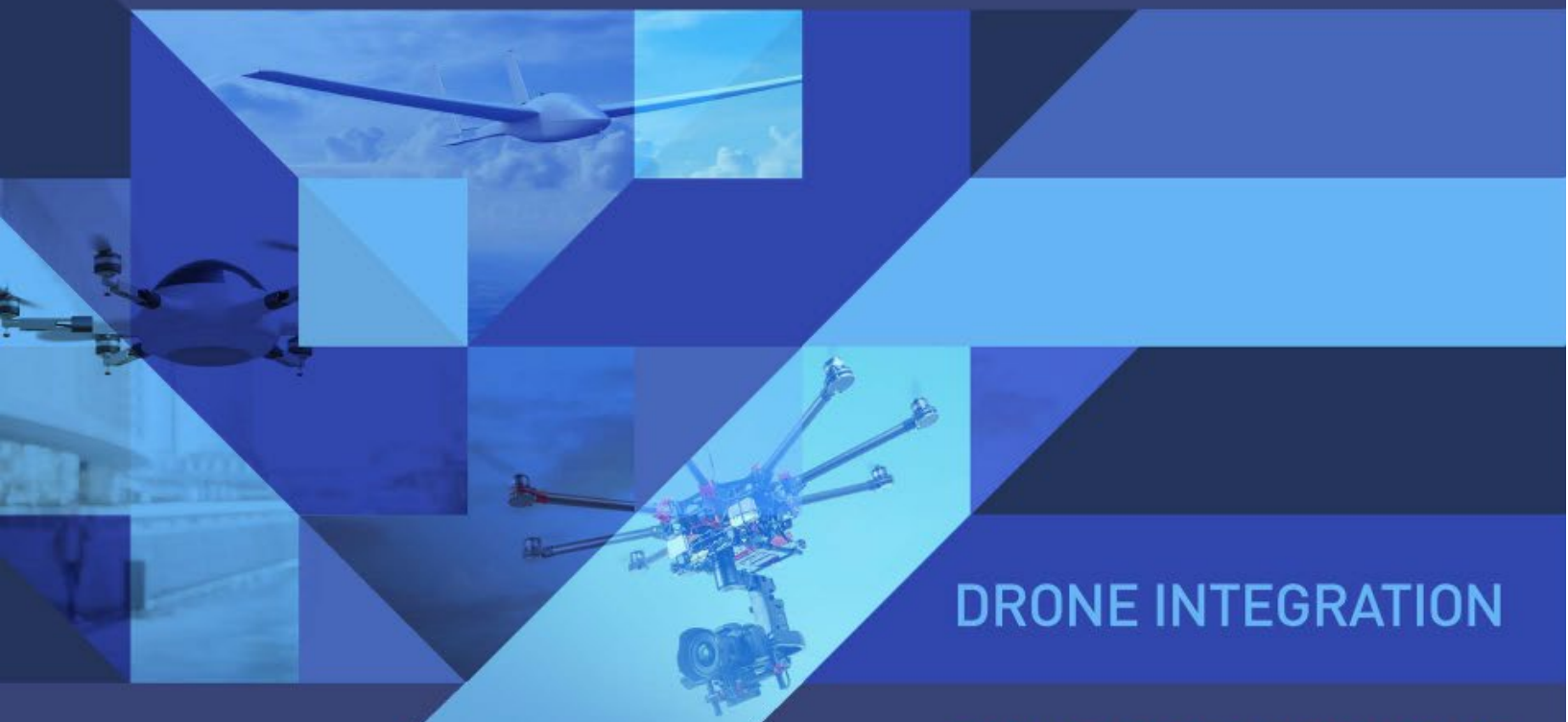
Federal Aviation Administration



DRONE INTEGRATION

CONCEPT OF OPERATIONS [ConOps]

May 2025

UAS Integration Office

The 2025 Drone integration Beyond Visual Line of Sight (BVLOS) Concept of Operations (CONOPS) outlines a conceptual vision for the next decade. It builds upon the current state of drone integration, focusing on a regulatory framework that enables routine, scalable operation beyond visual line of sight. The next step in integrating Unmanned Aircraft Systems (UAS) into the National Airspace System (NAS) is to provide continued safety and economic benefits that provide a predictable and clear pathway for operators to safely conduct routine and scalable operations including but not limited to package delivery, agriculture, aerial surveying, civic interest, flight training, demonstration, recreation, and flight testing in the NAS. This document explains the FAA's role as well as how and why the FAA regulates the airspace using a safety continuum[1] that balances public risk with oversight vigor and policies that have led to the safe integration of over 800,000 registered drones into the NAS today. It is important to note that UAS also known as drones are aircraft and should be treated as such. Ultimately, the CONOPS aims to provide a clear roadmap for integrating drones safely and efficiently into the NAS. This is an exciting step in the FAA's continuing efforts to integrate drones into the NAS. You are all vital partners in this stage of aviation history, and I hope you enjoy the journey.

The Drone Integration BVLOS Concept of Operations aims to establish a shared understanding of a future infrastructure to help develop operational and system-level requirements for routine, commercial, and recreational drone operations.

The 2025 Drone Integration BVLOS CONOPS outlines a conceptual vision for the next decade. It builds upon the current state of drone integration, focusing on a regulatory framework that enables routine, scalable, BVLOS operations. The CONOPS primarily focuses on operations below 400 feet above ground level (AGL), but it also addresses increasingly complex operations across both uncontrolled (Class G) and controlled (Classes B, C, D, E) airspace environments.

