a particular jurisdiction.²³ In its Notice of Proposed Rulemaking on Remote Identification of Unmanned Aircraft Systems, the FAA received over 53,000 comments after the notice was published in December 2019.²⁴ The final rule, published in the Federal Registrar in January 2021, became effective two months later.²⁵ According to this rule, drone operators can comply with the identification requirements of the Remote ID rule via three methods:

- Operate a standard Remote ID drone that broadcasts identification and location information about the drone and its control station. A standard Remote ID drone is one that is produced with built-in Remote ID broadcast capability in accordance with the Remote ID rule's requirements.
- Operate a drone with a Remote ID broadcast module. A broadcast module is a device that broadcasts identification and location information about the drone and its take-off location in accordance with the Remote ID rule's requirements.

²³ FAA, UTM CONCEPT OF OPERATIONS, *supra* note 2, at 64.

²⁴ UAS Remote Identification Overview, Fed. Aviation Admin. (Mar. 15, 2023), https://www.faa.gov/uas/getting_started/remote_id/ [hereinafter FAA Remote Identification Overview].

²⁵ *Id.*

The broadcast module can be added to a drone to retrofit it with Remote ID capability. Persons operating a drone with a Remote ID broadcast module must be able to see their drone at all times during flight.

- Operate (without Remote ID equipment) at FAA-recognized identification areas (FRIAs) sponsored by community-based organizations or educational institutions. FRIAs are the only locations unmanned aircraft (drones and radio-controlled airplanes) may operate without broadcasting Remote ID message elements.²⁶

The final rule also established 14 C.F.R. Part 89, which effectively mandates a “digital license plate” for uncrewed aircraft.²⁷

In early April 2021, the agency also launched its online Remote ID training program, designed to provide convenience for operators certified under 14 C.F.R. Part 107 to renew their statuses without having to attend in-person testing.²⁸

Remote ID is especially important as a complement to the FAA’s final rule on The Operation of Unmanned Aircraft Systems Over People, which also became effective in March 2021.²⁹ Amending portions of 14 C.F.R. Part 107, this final rule allows for routine UAS flights over people and at night under certain circumstances.³⁰ Prior to conducting UAS flights at night, the aircraft must also be equipped with anti-collision lights that are visible from up to three statute miles and have a sufficient flash rate to avoid collisions.³¹ Since the rule was first proposed in 2019, one change also mandated that these drones not have any exposed rotating parts that could injure others.³² Before this final rule, UAS opera-

²⁶ *Id.*

²⁷ FED. AVIATION ADMIN., EXECUTIVE SUMMARY: FINAL RULE ON REMOTE IDENTIFICATION OF UNMANNED AIRCRAFT (Part 89) (2020), https://www.faa.gov/sites/faa.gov/files/2021-08/RemoteID_Executive_Summary.pdf [hereinafter FAA, EXECUTIVE SUMMARY 2020].

²⁸ Jaron Schneider, *Drone Pilots Can Complete Remote ID Training Starting April 6*, PetaPixel (Apr. 2, 2021), <https://petapixel.com/2021/04/02/drone-pilots-can-complete-remote-id-training-online-starting-april-6/>.

²⁹ FAA, EXECUTIVE SUMMARY 2020, *supra* note 28.

³⁰ *Id.*

³¹ *Id.*

³² David Shepardson, *New Rules Allowing Small Drones to Fly Over People in U.S. Take Effect*, Reuters (Apr. 21, 2021), <https://www.reuters.com/business/aerospace-defense/new-rules-allowing-small-drones-fly-over-people-us-take-effect-2021-04-21/>.

tions over people were limited to flights where the people were directly involved with the flight, located under a covered infrastructure, or inside a stationary vehicle (with exceptions provided through FAA waivers).³³

Due to the reduced visibility for flights operating at night, the Remote ID requirements will provide airspace users and any governmental authority with the ability to quickly and accurately identify drones that may have either violated restricted airspace or caused any accidents. The enhanced safety features inherent with mandating anti-collision lights will likely prove effective to promote situational awareness for anyone affected by the drone operations.

Even though 14 C.F.R. Part 89 has established the foundational basis for regulatory accountability of uncrewed aircraft operating in the NAS, additional security concerns should be addressed before allowing widespread BVLOS operations. For example, the regulation states that standard Remote ID uncrewed aircraft will transmit data from the aircraft via radio frequency broadcasts (and likely through Wi-Fi or Bluetooth technology).³⁴ However, the provision should include mandatory encryption or additional safeguards for an uncrewed aircraft's Remote ID. This is especially true if public Wi-Fi signals are utilized to transmit Remote ID data when the uncrewed aircraft is transporting potentially protected or sensitive information, such as medical records.

Also, 14 C.F.R. Part 89 could be further improved by associating uncrewed aircraft capabilities with § 91.225, which governs the requirements for Automatic Dependent Surveillance-Broadcast (ADS-B) Out equipment and use.³⁵ Currently, the intent for UTM is to initially contain UAS BVLOS operations to uncontrolled Class G airspace, where aircraft generally do not operate under the direction of air traffic controllers (ATC). However, as the logistical advantages of UAS operations become more prevalent, their flights will begin to include sectors of controlled airspace. It is foreseeable that places such as Class B airports, with a high-volume of air traffic, may eventually become popular delivery destinations for UAS carrying commercial goods. The same con-

³³ *Id.*

³⁴ FAA, UAS REMOTE IDENTIFICATION OVERVIEW, *supra* note 24.

³⁵ 14 C.F.R. § 91.225.

cerns apply to UAS BVLOS flights in metropolitan or other densely populated areas. Therefore, mandating that such uncrewed aircraft operating within these sectors be equipped with ADS-B Out capabilities will better serve the public in regard to promoting situational awareness for operators and ATC.

After examining the legal framework regarding uncrewed aircraft for integration into the NAS, the next area of concern is the personnel behind UAS operations.

III. THE OPERATORS

As of December 2020, the U.S. has over 203,000 FAA-certified drone operators and more than 1.7 million registered drones.³⁶ In addition to the regulatory requirements emplaced on the aircraft themselves, another pragmatic and effective consideration is to properly train and evaluate uncrewed aircraft operators to ensure maximum compliance under UTM principles. Regardless of the safety mitigations applied to uncrewed aircraft, such equipment can still become hazards to the aviation community without proper stewards in the form of UAS operators.

The FAA has defined “the operator” as the person or entity that is responsible for the overall management of the drone’s operations.³⁷ Specifically, the operator “meets regulatory responsibilities, plans flights/operations, shares operation intent information, and safely conducts operations using all available information.”³⁸

As an additional role with a focus on flying the drone itself, the FAA has also delineated the “remote pilot in command.”³⁹ Here, this person is solely responsible for the safe conduct of every UAS flight, and it is possible for a person to serve as both the operator and the remote pilot in command.⁴⁰ Specifically, the remote pilot in command “adheres to the operational rules of the airspace in which the [UAS] is flying; avoids other aircraft, terrain and ob-

³⁶ U.S. Department of Transportation Issues Two Much-Anticipated Drone Rules to Advance Safety and Innovation in the United States, Fed. Aviation Admin. (Dec. 28, 2020), <https://www.faa.gov/newsroom/us-department-transportation-issues-two-much-anticipated-drone-rules-advance-safety-and>.

³⁷ FAA, UTM CONCEPT OF OPERATIONS, *supra* note 2, at 9.

³⁸ *Id.*

³⁹ *Id.*

⁴⁰ *Id.*

stacles; assesses and respects airspace constraints and flight restrictions; and avoids incompatible weather/environments.”⁴¹

A. Qualifications Under 14 C.F.R. Part 107 (Small Unmanned Aircraft Systems)

Under 14 C.F.R. Part 107, remote pilot certification requirements are listed under Subpart C.⁴² Currently, the remote pilot certificate is valid for two years, and UAS operators must pass a recurrent knowledge test after those two years have elapsed.⁴³ As UTM progresses with its automated airspace clearance procedures, new software (most likely in the form of a mobile app) will require UAS operators to remain up to date with the inevitable flurry of new app versions. In the event that the FAA or private sector organizations cannot incrementally push these software updates in relatively seamless segments that will not materially affect UTM protocols, then UAS operators conducting BVLOS flights may need to pass these recurrent knowledge test in a more frequent manner. The challenge to mandate these shorter certificate intervals will likely entail the lagging of regulatory changes behind these software updates. To prevent this issue, the FAA may need to amend 14 C.F.R. § 107.64 (Temporary Certificate) to allow for UAS operators to temporarily update their two-year remote pilot certificates upon downloading the recent app updates and passing a corresponding online training module or exam.