The CONOPS lists assumptions, delineates various drone operations, and describes current and future concepts for realizing scalable operations. It encompasses drone aircraft, associated elements, and infrastructure within the operating environment. Covering all classes of airspace within the NAS, the CONOPS aligns with emerging concepts such as Advanced Air Mobility (AAM), describing NAS capabilities necessary for drone integration, and

identifies challenges such as developing performance-based standards for safety, interoperability, and defining the infrastructure required for drone operations in diverse airspace environments. The FAA acknowledges that drone integration, the industry, and the NAS will continue to evolve over the next decade. As such, this CONOPS is a living document, and it will be updated regularly to reflect the latest developments and insights.

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INTRODUCTION

The airspace in the United States is a national public resource, and the FAA's role is to manage that resource toward the optimal public good. The FAA has two primary functions toward this end: to set safety standards to keep people in the sky and on the ground safe and manage access to the NAS. These functions manifest in Federal Aviation Regulations (FARs), hereafter referred to as regulations, and corresponding Air Traffic Management (ATM) procedures, which govern how aircraft transit through the airspace system.

The U.S. airspace and the regulations that manage it have evolved over many decades, almost always as a reaction to public demand. Catastrophic accidents in the early 20th century triggered the creation of the FAA as an independent agency. The Jet Age in the mid-20th century ultimately spawned the advent of commercial aviation, as entrepreneurs capitalized on military-funded technology to meet public demand for faster transportation options. In response to the Airline Deregulation Act of 1978, the FAA began individually certifying airlines and institutionalizing standards for their operation. Each new spark of change necessarily means adapting the airspace and safety rules to accommodate new aircraft, operating models, and ideas that push the boundaries of flight. While the FAA has traditionally focused on manned aircraft and ensuring safety, the rapid development of UAS presents new challenges and opportunities, requiring the FAA to expand its regulatory framework to accommodate both traditional and emerging forms of airspace use.

The beginning of the 21st century brought another aviation paradigm shift – unmanned and remotely piloted aircraft. These aircraft are technically referred to as UAS and are commonly called drones. While a variety of these aircraft existed before this century, their operation had generally fallen into one of two buckets: military aircraft operating in segregated airspace or model aircraft flown by hobbyists at pre-coordinated sites across the country. Neither of these buckets had necessitated the FAA to create a body of UAS-specific regulations. But the timely convergence of advancements in cloud-based systems and automated flight software with automated contingency management software would necessitate communication and data-sharing networks where Bluetooth and Wi-Fi technologies created the ideal operating environment.

Congress first charged the FAA with integrating civil UAS into the NAS in the FAA Modernization and Reform Act of 2012 (Public Law 112-95, Section 332).

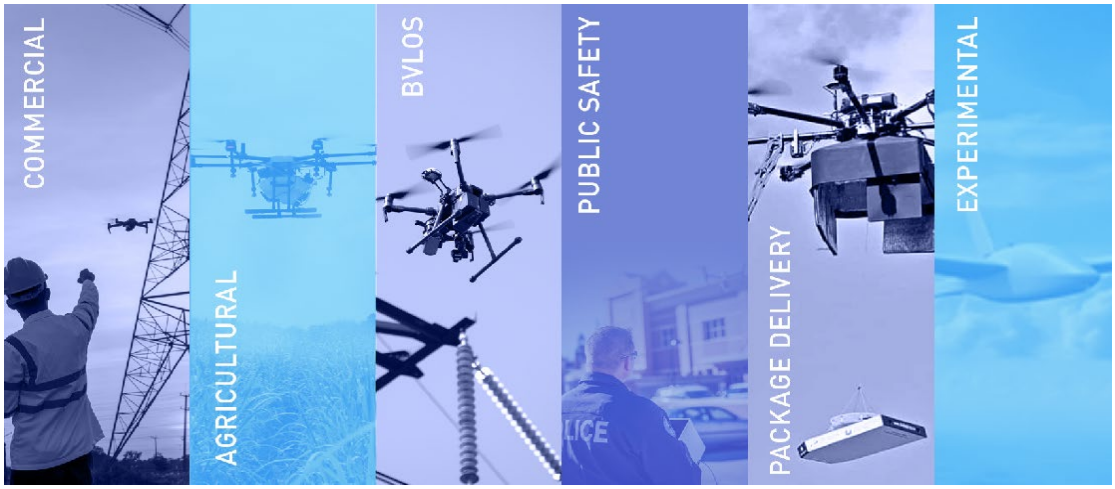
The FAA continues to work with industry stakeholders through initiatives like the Integration Pilot Program (IPP), known present day as BEYOND and the Unmanned Aircraft System Traffic Management (UTM) system, and the Drone Safety Team (DST) which are key to enabling safe and efficient UAS operations in the NAS. These efforts are laying the foundation for expanded operations, such as BVLOS flights made possible based on the increased amounts of waivers granted to date - and AAM, both of which are expected to play significant roles in the future of airspace management.