As mentioned earlier, the FAA now provides an online Remote ID training program for UAS operators certified under 14 C.F.R. Part 107.⁴⁴ Although Remote ID is governed by the newly-established Part 89, certain provisions within Part 107 (such as §§ 107.65 – Aeronautical Knowledge Recency; 107.67 – Knowledge Tests: General Procedures and Passing Grades; 107.73 – Knowledge and Training; and 107.74 – Small Unmanned Aircraft System Training) should mention the Remote ID requirements for BVLOS operations under UTM. Referring to Part 89 under these sections will help to uniformly notify UAS operators of certifica-

⁴¹ *Id.* at 10.

⁴² 14 C.F.R. 107 pt. C.

⁴³ *Become a Drone Pilot*, Fed. Aviation Admin. (Aug. 16, 2022), https://www.faa.gov/uas/commercial_operators/become_a_drone_pilot/.

⁴⁴ Schneider, *supra* note 28.

tion requirements to a wider degree. This is equally true when portions of Part 107 already refer to Part 89 regarding the decreased restrictions for drone operations over people.⁴⁵

B. Qualifications Under 14 C.F.R. Part 61 (Certification: Pilots, Flight Instructors, and Ground Instructors)

Next, certification regulations for pilots of crewed aircraft are stated under 14 C.F.R. Part 61.⁴⁶ The structure of Part 61 in terms of separately identifying pilots and ground instructors may need to be adopted by Part 107 as UTM progresses. As UAS BVLOS operations become more established, the distances that the drones travel will likely increase as well. Therefore, more ground control stations can be expected to support these longer flights. As the number of personnel operating these stations continue to grow, their responsibilities pertaining to the UAS flights themselves may also become more numerous. For example, a safeguard for UAS operations include lost-link capabilities, in which the aircraft will automatically abandon its previous flight route and navigate to a predetermined location if it detects a lost signal with the ground control station. Thus, Part 107 may eventually designate an additional role for extended UAS operations, such as a ground control station operator. At this point, Part 107 must also include regulations to define this role, analogous to portions of Part 61:

§ 61.1 – Applicability and Definitions.

(b) For the purpose of this part:

“Authorized instructor” means—

(iii) A person authorized by the Administrator to provide ground training or flight training under part 61, 121, 135, or 142 of this chapter when conducting ground training or flight training in accordance with that authority.⁴⁷

As UAS becomes fully integrated into the NAS, roles and responsibilities of operators and remote pilots will certainly change

⁴⁵ 14 C.F.R. § 107.110(b), 14 C.F.R. § 107.115(b), and 14 C.F.R. § 107.140(a)(2).

⁴⁶ 14 C.F.R. pt. 61.

⁴⁷ 14 C.F.R. § 61.1(b)(iii).

as well to include greater training requirements amidst expanded operations. In addition to the recent Remote ID requirements, the automated airspace clearance procedures within the UTM ecosystem will also necessitate more training and evaluations for UAS BVLOS flights. Then, the inevitably longer flight routes that will follow create a need for more ground control stations to facilitate these extended ranges. Perhaps these ground control stations may concurrently serve as logistical or distribution hubs for commercial goods to be transported via UAS operations. Regardless of how this expansion may take shape, the regulatory framework must keep pace with the progression of UTM.

After analyzing both the aircraft and the personnel components of UTM, the final factor to examine is the medium in which uncrewed aircraft will operate.

IV. THE AIRSPACE

US airspace sovereignty and its usage are established by 49 U.S.C. § 40103.⁴⁸ The generally broad provisions regarding the use of airspace are largely vested in the Administrator of the FAA:

(b) Use of Airspace—

(1) The Administrator of the Federal Aviation Administration shall develop plans and policy for the use of the navigable airspace and assign by regulation or order the use of the airspace necessary to ensure the safety of aircraft and the efficient use of airspace. The Administrator may modify or revoke an assignment when required in the public interest.