A few of the important milestones that the FAA has achieved since 2012:

- 2014 - Designation of UAS Test Sites
- 2015 – Creation of blanket COAs to streamline 333 exemptions
- 2016 - Publication of Part 107
- 2017 – Creation of Low Altitude Authorization and Notification Capability (LAANC)
- 2018 – Publication of UTM CONOPS
- 2021 – Publication of Remote ID Rule (Part 89)
- 2021 – Update to Part 107 to expand ops over people and night ops

ROLES AND RESPONSIBILITIES

Stakeholder	Responsibilities
FAA	▪ Govern all airspace classes and ensuring the safety of the national airspace ▪ Develop and implements rules, policies, processes, and guidance ▪ Guide federal and state, local, tribal, and territorial (SLTT) governments and other entities supporting drone integration, including manufacturers and service providers ▪ Inform drone stakeholders of their roles and responsibilities ▪ Grant NAS access through various Certificates of Waiver or Authorization (COAs) procedures and oversees the development of resources for approvals ▪ Support harmonization with International Civil Aviation Organization (ICAO), ICAO member states, and other international organizations to promote global safety and efficiency ▪ Work with federal security partners to develop interim standards for counter-UAS (C-UAS) technologies at and around airports through comprehensive performance testing
Federal, SLTT Governments	▪ Cooperate on different aspects of drone oversight ▪ Share responsibility for regulatory enforcement of drone operations
Law Enforcement	▪ Provide information on drone enforcement and registration matters ▪ Follow FAA guidance to detect situation elements and attempt to locate ▪ Identify the drone operator when public safety is at risk ▪ Report incidents to the FAA Regional Operations Center (ROC) ▪ Execute appropriate enforcement action while maintaining a safe environment
Drone Operators	▪ Obtain necessary certifications and authorizations and meet qualifications for drone operations ▪ Ensure drone is ready for flight and monitor the drone's performance and safety ▪ Remain aware of any potential hazards, obstacles, or changes in weather conditions ▪ Stay up to date with training, regulations, and guidelines set by aviation authorities ▪ Understand and comply with airspace restrictions, obtaining necessary permits, and adhering to safety protocols



CURRENT STATE OF DRONE INTEGRATION

Drones are a fast-growing sector in aviation, with over 860,000 registrations as of August 2024. Today, most drone operations take place in uncontrolled (Class G) airspace under 400 feet AGL, or controlled airspace, under UAS Facility Map (UASFM) altitudes. Among those operations in controlled airspace, in 2022, about 50% took place in Class D, 20% in Class B, 19% in Class C, and 8% in Class E. Amid steadily increasing drone operations of various complexities, the FAA, alongside stakeholders, has developed processes to allow qualified small drones to operate BVLOS, at night above 400 feet, over moving vehicles, and people.

The FAA's regulation and oversight of UAS are governed primarily by two principles: the Agency's legislative authority and the Agency's regulatory safety continuum. The FAA's regulatory safety continuum assesses risk by considering various factors, such as the size of the aircraft, the type of operation, and potential impact on the public. For instance, small drones operating BVLOS or overpopulated areas present different risk levels compared to drones flying in isolated regions or under 400 feet AGL. This continuum allows the FAA to tailor its oversight and regulations to specific operating risks. Title 49 of the United States Code gives the FAA the authority to conduct its safety mission—everything from registering and certifying aircraft and pilots to creating operating rules and ensuring compliance with those rules.

The Agency's regulatory safety continuum picks up where the legislation ends. The FAA bases the rigor of certification requirements and operational limitations on a safety continuum that considers the public's exposure to risk from each aircraft and operation. With finite resources, the Agency strives to match its regulatory and oversight activities to society's expectation of safety.

Ultimately, the safety of the entire airspace system depends on operators and pilots abiding by the rules even when no one is watching, thereby keeping themselves and other airspace users safe. But there are obvious spots in the system where risk is less acceptable. The safety continuum represents the level of safety established by regulation, guidance, and oversight and changes based on risk and societal expectations of safety.

UAS form one end of the FAA's safety continuum. Commercial UAS operations currently conducted in the United States do not carry any passengers or crew onboard, and weigh magnitudes less than a conventional piloted aircraft, significantly reducing the risk to the public should an in-flight incident occur. This reduced risk exposure governs how the FAA oversees these aircraft and their operators – relatively lower risk operations mean the FAA needs to be less involved on a routine basis, and operators need to interact less frequently with the FAA. The lower-risk end of the safety continuum is still evolving as the FAA reacts to market drivers and responds to industry demands for different operating concepts. As a result, the UAS regulatory framework remains a work in progress.

Current State of Drone Integration

Part 107 Operations

While the FAA worked on UAS-specific operating rules since the early 2000's, the Agency's initial effort was missing a key ingredient. Until 2012, the Agency was obligated to issue an airworthiness certificate for every aircraft, even small, unmanned aircraft. In many respects, this requirement was incongruous with the safety continuum concept and would almost certainly have hampered early innovation efforts in the UAS sector. However, leveraging relief from the requirement for airworthiness certification in 49 U.S.C. § 44807, the first drone-specific operating rules, known as Part 107, took effect in August 2016.