(2) The Administrator shall prescribe air traffic regulations on the flight of aircraft (including regulations on safe altitudes) for—

- (A) navigating, protecting, and identifying aircraft;
- (B) protecting individuals and property on the ground;
- (C) using the navigable airspace efficiently; and

⁴⁸ 49 U.S.C. § 40103.

(D) preventing collision between aircraft, between aircraft and land or water vehicles, and between aircraft and airborne objects.⁴⁹

In order to apply this statute to the UTM ecosystem, the FAA's Office of NextGen describes the "notional architecture" (Figure 1) by acknowledging that the agency "maintains its regulatory and operational authority for airspace and traffic operations."⁵⁰ However, the FAA makes a distinction in regards to ATC, stating that operations are instead "organized, coordinated, and managed by a federated set of actors in a distributed network of highly automated systems via application programming interfaces (APIs)."⁵¹

⁴⁹ 49 U.S.C. § 40103(b)(1)-(2).

⁵⁰ FAA, UTM CONCEPT OF OPERATIONS, *supra* note 2, at 8.

⁵¹ *Id.*

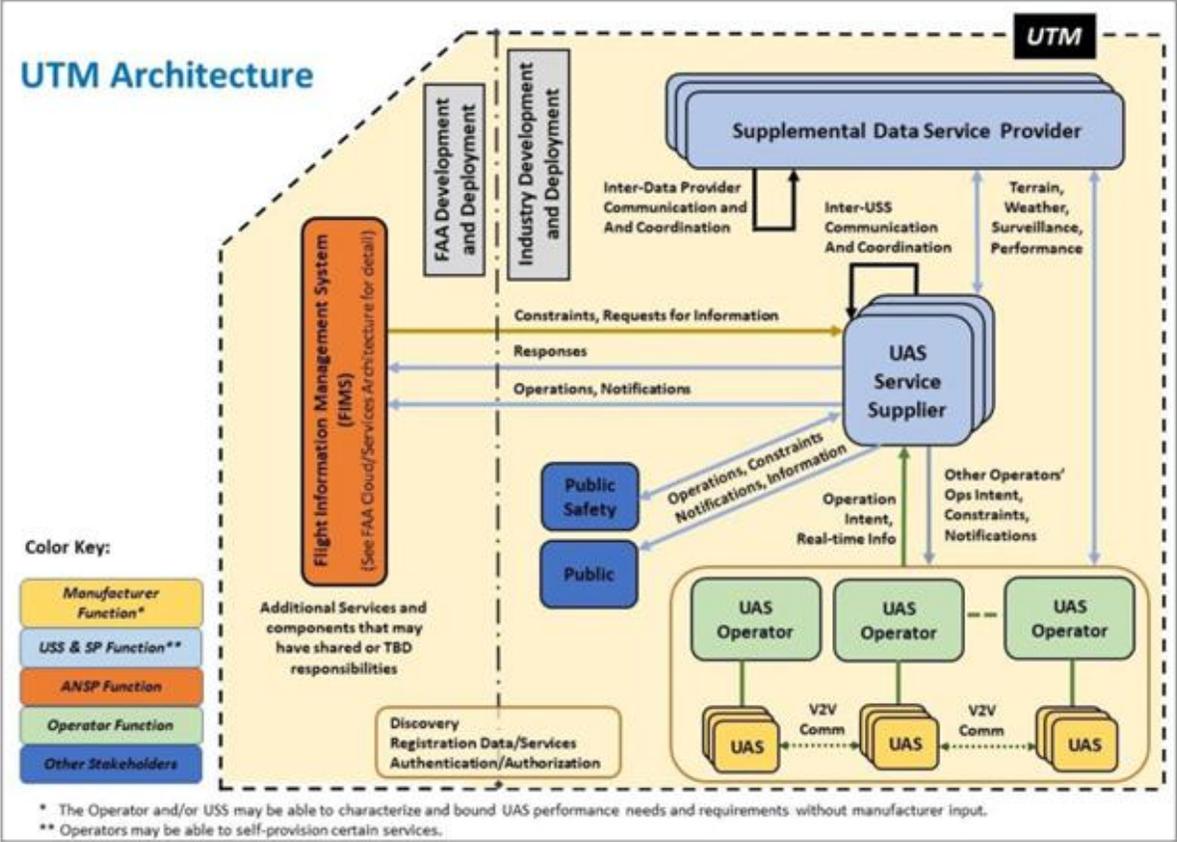


Figure 1. Notional UTM Architecture, Highlighting the Utilization of Third-Party Entities in Support of the FAA and UAS Operators.⁵²

The FAA further defines its roles within the UTM construct, including the responsibilities to “provide a regulatory and operational framework for operations and to provide FAA-originated airspace constraint data to airspace users (e.g., airspace restrictions, facility maps, [and] active Special Activity Airspace [SAA]).”⁵³

Issues relating to uncrewed aircraft and airspace deconfliction measures have arisen in case law, which further supports the

⁵² *Id.* at 9.
⁵³ *Id.*

importance of ensuring that clearly defined and effective regulations and statutes are promulgated from the FAA and Congress, respectively. In *Singer v. City of Newton*, a dispute arose when a city ordinance mandated that all owners of uncrewed aircraft must register their drones with the city.⁵⁴ The local ordinance also prohibited the operation of uncrewed aircraft BVLOS or in designated areas without express permission.⁵⁵ As a result, the city's ordinance conflicted with the FAA Modernization and Reform Act of 2012 (FMRA), in which Congress directed the agency to, "develop a comprehensive plan to safely accelerate the integration of civil unmanned aircraft systems into the national airspace system."⁵⁶ Here, the court ruled in favor of the plaintiff on the grounds of conflict preemption, which occurs when, "compliance with both state and federal regulations is impossible or if state law obstructs the objectives of the federal regulation."⁵⁷ The court reasoned that the local ordinance was preempted by federal law because the city sought to register all uncrewed aircraft in addition to restricting their altitudinal limitations, contravening the FAA's intended authority.⁵⁸ "Newton's choice to restrict any drone use below this altitude thus works to eliminate any drone use in the confines of the city, absent prior permission. This thwarts not only the FAA's objectives, but also those of Congress for the FAA to integrate drones into the national airspace," the court articulated.⁵⁹

A. *49 U.S.C. § 44802 (Integration of Civil Unmanned Aircraft Systems into National Airspace System)*

This statute establishes the comprehensive plan for integrating UAS into the NAS:

Not later than November 10, 2012, the Secretary of Transportation, in consultation with representatives of the aviation industry, Federal agencies that employ unmanned aircraft sys-

⁵⁴ RAVICH, *supra* note 10, at 93. *See also Singer v. City of Newton*, 284 F. Supp. 3d 125 (D. Mass. 2017).

⁵⁵ RAVICH, *supra* note 10, at 93.

⁵⁶ *Id.* at 95. *See* FAA Modernization and Reform Act of 2012, *supra* note 1.

⁵⁷ RAVICH, *supra* note 10, at 95.

⁵⁸ *Id.* at 98.

⁵⁹ *Id.* at 98–99.

tems technology in the national airspace system, and the unmanned aircraft systems industry, shall develop a comprehensive plan to safely accelerate the integration of civil unmanned aircraft systems into the national airspace system.⁶⁰

In a report from the Government Accountability Office (GAO), FAA officials stated that in addition to general aviation authorities, Congress expressly authorized the agency to promulgate regulations to allow low-altitude UAS operations, “even if they occur below ‘navigable airspace’ pursuant to 49 U.S.C. §§ 44802 and 44807.”⁶¹ According to the GAO, these provisions codify FMRA’s intent to formulate the required guidance for UAS flights “in the ‘national airspace system,’ provided that [the] FAA determines such operations may be carried out safely.”⁶² The report continues by denoting that even though Congress has not clearly defined the “national airspace system,” the FAA has described the term as, “a ‘network’ of ‘U.S. airspace’ together with aviation-related facilities, rules, technical information, manpower, and material.”⁶³ A Department of Transportation (DOT) official then distinguished the terms “national airspace system” and “navigable airspace” by stating that the former is, “a broader concept than the ‘navigable airspace.’”⁶⁴ To clarify this concept, the FAA, in its airport airspace analysis, defined “navigable airspace” as

“the airspace at or above the minimum altitudes of flight that includes the airspace needed to ensure safety in the takeoff and landing of aircraft. Congress has charged the FAA with administering this airspace in the public interest as necessary to ensure the safety of aircraft and its efficient use.”⁶⁵

Even though this particular content from the GAO report, when coupled with the FAA’s airport airspace analysis, is suffi-

⁶⁰ 49 U.S.C. § 44802(a)(1).