Part 107 was unique in several ways. It allowed routine commercial operations of unmanned aircraft without an airworthiness certificate, marking a new step on the FAA's safety continuum. Additionally, instead of requiring a practical flying test, the FAA established a written exam to evaluate a remote pilot's basic aeronautical knowledge This decision was based on the recognition that the wide variety of UAS designs made a uniform practical test impractical, and the absence of enough certified examiners further complicated the logistics. This approach represented a reasonable compromise between safety standards and the evolving nature of the industry. This decision culminated from the dual recognition that there were too many UAS variations to create a uniform practical flying test and a test would have required many examiners to administer the test, which did not exist. Part 107 was an outcome the agency deemed acceptable given the public's expectation of safety.

However, in one crucial way, Part 107 held fast to another central tenet of the existing aviation system – that every pilot must see and avoid other aircraft. Up to this point, aviation regulations had been developed with the assumption that there was always a pilot onboard the aircraft, and even though a pilot is not on board the unmanned aircraft, Part 107 maintained the requirement for remote pilots to maintain visual line-of-sight with their unmanned aircraft to see and avoid other aircraft during flight.

Part 107 continues to provide a crucial path to predictable low-risk small UAS operations. The operating profile envisioned under Part 107 – low altitude, within visual line-of-sight, and generally away from people – supports many of the operational concepts in demand today, including photography, data collection, and emergency response. Additionally, the FAA has issued thousands of waivers for certain operations that can be conducted safely within the general operational profile of Part 107 and expects to continue to leverage this flexibility as regulations evolve.

The FAA had worked on UAS-specific operating rules since the early 2000s. However, since 2012, the agency was required to issue an airworthiness certificate for all aircraft, including small, unmanned aircraft. This requirement presented a challenge, as it did not align well with the safety continuum concept and could have limited innovation in the rapidly growing UAS sector. The introduction of 49 U.S.C. §44807 provided the necessary flexibility, leading to the creation of Part 107 and the first set of drone-specific operating rules, which went into effect in August 2016. The complexities of these operations and their corresponding inherent risk have historically necessitated case-by-case approval, with FAA safety experts assessing the individual nuances of each operational concept and aircraft. However, over time, these approvals' performance- and outcome-based safety requirements have increasingly merged into a more uniform set of operating conditions and limitations. This is generally the FAA's cue to amend the regulations.

Near Future State

The FAA has long intended to develop rules for more advanced UAS operations, enabling the more complex operations that industry has successfully demonstrated at smaller scale. Waivers, exemptions, and other authorizations have safely permitted numerous BVLOS operations, including infrastructure inspection, package delivery, and surveillance. These operational advancements have occurred within the existing aviation regulatory framework, one that did not imagine the types of technologies that could, at a minimum, replace the human eye, or that could coordinate operations through decentralized automated systems. UAS technology has advanced faster than the regulatory framework, so developing clear rules for operating BVLOS is essential for future UAS integration and providing public transparency into the government's expectations for safe operations.

Since Part 107 was implemented, UAS technology and its applications have rapidly advanced. Industries like agriculture, infrastructure inspection, and package delivery are increasingly relying on drones for more complex operations, which often exceed the operational limitations of Part 107. This shift in use cases has highlighted the need for additional regulatory frameworks, like the proposed Part 108, to accommodate more sophisticated operations such as BVLOS, automated flights and heavier payloads. Recognizing the limitations of Part 107 and the overall demand to conduct more advanced drone operations, the FAA initiated the UAS BVLOS Aviation Rulemaking Committee (ARC) in 2021. This intense, 9-month industry-led effort included global aviation regulatory authorities given the need to globally align and harmonize to provide consensus recommendations for performance-based regulatory requirements to the FAA in March of 2022. Based on the BVLOS ARCs final recommendations, the FAA initiated the proposed Part 108 rulemaking effort, Normalizing UAS BVLOS Operations, to enable routine, scalable BVLOS operations.

The FAA has two primary goals with this rulemaking effort. The first would normalize the approval path for operational profiles that do not fit under Part 107 – operations with larger and more automated aircraft and operations BVLOS of an operator. The second would create a regulatory path for approval and oversight of Automated Data Service Providers (ADSP), including UAS Traffic Management (UTM) services, that support UAS operations. Together, these rules seek a balance between requirements for the design and operation of UAS and the qualification of their operators and will enable a much broader range of operations at scale than are allowed today, including package delivery, agriculture, aerial surveying, flight testing and demonstration, and other civic interest operations. The FAA looks forward to the data, diverse perspectives, and experienced opinions the public will provide in response to these proposals.

Airworthiness

One of the FAA's primary means of reducing risk in the aviation system is to ensure that aircraft function and fly as expected, which, considers the public's exposure to risk from the aircraft. Traditional manned aircraft generally require type certification or special airworthiness certification to operate in the airspace, and the FAA has allowed UAS manufacturers to pursue type certification for their UAS. However, the type certification process was not designed for UAS, which have shorter expected lifespans than manned aircraft, do not carry people, and are redesigned quickly and often by manufacturers.