⁶¹ U.S. GOV’T ACCOUNTABILITY OFF., UNMANNED AIRCRAFT SYSTEMS: CURRENT JURISDICTIONAL, PROPERTY, AND PRIVACY LEGAL ISSUES REGARDING THE COMMERCIAL AND RECREATIONAL USE OF DRONES 7 (2020), <https://www.gao.gov/assets/b-330570.pdf>.

⁶² *Id.*

⁶³ *Id.* See FED. AVIATION ADMIN., AIR TRAFFIC CONTROL ORDER NO. JO 7110.65Y (Aug. 15, 2019), <https://www.faa.gov/documentLibrary/media/Order/7110.65Y.pdf>.

⁶⁴ U.S. GOV’T ACCOUNTABILITY OFF., *supra* note 61, at 7.

⁶⁵ *Airport Airspace Analysis (AAA)*, Fed. Aviation Admin. (Oct. 5, 2022), https://www.faa.gov/airports/engineering/airspace_analysis/.

cient to delineate the differences between the terms “national airspace system” and “navigable airspace,” the FAA can offer greater clarity by succinctly differentiating the spatial attributes of each term via the “General Definitions” of 14 C.F.R. § 1.1. Currently, only “navigable airspace” and “national *defense* airspace” are defined in this section, excluding “national airspace.”⁶⁶

Nevertheless, the FAA issued guidance for airspace deconfliction measures between UAS and crewed aircraft. Pursuant to FMRA, the agency issued regulations specific to UAS flight characteristics in 2015 (i.e., aircraft dimensions and low-altitude flight profile).⁶⁷ Generally, the FAA mandates that crewed aircraft will maintain an altitude of at least 500 feet above ground level (AGL), whereas sUAS will operate at no higher than 400 feet AGL to offer vertical separation between the two aircraft types.⁶⁸

B. 14 C.F.R. Part 91 (General Operating and Flight Rules)

Currently, § 91.225 of this regulation generally prohibits remote pilots from operating UAS with ADS-B Out equipment in transmit mode unless:

- The operation is conducted under a flight plan and the person operating that unmanned aircraft maintains two-way communication with ATC; or
- The use of ADS-B Out is otherwise authorized by the Administrator.⁶⁹

Referring to the previous section discussing collision-avoidance capabilities for UAS, the FAA can consider lifting the blanket restriction in preparation for increased UAS traffic in vicinity of Class B airports or over densely populated urban areas once UTM becomes more prevalent. The two-way communication mandate could needlessly overburden remote pilots in command and would require additional training to ensure proficiency at the cost of efficiency. The automated nature of UTM to facilitate increased UAS traffic would be degraded with these increased de-

⁶⁶ 14 C.F.R. § 1.1.

⁶⁷ U.S. GOV'T ACCOUNTABILITY OFF., *supra* note 61, at 7.

⁶⁸ *Id.*

⁶⁹ 14 C.F.R. § 91.225(i)(2).

mands on the personnel conducting UAS operations. The general exception allowing the FAA Administrator to grant ADS-B Out usage to UAS further supports the notion that these limitations are unnecessarily restrictive.

C. FAA Reauthorization Act of 2018

Another legislative action to consider is the FAA Reauthorization Act of 2018. In addition to highlighting the Remote ID program, as well as public safety concerns due to widespread UAS operations, this Act also addresses the carriage of property by small uncrewed aircraft systems.⁷⁰ Recognizing the cargo delivery capabilities of UAS, former FAA Deputy Administrator Daniel Elwell stated that regulations must be promulgated to authorize “the carriage of property by operators of UAS for compensation or hire in the United States.”⁷¹ These efforts to promote UAS operations for package deliveries included the recent final rules allowing for more flights over people and at night.⁷² Elwell also shared that the FAA had issued the first ever air carrier certification for a commercial UAS operation, allowing for package deliveries through drone flights to rural Blacksburg, Virginia.⁷³

D. Research Transition Team (RTT)

In addition to the statutes and regulations mentioned, an RTT has been established amongst the FAA, NASA, and industry stakeholders to promote the UTM initiative.⁷⁴ The group acknowledges the inherent challenges with integrating UAS operations at low altitudes in both controlled and uncontrolled airspace.⁷⁵ As a

⁷⁰ *Implementation of the FAA Reauthorization Act of 2018*, Dep’t of Transp. (Sept. 26, 2019), <https://www.transportation.gov/testimony/implementation-faa-reauthorization-act-2018>.