From a risk perspective, the FAA considers UAS operations under the proposed Part 108 to fall between Part 107 small UAS and aircraft with a Special Airworthiness Certificate (SAC). BVLOS operations under the proposed Part 108 present higher risks than operations under Part 107 due to the increased potential for airspace conflicts with other users, the operation of larger aircraft, and more complex operational use cases, such as package delivery. Thus, these intrinsic risks require more rigorous mitigation than what is required under Part 107, which has no airworthiness approval process. However, airworthiness certification under Part 21 is more appropriate as a mitigation to ensure the safety of people onboard aircraft. Airworthiness certification plays a crucial role in ensuring the safety of aircraft. However, for UAS, which have shorter lifespans and frequently undergo design changes, traditional

airworthiness certification may be too rigid. For this reason, Part 108 proposes a more flexible airworthiness acceptance process, utilizing industry consensus standards. This approach allows for timely safety updates while minimizing the burden on manufacturers. It ensures that UAS operating under Part 108, especially for BVLOS and other complex operations, are safe and capable without imposing excessive regulatory delays. While the regulatory and certification demands for BVLOS operations are more stringent than those for Part 107, they should be less stringent than those for aircraft that currently require a SAC, such as Light Sport Aircraft (LSA). This intermediate positioning supports a balance between flexibility and level of risk on the safety continuum.

The proposed Part 108 puts forward a new airworthiness process that would ensure public safety while being appropriately thorough for the operational profiles allowed under this rule. This process leverages airworthiness acceptance and industry consensus standards to provide a more time- and resource-appropriate path for mitigating the risks of more complex UAS operations. A fast and efficient process is critical, because UAS technology constantly changes. A manufacturer may only produce a particular UAS model for a few months before iterating to a new version. A lengthy process would not only slow potential safety improvements and technology advancement but would also cost substantially more to make design improvements with no clear comparative safety benefit to justify the additional time and resources required from manufacturers and the FAA.

The proposed Part 108 only allows for the use of industry consensus standards under a streamlined airworthiness acceptance process for unmanned aircraft weighing up to 1,320 pounds. The basis for this maximum weight is contained in the UAS BVLOS ARC recommendations. The airworthiness of an LSA is currently approved using industry consensus standards through a similar process as Part 108 proposes. However, in the case of an LSA, the FAA or a designated representative performs a final inspection of the aircraft, and the FAA issues a SAC before the aircraft can be flown. In keeping with the safety continuum concept, the FAA will use its discretionary authority to determine audit schedules based on the appropriate level of oversight rigor defined by risk analysis that may be more appropriate for an aircraft with no people onboard. However, to mitigate risk to people on the ground, different types of operations under what Part 108 proposes would have weight limitations on the aircraft – not all operations would be allowed to use a 1,320-pound unmanned aircraft.

Operational Requirements

Today, regardless of how the FAA determines the airworthiness of an UAS, all operators flying beyond the operational profile of Part 107 must still apply for and receive operational approval from the FAA. This typically requires potential operators to be exempted from various rules for conventional aircraft, including Part 91, the general operating rules for manned aircraft; Part 61, the airman certification rules; and Part 135, rules for air carriage. Given the significant increase in the volume of UAS and UAS operators over the past decade, this model is not sustainable for the public or the government, and a general set of operating rules is needed to govern UAS operations at this point in the safety continuum.

Under the proposed Part 108, operations would still be conducted primarily below 400 feet, and the rule would establish new requirements to allow for safe BVLOS operations in more integrated airspace by updating right-of-way rules to account for technology advancement. The FAA's right-of-way system is based on the foundational principle of "see-and-avoid," a concept based on aircraft maneuverability, piloting skillset, physical limitations of visual line of sight, and the conspicuity of other aircraft to determine right-of-way. The aircraft with right-of-way can continue its flight unimpeded, while the other aircraft gives way. The FAA has considered this consistent approach in developing right-of-way rules for the proposed Part 108, adopting some (but not all) of the UAS BVLOS ARCs recommendations.

UAS operating under the proposed Part 108 would be required to detect and yield the right-of-way to other aircraft broadcasting their position using Automatic Dependent Surveillance-Broadcast (ADS-B) Out equipment or other electronic conspicuity equipment, as well as all aircraft departing from or arriving at an airport or heliport. UAS operating below 400 feet in shielded areas would have right-of-way over manned aircraft, since manned aircraft are extremely unlikely to operate in shielded areas. Operations over certain populated areas would be required to use risk mitigations also to avoid collisions or conflicts with other UAS operating under the proposed Part 108 operations in controlled airspace which would require strategic deconfliction, conformance monitoring, and the ability to detect both cooperative and non-cooperative aircraft in certain airspaces. Additionally, ADS-B Out systems occasionally fail to meet their specified performance requirements, and the FAA expects that UAS detect and avoid (DAA) standards would account for situations when ADS-B Out equipment exhibits performance deficiencies.

The proposed Part 108 also proposes two avenues for operators to conduct operations – using operating permits and operating certificates. Under this construct, operators would have to apply for either an operating permit or an operating certificate from the FAA, meaning the FAA would review the application and issue the permit or certificate as appropriate. Operators would then have to comply with the applicable performance requirements of their chosen path as proposed under Part 108, as well as any additional operating limitations imposed by the FAA or the UAS manufacturer. An operating permit would allow operators to conduct certain BVLOS operations using a less rigorous approval process, but the operations would be subject to certain limitations on size, number of aircraft, and other operating requirements. Operations with a higher risk threshold, based on aircraft size, weight, speed, or other parameters, would instead need an operating certificate. Certificated operations would receive greater oversight from the FAA but would also be able to use larger aircraft, have more aircraft, and have more flexibility to operate over people. Operations conducted under an operating certificate would require operators to develop a safety management system (SMS) and a training program for operations personnel.