⁷¹ *Id.*

⁷² *Id.*

⁷³ *Id.* See also *Drone Delivery Launches in Southwest Virginia*, Va. Tech (Oct. 18, 2019), <https://vtnews.vt.edu/articles/2019/10/ictas-wingdronedeliverylaunch.html> (introducing Wing, a drone-delivery company associated with Google’s parent company Alphabet).

⁷⁴ *Unmanned Aircraft System Traffic Management (UTM)*, Fed. Aviation Admin. (Aug. 16, 2022), https://www.faa.gov/uas/research_development/traffic_management/.

⁷⁵ FED. AVIATION ADMIN. & NAT’L AERONAUTICS AND SPACE ADMIN., UAS TRAFFIC MANAGEMENT (UTM) RESEARCH TRANSITION TEAM (RTT) PLAN: FAA AND NASA COLLABORATIVE EFFORTS PLANNED THROUGH SEPTEMBER 2020 6 (2017),

solution to integrate private stakeholders into UTM, the RTT has developed Joint Management Plans (JMPs) to memorialize specific actions, create corresponding timetables for accomplishments, assign organizational roles and responsibilities, and describe the desired metrics for any planned outcomes from the collaborative effort.⁷⁶

As the aforementioned roles and responsibilities from private stakeholders take shape, corresponding updates to 14 C.F.R. Part 107, and possibly Part 89, should follow. Setting the regulatory guidance for this dynamic initiative is important because local, private stakeholders may vary drastically amongst different airspace sectors throughout the U.S. Therefore, a defined set of rules to manage this civil-governmental relationship will be paramount for the success of UTM.

E. Low Altitude Authorization and Notification Capability (LAANC)

In support of the collaborative approach between the public and private sectors to share airspace information, the FAA has also created its UAS Data Exchange.⁷⁷ Under the agency's UAS Data Exchange umbrella, multiple partnerships will benefit through the LAANC.⁷⁸ The FAA states that, "LAANC automates the application and approval process for airspace authorizations."⁷⁹ In doing so, it provides UAS operators with access to controlled airspace below 400 feet AGL, allows for greater awareness for restricted airspace, and enhances situational awareness for air traffic personnel regarding their ability to identify and track drone flights.⁸⁰ The system also checks airspace approval requests against multiple data sources, including "UAS Facility Maps, Special Use Airspace Data, Airports and Airspace Classes, as well as Temporary Flight Restrictions (TFRs) and Notices to Airmen

https://www.faa.gov/sites/faa.gov/files/2022-08/FAA_NASA_UAS_Traffic_Management_Research_Plan.pdf.

⁷⁶ *Id.* at 5.

⁷⁷ RAVICH, *supra* note 10, at 81.

⁷⁸ *Id.*

⁷⁹ *Id.*

⁸⁰ *UAS Data Exchange (LAANC)*, Fed. Aviation Admin. (Nov. 18, 2021), https://www.faa.gov/uas/programs_partnerships/data_exchange/.

(NOTAMs).⁸¹ Once these requests are approved, UAS operators can receive nearly instant authorization through the automated process.⁸²

LAANC represents an ambitious and fruitful collaborative effort between the FAA and private entities within the aviation industry. At this time, the agency has approved 16 UAS Service Suppliers (USS) to provide LAANC services in accordance with both 14 C.F.R. Part 107 and 49 U.S.C. § 44809 (Exception for Limited Recreational Operations of Unmanned Aircraft).⁸³ Additionally, since the LAANC program launched in 2017, the FAA has expanded the initiative nationwide, encompassing more than 500 airports.⁸⁴