Personnel

The FAA issues airman certificates to accommodate the varied personnel roles within manned aviation, including pilots, air traffic controllers, mechanics, and other roles. However, the regulations that stem from this authority were developed and envisioned for manned aviation. As previously discussed, the Part 107 framework for small UAS operations created the remote-pilot-in-command (RPIC) position, a certificate earned by passing an aeronautical knowledge test but with no requirement to demonstrate operational competence. The requirements prioritized individual responsibility for operations, placing the burden of safe operations on the RPIC. While this approach has continued merit for many UAS operational profiles, it does not always align with more complex profiles, especially in a BVLOS operation.

The proposed Part 108 would shift responsibility for some aspects of the safe operation of UAS from humans to systems and from individuals to organizations, concentrating safety responsibility at a corporate level, leveraging flexible approaches to training, operations personnel duties, and development of manuals. This also provides flexibility to allow operators to make risk-based decisions to conduct operations safely. Under this construct, an operator, rather than a pilot, would be responsible for ensuring the safety of the operation, including responsibilities for maintenance and alterations, ground handling, loading and unloading of aircraft, and emergency procedures and protocols, even though individuals may accomplish those tasks. While individuals would remain accountable for their actions, the FAA would hold the designated operator (determined by the organization) liable for any unsafe operational outcome.

In considering this issue, the FAA examined the safety and economic implications of not requiring an airman certificate and determined that the proposed Part 108 framework would provide a flexible path to ensure that personnel possess the appropriate knowledge, skills, and training to safely conduct and support the BVLOS operations covered in this proposal. Personnel requirements should be tailored to the UAS to provide adequate safety for BVLOS operations, and an operations supervisor must be a designated individual who is responsible for the overall safety and security of the operation, including ensuring that operations are following all rules and that personnel are appropriately trained for their roles. The position would also demand knowledge of the relevant regulatory requirements, company procedures, and the specific requirements associated with the UAS used in their operations. Additionally, the rule proposes the use of flight coordinators, if necessitated by the aircraft design, who have more direct involvement in the operation of an aircraft and must be similarly trained in safe operations.

This structure reflects the technological capabilities and interfaces of the aircraft and systems that will be used under the proposed Part 108, which are both managed and operated in significantly different ways to manned aircraft and UAS operated under Part 107. Many of the UAS the FAA expects to fly under the proposed Part 108 are highly automated and do not require constant pilot interaction like manned aircraft. Part 108 sets clear expectations for the personnel positions that require the knowledge, training, and skills to conduct the operations envisioned under this rule safely. However, the UAS proposed for use under Part 108 and the related operations vary in ways that make a centralized airman certification process and criteria impracticable. This variation in operations and aircraft could not be subject to a singular, regulated training program. Further, it does not seek to overly prescribe operational positions and duties because there is limited uniformity across types of operations that fit within the operational profile envisioned under the proposed Part 108.

The lack of required airman certification aligns with the more limited personnel requirements for operations at the low end of the safety continuum. FAA analysis has determined that airman certification is inconsistent with the envisioned UAS, and operational profiles enabled by the proposed Part 108. On manned aircraft, the pilot is responsible for operational control and safety of flight from the flightdeck. Pilot responsibilities on the flightdeck are

constructed around pilot control, including seeing and avoiding other aircraft, interacting with air traffic control, and monitoring instruments and displays. With the increasing levels of automation incorporated into UAS, particularly those anticipated for use under this proposal, the role of the pilot has and will continue to decrease. The UAS industry has increasingly come to rely on technology rather than human interaction or intervention to ensure safe operation. Industry reliance on technology rather than human interaction is driven in part by the fact that UAS do not carry responsible persons who can control and ensure the safety of flight from within the aircraft.

Automated Data Service Providers

The ability to operate UAS BVLOS safely and effectively is predicated on the fidelity and assurance of flight data. Specifically, the FAA recognizes the pressing need to enable UTM services, which help manage risks for UAS BVLOS operations and optimize airspace safety and efficiency. To support the operational and airworthiness requirements of the proposed Part 108, the FAA developed a new Part 146 to create a regulatory framework that would enable the development, growth, and continued innovation of automated data services, specifically services in the UTM ecosystem.

Data automation is a method of data management that relies on technology to collect, process, analyze, and transform raw data into usable information. Typically, automated data service providers use a network to gather raw data, process it, and then provide it in a functional format to the data recipient or user. These data services may fulfill various purposes for UAS BVLOS operations depending on their exact functionality. For example, automated data services could provide data that enables unmanned aircraft to deconflict from each other and avoid midair collisions strategically. Other automated data services may support operators detect-and-avoid responsibilities, providing surveillance information or avoidance maneuvering instructions. Other automated data services may support operators DAA responsibilities, providing surveillance information or avoidance maneuvering instructions. They may also help operators avoid flight into terrain or dangerous weather, resulting in loss of flight control. These services will play an important role in mitigating risk inherent in BVLOS operations and thus warrant FAA oversight to ensure the continued safety and efficiency of the airspace.

Part 146 would regulate those automated data services to support BVLOS operations. Whether the automated data services are self-provided or outsourced to ADSPs, any entity that provides automated data services to support the proposed Part 108 aircraft operation would be subject to the additionally proposed Part 146 regulation. Under this construct, ADSPs include UAS service suppliers (USS) and Supplemental Data Service Providers (SDSP). These providers may or may not be directly involved in the aircraft operation. Still, they provide pre-flight services to help operators conduct their operations safely and efficiently. As such, the FAA anticipates that most BVLOS operations rely on automated data services to meet the operational requirements proposed in the proposed Part 108. The proposed Part 146 creates the regulatory path for these data services to obtain FAA certification and defines the minimum performance standards for those services by leveraging industry consensus standards.

The FAA's goal is for operators to have options in the services they use to meet their system or operational needs while being assured that those options meet a standard that will keep the public safe. By keeping the regulation flexible and allowing operators to choose the service they need, future technological innovations can be recognized while allowing competition among the data service providers. This process allows airworthiness acceptance leveraging industry consensus standards, as a Means of Compliance to Design and Performance requirements, to provide a more time – and resource-appropriate path for mitigating the risks of more complex UAS operations.

OPERATIONAL CONCEPT OF DRONE INTEGRATION

Conceptually, the FAA envisions Parts 107 and the proposed 108 as complementary operational regulations, forming the low end of the FAA's safety continuum and providing appropriate rigor and flexibility for public safety and technological innovation. Part 107 will continue to enable more individual operations, while the proposed Parts 108 and 146 will open the door to scalable BVLOS in growing demand today. These new regulations will not enable every possible UAS operation that humankind can imagine, nor is that the FAA's goal. The FAA issues waivers and exemptions to existing regulations every day for both manned and unmanned operations, and these will continue to be critical regulatory tools the Agency will employ to manage the airspace safely and efficiently.

Beyond the scope of these proposed regulations, existing regulations for aircraft and airman, and operations (Parts 45, 48, 89, 91, 135, 137) will continue to apply, and the FAA will also issue waivers or exemptions to these regulations to allow operations as safety permits. The unfortunate fact for aerospace innovation is that enabling regulatory change typically comes after, rather than before, market or public demand due to the simple fact that the FAA needs data from operations to inform reasonable regulations. This chicken-or-egg reality can be frustrating for innovators, so it is critical for regulations for emerging entrants to be as flexible as possible while still being clear about safety expectations.

Much of this necessary flexibility is driven by increasingly outcome-based regulations that rely on industry consensus standards to set technical performance specifications. Participation in standards-making organizations and efforts will be critical for the successful implementation of these new proposed regulations and future emerging entrant regulations, as well as for supporting amendments to existing regulations like Part 21 to make them more performance-based. This new rule will rely on standards for airworthiness and automated data services, such as UTM services, to meet the regulatory requirements.

Additionally, UAS are not the only new type of aircraft looking to enter the airspace. As the FAA considers the most efficient use of the airspace, and the government considers the optimal societal use of this resource, it will be necessary to consider what changes may be needed to the whole system to integrate the greatest variety of airspace users. The FAA will need to consider the needs of, and cost burdens on, all participants in the system as it makes the necessary regulatory and infrastructure updates to accommodate public demand.

For example, future regulations may consider maintaining aircraft separation based on broadcasting aircraft position over a networked connection, such as the Internet. This could enable a technological solution on the manned aircraft side where the pilot of a manned aircraft could use something as simple as an app on their smartphone to retain right-of-way privileges. Research into this solution has not advanced enough to incorporate into a rulemaking proposal without significant public interest, but the FAA Reauthorization Act of 2024 requires a study of technologies and methods to support more widespread aircraft-to-aircraft location communication.

Similarly, as the industry and the FAA gain more experience with approving services under Part 146, the FAA expects significant maturation of technologies and capabilities conceived over the past decade to support a UTM ecosystem. While the FAA can anticipate many of the services and expect operators needs to conduct operations safely, while also anticipating technology and standards to continue to adapt over time to support the needs of industry for a broad range of operations, both current and future applications of drone technologies.

Ultimately, highly automated software and systems are an increasingly common denominator as the FAA considers operations across the safety continuum into the future. As automated software and systems mature, safety data is collected, and demand increases,

the FAA and the larger aerospace community must consider what changes may be needed to aviation regulations to enable the safe co-existence of both human- and software-operated aircraft. Automation is the true bridge between the UAS and AAM ecosystems. The FAA has taken initial steps to enable some more advanced aircraft that still have pilots onboard under its existing regulatory framework. However, those regulations still assume a pilot onboard the aircraft is seeing and avoiding other aircraft during flight. Removing the reliance of a pilot onboard the aircraft and realizing routing unmanned AAM operations will take time, as the unknown factors rival the known.

Next Steps

This proposed rulemaking is a crucial and congressionally mandated required activity to advance UAS integration into the airspace. It would expand the profile of operations that can be performed under a tailor-made rule, rather than by waiver or exemption from ill-fitted rules and would shift the FAA's oversight model to organizations vs. individuals. The proposed Part 108 provides a companion operational regulation to Part 107, forming a relatively holistic (for now) tail-end of the FAA's safety continuum represented by aircraft carrying no humans onboard. Part 146 opens the door to ADSP approvals that can mitigate risk across operations and aircraft with appropriately scaled FAA oversight and which could be applicable to or required under future regulations.

The proposed Parts 108 and 146 are in the proposal stage of development. In making this proposal, the FAA considered the UAS BVLOS ARCs report the dissenting opinions to the ARCs report and looked at the operations currently in demand and being approved under waivers and exemptions. This proposal captures the FAA's analysis of the safety requirements needed to allow safe UAS BVLOS operations while recognizing the FAA does not have all the answers. The proposal asks for input, feedback, and data from the public from start to finish. The FAA looks forward to reviewing and considering all comments received, as this is a critical part of the policy development process.