V. THE FUTURE

A. UTM Pilot Program (UPP)

The FAA Extension, Safety and Security Act of 2016 established the UPP to identify required capabilities from both the FAA and the aviation industry in support of the UTM initiative.⁸⁵ UPP currently consists of two phases:

Phase 1

- Selected UAS test sites:
 - Nevada Institute for Autonomous Systems (NIAS)
 - Northern Plains UAS Test Site (NPUASTS)
 - Virginia Tech, Mid Atlantic Aviation Partnership (MAAP)
- Demonstrated UTM services:

⁸¹ *Id.*

⁸² *Id.*

⁸³ *Id.*

⁸⁴ William Goodwin & Tyler Finn, *The Local Future of the Low-Altitude Airspace*, 31 *Air & Space L.* 1, 20 (2018).

⁸⁵ *UTM Pilot Program (UPP)*. Fed. Aviation Admin. (May 27, 2022), https://www.faa.gov/uas/research_development/traffic_management/utm_pilot_program/.

- o Exchange of flight intent among operators;
- o Generation of notifications to UAS operators regarding air and ground activities, known as UAS Volume Reservations (UVRs); and
- o Sharing of UVRs with stakeholders, including other USS and the Flight Information Management System (FIMS).

Phase 2

- Selected UAS test sites:
 - o Griffiss International Airport (NYUASTS)
 - o Virginia Tech, Mid Atlantic Aviation Partnership (MAAP)
- The FAA Reauthorization Act of 2018 directed the agency to meet additional testing objectives, including Remote [ID] technologies and operations amidst higher air traffic volumes.⁸⁶

Upon the completion of Phase 2, the FAA will share test results with stakeholders to continue enabling technologies for the UTM ecosystem, such as Remote ID services, which will eventually enable increasing BVLOS operations.⁸⁷ This structured approach to continue developing the necessary technological capabilities to promote UTM is important as the FAA has conducted real-world testing at sites to relay pertinent data to the private sector. Therefore, this process further bolsters the FAA's collaboration with USS to ensure airspace deconfliction abilities will allow for the full integration of UAS into the NAS.

B. Pilotless, Passenger-Carrying Drones

Finally, as commercial UAS operations perfect automated package delivery capabilities within the U.S., a possible new hori-

⁸⁶ *Id.*

⁸⁷ *Id.*

zon will include pilotless drones to transport passengers.⁸⁸ Using “sense-and-avoid” equipment, full automation, and the full array of capabilities provided by the UTM ecosystem, these pilotless vehicles will likely start as short-distance, vertical takeoff and landing (VTOL) aircraft.⁸⁹

However, certain issues may arise with this new form of transportation. These include fair practices in allowing private entities equal access to the UTM Registry across every airspace sector.⁹⁰ Additionally, the process for awarding these potential government contracts for UTM services may implicate antitrust violations.⁹¹ Since 14 C.F.R. Part 107 currently does not mandate airworthiness certificates for uncrewed aircraft, these safety concerns must also be addressed before the capabilities become a reality.⁹²

Despite these foreseeable obstacles hindering pilotless, passenger-carrying drones, the continuing efforts behind UTM are incrementally providing the technological basis for this possibility. Once public and private aviation sectors fully solidify their collaborative ventures to integrate UAS BVLOS operations across all airspace regions within the U.S., then innovation will undoubtedly drive this future mode of transportation.

VI. CONCLUSION

As former FAA Acting Chief Counsel and Deputy Chief Counsel Marc Warren stated, “Law and policy should enable, not hinder, UAS integration.”⁹³ Upon analyzing the current legal framework governing uncrewed aircraft, their operators, and the airspace in which they fly, it is apparent that governmental efforts have established a solid, yet dynamic collection of air law statutes and regulations to propel UAS integration into the NAS via UTM. The ever-important need to constantly anticipate, assess, and act

⁸⁸ E. Tazewell Ellett & Matthew J. Clark, *Passengers Without Pilots*, 45 VBA J. 18, 19 (2018).

⁸⁹ *Id.* at 20.

⁹⁰ *Id.* at 21.

⁹¹ *Id.*

⁹² *Id.* at 22.

⁹³ Marc Warren, *UAS Integration: A Call to Action*, 27 Air & Space L. 1, 20 (2014).

in regards to legal considerations supporting the aviation industry remains vital for future UTM accomplishments.