ACRONYM LIST

AAM	Advanced Air Mobility
ADS-B	Automatic Dependence Surveillance-Broadcast
ADSP	Automated Data Service Providers
AGL	Above Ground Level
ARC	Aviation Rulemaking Committee
BVLOS	Beyond Visual Line of Sight
COA	Certificate of Waiver or Authorization
CONOPS	Concept of Operations
C-UAS	Counter UAS
DAA	Detect and Avoid
DST	Drone Safety Team
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
ICAO	International Civil Aviation Organization
IPP	Integration Pilot Program
LAANC	Low Altitude Authorization and Notification Capability
LSA	Light Sport Aircraft
NAS	
RPIC	Remote-Pilot-in-Command
ROC	Regional Operations Center
SAC	Special Airworthiness Certificate
SDSP	Supplemental Data Service Provider
SLTT	State, Local, Tribal and Territory
SMS	Safety Management System
U.S.	United States
UAS	Unmanned Aircraft System
UASFM	UAS Facility Map
USS	UTM Service Supplier
UTM	UAS Traffic Management

REGULATIONS

Remote ID	Part 89	Part 89 of the Federal Aviation Regulations (FAR) mandates that most drones operating in US airspace have remote identification (Remote ID) capability, requiring them to broadcast identification, location, and performance information from takeoff to shutdown
Right of Way	Part 91	Under Part 135 certification, small drones can operate under Visual Flight Rules (VFR) or Instrument Flight Rules (IFR) if authorized. (1) When operating under VFR, drone operators must give way to all manned aircraft. This means they should yield the right- of-way to other aircraft and avoid impeding, delaying, or diverting manned operations, except as directed by air traffic control. If operating under IFR, the rules for right-of-way may differ, but the general principle of not impeding manned operations still applies. (2) Follow any applicable instructions as directed by air traffic control. If operating under IFR, pilots must adhere to specific regulations and procedures, including an IFR Flight plan, receiving ATC clearance, and maintaining required equipment and altitudes, while also reporting malfunctions and weather conditions
Small UAS Rule/ Commercial	Part 107	Governs the operation of small drones in the NAS for non-recreational or commercial purposes in which the total weight limit of the aircraft is 55 pounds or less. These regulations are also known as the Small UAS Rule. Under Part 107, operators must obtain a Remote Pilot Certificate and comply with various operational and safety requirements when flying drones commercially or for other non-recreational purposes. ▪ Commercial operations under Part 107 are allowed by the Small UAS Rule without a waiver if they meet requirements for flights at night, over people, and over moving vehicles. ▪ Enables small drone operations for non-recreational purposes, eliminating the need for cumbersome exemptions to legacy rules for drones under 55 pounds max takeoff weight in the NAS. ▪ Operations in controlled airspace still require airspace authorizations ▪ Operations under the small UAS Rule without a waiver if they meet various safety requirements for over people, and from moving vehicle operations ▪ This rule enables small drone operations for non-recreational purposes, eliminating the need for exemptions to legacy rules for drones under 55 pounds in the NAS
Package Delivery	Part 135	Typically applies to air carriers and operators conducting commercial air transportation, drones can be used for package delivery services. The operator under Part 135 certifications usually holds a commercial pilot certificate with specific ratings and authorizations. Unlike Part 107 operations, where the operator needs a Remote Pilot Certificate, there are no specific size or scope limits for operations under Part 135. However, the operator must still be granted authorization for each type of operation they want to conduct. This means that specific approval or authorization may be required from the FAA for each aspect of the operation, such as the route, altitude, airspace, and other relevant factors. Require an operator to receive certification under 14 CFR Part 135, often requiring multiple waivers and exemptions.
Drones 55 pounds or more	49 U.S.C. § 44807	Applicable to drones weighing 55 pounds or more, and the mission includes a non-waiverable rule in which an exemption would be required on a case-by-case basis to determine if that drone may safely operate in the NAS. This grants drone operators safe and legal entry into the NAS, thus improving safety and significant economic benefits.
Agricultural	Part 137	Part 137 governs the use of aircraft, including drones, to dispense or spray substances intended for various agricultural purposes. This includes activities such as plant nourishment, soil treatment, propagation of plant life, pest control, or engaging in activities directly affecting agriculture, horticulture, or forest preservation. This regulation is crucial for ensuring the safe and effective application of chemicals or substances from aircraft, including drones, in agricultural and environmental contexts. It outlines requirements for pilot certification, aircraft maintenance, operational procedures, and environmental considerations to minimize risks to human health, property, and the environment while carrying out these activities: ▪ Drone agricultural operations encompass tasks like aerial application of materials and survey missions ▪ If drones weigh less than 55 pounds and are equipped with sensors for crop assessment, they fall under the Small UAS rule ▪ For spraying activities or drones weighing 55 pounds or more, compliance with Part 137 rules is necessary for certifying agricultural operators and/or larger aircraft, often requiring exemptions Operators engaging in agricultural activities must secure an Agricultural Aircraft Operator Certificate and adhere to specific regulations, including those governing the carriage of hazardous materials, along with relevant State, Local, or Tribal regulations